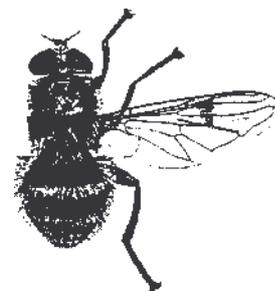


DYFED INVERTEBRATE GROUP



NEWSLETTER N^o. 5

March 1987

Another field season is nearly upon us and reports of the first Small Tortoiseshell, Peacock or Brimstone will herald that Spring is here. The winter has not been particularly hard but, most importantly, it has been relatively dry and that should benefit many invertebrates that are normally prone to fungal attacks in their overwintering stages during Dyfed's damp winter months. Of course, two poor summers will have taken their toll on insect populations already but a warm Spring would begin the road to recovery. I hope that some of the recent articles which have featured in the Newsletter have fired your enthusiasm to spend more time watching invertebrates, perhaps of groups that you previously knew little of. This theme of introductory articles on invertebrates that require more attention in Dyfed is continued in the present issue with accounts of ladybirds, soldier beetles, and millipedes. Help with identification is available for all three recording schemes, and the schemes need your help if they are to successfully describe the composition of the respective faunas in Dyfed.

April sees the start of a three-year project, organised by the Nature Conservancy Council, to investigate the management of invertebrates on wetland sites throughout Wales. Using data derived chiefly from pitfall-trapping, the Welsh Wetland Invertebrate Survey aims to identify the management regimes which are most beneficial to invertebrates on a range of wetland sites throughout the country. An open sward is often considered to promote the greatest species-diversity amongst flowering plants in wet pasture but what effect does this have on the invertebrate fauna? Which groups are most affected by spring-burning on heathlands and mires? How does the cutting of fen vegetation affect the distribution of spiders? These will not be easy questions to answer but we are fortunate that these questions are at last being asked in Wales. I am sure that all concerned with invertebrate conservation in Dyfed will look forward eagerly to the results and wish the survey team well in their endeavours. Similarly, the pioneering work of the West Wales Trust for Nature Conservation on Dowrog Common will provide valuable information relating to the management of lowland heath invertebrates. The publication of the results of both of these surveys should have lasting implications for the informed management of nature reserves throughout Britain.

Once again, the Dyfed Invertebrate Group will be holding one summer field meeting in each vice-county. The sites chosen should cater for the interests of allcomers and provide plenty of scope for exciting discoveries. The meetings are designed to generate useful information in terms of biological recording and management recommendation and are thus not intended to be "guided walks". Inexperienced members should regard the meetings as an opportunity to learn field techniques and identification procedures from others; informal discussion with colleagues is a strong feature of these outings. Details of the meetings are to be found on page 2.

Finally, it's subscription time again - if you wish to continue to receive the Newsletter for 1987 please send 4 First Class Stamps to -

Editor: A P Fowles
Nature Conservancy Council
Plas Gogerddan Aberystwyth
Dyfed SY23 SEE.

LEPIDOPTERA

BUTTERFLIES AND MOTHS IN PEMBROKESHIRE (VC 45) IN 1986 - R ELLIOTT

The very cold and wet weather in the spring of this year caused delays in the time of emergence of many species and in some cases reduced the numbers of adults in flight. There was a single record of a Small Tortoiseshell Aglais urticae near Nevern on 17 March, otherwise all butterfly records for 1986 occur between May and September with a few odd ones in October.

Orange Tips Anthocharis cardamines, often seen as early as mid-April in good years, did not appear until mid to late May in 1986. Clouded Yellows Colias croceus were recorded at Pwllgwylog in July and at Carew in September. Purple Hairstreaks Quercusia quercus were recorded at four localities in the county and Green Hairstreak Callophrys rubi at six localities. Small Copper Lycaena phlaeas and Brown Argus Aricia agestis both seemed less common than in previous years although Common Blues Polyommatus icarus seemed to be around in normal numbers, at least on the coast. Holly Blues Celastrina argiolus were recorded in both May and August in small numbers.

Among the Vanessids, the Peacock Inachis io seemed to have been the most affected by the bad conditions in the early part of the year and none were recorded until September when they were seen near Pembroke, Haverfordwest and Milford Haven. Small numbers of Small Tortoiseshells Aglais urticae were seen throughout July and August and into September but numbers were below those expected. Red Admirals Vanessa atalanta were seen throughout the county from mid-June until mid-October but again numbers were lower than usual.

Six Fritillary species were recorded during 1986. A High Brown Fritillary Argynnis adippe was seen by Jack Donovan at 21/9606 on 30 June (the only record for the year) and Marsh Fritillaries Eurodryas aurinia were recorded at 21/9026 by Alan Hansen (no date) and at 22/0030 by Ken Longstaff 6 July. The other four species, Pearl-bordered Fritillary Boloria euphrosyne, Small Pearl-bordered Fritillary Boloria selene, Silver-washed Fritillary Argynnis paphia and Dark Green Fritillary Argynnis aglaja were all seen in the expected numbers and places. Dingy Skippers Erynnis tages were recorded by Alan Hansen in the Haverfordwest area.

The most interesting of the moth species were Humming-bird Hawk Moths Macroglossum stellatarum at 22/0305 in July, 22/1246 in August and 22/1830 in September and a single Death's Head Hawk Moth Acherontia atropos seen at Moylegrove (22/1044) in early August.

In total, 32 species of butterfly and 103 species of macro-moth were recorded in the county during 1986. Despite the adverse conditions at the start of the year the number of species recorded was about normal although numbers of some species were reduced.

FIELD MEETINGS 1987

13 June 1987 - DINEFWR ESTATE, LLANDEILO, CARMS (Deer-park pasture woodland with huge, ancient trees; rich mixed deciduous woodland; oxbow lakes and reedswamp). Meet at Llandeilo Bridge (SN 627220) at 11.00 am.

12 July 1987 - GWBERT, CEREDIGION (Sand dune; estuarine boulder-clay cliffs with seepages; cliff top maritime heath). Meet at the north end of the promenade, near the Boat Club, (SN 165483) at 11.00 am.

2 August 1987 - WESTERN CLEDDAU MARSHES, PEMBS (Flood-plain and valley mire with tall fen communities including Cladium mariscum fen). Meet at Llangloffan Bridge (SM 904319) at 11.00 am.

COLEOPTERA

LADYBIRDS IN DYFED, 1985-1986 - M MAJERUS

Ladybirds are one of the most well known and popular groups of invertebrates in Britain, so it is rather surprising that these useful, attractive and rather obvious insects have been relatively little studied in the British Isles, while other groups have been investigated intensively. Indeed, until recently, there had never been a concerted effort to produce collated nationwide distribution data on ladybirds. In an attempt to obtain a better appraisal of the present distribution, a team of scientists at Cambridge University launched a nationwide scheme under the title the Cambridge Ladybird Survey, in September 1984. The project, which is intended to run until 1989, took off far more rapidly than was expected and in 1986 WATCH, the junior wing of the Royal Society for Nature Conservation, joined in the survey. Apart from obtaining records of ladybird species, those taking part in the survey have been asked to try to obtain data of various other types; the frequencies of the different forms of polymorphic species like Adalia 2-punctata and Adalia 10-punctata, specific habitat associations, types of hibernation site used by different species, and any other behavioural or ecological observations that seem unusual or interesting.

The flow of records has surpassed anything we expected, and we feel that in many of the more populated areas of Britain we are beginning to build up a realistic picture of which species occur where. Obviously, we get far fewer records from areas where less people live. This may put a considerable bias on the distributions we are producing. In general, the southeast of England is the most species-rich part of Britain for ladybirds. Species diversity and population density both drop away to the west and north. How much this is a true reflection of ladybird distribution, or simply a manifestation of the number of ladybird recorders in different parts of Britain still has to be appraised. Ideally, we would like either to have a more even spread of recorders across the country, or at least to ensure that each square in the country was surveyed at least once a month for a period of a couple of years. However, with the huge tracts of under-recorded areas of Scotland, northern England and Wales, this seems something of a pipe-dream given our present resources.

An alternative way of appraising whether the lack of records from some areas is real or apparent is to pick a few of these areas and have them surveyed really well. So, I was very pleased when Adrian Fowles wrote to me about the Dyfed Invertebrate Group, and asked whether I would write a piece on 'Ladybirds in Dyfed' for the Newsletter. This gives me an ideal way of asking a group of experienced naturalists and biologists for help in surveying one county much more intensively than it otherwise might be. Due to its geographical location, habitat diversity, and comparatively low population, Dyfed is ideal area for such an intensive study. In addition, while we have had records of eleven species of ladybird and two species of coccinellid sent to us in 1985 and 1986, the number of actual 10 km square records for most species is relatively small, and we feel does not, as yet, give a true reflection of the current distribution in Dyfed. For example, Coccinella 7-punctata has been recorded from 39 of the 90 squares which make up Dyfed. 43 per cent representation may seem reasonably high, but we think it likely that this ladybird could be found in virtually every one of the squares if sought. We suspect that other species which do not have very specific habitat preferences, like Adalia 2-punctata, Propylea 14-punctata and Calvia 14-guttata may also be widely distributed in the region.

All of the ladybirds so far recorded from Dyfed in the present survey have fairly wide distributions in Britain. Three of them, Exochomus 4-pustulatus, Anatis ocellata and Mysia oblongoguttata are conifer specialists, the latter two being found most commonly on Scot's pine. Although each has been recorded from only a few squares, it is likely that they will be found to occur in other parts of the county where Scot's pine grows in reasonable amounts.

Subcoccinella 24-punctata and Psyllobora 22-punctata usually occur in lowland pasture or meadowland, and again these may be more widely distributed than the present maps indicate. These two species are the only non-carnivorous ladybirds on the present list. Subcoccinella 24-punctata is a true vegetarian, feeding most commonly on clovers, vetches and campions, while Psyllobora 22-punctata grazes on mildews.

While most of the species could be found almost anywhere in the county given the appropriate vegetation, Coccinella 11-punctata is only really likely to be found on or close to the coast. While this species does occur inland in south-eastern parts of England, in the north and west of Britain it is almost always confined to coastal areas. At one time this species was thought to be halphytic, but it has been shown that the reason for its coastal distribution is in fact that it is, on the one hand, resistant to dessication, and on the other hand, intolerant of high humidity levels.

Many species of ladybird are extremely variable. This is particularly true of the two Adalia species. Adalia 2-punctata has a range of forms from f.typica, which is red with two black spots, through to the melanic forms sublunata, quadrimaculata, and sexpustulata which are black with 2, 4 or 6 red spots respectively. Melanic forms of this species occur throughout continental Europe, although melanics are not present in every population. So, for example, black forms are not found in most parts of East Anglia. The frequencies of melanic forms may vary greatly over a relatively short distance. The factors which affect such frequency variations are complex, but appear to involve climate, smoke pollution and female mating preferences. During frequency surveys in the 1960s and 1970s Creed found that in South Wales the frequencies of black forms of Adalia 2-punctata ranged from 0% in Dyfed to over 50% in some parts of Mid Glamorgan and Gwent. Frequency figures for specific locations in Dyfed from these surveys are given in Table 1. Since the introduction of antipollution legislation there have been significant declines in melanic frequencies in many areas, but Dyfed has never been surveyed extensively, and in fact, the supposed absence of melanic forms of Adalia 2-punctata was based on just one sample. We feel it would be particularly useful to obtain or record large samples (at least 50) of Adalia 2-punctata from several locations in Dyfed, so that we could obtain verification of the absence of melanics.

TABLE 1 - The frequencies of melanic forms of Adalia 2-punctata in Dyfed

Location	Year	Red	Black	Total	% melanic
Haverfordwest+, Pembs	1970	31	0	31	0
Cwmaman, Carmar	1973	188	60	248	24.2
Ynysuir, Ceredigion	1973	130	6	136	4.4

Records from Creed, E R (1974) - Nature 249; 390-392 and + from Creed, E R (1971) -Ecological Genetics and Evolution pp 134-151. Blackwell, Oxford.

Adalia 10-punctata also has a melanic form, f.2-maculata. This form is black with an orange or red shoulder flash on each elytron. The typical form is orange-brown with anything from 0-12 small blackish dots. In addition there is a form called 10-pustulatus, which has a dark brown or black grid pattern on a pale ground colour, usually cream, buff-yellow, orange or red. The frequencies of the forms of this species are reasonably constant throughout Britain, in contrast to those of Adalia 2-punctata. Typica usually comprises about 50-60% of populations, 10-pustulatus 25-35%, and 2-maculata 10-15%. However, the exact pattern of each form does seem to vary in peripheral populations in the north and west of Britain. Figure 1a shows the normal patterns of the three forms found over the majority of Britain. Figure 1b shows the pattern of the forms from a sample taken in Aberdeen. It would be of great value to us to know whether populations of Adalia 10-punctata in Dyfed show the normal or the darker expressions of the forms, and in what frequencies.

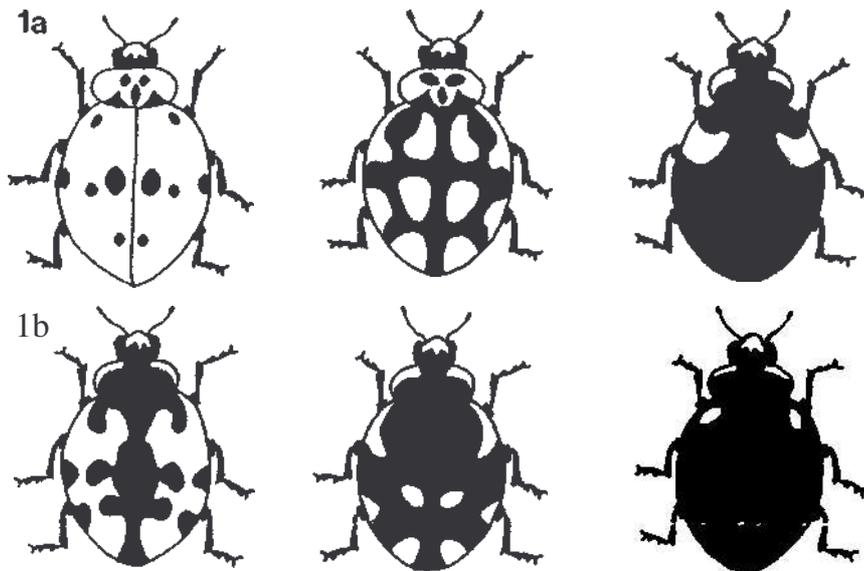


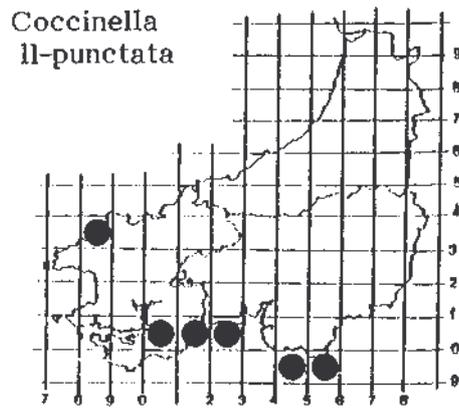
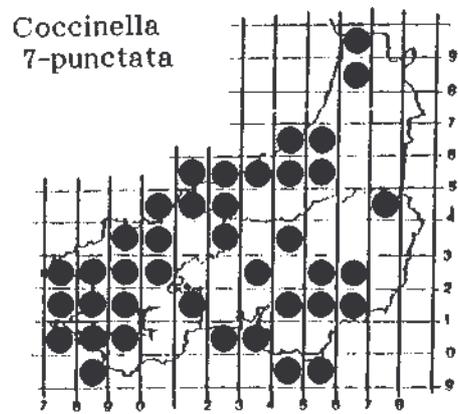
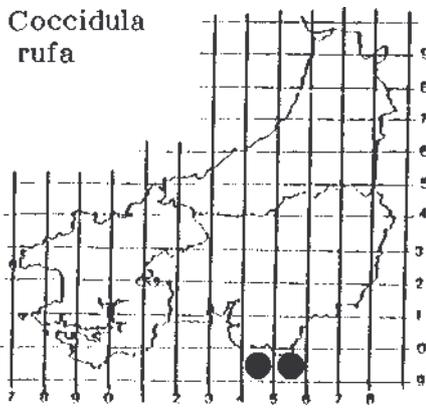
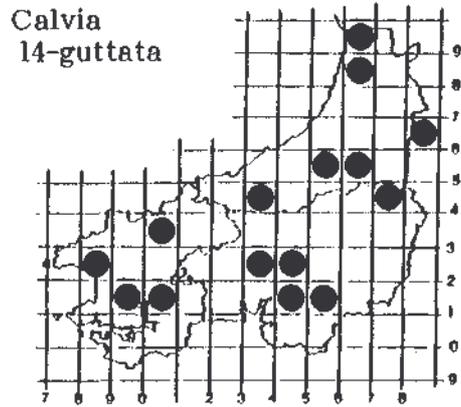
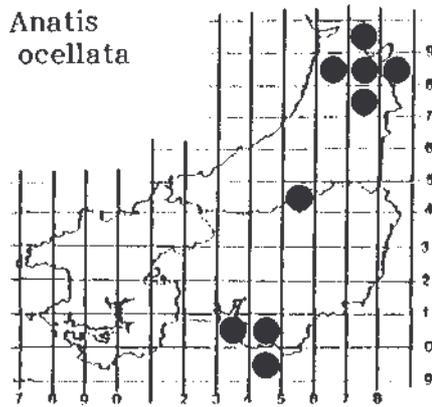
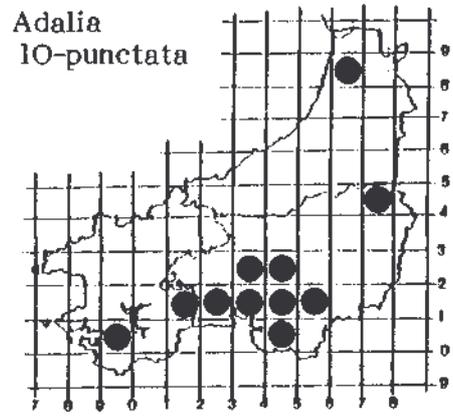
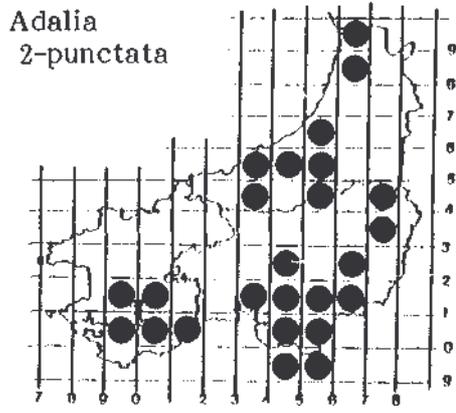
Figure 1. The typica, 10-pustulatus and 2-maculata forms of Adalia 10-punctata. 1a - patterns found in most British populations 1b - patterns found in some peripheral British populations.

Almost any other species of British ladybird may crop up in Dyfed in the future if recording is done more intensively. However, after looking at records from neighbouring counties, we feel that there are four particular species which are very likely to be found if sought in the right place. Adonia variegata is usually a scarce ladybird, but it is widely distributed and is usually found on the coast or in dry inland habitats. Aphidecta obliterated is a conifer specialist most often found on Larch, Douglas fir or Scot's pine. Micraspis 16-punctatus is a small cream and black species which feeds on mildew, and is usually found in grass or meadowlands. And Chilocorus renipustulatus, a black ladybird with two bold central red spots is usually found on sallows, willows or birch trees. The Scot's pine specialist Myrrha 18-guttata might also turn up, and Scot's pine may also yield Harmonia 4-punctata. This species which arrived in Britain earlier this century has been spreading across England from East Anglia where it was first recorded, and will undoubtedly soon reach Dyfed. Sweeping Erica or Calluna may be rewarded by finding either of the two heather specialists Chilocorus 2-pustulatus or Coccinella hieroglyphica. It is always possible that in a relatively under-recorded region one of the real rarities like Coccinella 5-punctata, Halyzia 16-guttata or Hippodamia 13-punctata might be found.

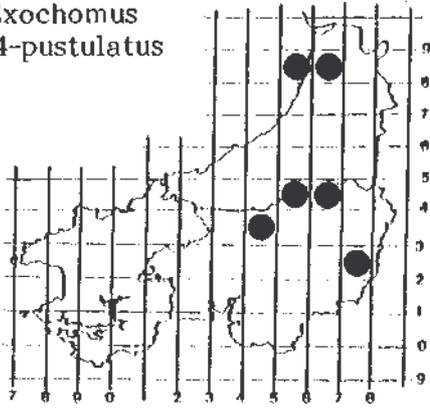
As this article suggests there is a great deal of work to be done before we can be confident that we know the distribution of ladybirds in Dyfed with any degree of certainty. Basic recording is essential, but need not be done in isolation, for there are a great many other areas relating to the behaviour, ecology and population biology of ladybirds where we know very little and which would repay the careful collection of data. Ladybird watching can be a very rewarding past-time. We hope that some of the members of the Dyfed Invertebrate Group take it up, and enjoy themselves with these lovely spotty little creatures.

The Cambridge Ladybird Survey produces Newsletters, Fact Sheets and a colour identification chart to assist with the study of ladybirds. Recording forms and other information is available from Dr M Majerus, Dept of Genetics, 219D Huntingdon Road, Cambridge CB3 0DL.

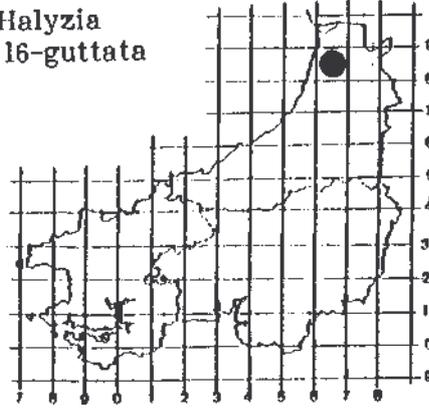
[POSTSCRIPT: Since the receipt of the manuscript for this article one of Dr Majerus' predictions has been confirmed. Two specimens of Halyzia 16-guttata were found underneath ivy litter on the wall of the railway bridge at Bow Street (22/620836) on 11 March 1987.]



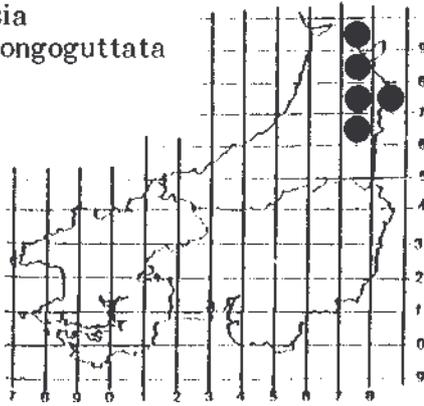
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4-pustulatus



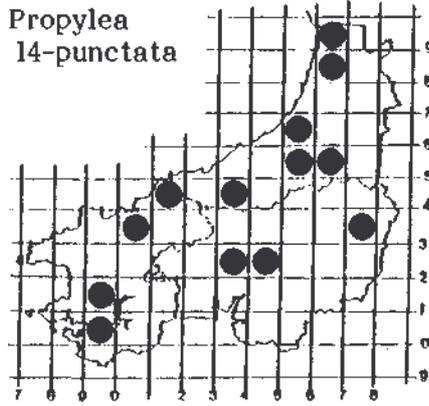
Halyzia
16-guttata



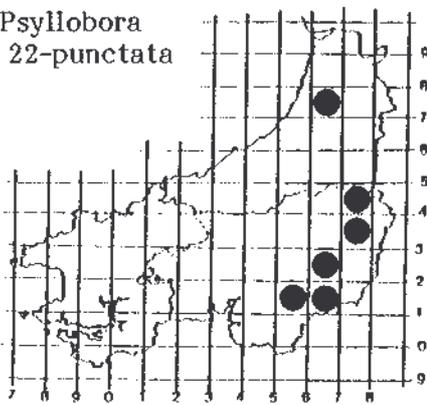
Mysia
oblongoguttata



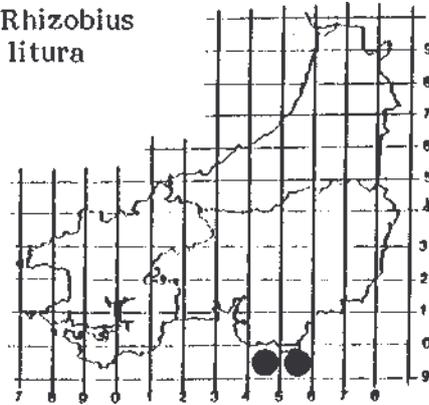
Propylea
14-punctata



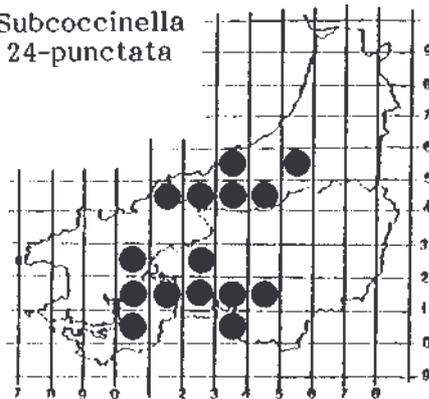
Psyllobora
22-punctata



Rhizobius
litura



Subcoccinella
24-punctata



MOLLUSCA

A REVIEW OF THE BIOLOGY OF THE LAND SNAIL *THEBA PISANA* IN DYFED - R H COWIE

The land snail *Theba pisana* (Muller) is locally abundant in Mediterranean and western European coastal regions, inhabiting a range of disturbed and early-successional habitats such as dunes and roadside verges, and has been introduced to other parts of the world where it has become a serious agricultural pest. It reaches the northern limit of its range at a number of localities in south-west England, Wales and the east coast of Ireland, and was probably introduced here by Man as little as three centuries ago (Turk 1972). The south-western distribution in the British Isles corresponds roughly with the 5°C isotherm for mean January temperature and this, combined with the fact that in Tenby (Dyfed) it is confined to south and west-facing slopes, suggests that its distribution is restricted by both climate and aspect. In Wales *T. pisana* occurs at a small number of localities, two of which are near Porthcawl (Glamorgan) whilst the remainder are in Dyfed - at Saundersfoot, Tenby, Manorbier, Caldey Island and Stackpole Warren. By far the greatest numbers occur in and around Tenby. *T. pisana* is now extinct in the Swansea area, from which it was last recorded in 1969 (Dr M P Kerney, pers. comm.).

Theba pisana is usually an extremely abundant species wherever it occurs. At Tenby, population densities of up to 202 adults and 436 juveniles per square metre have been recorded over wide areas (Cowie 1984a). It also has a high reproductive capacity - in laboratory experiments with pairs of Tenby snails (*T. pisana* is a hermaphrodite with obligate outcrossing) mean egg production per pair was 368 eggs with one pair producing 1303 eggs over the course of the breeding season (Cowie, 1984b). At Tenby the life-cycle is biennial, breeding taking place between July and October, and snails only breed during their second season, after which they die (Cowie 1984b). Occasionally snails may breed when apparently immature (Cowie 1980), and in other parts of the range the life-cycle may be annual (eg Heller 1982). *T. pisana* also has the potential for long-distance dispersal (Johnson 1981), although this was not seen in experiments at Tenby where no snails were found more than 3 m from their release points after 100 days (Cowie 1984a). Rapid dispersal combined with high productivity means that *T. pisana* can easily invade new areas and new colonies may expand rapidly. The snails are often transported inadvertently by Man and this enhances their colonising ability. However, at the edge of a species' climatically-determined range, as for *T. pisana* in South Wales, climatic fluctuations will be responsible for many changes in local distribution; in particular, small isolated colonies will be very susceptible to short-term fluctuations, such as an especially cold winter. This explanation was put forward by Cowie (1986) as at least a partial cause of the extinction of *T. pisana* at Manorbier between 1961 and 1979; it has subsequently been rediscovered (in 1986) at this locality.

Theba pisana is a very variable species, especially with regard to shell pattern variation. Some examples of the immense range of variation are given in the colour plates of Taylor (1912). Cowie (1984c) has described and pictured the variation exhibited at Tenby and other localities in South Wales, and by laboratory breeding has shown that the shell banding patterns seen at Tenby are controlled genetically by three loci (at least) with two alleles showing dominance at each. Epistasy allows only four main phenotypes (morphs) to appear : dark five-banded, yellow five-banded, plain unbanded, dotty unbanded (with a row of dots along the midline of the shell). There is much variation within these classes, in particular in the presence of some banding pigmentation in so-called unbanded individuals, and in the darkness of the bands in banded individuals, and it is possible that at least some of this variation is under genetic control. Frequencies of these four morphs have been recorded at six sites at Tenby annually from 1977 to 1981 (Cowie 1984c) and every subsequent year at three representative sites. At three of the six sites approximately 15% of the snails are unbanded, while at the other three, unbandeds account for approximately 30% of the total. At all

sites, approximately 75% of banded snails are dark five-banded, and approximately 70% of unbandeds are plain (with no dots around the periphery of the shell). Reasons for the existence of this polymorphism at Tenby, and for the differences in morph frequencies among the sites are not known; they may be as diverse as those for the similar shell pattern variation in the common British land snails Cepaea nemoralis and C. hortensis (Jones, Leith & Rawlings 1977). Elsewhere in Dyfed, only banded shells have been found, these mostly dark.

As well as this immense variation in shell pattern, T. pisana exhibits variation in the colour of its soft parts. The head and foot of the snail is usually fairly pale, but the mantle collar - the part which covers the shell aperture when the snail is retracted into its shell - can vary from jet black to very pale. This variation is related to climate, the hotter the climate the paler the snail, and so snails from South Wales are generally rather dark (Cowie 1983). It has been suggested by Bar (1978) that a further adaptation to climate involves the thickness of the shell - the hotter and more arid the climate the thicker the shell. However, shells from Tenby are not significantly thinner than shells from Israel (where Bar did his work) and there is no general trend over the whole range of T. pisana (Cowie 1984d).

Other adaptations to climate are more clear. All over its range Theba pisana can be found, particularly during hot dry periods, resting during the daytime attached some distance above ground to tall vegetation, fence posts, telegraph poles, etc. (McQuaid et al 1979). At Tenby this is also true, although in places where the vegetation is thick at ground level juveniles tend to remain low down (Cowie 1985). The adults tend to orientate themselves at rest so as to avoid the most intense sunlight and to shelter from the wind. Such climbing and orientation are essential for both adults and juveniles in the Mediterranean habitats where T. pisana presumably evolved, since ground temperatures can exceed the lethal limit. Although Tenby snails are less tolerant of high temperatures than Mediterranean snails (Cowie 1985), this behaviour is probably less important at the northern edge of the range. However, it is still retained by the adults while juveniles are able to remain in lower vegetation where humidity is higher and suitable food may be more accessible.

The work briefly reviewed here has already provided important background knowledge for work in both Australia and California. T. pisana is an important pest of cereal crops in Australia and potentially of citrus trees (among other things) in California. However, in Britain it is not sufficiently widespread to cause serious damage except perhaps to gardens and allotments in and around Tenby. Its distribution here is unlikely to expand and in fact is probably contracting (Cowie 1986). Further, its overall range in Britain is unlikely to expand because of its climatic tolerances, and small isolated colonies may perish not only as a result of sporadic local extremes of climate but also because of urban development including building, landscaping and so on. Arguments for the conservation of Theba pisana in Cornwall have been lucidly stated by Turk (1972) and apply equally to the Dyfed populations. They revolve not only around the species' rarity in Britain per se, but also around its value in terms of genetic studies of isolated populations of highly variable organisms and ecological studies of the factors limiting the distribution of a species at the edge of its range. Cowie (1986) described an overall reduction in its distribution in Dyfed and the fragmentation of the large Tenby populations since the turn of the century when records were made by Stubbs (1900). It is to be hoped that this trend does not continue.

Acknowledgements: I would like to thank all the staff of the Department of Zoology, University of Liverpool, who gave me the time, opportunity and facilities to undertake my work on Theba pisana. My particular thanks go to Professor A J Cain.

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COLEOPTERA

SOLDIER BEETLES IN DYFED - K N A ALEXANDER

Spring 1986 saw the launch of a new BRC Recording Scheme covering the Cantharoidea and Buprestoidea. As the organiser, I have produced an introductory newsletter which gives information on nomenclature, identification and present ideas on national status of the species. The Scheme deals with the 60 species which comprise the families Drilidae (1 sp), Cantharidae (41 spp), Lampyridae (2 spp), Lycidae (4 spp) and Buprestidae (12 spp). The Scheme newsletter also includes a field key to the larger and more colourful of the Cantharidae or soldier beetles.

My knowledge of Dyfed beetles is largely restricted to my own fieldwork in 1981 when I spent six weeks sampling the invertebrate fauna of National Trust properties in the region, as part of the Trust's Biological Survey project. This has been supplemented by a small number of records from the literature and recent fieldwork by DIG members. As a result, I am now aware of 21 species of Cantharidae and one of Lampyridae - the glow-worm, Lampyris noctiluca - in Dyfed. This falls a long way short of the potential. Only five soldier beetles appear unlikely for the region on grounds of known distribution, which leaves fifteen possibilities to be sought. A list of the British Cantharidae follows this article, and includes Dyfed records, national status, geographic distribution, habitat preferences and seasonal occurrence. I should stress that this is very preliminary, and should be taken as a guide only - a more accurate version will only be feasible after the Scheme has been running a few years!

The adult beetles are generally found amongst vegetation or on flower-heads, and are most readily captured by sweeping or beating. Tall, well-developed vegetation and trees and shrubs are the most productive sources, with the majority of species living in semi-natural broad-leaved woodlands, hedgerows and scrub, or in marshland and wet meadows. Fewer species occur in dry grasslands or on heath and moor - although these have their specialists and should not be neglected. One species cannot fail to be found - Rhagonycha fulva is a very abundant reddish-yellow species with black elytral tips, and occurs on just about every available flower-head in July and August.

The geographical position of Dyfed, being both southern and western, together with its rich diversity of habitat, make it potentially a very productive area for soldier beetles. Species confined in Britain to the north and west are present, including the metallic blue Ancistronycha abdominalis and the small yellow-tipped grey-green Malthodes flavoguttatus and M. mysticus. With a little searching, we should be able to add Cantharis obscura, C. paludosa (a peatland speciality), Malthodes fuscus and M. guttifer. The common southern species C. rustica, Malthinus seriepunctatus and Malthodes minimus are here, so why not the rarer C. fusca?

The other three families in the Scheme - Drilidae, Lycidae and Buprestidae - are virtually unknown in Wales, and none have been reported from Dyfed to my knowledge.

Copies of the Scheme newsletter and field key to soldier beetles will be sent to anyone interested on receipt of a SAE, to Keith Alexander, 22 Cecily Hill, Cirencester, Glos GL7 2EF.

SOLDIER BEETLES (CANTHARIDAE): DISTRIBUTION, STATUS AND SUGGESTED

HABITATS AND DATES FOR FINDING THEM

Species	Dyfed	Wales	Britain	Status		Habitat	Season
<i>Podabrus alpinus</i>	+	+				W	May-July
<i>Ancistronycha abdominalis</i>	+	+	N+W		Na	W	May-June
<i>Cantharis cryptica</i>	+	+				W	May-July
<i>C. decipiens=haemorrhoidalis</i>	+	+				W	May-July
<i>C. figurata</i>		+			Na	W(damp)	June
<i>C. fusca</i>		+			Na	M?	June-July
<i>C. lateralis</i>			S+E			M	June-July
<i>C. livida</i>		+		+		W	May-June
<i>C. nigra=fulvicollis</i>		+		+		M	June-July
<i>C. nigricans</i>	+	+				W	May-July
<i>C. obscura</i>				+	N+W	Nb	May-June
<i>C. pallida</i>		+		+		M	May-July
<i>C. paludosa</i>				+	N+W	L	May-July
<i>C. pellucida</i>		+		+		W	May-July
<i>C. rufa</i>	+	+				W	May-
<i>C. rustica</i>	+	+				G	May-June
<i>C. thoracica</i>	+	+			Nb	M	July
<i>Rhagonycha elongata</i>			Scot			W(pine)	July
<i>R. fulva</i>	+	+				G	July-
<i>R. lignosa</i>	+	+				W	May-July
<i>R. limbata=femorialis</i>	+	+				W+G	May-July
<i>R. lutea</i>			S+E		Nb	W(damp)	June
<i>R. testacea</i>		+				W(damp)	May-July
<i>R. translucida</i>	+	+			Nb	W	June-
<i>Silis ruficollis</i>				S+E	Nb	M	June
<i>Malthinus balteatus</i>			S+E		L	W	July
<i>M. flaveolus</i>						W	June-
<i>M. frontalis</i>		+			L	W	June-
<i>M. seriepunctatus=fasciatus</i>	+	+				W	June-
<i>Malthodes brevicollis</i>					RDB	W	May-June
<i>M. crassicornis</i>					RDB	W	May-June
<i>M. dispar</i>		+			L	W(damp)	June-July
<i>M. fibulatus</i>					Nb	W	May-June
<i>M. flavoguttatus</i>	+	+	N+W		Nb	W	May-
<i>M. fuscus</i>				+	N+W	L	June-July
<i>M. guttifer</i>				+	N+W	Nb	May-
<i>M. marginatus</i>	+	+				W	May-
<i>M. maurus</i>					Nb	W(damp)	June-July
<i>M. minimus</i>		+		+		W	May-July
<i>M. mysticus</i>		+		+	N+W	Nb	May-
<i>M. pumilus</i>		+			L	W	June

Notes: N+W - mainly found in the north and west S+E - mainly found in the south and east.

RDB - listed in Britain Insects Red Data Book (Shirt, 1987); Na, Nb - 'notable' species,

i.e. likely to occur in fewer than 100 10 km squares across Britain (fewer than 30 in the case of Na) (Hyman, 1986); L - local species; W - occur in wooded places - woods, parks, hedges, scrub;

M - occur in marshy places, incl wet meadows, fens, reedbeds; G - occur in grassy places

References: Shirt, D B ed (1987). British Red Data Books: 2 Insects. NCC

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MYRIOPODA

A PROVISIONAL REVIEW OF THE MILLIPEDES OF CARMARTHENSHIRE - I K MORGAN

In a short note published in the 'Entomologists Monthly Magazine' of 1974, which listed four millipedes new to Carmarthenshire, A D Barber and R D Kime remarked that "relatively few vice-county records are known from south Wales". This generalisation was especially applicable to Carmarthen, VC44, then one of the more poorly documented counties of Wales for several invertebrate groups. Visits by myriapodologists were sporadic, with only occasional records, such as those made by the Biological Recording Group for Wales (Chatfield 1975), contributing to our limited knowledge of the county's myriapod fauna.

The listings of the vice-comital distribution of Diplopoda published in the British Myriapod Group Newsletter (Richardson 1983) summarised the situation as it then stood, giving only twelve species (out of a present British fauna of c 55 species). During the current recording period, 1985-87, a determined effort has been made to evaluate Carmarthenshire's millipede fauna and its distribution. As many of the county's 10 km squares and habitats as possible have been visited and collections made. Currently, twenty-five millipede species are known from VC44, a doubling of the 1983 totals. Carmarthen could now be said to be one of the better-worked counties in Britain for myriapods. (Recording of centipedes, Chilopoda, has also taken place with twenty-one species recorded to date. An account of this group will be published in a future newsletter when more information is available.)

It is premature to comment, in an authoritative fashion, on the distribution of many species of millipede in the county. Some are probably widespread, such as Ophiulus pilosus or Cylindroiulus punctatus, whilst others are much more localised, eg Brachiulus pusillus on the dry rocky soils of the Carboniferous Limestone. Reference to the Table which follows shows that the most commonly recorded species are Chordeuma proximum, Ophiulus pilosus, Tachypodoiulus niger, Cylindroiulus punctatus and Polydesmus angustatus. With the exception of C. proximum (32nd on the British list, Blower 1985) this tallies well with the British rankings. Chordeuma proximum is a common, autumn to spring, species of acidic leaf litter in Dyfed (Morgan 1986), yet it was only described as part of the British fauna as recently as 1964 from material collected in 1955 in the Forest of Dean. Still with the Chordeumatidae, Melogona gallica is apparently much more frequent than its close relative M. scutellare (which has only one Carmarthen record - Llwynhendy, 21/537993, 5 Jan 1987) - a reversal of the situation nationally.

There is only a single record for Cylindroiulus caeruleocinctus (Penybont, 22/305273, 23 Sept 1985), a scarce species nationally which is distinctive because of the uniform thickness of the body along virtually the whole length, a feature shared with the related C. londonensis. Macrosterodesmus palicola too, has only one record - at Cwm Cych (22/290354) on 5 Jan 1987. Its diminutive size, coupled with the fact that it has only been found during the late winter - early spring period, mitigates against many records of this species.

The maritime species Thalassiosobates littoralis was noted, in September 1986, under clothing and pieces of driftwood overlying a coarse grit substrate at Penrhynwyn (21/517974). This gritty beach (with a few larger stones) grades landwards to an area of pebbles and industrial slag with sparse vegetation, and laterally to mud with cord-grass Spartina and other halophytes. Thalassiosobates is regarded as a rare British species with only about six geographically-spread records. Harding (1985) commented that - "It seems possible that the rarity of T. littoralis may be more apparent than real" and that "the habitats in which it occurs are difficult to work". This statement is certainly worth remembering, I have several times worked the Penrhynwyn site, in varying weather conditions, both before and after the September 1986 discovery and have not refound the species. Therefore, if a search of an apparently suitable locality fails to produce T. littoralis on one occasion it would be unwise to assume its absence.

The day after the Thalassiosobates find, an elegant millipede with well-defined markings that included a distinct longitudinal dorsal stripe, was found under an old apple in a garden at Erw Las, Llwynhendy (21/537993). Subsequent examination revealed it to be Leptoiulus belgicus, otherwise known only from Devon, Cornwall and the Channel Islands. It has since been found in some numbers in the same garden and also at another garden some 0.75 km away during the 1986-1987 winter. L. belgicus has thus only been recorded as a synanthrope in Carmarthen and not in any semi-natural habitats nearby.

The county millipede list is arguably not yet complete and the following species are offered as potential additions (some are more likely than others!), when they have occurred in neighbouring counties this has been indicated:

Archeboreoiulus pallidus (VC41), Boreoiulus tenuis, Brachychaeteuma bradeae, Choneiulus palmatus (VC41), Cylindroiulus londinensis (VC46), C. nitidus, Ophoidesmus albanus (VC41), Polydesmus inconstans (VC42) and Polyxenus lagurus (VC45 and VC46).

Acknowledgements: I would like to sincerely express my gratitude to Mr Douglas Richardson for the great amount of help he has provided in the identification of specimens. All specimens collected during this survey will be housed within the invertebrate collections at the National Museum of Wales, Cardiff.

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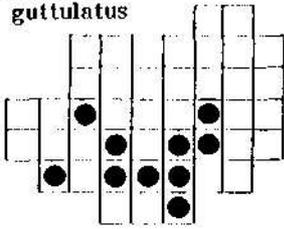
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	Rank	10 km	1 km	MICRO- HABITATS (VC 44)
<i>Blaniulus guttulatus</i>	10	10	11	under stones, leaf litter
<i>Brachydesmus superus</i>	9	10	12	and in soil, not too acidic
<i>Brachyiulus pusillus</i>	(15)	6	8	as above dry, often base-rich sites esp on limestone
<i>Chordeuma proximum</i>	1	25	44	acidic leaf litter esp oak and beech
<i>Craspedosoma rawlinsi</i>	19	4	4	wet flushes in woodland
<i>Cylindroiulus brittanicus</i>	(15)	6	6	under bark
<i>C. caeruleocinctus</i>	(21)	1	1	one record only: under hazel copse on base-enriched slope
<i>C. latestriatus</i>	14	7	16	under-stones etc, dry situations-dune land and limestone
<i>C. punctatus</i>	4	19	31	under bark and logs, woodland
<i>Glomeris marginata</i>	6	15	26	under logs and leaf litter, woodland - not too acidic
<i>Julus scandinavicus</i>	11	9	13	under logs and leaf litter, esp woodland
<i>Leptoiulus belgicus</i>	(21)	1	1	two sites only: under garden debris
<i>Macrosternodesmus palicola</i>	(21)	1	1	under logs etc, base-rich woodland
<i>Melogona gallica</i>	(12)	8	8	under logs and litter, scrub and woodland - not too acidic
<i>M. scutellare</i>	(21)	1	1	one record only: under stones on rich alluvial soil
<i>Nanogona polydesmoides</i>	8	13	16	under logs, leaf litter and bark in woodland
<i>Nemasoma varicorne</i>	(15)	6	6	under bark
<i>Ommatoiulus sabulosus</i>	(12)	8	9	dry situations in woods, also walls, duneland
<i>Ophiulus pilosus</i>	2	20	38	leaf litter and logs generally
<i>Polydesmus angustus</i>	5	17	20	leaf litter and logs generally
<i>P. denticulatus</i>	20	3	3	under logs and litter, old woodland esp oak
<i>P. gallicus</i>	7	13	17	leaf litter and logs generally
<i>Proteroiulus fuscus</i>	(15)	6	8	leaf litter in woodland
<i>Tachypodoiulus niger</i>	3	20	33	under logs and stones generally
<i>Thalassiosobates littoralis</i>	(21)	1	1	supra- littoral, under drift materials on coarse grit beach

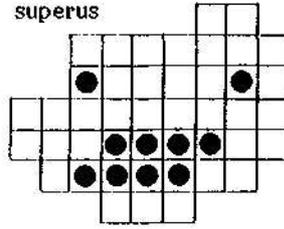
Notes

- 1 Species are ranked according to the number of 10 km squares in which they have been recorded, eg 1 = the most commonly-encountered species. Joint rankings are bracketed.
- 2 Information is tabulated on the number of 1 km and 1 km squares in which each species has been recorded.
- 3 Records deposited with the National Biological Records Centre at Monks Wood have not been consulted.

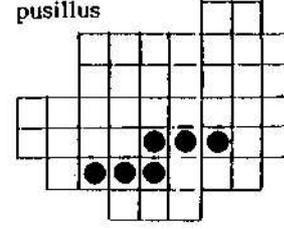
Maniulus guttulatus



Brachydesmus superus

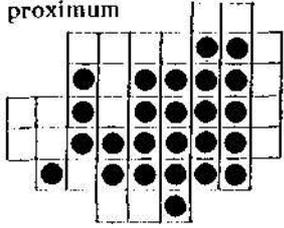


Brachyiulus pusillus

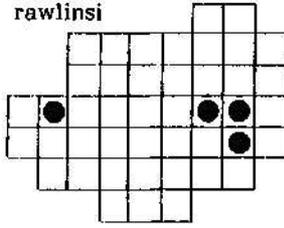


					63	75		
		24	34	44	54	64	74	84
		23	33	43	53	63	73	83
02	12	22	32	42	52	62	72	82
01	11	21	31	41	51	61	71	81
		10	20	30	40	50	60	70
				39	49	59		

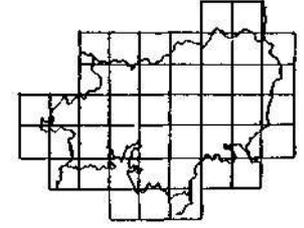
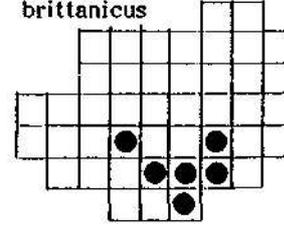
Chordeuma proximum



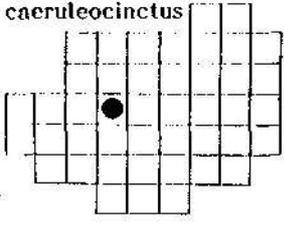
Craspedosoma rawlini



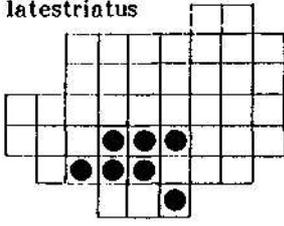
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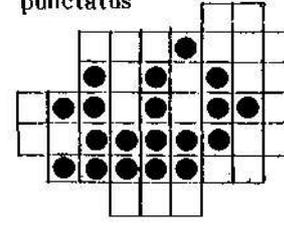
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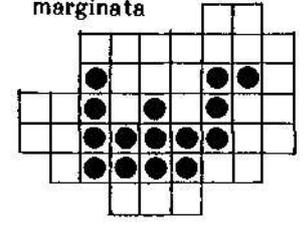
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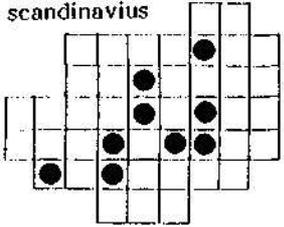
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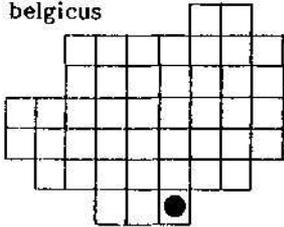
Glomeris marginata



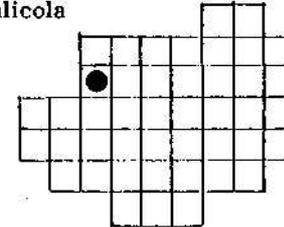
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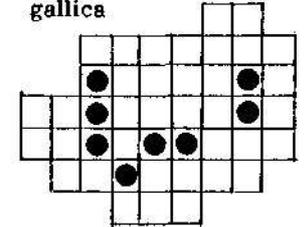
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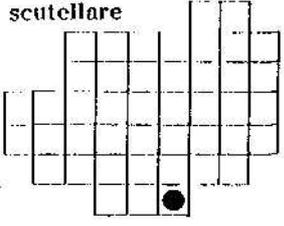
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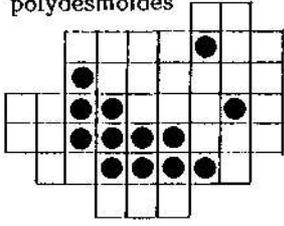
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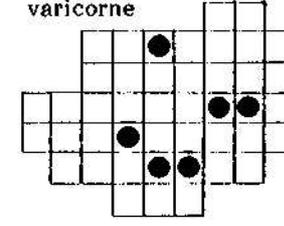
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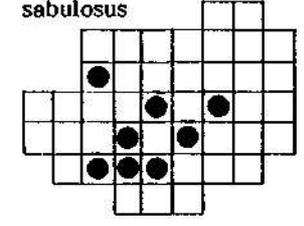
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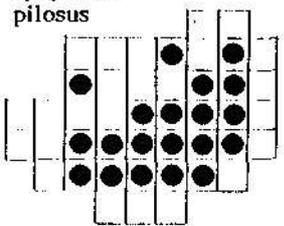
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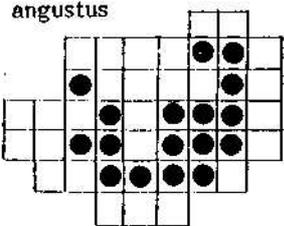
Ommatoiulus sabulosus



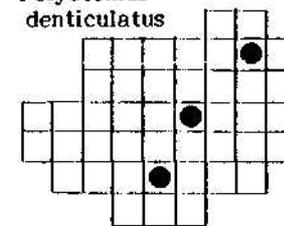
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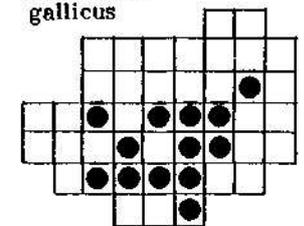
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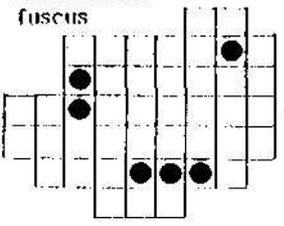
Polydesmus denticulatus



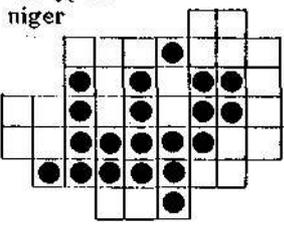
Polydesmus gallicus



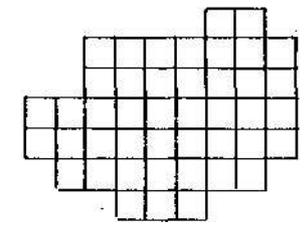
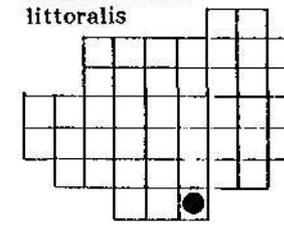
Proteroiulus fuscus



Tachypodoiulus niger



Thalassisobates littoralis



LEPIDOPTERA

MOTH RECORDS FROM THE CEREDIGION ROTHAMSTED TRAPS, 1986 - IJ L TILLOTSON

The insistent foul summer weather of 1986 reduced the year to one of the least interesting in terms of moth catches for some time. A combination of rain, wind and low temperatures resulted in catches which were small in number as well as being low in diversity. However, no year passes without something of interest turning up and this short list identifies some of the more notable species which appeared in the three traps operated permanently for the Rothamsted Insect Survey - on the cliffs at Aberporth (22/249520); on the edge of Tregaron Bog (22/687618); and in the Welsh Plant Breeding Station at Aberystwyth (22/629837).

Venusia cambrica Welsh Wave - this species was described as new to science in 1839 from a specimen taken at Hafod. However, until a singleton was captured at Tregaron in 1981 only three others had been seen in Ceredigion - at Ponterwyd, Devil's Bridge and Trawscoed. Two were taken at Tregaron in 1986, on 10 and 13 July. The larvae feed on rowan Sorbus aucuparia in woodlands and on upland moors.

Euchoea nebulata Dingy Shell - trapped at Aberystwyth on 2 July. This is only the third county record, having previously been reported from Capel Bangor in 1924 and Gogerddan in 1953.

Pseudopanthera macularia Speckled Yellow - a common day-flying species amongst scrub and open woodland but a rare event to find one caught in a moth-trap, as at Aberystwyth on 29 June.

Leucoma salicis White Satin - recorded at Tregaron on 10 August and Aberystwyth on 13 July. There was another record in the county this year (Eglwysfach, 4 July) and perhaps an indication that the species is spreading. It was first seen in Ceredigion in 1977 at Tregaron, where it was also recorded in 1983 and 1985.

Thumatha senex Round-winged Muslin - three individuals came to the Tregaron trap in mid-July after one was recorded there in 1985. This is an inconspicuous species of fens and marshes previously reported only from Cors Fochno and Pontrhydfendigaid.

Nola cucullatella Short-cloaked - the record at Aberystwyth on 21 July continues the run of annual sightings at Plas Gogerddan since 1984 of a species which has been seen on only two other occasions in Ceredigion.

Syngrapha interrogationis Scarce Silver Y - a singleton taken at Tregaron on 22 July. There are only two previous county records of this heather-moor inhabitant - Tregaron in 1982 and Cwm Einion in 1984.

More effort has recently been given to the identification of Pugs Eupithecia spp caught in Rothamsted traps and several species that had been recorded on very few occasions in the county are now proving to be fairly common. In 1986 these included such nationally scarce species as E. expallidata Bleached Pug (Aberporth, five in early August) and E. valerianata Valerian Pug (Tregaron, 15 July), whilst in 1985 E. trisignaria Triple-spotted Pug was added to the county list when a singleton was caught at Tregaron on 28 July.

DYFED SITE REPORT - Number Three

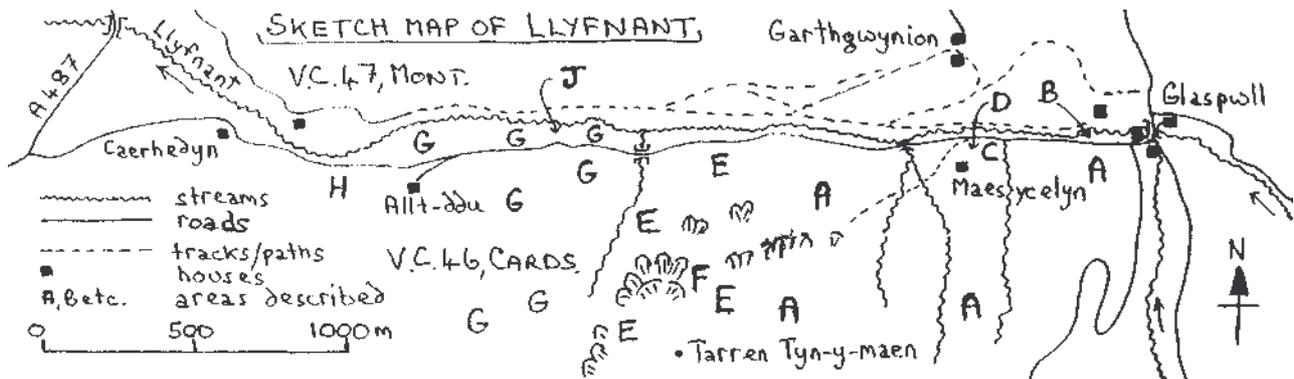
LLYFNANT, CARDS (22/720975) - A O CHATER

The Llyfnant valley, whose stream is a tributary of the Dyfi, forms the northern boundary of Dyfed. It is one of the three or four valleys in the north of the county that make this area, although it is south of the Dyfi, scenically seem part of North Wales. The lower 4 km of the valley runs due east-west and is very steep-sided, rising from almost sea level to 200 m on the north and to nearly 300 m on the south. The valley here follows the Llyfnant fault, which strikes east-west and crosses the junction of the Silurian and Ordovician systems. The geology was described in classic papers by O T Jones and W J Pugh (1915, 1935). Further east the valley curves southwards and the uppermost 2 km runs south-north. The head of the valley is a magnificent north-facing ice-formed corrie with a waterfall, and the east-west, lower part of the valley owes its present topography to having been a glacial overflow channel.

The scenery is picturesque in the extreme, and around the turn of the century the valley was second only to Devil's Bridge as an inland scenic attraction in Cardiganshire, refreshments being served at Glaspwll and several ornamental footbridges enticing visitors to explore the wooded streambanks. Much of the ancient woodland of the valley has been replaced by conifers in recent decades, but extensive areas remain especially in the east-west part below Glaspwll on which this article concentrates. Apart from forestry, including the cultivation of Christmas trees at Glaspwll, the valley has been unusually free of exploitation other than the normal grazing practices of the district and coppicing of the woodland. Levels were dug into the Cardiganshire side some time in the last century, but no significant mineral ore was found to be associated with the Llyfnant fault.

The geological interest of the valley led to much of it being given SSSI status in 1954, but it has recently been downgraded geologically and the part of the east-west stretch that is free of conifers has been re-notified as an SSSI largely on botanical grounds. In recent years it has been found to contain a very rich bird fauna and this revised SSSI area, comprising part of the Alltddu estate, was purchased by the RSPB as a reserve in 1985.

The north-facing, Cardiganshire slope from Glaspwll for 3 km westwards down to Caerhedyn is the best-worked part of the valley. The eastern half of this part (A) is plantations of sitka spruce, Douglas fir, Japanese larch and european larch, with lodgepole pine more recently planted above on the top of the slope. Only a narrow, interrupted strip of native woodland is left, alongside the road and stream. This consists of alder woodland, swampy in places by the stream (B), and sessile oak/downy birch woodland, with occasional small-leaved lime and wych elm, on the rocky streamside and on the rocky slope above. In two places (C, D) there is a distinctly calcicole flora on shaded, wet rocks of the Bryn-glas Formation at the very top of the Ordovician close to the Silurian boundary. The microclimate here, probably exaggerated by the surrounding conifers, is cool and damp enough to allow Wilson's filmy fern *Hymenophyllum wilsonii* to grow abundantly on the roadside cliff.



West of the conifers the steep slope (E), heavily flushed in places, is dominated by heathers, Sphagnum and bracken, with scattered hawthorn, alder, rowan and sessile oak. Grazing pressure is very low and the heathers and Sphagnum cushion the slope luxuriantly. Below Tarren Tyn-y-maen at c 250 m asl cliffs with massive boulder scree create a site unique in Cardiganshire (F) where Tunbridge filmy fern Hymenophyllum tunbrigense grows in the deep cavities in the scree, as it does in Snowdonia, instead of on wet rocks by streams in woodland as it does elsewhere in this county. A large cave contains the 'luminous' moss Schistostega. Elsewhere along this western part of the slope are substantial relics of ancient woodland (G), much of it scarcely grazed and mostly sessile oak with scattered ash and more wych elm and small-leaved lime, but also alder in abundance along the Llyfnant and its tributary streams and flushes. In one place (H) there is dry slope alder wood, perhaps the most southerly example of this predominantly north-western woodland stand type in Britain. These alders were regularly coppiced for clog-making until some 50 years ago, and this dry alder wood used to extend westwards so that it was some 400 m wide. Unfortunately this western part was replaced by larch several decades ago. By the Llyfnant stream in one place (J) is an area of moss-covered scree under a canopy of wych elm and ash, clearly somewhat calcareous as it contains the only substantial population of wood stitchwort Stellaria nemorum subsp glochidisperma in Cardiganshire. The scree, a very fragile habitat that should be approached with extreme care and not walked over, is of sandstone of the Drosgol Formation, near the top of the Ordovician.

Several floristic features of the valley indicate the northern affinities of the site, for example the Tunbridge filmy fern microsite, the dry slope alder wood and the presence of lesser twayblade Listera cordata, a northern-montane species, near the head of the valley. At the same time the valley has strong atlantic features, with ivy-leaved bellflower Wahlenbergia hederacea and whorled caraway Carum verticillatum as well as both species of filmy fern and various characteristic bryophytes. The microclimate of the valley is clearly one of its most distinguishing features. It is very sheltered from the prevailing winds and remains unusually moist throughout the year. The unprecedented south-easterly storm of 13 December 1981 uprooted a vast number of oaks, as well as conifers and other trees, in the Llyfnant, indicating that it is normally unusually sheltered compared with most of the rest of the county where less damage was done. This storm provided a great quantity of dead wood that will undoubtedly enhance the invertebrate interest of the valley for many years to come.

Land molluscs are the only invertebrate group to have been at all adequately surveyed in the valley, and with 42 species recorded within the RSPB reserve/revised SSSI it is very rich by Welsh standards. The presence of all but one (the slug Limax tenellus) of the ancient woodland indicator species recorded from Dyfed (Acicula fusca, Leiostylia anglica, Limax cinereoniger, Spermodea lamellata, Vertigo substriata and Zenobiella subrufescens) confirms the botanical evidence for considering the woodland here to be of exceptional interest. These species occur chiefly in sites C, D and J, in all of which a considerable depth of wet leaf litter has accumulated among the somewhat calcicolous rocks and scree. Other molluscs uncommon in Dyfed as a whole include the tree snail Balea perversa on ash trees and Arianta arbustorum on the mossy scree and in other rich sites.

Casual sampling of the millipedes in December 1986 produced Cylindroiulus londinensis, a Red Data Book species not previously recorded for Wales, both in the dry slope alder wood (H) and the mossy scree (J) along with Chordeuma proximum and several more widespread species. Craspedosoma rawlinsii, a northern species uncommon in England and Wales, was also found in the mossy scree. Spiders were similarly briefly investigated on the same occasion by K Catley, and 18 species were found, the mossy scree producing three comparatively local species Centromerus arcanus, Saarioa firma and Walckenaeria cuspidata.

Among the nineteen butterflies recorded, the white-letter hairstreak Strymonidia w-album, present in some abundance in the 1940s and 1950s, has not been seen since 1976 when W M Condry saw it feeding on bramble flowers on the Montgomeryshire side of the stream opposite site J on 23 July. Dark green fritillaries Argynnis aglaja are also recorded from

the valley, in their only woodland colony in Cardiganshire, as well as silver-washed fritillaries A. paphia. High brown fritillaries A. adippe were last reported here in 1978, and this was the last time they were seen in the vice-county. Purple hairstreaks Quercusia quercus are widespread. A purple emperor Apatura iris was taken on the Montgomeryshire side in 1906 by E S Lewis, and may have been a stray from the nearest known colonies on the Welsh border. Few moths have been noted. The clouded magpie Abraxas sylvata was seen in 1983 on the mossy scree, but the wych elms here have since been almost entirely killed by Dutch Elm disease and this moth, like the white-letter hairstreak, another elm feeder, may well now be extinct in the valley. E C Pelham-Clinton recorded the forester Adscita statices and the smoky wave Scopula ternata in 1949, and J P Robson recorded the beech-green carpet Colostygia olivata in 1938, one of the only two records for Cardiganshire. The last two species are predominantly northern in distribution in Britain.

Thirty-four species of hoverfly were recorded by A P Fowles in August 1986, the most interesting being Chrysotoxum arcuatum and Eristalis rupium, both being predominantly northern and western in distribution and the latter being here very close to its southern limit, and Leucozona laternarius, currently known from only two other sites in Dyfed. A E Stubbs recorded two Red Data Book crane flies in 1970, Pedicia lucidipennis and Scleroprocta sororcula, under alders by the stream, as well as Lipsothrix errans.

The Llynant invertebrates are very under-recorded, but the proportion of rare and interesting species among the few that have been noted suggests that further work in the valley is likely to be very rewarding. This short account is thus intended as background ecological information and as a stimulus to future investigation rather than as a summary of the invertebrate interest of the area. Visitors wishing to investigate the invertebrate fauna of those areas of Cwm Llynant within the RSPB reserve should gain permission from the Warden, Caer-berllan, Eglwysfach, Machynlleth, Powys (Tel: 065474-265).

I am grateful to A P Fowles, B A Hains, W M Condry and A Jones in particular for records and information.

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