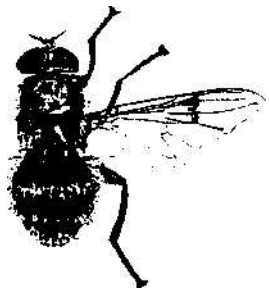
DYFED INVERTEBRATE GROUP



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ARACHNIDA

SPIDERS, HARVESTMEN AND PSEUDOSCORPIONS FROM CASTLE WOODS, LLANDEILO (22/615217) - C M MERRETT [ZOOLOGY DEPT, NATIONAL MUSEUM OF WALES]

This reserve of the West Wales Trust for Nature Conservation is mainly located on sloping ground, which becomes quite precipitous towards the old castle, and is for the most part well-drained. The area around the Church Information Centre and the Summer Warden's hut is damper due to a small stream running south-west, and the heavier ground above the church creates a small area where boggy conditions occur after heavy rain. Harvestmen de-hydrate very quickly and seek seclusion in easy reach of moisture while ground-living spiders and pseudoscorpions burrow deep into the leaf litter as the ground dries out so it is not surprising that the area round the stream produced the most easily-collected specimens during visits to the reserve between September 1986 and June 1987.

For collecting purposes, spiders can basically be divided into two vertical zones, ie from ground level up to 15 cms; and 15 cms up to 2 metres. The lower-zone spiders include the hunters - fast-moving and large, capable of chasing and overpowering prey - and the concealed patient waiters, resorting to stealth and lying secluded under stones or in tunnels ready to pounce on passing victims. Some of these spiders do not need strong venom to subdue their captives, others have to possess lethal doses because they lack strong jaws or large size. Some use a combination of venom and silk to enmesh and immobilise the victim. The tiny ground-dwelling money spiders of the family Linyphiidae spin small webs amongst the grasses and plants to ensnare their food supply. Living above 15 cm are those spiders who spin orb webs, relying on the wind to direct the positioning of the bridge line of silk that commences and supports the web to be spun - the sticky excrescence that traps flying insects being added to the strands after the web is completed. Of course, some spiders come between the two zones described, as many ground dwellers and hunters will climb trees and walls, while some spiders live well above the ground but hide in flower heads and under leaves ready to pounce on prey that alights to feed on nectar or collect pollen.

Spiders vary in the number of moults necessary to reach maturity and different species can be found fully mature at all times of the year - as there are over six hundred species in the British Isles this is not a surprising fact. Their adaptability to variations in climate, altitude and habitat has made them a highly successful group, little changed since the Devonian period, 300 million years ago. To identify a spider to species level with certainty, the specimen needs to be fully mature - the sexes are easily separated in the field and a little experience identifies the mature from the immature.

By contrast, harvestmen can be identified when immature but are sometimes difficult to sex in the field without a microscope. There are only twenty-three species in the British Isles (with a further three species not yet accepted to the British list) and, with a few exceptions, they hatch from the egg during the spring, reaching maturity through July to October, lay their eggs in the autumn, and die. The pseudoscorpions, of which there are twenty-five different species, have a rather variable life-history. They moult through four stages into maturity and can be identified to species level at each stage. They are capable of hibernating during these stages so the lifecycle is not seasonably predictable. Adult females disappear periodically to lay eggs in a cocoon and to stay with newly-emerged protonymphs. They can be sexed in the field by those who become familiar with their morphology.

The initial visit to Castle Woods was made during September 1986 and collecting commenced around an old ruin near the church, flanked by a rock face that had apparently been quarried. The ground was very dry and turning over stones produced meagre results; a single species of spider, two harvestmen and two pseudoscorpions. The next area investigated was the area of woods on either side of the footpath from the stile on the side of the roadway to Dinefwr Castle. Although the soils were again well-drained, the beech and other trees produced a good carpet of leaf litter and sifting this yielded better results with thirteen spider species, including the rather local Pachygnatha listeri, and two additional species of harvestman. Rhododendron bushes flourish higher up along this footpath, indicating an area of acidic glacial drift. It is pure conjecture that this type of environment affects the prey of spiders, and therefore the spider numbers, but they were certainly scarce amongst this acid-loving vegetation.

On 30 October 1986 the woods near the old castle and quarry were visited again and conditions were somewhat damper, producing easier conditions for collecting. Twelve species of spider were collected, of which eleven were different from the earlier visit. A juvenile specimen of Rilaena triangularis was an additional harvestman species but no pseudoscorpions were found.

On 1 June 1987 the last visit was made and collecting took place in two areas. The first was a repeat visit to the woods between the old castle and disused quarry; the second was the beech wood east of the Summer Warden's hut, near the stream. This latter proved one of the easiest for collecting, the damper habitat proving ideal for harvestmen and pseudoscorpions as well as spiders. Twenty-three species of spider were taken, fifteen of these being additional to the list which thus increased the total to forty species; harvestmen remained at five and pseudoscorpions at two species.

As most of the collecting was done by sifting ground litter and by looking under stones and fallen wood it is interesting to note that spiders collected at Castle Wood twelve days later by Kefyn Catley, mainly by sweeping vegetation, produced quite a different species list - only five being duplicated through our joint efforts. The total for Castle Woods to date is fifty-two species and I am sure that there are many more species awaiting collection to add to this number.

ARANEAE(SPIDERS)

AMAUROBIIDAE
Amaurobius fenestralis (3)

DYSDERIDAE
Harpactea hombergi (2, 4, 5)

SEGESTRIIDAE
Segestria senoculata (4)

CLUBIONIDAE
Clubiona reclusa (5)
Clubiona terrestris (2, 5)

THOMISIDAE
Misumena vatia (5)
Xysticus cristatus (5)

PHILODROMIDAE
Philodromus dispar (5)

LYCOSIDAE Pardosa amentata (4, 5)
Alopecosa pulverulenta (4)
Pirata hygrophilus (4)

PISAURIDAE
Pisaura mirabilis (5)

AGELENIDAE
Coelotes atropos (5)

THERIDIIDAE
Theridion bimaculatum (5)
Theridion mystaceum (4, 5)
Theridion pallens (4, 5)
Robertus lividus (3)

OPILIONES (HARVESTMEN)
Leiobunum rotundum (2)
Nelima gothica (1, 2)
Nemastoma bimaculatum (1, 3, 4)
Paroligolophus agrestis (2, 3)
Rilaena triangularis (3, 4)

TETRAGNATHIDAE
Tetragnatha montana (4, 5)
Pachygnatha listeri (2)

METIDAE
Metellina mengei (3, 4)
Metellina merianae (2)
Metellina segmentata (2, 5)

ARANEIDAE
Araneus diadematus (5)

LINYPHIIDAE
Dicymbium tibiale (3)
Entelecara acuminata (3)
Entelecara erythropus (5)
Dismodicus bifrons (4)
Gonatium rubellum (2)
Maso sundevalli (4, 5)
Monocephalus fuscipes (4)
Diplocephalus cristatus (5)
Diplocephalus latifrons (3, 4)
Diplocephalus picinus (4)
Microneta viaria (3, 4)
Centromerus dilutus (4)
Bathyphantes gracilis (1, 4)
Bathyphantes nigrinus (2)
Kaestneria dorsalis (4)
Diplostyla concolor (4)
Floronia bucculenta (2)
Labulla thoracica (3)
Stemonyphantes lineatus (5)
Lepthyphantes cristatus (2, 4)
Lepthyphantes flavipes (3, 4)
Lepthyphantes mengei (2)
Lepthyphantes minutus (3)
Lepthyphantes obscurus (5)
Lepthyphantes tenuis (3)
Lepthyphantes zimmermanni (2, 3, 4)
Linyphia clathrata (4)
Linyphia montana (2)
Linyphia triangularis (2)

PSEUDOSCORPIONES (PSEUDOSCORPIONS)
Chthonius ischnocheles (1, 4)
Neobisium muscorum (1)

SITE DETAILS:
(1) 22/622222 - quarry face and ruin near the church - Sept 1986
(2) 22/615217 - Castle wood, mixed broadleaves - Sept 1986
(3) 22/615217 - Castle wood, mixed broadleaves - 30 Oct 1986
(4) 22/615217 and 22/622223 - Castle Wood and Church Woods - 1 June 1987
(5) 22/615217 and 22/608222 - Castle Wood and Dinefwr oxbows
- 13 June 1987 (K Catley)

COLEOPTERA

AN INVESTIGATION OF THE EFFECTS OF FIRE UPON THE INVERTEBRATE FAUNA OF A COASTAL RAISED MIRE - A P FOWLES

INTRODUCTION

On 25 February 1986 a spring-burn of land adjacent to Cors Fochno NNR, Dyfed (SN 635915) got out of hand and flames raced rapidly westwards across the mire surface. More than half of the bog Was burnt, leaving only the blackened stems of bog myrtle Myrica gale and the scorched tufts of cottongrass Eriphorum spp. and purple moor-grass Molinia caerulea. However, the bog had been frozen for two weeks previously and this, coupled with the strong easterly winds, meant that the fire raced across the dome without penetrating into the peat. The general feeling was that little long-term damage had been done to the vegetation and the overall effects may have been beneficial in rejuvenating the maturing scrub-layer of heather Calluna vulgaris and bog myrtle. Subsequent surveys have largely shown this to be the case, although one unseen effect was the damage caused by the continuing frosts on the bog moss Sphagnum carpet after the removal of the insulating litter-layer.

Two transects cross the central dome of the bog in a north-south/east-west direction with a permanent vegetation quadrat situated every one hundred metres. These quadrats had been monitored in 1977 and 1981 and hence provided comprehensive data for assessing the effects of the fire. In August 1986 they were resurveyed and the conclusions drawn suggested that the distribution and status of the vascular plants had not been significantly affected, indeed most species were regenerating healthily only five months after the fire. The ericaceous species - heather, cross-leaved heath Erica tetralix, and bog rosemary Andromeda polifolia - were re-establishing vigorously from seedling germination, whilst purple moor-grass, cotton-grass, and bog myrtle were regenerating from rootstocks and stems. Bog asphodel Narthecium ossifragum and white beaked-sedge Rhynchospora alba were responding well to the removal of the dense shrub-layer and only sundew Drosera spp had failed to make a comeback, although they too can be expected to benefit in coming years from the opening up of the canopy. The situation for the lower plants was very different -Cladonia lichens were completely killed off whilst the distribution of the Sphagnum species is likely to be significantly altered. S. pulchrum, a characteristic species of wet hollows, was little affected but S. tenellum, exposed on the hummocks, suffered badly as did S. capillifolium. S. tenellum, however, can be expected to spread quickly over the next few years as it is well-known to benefit from fire damage to mires.

In the past Cors Fochno has regularly been subjected to devastating fires and in many respects the present-day fauna and flora must reflect the modifying effects of burning. A principal management aim of the Nature Conservancy Council since acquiring Cors Fochno has been to reduce the incidence of fire and the last major burn was in April 1979; even then the central dome escaped unscathed. This has resulted in a maturing shrub-layer and the additional effect of an increased water-table through ditch-blocking activities has led to a decrease in the abundance of Sphagnum tenellum, bog rosemary, bog asphodel and sundews - only the cotton-grasses have increased their cover substantially in response to the wetter conditions. The position has been one of a maturing canopy of heather and bog myrtle shading out the smaller flowering plants. There is, therefore, something of a management dilemma - to continue with the present policy of preventing fire and hence, at least in the short-term witness a reduction in plant diversity; or to allow periodic, controlled, rotational

burning which will rejuvenate the vascular plants but which will modify the natural pattern of Sphagnum distribution.

In recent years the invertebrate fauna of lowland raised mires in Britain has attracted considerable attention, despite the fact that abundance and species diversity are characteristically poor. Interest centres around the composition of the communities present. Coulson and Butterfield (1980) "stress the different nature of the fauna on the near sea-level mosses .... There is an urgent need for faunistic surveys of these areas both to establish and describe the communities present and to recognise those which are of particular faunistic interest". Their studies of Deer Dyke Moss and Meathop Moss in Cumbria provide a baseline for community analysis whilst ongoing surveys of Irish midland raised bogs (Reynolds 1984; Good 1985) will provide valuable comparative information.

Although several rare invertebrates are known from Cors Fochno (eg the rosy marsh moth Eugraphe subrosea and the craneflies Limnophila abdominalis and Tipula holoptera) little attention has been paid in the past to aspects of management for the fauna. An attempt to evaluate the distribution pattern of invertebrates across Cors Fochno was begun on 18 June 1986 when a series of pitfall traps was laid across the bog. After two trapping seasons some trends of distribution are beginning to appear which can be related to the fire of February 1986. Emphasis has been placed on the predatory and scavenging invertebrate groups which, by virtue of their cursorial habits, were the main components of the total catch. This paper discusses the relative distributions of the ground beetle fauna and further articles will look at the spiders, harvestmen and ants of Cors Fochno.

Carabids are chiefly ground-dwelling carnivores inhabiting a broad range of habitats in which they hunt or scavenge for small arthropods. Many species require high levels of humidity and the larvae, in particular, are very prone to dessication. Peatlands, therefore, generally support a diverse carabid fauna but lowland ombrotrophic mires are characteristically species-poor. Pitfall-trapping for two years on coastal raised mire in Cumbria, at Meathop Moss and Deer Dyke Moss, yielded a total of eighteen species (Coulson and Butterfield 1980) and in two seasons only fourteen species have been captured on Cors Fochno. Few rarities are known from raised mires - an exception being Bembidion humerale on Thorne Moors, Yorks (Skidmore et al 1987) - and interest centres around the association of strongly hygrophilous species in a distinct community not recognised from other peatland types surveyed so far. A high proportion of wetland carabids overwinter as adults (Murdoch 1967) and their larvae therefore avoid the dangers of winterflooding when the water-table is at, or just below, the mire surface.

After two seasons of pitfall-trapping on Cors Fochno a total of 2307 ground beetles have been caught, 97.4% of which is accounted for by three dominant species. The most frequently captured species is Pterostichus nigrita (1482 individuals), an obligate hygrophile which is widespread in damp situations. Coulson & Butterfield (1980) caught few specimens on the Cumbrian mires although it is a regular component of the fauna of Finnish oligotrophic bogs (Thiele 1977). Pterostichus diligens (480 specimens) was the next-commonest species caught in the pitfall-traps, it is widely distributed on peatlands and its affinity for nutrient-poor mires in Europe has frequently been commented upon (Thiele 1977). The third dominant is Agonum ericeti (293 individuals), a diurnal species strongly associated with areas of Sphagnum on oligotrophic mires. In Britain it is mainly a northern and western species, regarded as nationally scarce but occurring in some abundance on its chosen sites. A ericeti is widely recognised as a highly characteristic inhabitant of oligotrophic bogs (Lindroth 1986; Thiele 1977) and was the commonest carabid on Meathop Moss (Coulson and Butterfield 1980).

The remaining eleven species taken in the pitfall traps are all represented by a relatively small number of individuals. The most frequent member of this group is Carabus granulatus (27), a rather hygrophilous ground beetle of wet grassland. Hibernation as an adult usually takes place inside tree stumps or fallen timber and hence it is most often found in the vicinity of encroaching carr. Good (1985) regards C granulatus as a typical species of Irish raised bogs. Ten specimens of Pterostichus minor have been captured, all of them in the two traps immediately north of the overgrown ditch which cuts into the centre of the mire. P minor is considered to be a regular component of the oligotrophic mire fauna in Finland (Thiele 1977) but it was not captured on either of the Cumbrian sites mentioned above. Its distribution on Cors Fochno may be associated with slight nutrient enrichment resulting from the draw-down effect of the old ditch: it is more typically an inhabitant of mesotrophic fen and water's edge habitats. Nine species are represented by less than five individuals - Loricera pilicornis (4), Pterostichus cupreus (3), P strenuus (2), and a single specimen each of P niger, P madidus, Agonum muelleri, Carabus problematicus, Leistus spinibarbis, and Nebria brevicollis. Many of these species were also taken in small numbers in the Cumbrian study and P strenuus is frequently found on Finnish oligotrophic mires. Pterostichus niger formed more than 10% of the total catch on Deer Dyke Moss and is used as an indicator of the lowland raised mire community by Butterfield and Coulson (1983).

The relative distribution of the four commonest species of ground beetles on Cors Fochno has changed considerably in the two years following the accidental fire. In order to facilitate comparisons the 1986 data is computed only from those traps which were in operation continuously from 18 June to 10 October. Although the sampling programme is not extensive enough to analyse statistically the totals from each of the traps on both halves of the mire have been amalgamated to provide an index of distribution.

The most interesting species amongst the carabid fauna on Cors Fochno is Agonum ericeti, the metallic adults of which are frequently seen scrambling across the boardwalk on sunny days in April and May. Adults are active early in the spring but become progressively less common as autumn approaches and few are encountered from September onwards. Throughout its European range ericeti is apparently found only on oligotrophic mires with active Sphagnum growth, occurring in regions of high rainfall. It is scarce in Britain, being found most commonly in Scotland and northern England with isolated colonies on the valley mires of Dorset and Hampshire (Luff 1982). Cors Fochno is one of five Welsh sites reported so far (although it is undoubtedly more widespread). The species has attracted much attention amongst European carabidologists and has been the subject of a range of investigations into its ecological preferences and tolerances (reported in Thiele 1977). A ericeti is a tyrphobiontic species (restricted entirely to ombrotrophic bogs) but the adults have been shown to prefer warmth and dryness; presumably the larval requirements are very different. Lindroth
(1986) states that the beetles are often to be found running about "on bare spots of dry dark peat, where the temperature may become very high".

Despite the fact that trapping began in 1986 after the spring period of peak activity adults were still caught in reasonable numbers; unexpectedly almost seven times as many were caught on the southern (burnt) half of the mire as on the unburnt. Agonum ericeti is a flightless carabid which overwinters as an adult, presumably in the Sphagnum layer. The adults must have experienced a good survival rate during the fire and on emergence from hibernation will have found the charred peat surface ideal for their requirements of a dry substrate coupled with high temperatures. In this favourable microclimate they would

have had a high level of surface activity and hence were caught more readily than on the unburnt mire. In 1986 the ratio of adults captured on the unburnt mire compared to the burnt mire was 0.17 (19:115) but in the following year this index had swung to favour the unburnt mire (66:32 = 2.06). The southern part of the bog still had a high cover of blackened peat but the adults were far less common. A possible explanation is that breeding success was much reduced in the summer of 1986 in the burnt area, either due to a shortage of prey affecting reproductive development or because larval survival was affected by the changes in the microclimate which resulted from the fire. We can speculate that, as A ericeti is a tyrphobiontic species in which the adults favour conditions uncharacteristic of ombrotrophic bogs, it is the larvae which depend upon the permanently wet Sphagnum to achieve maturity. The after-effects of the fire, in creating a dry Sphagnum crust, have severely reduced breeding potential -at least in the short-term while the mire surface re-establishes an actively-growing Sphagnum carpet.

Pterostichus nigrita is a common ground beetle in damp habitats where it is a nocturnal carnivore preying on small arthropods. The adults overwinter and were caught in abundance from April to July but decline noticeably from August onwards. In 1986 they were evenly distributed across the bog with a similar index of surface activity on both the unburnt and burnt mire (171:163 - 1.05). Considering that adults will be less impeded by vegetation on the charred peat higher numbers could have been expected to be caught there than on the untouched mire. The parity of the results implies that adults were in fact commoner on the unburnt mire. This could be due to differing survival rates or perhaps adults dispersed following emergence when they discovered that post-fire conditions were not favourable. Whatever the reason, a dramatic swing had occurred by 1987 when 727 were caught on the unburnt mire and only 138 on the burnt mire, the distribution ratio now is 4.08. Pterostichus diligens has a similar life-history to nigrita but maximum activity occurs in July with the emergence of the new generation of adults (Greenslade 1965). This is a characteristic species of acid bogs and although few specimens were caught on the Cumbrian mires by Coulson and Butterfield (1980) they accounted for more than ten per cent of the total catch (Butterfield and Coulson 1983) - as did P nigrita. The trapping results for the 1986 season are consistent with a high survival rate of overwintering adults on the burnt mire followed by a greater level of surface activity in the more open conditions, giving a distribution ratio of 0.64 (72:113). P diligens has rudimentary wings and its powers of dispersal are correspondingly limited. The change in favour of the unburnt mire in 1987 (112:32 = 3.5) therefore indicates reduced breeding success on the southern half.

Large species of carabids are caught more readily in traps set in open areas (Greenslade 1964) as they are impeded in closed vegetation and hence more likely to be able to avoid falling into the traps. This appears to be borne out by the results for Carabus granulatus, the biggest member of the ground beetle fauna on Cors Fochno, as none were caught on the unburnt mire in 1986 but eleven were captured on the burnt area. C granulatus is another carabid lacking powers of flight although it is not known how far they can disperse on foot. The total catch for this species was reduced in 1987 (despite the trapping season beginning earlier, when adults are most active following hibernation) but the small sample suggests conditions are more favourable on the unburnt mire (3:4 = 0.75). Once again there has been a significant reduction in adult activity on the burnt mire over the two seasons, leading towards the conclusion that breeding success has been impaired. Boyd (1960) found that C. granulatus favoured closed vegetation in a study of grazed and ungrazed machair grassland.

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LEPIDOPTERA

THE WOOD WHITE Leptidea sinapis in CARMARTHENSHIRE - I K MORGAN

The 'Atlas of Butterflies in Britain and Ireland' (Heath et al 1984) shows only four records for the wood white in West Wales, all of which are pre-1940 observations in West Gwynedd. However, it is apparent from a study of the writings of local naturalists that the species was resident in Carmarthenshire up to at least the first few decades of this century. The first record of the species in the county is reported by Barker (1906) as occurring "occasionally near Oaklands" (at Cwmffrwd, south of Carmarthen, 22/425165) and "in lanes between Kidwelly and Pontyates" (22/40). The next reference we have to the wood white is in letters to John Brunker from the knowledgeable Glamorgan entomologist Terence Parsons. The first letter, dated 18 April 1949, mentions that he (Parsons) "had not heard of the occurrence of Leucophasia (=Leptidea) sinapis in Carmarthenshire previously", whilst in a second letter (14 June 1949) he expresses his thanks to Brunker for "the specimen of L sinapis from your county". No indication is given as to where in the county the specimen had been obtained, nor the date on which it had been taken.

John Brunker, who died in 1972, was a capable, all-round naturalist who resided at Llanegwad in the Tywi Valley. In an article for the Carmarthenshire Antiquarian and Field Club (1959a) he alludes to the wood white without actually naming it - "Sometimes, even with rare insects, the naturalist may be fortunate enough to visit a spot when the insects are just emerging from the pupae ... whilst working along the limestone ridges beyond Porthryd in May 1915, I saw fluttering in a copse vast numbers of delicate-looking white butterflies with a distinct black mark on their upper wings. This was the only time I saw them".

In a later part of the same article (Brunker 1959b) he states - "Seldom seen out in the sunny positions, but rather in the shady sides of woods, this frail butterfly flutters about like a piece of tissue paper blown on the breeze. This is a disappearing insect in Carmarthenshire". Referring to Barker's records of the wood white in Carms, Brunker adds - "I remember him telling me that he had seen very few specimens of this very delicate butterfly".

In support of these past records the existence of Carmarthenshire-taken specimens has recently been established. Eleven specimens are housed in two drawers in the Carmarthen Museum at the Bishop's Palace, Abergwili; they are labelled "G W Walton, Pontyberem 1919". The grid reference of Pontyberem would be either 22/4910 or 22/5110. Other Carmarthenshire specimens are to be found in the collection of locally-caught (ie around Ammanford, 22/61) butterflies at the Amman Valley Comprehensive School, collected by a former school master (E J Smith, pers comn).

I have many times searched Brunker's "limestone ridges" (presumably near Drefach, 22/5014 and 22/5114) and similarly the still-leafy "lanes between Kidwelly and Pontyates" have been examined, but not once have I chanced upon the wood white. Regrettably we must conclude that "this frail butterfly" is now extinct in Carmarthenshire although there is some indication of an expansion of its British range and there is always hope that it may once more grace the county's woodlands.

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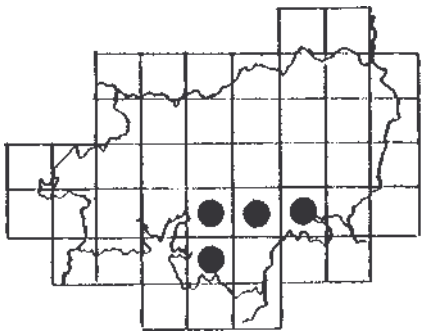
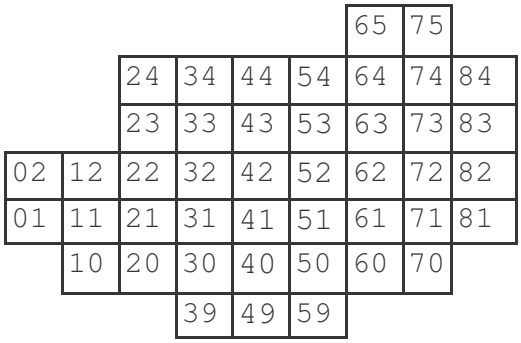




The past distribution of the wood white in Carmarthenshire.

[This article originally appeared in Brit Butterfly Cons Soc News (1987) 39:39-40]

COLEOPTERA

NOTES ON GLOW WORMS ON SKOMER ISLAND NATIONAL NATURE RESERVE -J E HODGES

Skomer Island has probably the largest population of glow worms Lampyris noctiluca in Pembrokeshire. The presence of female glow-worms in the vegetation close to the footpaths in late June and early July adds to the pleasure of watching Manx Shearwaters Puffinus puffinus returning to (or leaving) their burrows at night; but how much is known about them? During July 1987, an attempt was made to estimate the numbers of glow worms present in the vegetation adjacent to the footpaths and to gain an impression of the distribution of female beetles on the island. The "census" was carried out on the nights of 5 and 6 July 1987, between 11 pm and 2 am (approximate times). On both nights the weather was dry and mild with clear skies, although there was a dense mist on the second night. The two observers walked sections of the footpath systems, marking the locations of groups or individuals onto a 1:10,000 scale compartment map. All the glow worms seen from the paths were counted. Throughout the exercise, the observers strictly adhered to the footpaths, for obvious reasons. Large areas of the island, including all of the Neck, were therefore not included in the survey.

Glow worms were found along all sections of the footpaths, with the exceptions of the stretch between the Mew Stone and the Wick (on the south plateau) and between the Skomer Head area and Pig Stone Bay. A total of 268 female beetles were recorded during the 2 nights survey work. The greatest concentrations of beetles seemed to occur in areas characterised by short maritime grassland or bird-cliff vegetation, such as that on the coastal slopes on the north side of the Wick (compartment 12) where the largest aggregation of individuals seen was 27. Large numbers were also seen in short turf (flushed in places) above the Basin and Tom's house, in compartment 14. An individual was on top of a flat stone on the boundary wall. Elsewhere, between End Wall Ridge and the field boundary between compartments 16 and 18, most beetles seemed to occur in short, open vegetation, or to be associated with the old field boundaries close to the footpath. Away from the path, the vegetation in compartments 11, 15 and 16 is often dominated by dense stands of bracken Pteridium aquilinum. Glow worms found in compartment 18 tended to be rather scattered, with no obvious aggregates of individuals. Here the dry acidic grassland is grazed by rabbits which maintain a close-cropped sward.

In compartments 2, 4, 5, 7 and 8 most glow worms again occurred in areas close to the footpath, where bracken peters out. The old field boundaries were also favoured to some extent. This pattern was also observed in compartments 10 (where glow worms frequently chose the tops of tussocks of purple moor-grass Molinia caerulea), 8 and 9. In compartments 3, 19 and 14, the impression gained was that glow worms were "thinner" on the ground than, for example, in the vicinity of the Wick and the slopes above the Basin/Tom's house. Only two beetles were seen in compartment 13 - both on dead clumps of Yorkshire fog Holcus lanatus. It is virtually impossible to draw any conclusions from this casual "census", for the following reasons:

a Only a fraction of the island was surveyed. Visibility from the paths was restricted, especially on the second night, when thick mist enveloped the island.

b No detailed habitat notes were made.

c Glow worm activity may vary between nights due to weather conditions (eg temperature, precipitation) and other environmental factors. (It is noticeable that there is often tremendous variation in the numbers of glow worms from week to week and even night to night).

The female glow worm uses luminescence (produced by organs located on the ventral surface of the terminal abdominal segment) to attract males. Female glow worms are

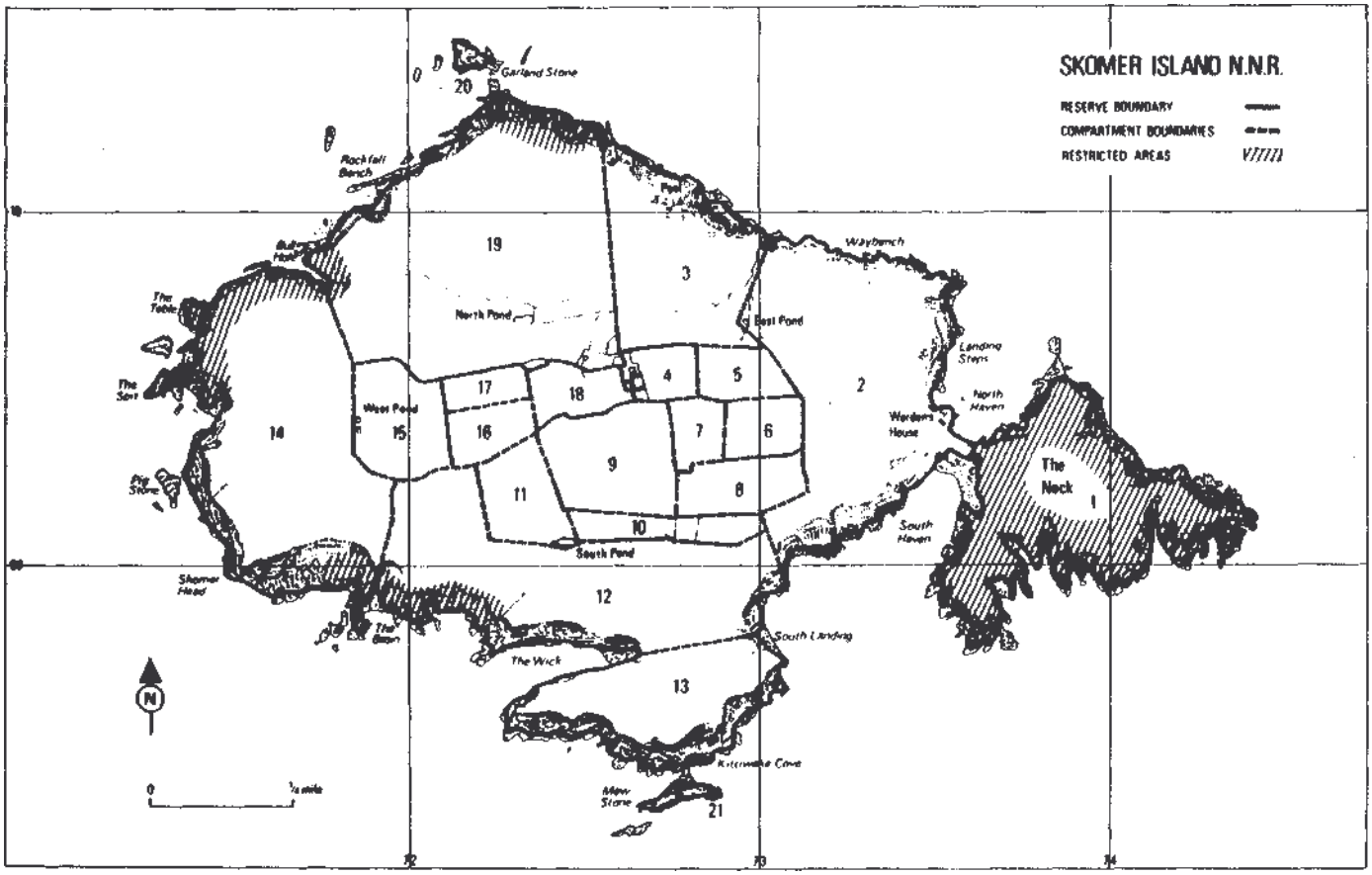
flightless, lacking both wings and elytra, and are totally dependent on light to attract passing males. With this in mind, it would be tempting to conclude that females select areas where the vegetation is relatively short, or prominent features such as the tops of banks or walls where they are most likely to be seen by males. However, a much more systematic approach to survey and recording would be required before a direct link between structural characteristics of vegetation and the distribution and frequency of glow worms can be established.

Glow worms appear to be generally declining, probably due to habitat loss, or other factors. The population on Skomer is significant in county terms. There appears to be scope for a little research, perhaps, into the following:

i Population size and subsequent changes.

ii Habitat preferences: relationship between the distribution of glow worms and structural characteristics of the vegetation.

Any study would have to be carried out over a period of weeks, during the "glow worm season", to pick up variations in, or patterns of, activity. One season's observations may not be sufficient, especially if the objectives of further work were to include monitoring of the size of the population. It is all part of the island's ecology - any volunteers?



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LETTERS TO THE EDITOR

Following A P Fowles' article on the bog bush-cricket Metrioptera brachyptera (DIG 7: 7) I consulted my records and could find no other localities in North Wales, apart from those mentioned, for this uncommon insect. I know of no recent record for the Aberdaron site but I did take a female at Fenn's Moss on 18 August 1979 and saw a second one nearby.

It was interesting to read of another Cardiganshire record for Ashworth's Rustic Xestia ashworthii, a species almost entirely restricted to grid square SH. When I reviewed the status of this moth in Wales (Nature in Wales (1974) 14:117-121) I was unable to find any post-1960 records for the vice-county of Cardigan though there were two older ones for the Aberystwyth district and from the Plynlimon area. This species is much more widely distributed than used to be suspected.

I K Morgan refers to the beetle Dascillus cervinus (DIG 7: 6) which, according to Fowler, feeds "at the roots of plants especially orchidacea". I have always viewed this statement with great scepticism. The beetle is relatively common is this area and I often find it in my garden on warm sunny days in June, but there are no orchids growing there and few in the surrounding sheep pastures. There must be a more common foodplant. I once disturbed a larva in a heap of loose soil in my garden in early November but it was probably settled down for the winter and not feeding. There seems no doubt that it is a soil dweller but presumably feeding on roots more readily available than those of orchids.

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Editor's note: Xestia ashworthii has now been found on six occasions in Ceredigion. F C Best reported finding larvae "scarcely on a rock in Cardiganshire during 1934 and 1935" (Ent 70: 212) and P B M Allen believed this was somewhere on Pumlumon (Moths and Memories (1948) p 183). S Gordon Smith (The Butterflies and Moths found in the county of Cardiganshire. Cheshire, North and Mid-Wales Natural History (1951) IV: 22) wrongly reports this as "Aberystwyth district" and F C Best (pers comm, 1987) has recently confirmed that the locality was, in fact, the cliffs of Craig-y-pistyll above Talybont. There were no further sightings for almost fifty years but adults have now been captured five times in as many years, all in the general area of the Dyfi valley. Singletons were trapped at Plas Gogerddan (29 July 1982 and 18 July 1983.) Talybont (July 1982), RSPB Ynyshir (15 July 1983) and at Salem (26 July 1987 - DIG 7: 8).

HELOPHORUS ALTERNANS - CORRECTION

In the article entitled "Beetles of the Tan-y-Bwlch area, Aberystwyth" by D C Boyce (DIG 7: 3) the water beetle Helophorus alternans was reported from the "brackish river shingle behind the storm beach. The specimen has now been confirmed as the common Helophorus aequalis by Garth Foster of the Balfour-Browne Club, who points out that Joy's keys are inadequate for water beetle identification.