DYFED
INVERTEBRATE
GROUP

Dec 1991

NEWSLETTER N°. 23

ISSN 0952 - 5327

Editor-AP Fowles, c/oCCW, Plas Gogerddan, Aberystwyth, Dyfed, SY23 3EE.

COLEOPTERA

THE BEETLES OF PEMBROKESHIRE PEATLANDS, 1987 - D C BOYCE, P R HOLMES & D K REED

Introduction

During the summer of 1987, a survey of the invertebrate fauna of peatland sites in Pembrokeshire was undertaken. This work formed part of the Welsh Peatland Invertebrate Survey (W.P.I.S.), a three-year project set up by the Nature Conservancy Council. Using pitfall traps as the chief sampling technique, W.P.I.S. aimed to provide a baseline of data regarding the invertebrate communities present on wetlands in Wales, to relate these communities to environmental features and, in particular, to suggest appropriate management. In addition to the programme of pitfall trapping, further sampling was carried out through the medium of water traps and by hand-searching litter. Twenty-one sites were investigated in Pembrokeshire. These were selected to adequately encompass the considerable diversity of peatland formations in the county. These range through the whole spectrum from ombrotrophic raised mire through to tall fen. Particularly important habitat types targeted for study were the lowland fens, coastal wet heaths, and the extensive wet heath/flush systems skirting Mynydd Preseli.

Pembrokeshire is richly endowed with lowland fen systems. Many of these are to be found in the valleys produced by meltwater erosion subsequent to the last glaciation. Examples of such sites sampled by W.P.I.S. include Dyffryn Gwaun and Portheiddy Moor. Closely allied to the valley fens are the floodplain fens which, as their name suggests, occur where the site is seasonally inundated with river water. The transition between floodplain fen and valley fen is well illustrated at Cors Llangloffan where tall fen communities of common reed and reed canary grass occur on the low-lying floodplain of the Western Cleddau. Towards the periphery of the fen, where there is no seasonal input of nutrients from the floodwaters, a more acidophilous, poor fen vegetation is established. Floodplain fen also occurs on the coast, as at Goodwick Moor, an area of diverse fenland vegetation, and Castle martin Corse. The latter, a very extensive fen of some thirty hectares, is enriched by calcareous groundwater derived from the surrounding dune systems. Similar conditions exist at Cors Penally, situated on the South Pembroke coast and sandwiched between Carboniferous Limestone to landward and calcareous sand dunes towards the sea. It is not always easy to assign a peatland to a particular category, as at Aber Mawr, where a tall fen has developed behind a coastal shingle bar which has dammed the stream. Another unusual site investigated by W.P.I.S. was Marloes Mere, a shallow clay-lined dish with little or no peat deposit, which floods extensively in the winter.

The botanical interest of the lowland heaths has been well known for some time but, somewhat surprisingly, they have remained relatively unexplored by entomologists until recently. Particularly fine examples looked at by W.P.I.S. were Dowrog Common, Trefeiddan Moor and St. David's Airfield Heaths. In reality these sites are much more than simply heath,

but rather form a mosaic of heath, valley and basin fens, and carr. Another factor that may be important in influencing the beetle communities present here is the hyper-oceanic climate experienced by many of these heaths. In layman's terms, such a climatic regime results in very mild, wet and frost-free winters and cool, wet summers.

Mynydd Preseli is the main range of hills in Pembrokeshire, rising to 536 metres at Foel Cwm-cerwym. On the lower fringes of these hills, numerous springs arise to form an intimate network of flush lines imposed over the heaths and acidic grasslands that constitute the dominant vegetation types on these hills. As with the lowland heaths, considerably more is known of the flora than of the invertebrate fauna. Having said this, the Preseli flush systems are known to be of national importance for their dragonfly fauna, in particular for the large population of southern damselflies Coenagrion mercuriale present. These sites were sampled relatively intensively by W.P.I.S. at Brynberian Moor, Gors Fawr, Waun Fawr and Waun Isaf.

Esgyrn Bottom is the most south-westerly raised mire in Britain and, although rather damaged by drainage and peat-cutting, it still has areas of pool and hummock bog supporting vegetation typical of raised mires, including the stenotopic bog moss Sphagnum magellanicum. The mire is on the floor of a steep-sided valley scoured out by water flowing from the melting glaciers and the bog is thought to have developed over a post-glacial lake.

Superimposed on this range of mire types is a diverse collection of vegetation communities which are as important as the physical factors discussed above in determining the beetle fauna of a site. In particular, the degree of structure or architecture possessed by the vegetation is of crucial importance in determining which species of beetles are present. On an undisturbed peatland, the fauna would be a product of a number of physical, chemical and biological factors, amongst which the most important would be: hydrology, water chemistry, substrate, vegetation composition and structure, and climate. The interpretation of this is further complicated by the influence of Man, who, through his management or damage of sites, can also fundamentally influence the composition of the beetle community.

Notes on the beetle fauna

A total of 438 species of beetles were recorded during the course of the survey. Typically, the bulk of these (128 species) belonged to the large rove beetle family (Staphylinidae), along with 67 species of ground beetles (Carabidae). It is known that members of both of these families pitfall trap relatively well, as they are, for the most part, ground active predators and scavengers. Other well represented groups were the leaf beetles (Chrysomelidae; 50 spp.), water beetles (Dytiscidae, Hydrophilidae & Hydraenidae; 48 spp.) and weevils (Apionidae & Curculionidae; 38 spp.). Many trap lines were situated at the transition between terrestrial and aquatic habitats and this is reflected in the relatively large number of water beetles recorded. Sweep-netting during the survey would undoubtedly have resulted in the capture of many more species of leaf beetles and weevils.

Tall fen, composed of large monodominant stands of bulky monocotyledons such as common reed, reedmace, bur-reed and reed canary grass, tends to have a rather limited, but at the same time, highly specialised, fauna. The carabids, in particular, are few in number, although Agonum thoreyi can be very abundant. In the extensive reedbed at Castlemartin Corse, eight individuals of the nationally scarce carabid Pterostichus gracilis were found. It is amongst the rove beetles that the greatest diversity of species occurs in this habitat. Many are detritivores that thrive in the dense litter layer. The colourful red, green and black Paederus riparius is a typical denizen of tall fen, as are a number of members of the genus Stenus, such as S. bimaculatus, S. juno, S. latifrons and S. pallitarsis. At the Ritec, these four were accompanied by S. nitens, which was found by W.P.I.S. at a handful of sites in South Wales. Where the fen is particularly eutrophicated, other rove beetles, such as Quedius scintillans, Megarthrus spp. and Tachinus spp., which are more often found in compost, manure, etc., may also be present. At Cwm Dewi, a small coastal valley fen near Fishguard, this community was especially well represented, with all of the above species present. This may indicate that excessive nutrient enrichment is occurring here. Closely related to the rove beetles are the pselaphids, tiny beetles that were at their most abundant and diverse in the litter layer of tall fen. The diminutive Bibloplectus spinosus is a nationally notable species that

was particularly characteristic of this habitat. In Pembrokeshire it was recorded at Cors Penally, Cwm Dewi, Goodwick Moor, Llangloffan Fen, St. David's Airfield Heaths, Trefeiddan Moor and Western Cleddau.

Moving into fens with a more open and varied structure, the diversity of Coleoptera greatly increased. A striking example was at Llangloffan Fen, where an area of lightly cattle grazed reed canary grass floodplain fen had 28 species of ground beetles, whilst an identical area of ungrazed fen just over a fence had only nine species (Holmes 1989). The main reason for this difference was probably the absence of a dense litter layer on the grazed fen, which prohibits the free movement of ground beetles. A classic case was the bug-eyed, metallic bronze Elaphrus cupreus, of which 61 individuals were found in the grazed fen and none in the ungrazed area. This beetle is a diurnal, visual predator that hunts its prey by sight and then runs it down. Clearly, such a hunting technique would be incompatible with a dense litter layer. The nationally notable carabids Chlaenius nigricornis and Trechus discus were also recorded from the area of grazed fen. C. nigricornis was quite widely recorded by W.P.I.S. in Wales, though almost always in sites that were of high interest for their invertebrate fauna. Its chief requirement was for peatlands with a high water table and as such it was most often encountered in floodplain fen. It, like many other carabids, favoured a degree of grazing of its habitat and could even be found in heavily grazed fen such as Marloes Mere. Other Pembroke sites for Chlaenius were Castlemartin Corse, Cors Penally, Dowrog Common and Puncheston Common. T. discus, by comparison, was found by W.P.I.S. at only one other site in Wales. It is thought to lead a largely subterranean existence, burying down into wet peat and mud. This may account for its apparent rarity. Interestingly, Llangloffan fen also produced records of the small rove beetles Carpelimus corticinus and C. gracilis, which also burrow in wetland substrates.

The genus Agonum is very useful in classifying the ground beetle communities of fenland sites, though as the transition to more acid mires is made they decline in abundance and diversity and tend to be replaced by Pterostichus species. As mentioned earlier, A. thoreyi is almost confined to tall fen, whilst in grazed, open-structure fen it is replaced by A. moestum, A. piceum and A. viduum. A. gracile requires a very high water table and, whilst it too can be found in nutrient rich fen, it also occurs in a wide range of other peatland types right through to acid basin fens. Oodes helopiodes is another carabid requiring a very high water table. It is nationally notable and was only found at a handful of Welsh sites during the current survey. The beetle is matt black in colour with a streamlined shape, somewhat suggestive of a water beetle, and it also has a marked reduction in setae (Lindroth 1974). These are thought to be adaptations to an aquatic existence. Three individuals were found in calcareous fen at Cors Penally. Also at Cors Penally, single specimens of the large rove beetle Staphylinus dimidiaticornis and of the sulphur beetle Cteniopus sulphureus were found. Both are uncommon inhabitants of dry coastal habitats and in this instance have probably strayed from the adjacent sand dunes. This hints at another of the problems of interpreting data collected in this manner, namely the propensity of beetles to wander from their typical habitats. In the narrow, linear, valley fens of Pembroke this problem was particularly felt.

Botanical diversity increases as we move from the tall fens to more open structured fenland and the number of phytophagous beetles present is also increased. The handsome Phyllobrotica quadrimaculata was found in association with its foodplant, common skullcap, at Cors Penally, Llangloffan Fen and Western Cleddau. Mantura obtusata, a small, bronzy flea beetle, was only found at the latter two sites, in poor fen. Despite the abundance of its foodplant, Rumex acetosa, this species was only rarely recorded by W.P.I.S. More widespread was another flea beetle, Phyllotreta flexuosa, which feeds on wetland crucifers and was encountered in seven Pembroke sites. Amongst the weevils, the rather local Notaris scirpi was recorded at Cwm Dewi and Abagous lutulentus, which feeds on Equisetum species, was taken on the floodplain fen at the Ritec. Rumex acetosa is also the foodplant of Apion cruentatum and it was recorded on both of the sites with Mantura obtusta and also at Dyffryn Gwaun. Other typical fenland inhabitants were the two soldier beetles, Cantharis pallida and C. thoracica, which were common across the spectrum of fenland sites sampled by W.P.I.S. Much more elusive was the 19-spot ladybird Anisosticta 19-punctata, a fenland specialist only found by us in reed litter at *the* Ritec. This ladybird is *somewhat* southern and *eastern in* its Welsh

distribution and is possibly at the edge of its range here.

The lowland wet heaths were rather disappointing in their invertebrate fauna, with the greatest interest being concentrated in the other wetland habitats present on these sites. For example, Trefeiddan Moor had little of interest on the area of wet heath investigated but the mesotrophic basin fen on this site was superb with both communities and species of considerable note. Two nationally scarce rove beetles, Stenus oscillator and Philonthus corvinus, were recorded. S. oscillator has been found at a number of acid/mesotrophic fens in Wales and is another species that appears to require permanently saturated conditions. P. corvinus is a rather undistinguished, black staphylinid that was also found by W.P.I.S. in very similar habitat on St. David's Airfield Heaths and elsewhere in Wales at only one site on the Lleyn Peninsula. It is interesting to note that these three sites all experience extremely oceanic climates and that the uncommon carabid Badister dilatatus was also found by W.P.I.S. only at Trefeiddan Moor and on Lleyn. Does this reflect a 'relict' distribution in Wales?

Although lacking rare species, the carabid fauna of wet heath was distinctive, being characterised by species such as Carabus arvensis, Amara lunicollis, Bembidion mannerheimi and Bradycellus spp. In addition to these species, other, more eurytopic, ground beetles of the genus Pterostichus occurred commonly, in particular P. diligens, P. minor and P. nigrita sensu lato. These three (along with Agonum fuliginosum) were the commonest ground beetles recorded by W.P.I.S. in Pembrokeshire, being recorded at 40, 38 and 42 trapping stations respectively out of the 56 stations sampled on the 21 sites in the county. They were all most common across the acidic end of the peatland spectrum, though they could also be found in rich fen in lower numbers. A. fuliginosum was found in 36 stations but, like other species of the genus, was more characteristic of taller vegetation, particularly in poor fen.

Pools in wet heath in other areas of Britain, such as the New Forest, have an outstanding water beetle fauna. This did not appear to be the case on the Pembroke heaths, though the notable Rhantus grapii was recorded from Dowrog Common, St David's Airfield Heaths and Trefeiddan Moor. However, our sampling techniques were not intended to comprehensively survey the water beetle assemblages of peatlands and further surveys could still reveal much of interest in these heathland pools. It was also hoped that the Preseli sites might yield a rich water beetle fauna, primarily because of the presence on these sites of a number of pingos, water-filled depressions resulting from the last glaciation. In other parts of Britain these support a superb 'relict' fauna but not, it would seem, in Wales. The nationally notable Helochares punctatus, recorded from Waun Isaf, was perhaps the best find. Fortunately, the Preseli flushes did have much of interest. The Red Data Book staphylinid, Stenus opticus, was found on Brynberian Moor and Gors Fawr. It has subsequently turned up in a number of . other Welsh localities and possibly has its national headquarters in the Principality. Its preferred habitat seems to be acidic/mesotrophic fen with a very high water table. S. oscillator, mentioned earlier in connection with Trefeiddan Moor, was also found in a wet acid flush on Brynberian Moor.

Wet heath adjacent to the Preseli flushes had leaf beetles of note, such as the Juncus-feeding Chaetocnema confusa and Longitarsus holsaticus, which feeds exclusively on louseworts Pedicularis spp. At Waun Isaf, the local weevil Anthonomus brunnipennis was recorded. It is chiefly associated with tormentil and is probably widespread on heaths and acidic grasslands in the county. Perhaps the most characteristic beetle of these flushes was the spectacular, metallic green, ground beetle Elaphrus uliginosus, which was found at Brynberian Moor, Waun Fawr and Waun Isaf, and in Wales generally shows a strong affinity for well-grazed flush systems. An upland element to the beetle fauna was very poorly developed here, the only exception being Quedius boopoides, a small, dark brown, rove beetle that is generally found in upland areas.

As in other regions of Wales, the peatlands of Pembrokeshire have few outstanding rarities amongst the Coleoptera. Their importance lies rather in the abundance of 'second rank' species and communities which, whilst being quite scarce in Britain as a whole, are still relatively common in Wales. The preservation of such typical peatland communities is every bit as important as the conservation of rarities. In this respect Pembrokeshire still has a remarkable

peatland resource and much more work is needed before we will have a clear picture of the range of wetland invertebrate communities present in the county.

Acknowledgements:
Thanks are due to Dr KNA Alexander, J Cooter, Dr ML Cox, M Darby, Dr GN Foster, T Eccles, AP Fowles, C Johnson, AH Kirk-Spriggs, Dr ML Luff, Dr MEN Majerus and Prof JA Owen for identifying and verifying material, and to SB Evans, District Officer for Pembroke of the Countryside Council for Wales.

References:
HOLMES, PR (1989) - The effect of site management on carabid beetle numbers on selected Welsh peatlands. Welsh Peatland Invertebrate Survey Newsletter 3: 2-6.

LINDROTH, CH (1974) - Handbooks for the identification of British insects. Vol 4, part 2. Coleoptera, Carabidae. Royal Entomological Society, London.

APPENDIX: Sites surveyed by W.P.I.S. in Pembrokeshire.

Aber Mawr	12/882345	Marloes Mere	12/775083
Brynberian Moor	22/118345	Portheiddy Moor	12/808314
Castlemartin Corse	11/897998	Puncheston Common	22/003302
Cors Penally	21/118989	Ritec	22/109012
Cwm Dewi	22/008397	St. David's Airfield Heaths	12/798262
Dowrog Common	12/779274	Trefeiddan Moor	12/734254
Dyffryn Gwaun	22/049348	Tre-Rhos Common	12/924272
Esgyrn Bottom	12/968346	Waun Fawr	22/017304
Goodwick Moor	12/945374	Waun Isaf	22/142301
Gors Fawr	22/131295	Western Cleddau	12/896317
Llangloffan Fen	12/907317		

THE ESSO REFINERY SITE NEAR MILFORD HAVEN (12/870060), PEMBS. - A DECOMMISSIONED INDUSTRIAL SITE OF CONSIDERABLE WILDLIFE INTEREST -J W DONOVAN

In late 1988 I was asked to carry out a natural history appraisal of this 700 acre site on the northern flank of Milford Haven - an oil refinery which is in the process of dismantling and where considerable impact had been made on the former agricultural land by the needs of industry. Bunded tank bases (areas of vegetation treated chemically because of the risk of fire) and an area which is substantially unvegetated were the major features present. The site is on Old Red Sandstone and essential earth-moving works had produced a diverse topography with small cliffs, slopes, and even pools. Small patches of old pasture, hedges, and wetlands below seepages were also present. Following the original survey and report, monthly monitoring has taken place and, whilst the author of this note is primarily interested in botany and ornithology, several uncommon invertebrates have also been recorded, which rather points to the area being worthy of a more detailed investigation of these groups.

In June 1991, at one small pool created by blocking a drain, Odonata recorded included common blue damselflies Enallagma cyathigerum, common darters Sympetrum striolatum and four-spotted chasers Libellula quadrimaculata. By late July this same pool held emperor dragonflies Anax imperator and, to my total surprise, several very active keeled skimmers Orthetrum coerulescens. Previously I had only encountered this latter species on the acidic, upland wetlands of Preseli. Subsequently many of these species of dragonflies were recorded elsewhere on the site.

It was particularly pleasing to find grey bush crickets Platycleis albomaculata (at three locations and in good numbers) and some fifteen or so six-belted clearwing Bembecia scopigera moths in the close vicinity of a vigorous clump of bird's-foot trefoil, their larval foodplant. The discovery of two small colonies of brown argus Aricia agestis butterflies added to the list of interesting records.

With the end of oil refining and subsequent site closure, planning needs to reinstate the area became imminent and, indeed, landscaping works on the visible refinery boundaries have taken place. Without a doubt, some pleasant features have developed, including long slopes, ridges and shallow pools. These works were carried out in 1990 and already they are becoming vegetated from the exisiting seed bank. However, the really interesting and productive areas in plant and invertebrate terms are those places where landscaping has not yet proceeded. It is clearly important that, in these situations, surveys are carried out to ensure that scenic 'improvements' do not cause the loss of important wildlife populations. This will enable species already present on the site to colonise the landscaped areas in the future as the newly-created habitats become suitable for different species.

HEMIPTERA

A PROVISIONAL LIST OF THE HETEROPTERA OF CARMARTHENSHIRE (VC44) - P KIRBY

Carmarthenshire has never been amongst the first rank of counties popular with heteropterists and, although it has not suffered from the extraordinary dearth of records shown until recently by some inland counties, it has taken many years for the Carmarthenshire list to reach a healthy total. Although seemingly quite neglected in the nineteenth century, Carmarthenshire showed early promise in the twentieth. A series of papers by E A Butler published between 1907 and 1912 recorded a number of interesting species, including the alien Xylocoris flavipes from a Carmarthen warehouse and the first British record of Polymerus palustris. Butler's "Biology of the British Hemiptera-Heteroptera", published in 1923, makes further mention of many of these records. Confusingly, though, his table of county distributions omits some Carmarthenshire records included in earlier publications. Despite these early hints of a rich fauna, other Hemipterists do not seem to have been tempted, and the records for Carmarthenshire in Massee's county distribution table, published in 1955, are largely direct transcriptions from Butler. Some aquatic species were recorded in a series of papers by J R Erichson-Jones (1948-51), J Green made a study of Plea minutissima from the county in 1953, and small numbers of records were added by H G Stokes (published in 1952) and by Arthur Price, a schoolmaster who holidayed in Kidwelly in the late 1950's and early 1960's. Price's records are published in Miles (1959, 1961a, 1961b) and in Price (1961).

The 1960's, 1970's and early 1980's saw the county's Heteroptera once more neglected: neighbouring Glamorgan and Pembrokeshire seem to have exerted a greater attraction. 1985 saw the beginning of an upsurge in recording. A brief visit by B J Tigar and P S Hyman in August of that year produced several new county records, as did a visit by R S Key in 1988. Collecting by Ian Morgan and Mark Pavett from 1985 onwards, and particularly intensive recording by Ian Morgan in 1990, have added considerably to the county list. The Nature Conservancy Council's Welsh Peatland Invertebrate Survey operated pitfall and water traps in ten peatland sites in the county in 1989. The Heteroptera catches from these traps, though not large, included several species not previoulsy recorded for the county. In 1991 the Heteroptera Study Group held a weekend field meeting in Carmarthenshire, based at Ferryside, and despite poor weather managed to add further to the county list.

With such a concentration of recent activity in the county, now seems an appropriate time to take stock of what is known of the county's Heteroptera. The list below assembles records from all readily available sources. The search for records has not been exhaustive, and other published and unpublished records may exist. The final list is of 240 species. Although this is quite a good total, it is clearly still incomplete and some obvious recording gaps can be

recognised. Further collecting from trees, and perhaps especially from conifers, should add a number of widely distributed and common species. Surprisingly, for they are usually amongst the best-recorded of Heteroptera, there is much more to be done with the aquatic species. Several generally common corixids are not included in the county list below. It is hard to believe that such species as Callicorixa praeusta and Sigara fossarum have not been recorded in the county by someone in the past, even if the records are not now readily accessible.

The coastal dunes have, quite rightly in view of their richness for Heteroptera, tended to receive the lion's share of recording effort, especially in Butler's time. Despite this, there is scope for the finding of more species of interest in these sites. There are several uncommon dune species recorded from both Glamorgan and Pembrokeshire (for example, the lygaeid Pionosomus varius) which have not yet been found in Carmarthenshire. There seems no obvious reason why such species should not occur in this county also.

SOURCE CODES

B07 = Butler 1907
B1O = Butler 1910
B11 = Butler 1911
B12 = Butler 1912
B23 = Butler 1923
Br = Brown 1951
F = A P Fowles records 1988, det. P Kirby
G = Green 1953
H = Heteroptera Study Group field meeting, August 1991
IKM = IK Morgan records 1985-1991, conf./det. P Kirby
J48 = Jones 1948
J51 = Jones 1951
K = R S Key: lists from Laugharne Burrows (SN2607) and Bishops Pond, Abergwili (SN4420) in 1988
LQ = Le Quesne 1955
M = Massee 1955
Mi 59 = Miles 1959
Mi61a = Miles 1961a
Mi61b = Miles 1961b
MJM = M J Morgan records 1986
Mo91 = Morgan 1991
N = B S Nau records 1990
P = Price 1961
Pa = P M Pavett records, 1985-1991
S = Scudder 1956
Ste = J B Steer field records, 1989-1990
Sto = Stokes 1952
TH = B J Tigar & PS Hyman: records from visit to Carms. August 1985
W = Welsh Peatland Invertebrate Survey: Nature Conservancy Council survey material, 1989: det. P Kirby.

LIST OF HETEROPTERA RECORDED FROM CARMARTHENSHIRE, WITH SOURCE OF RECORDS

ANEURIDAE	
Aneurus avenius (Dufour)	IKM, Mi61b, P, Pa
Aneurus laevis (Fab.)	Pa
ACANTHOSOMATIDAE	
Acanthosoma haemorrhoidale (L.)	IKM, Pa
Elasmostethus interstinctus (L.)	IKM
Elasmostethus tristriatus (Fab.)	IKM, Mo91

CYDNIDAE	
Thyreocoris scarabaeoides (L.)	B12, B23, IKM, M, Sto
SCUTELLERIDAE	
Eurygaster testudinaria (Geoffroy)	K, H, IKM, Mi61b, P
PENTATOMIDAE	
Palomena prasina (L.)	H, IKM, Mi61b, N, P, Pa
Dolycoris baccarum (L.)	B12, B23, H, IKM, M, Mi61a, Mi61b, P, Pa, TH
Piezodorus lituratus (Fab.)	B12, B23, H, IKM, M, Mi61a, Mi61b, N, P, Pa, Ste, W
Pentatoma rufipes (L.)	H, IKM, M
Picromerus bidens (L.)	IKM, Mi61a, Mi61b, P, Pa, Ste
Troilus luridus (Fab.)	H, IKM
Zicrona caerulea (L.)	B12, B23, IKM, M
COREIDAE	
Enoplops scapha (Fab.)	IKM, Mo91
Coreus marginatus (L.)	F, H, IKM, Mi61a, P, Pa
Arenocoris falleni (Schilling)	B11, B12, B23, H, M
ALYDIDAE	
Alydus calcaratus (L)	H, K
RHOPALIDAE	
Corizus hyoscyami (L)	B11, B12, B23, H, IKM, K, M, Mo91, Sto, TH
Rhopalus parumpunctatus Schilling	B12, B23, H, M
Myrmus miriformis (Fallen)	H
Chorosoma schillingi (Schummel)	B11, B12, B23, H, M
STENOCEPHALIDAE	
Dicranocephalus agilis (Scopoli)	B11, B12, B23, H, IKM, M, Mo91, Pa, Sto
LYGAEIDAE	
Heterogaster urticae (Fab.)	B12, B23, M
Chilacis typhae (Perris)	IKM, Mo91
Henestaris laticeps (Curtis)	IKM, Mo91
Nysius ericae (Schilling)	H, IKM, TH
Nysius thymi (Wolff)	H
Kleidocerys resedae (Panzer)	H, IKM
Pachybrachius fracticollis (Schilling)	IKM, W
Peritrechus geniculatus (Hahn)	W
Megalonotus chiragra (Fab.)	B12, B23, M, Sto
Megalonotus praetextatus (H.-S.)	B12, B23, M
Trapezonotus arenarius (L.)	IKM
Trapezonotus desertus Seidenstucker	H, IKM
Stygnocoris fuligineus (Geoffroy)	B12, B23, IKM, M
Stygnocoris rusticus (Fallen)	B12, B23, M
Stygnocoris sabulosus (Schilling)	B12, B23, IKM, M, W
Drymus brunneus (Sahlberg)	B12, B23, IKM, M
Drymus sylvaticus (Fab.)	B12, B23, IKM, M, Pa, W
Scolopostethus affinis (Schilling)	B12, B23, M
Scolopostethus decoratus (Hahn)	B12, B23, IKM, M, W
Scolopostethus grandis Horvath	W
Scolopostethus puberulus Horvath	IKM, Mo91
Scolopostethus thomsoni Reuter	B12, B23, IKM, M, N, W
Taphropeltus contractus (H.-S.)	B12, B23, M

Gastrodes grossipes (DeGeer)	H, IKM
Cymus claviculus (Fallen)	B23, IKM
Cymus glandicolor Hahn	IKM, K
Cymus melanocephalus Fieber	B23
BERYTIDAE	
Berytinus minor (H.-S.)	H
Berytinus montivagus (Meyer)	K
Berytinus signoreti (Fieber)	B12, B23, M
Neides tipularius (L.)	B11, B12, B23, M, Sto
Gampsocoris punctipes (Germar)	B12, B23, H, IKM, M, Sto, TH
Metatropis rufescens (H.-S.)	H, IKM, Mo91
PIESMIDAE	
Piesma maculatum (Laporte)	B12, B23, M
Piesma quadratum quadratum (Fieber)	H, IKM, Mo91
TINGIDAE	
Acalypta carinata (Panzer)	W
Acalypta parvula (Fallen)	B12, B23, H, M
Dictyonota strichnocera Fieber	B12, B23, M
Kalama tricornis (Schrank)	B12, B23, M
Derephysia foliacea (Fallen)	B12, B23, M, Pa
Tingis cardui (L.)	B12, B23, H, IKM, M, Pa
Dictyla convergens (H.-S.)	W
Agramma laetum (Fallen)	B12, B23, M
REDUVIIDAE	
Coranus subapterus (DeGeer)	B12, B23, H, IKM, M
NABIDAE	
Nabis ferus (L.)	B12, B23, H, IKM, M, W
Nabis ericetorum Scholtz	B12, B23, IKM, M, W
Nabis rugosus (L.)	B12, B23, H, IKM, M
Aptus mirmicoides (Costa)	B12, B23, H, IKM, M, TH
Anaptus major (Costa)	B23, H, IKM, K, M
Nabicula limbata (Dahlbom)	B12, B23, H, IKM, M, TH, W
Nabicula lineata (Dahlbom)	B12, B23, H, IKM, M
Nabicula flavomarginata (Scholtz)	B12, B23, IKM, M, TH, W
ANTHOCORIDAE	
Temnostethus gracilis (Horvath)	LQ, N, S
Temnostethus pusillus (H.-S.)	LQ, S
Anthocoris confusus Reuter	B12, B23, F, IKM, M
Anthocoris nemoralis (Fab.)	B12, B23, H, IKM, M, N
Anthocoris sarothamni Douglas & Scott	H
Anthocoris nemorum (L.)	B12, B23, H, IKM, K, M, N, W
Acompocoris pygmaeus (Fallen)	B23, M
Orius laevigatus (Fieber)	H, IKM
Orius niger (Wolff)	H, IKM
Lyctocoris campestris (Fab.)	B12, B23, M
Xylocoris cursitans (Fallen)	IKM, Mo91
Xylocoris flavipes (Reuter)	B07, B12, B23, M
MICROPHYSIDAE	
Loricula elegantula (Barensprung)	B12, B23, M, W
Myrmedobia exilis (Fallen)	B12, B23, M, W

MIRIDAE

Monalocoris filicis (L.)	B12, B23, H, IKM, M, N, W
Bryocoris pteridis (Fallen	B12, B23, H, IKM, M, N
Deraeocoris lutescens (Schilling)	IKM
Deraeocoris ruber (L.)	B12, B23, H, IKM, M, Pa
Lopus decolor (Fallen)	IKM
Megalocoleus molliculus (Fallen)	H, K
Macrotylus paykulli (Fallen)	B12, B23, H, IKM, M
Orthonotus rufifrons (Fallen)	B12, B23, IKM, M, N, TH
Harpocera thoracica (Fallen	IKM, Pa
Tytthus pygmaeus (Zetterstedt)	W
Phylus coryli (L.)	B12, B23, M, MJM, N
Phylus melanocephalus (L.)	MJM, N
Phylus palliceps Fieber	N
Psallus perrisi (Mulsant & Rey)	W
Psallus variabilis (Fallen)	B12, B23, M, N
Psallus salicis (Kirschbaum)	B12, B23, M
Psallus flavellus Stichel	B12,
Psallus lepidus (Fieber)	B12, N
Psallus haematodes (Gmelin)	B12, B23, H, IKM, M
Psallus diminutus (Kirschbaum)	B12, N
Psallus varians (H.-S.)	B12, B23, IKM, M
Coniortodes salicellus (H.-S.)	B12, B23, H, M
Atractotomus magnicornis (Fallen)	B12, B23, M
*Plagiognathus albipennis (Fallen) s.l.	B12, B23, M
*Plagiognathus litoralis Wagner	H

*see note under "doubtful and erroneous records" below

Plagiognathus arbustorum (Fab)	B12, B23, H, IKM, K, M, N, TH, W
Plagiognathus chrysanthemi (Wolff)	B23, H, IKM, K, M
Chlamydatus pullus (Reuter)	B12, B23, M
Chlamydatus saltitans (Fallen)	B12, B23, M
Sthenarus rotermundi (Scholtz)	H
Psallodema fieberi (Douglas & Scott)	H
Asciodema obsoletum (Fieber)	B12, B23, H, N, M
Hallodapus rufescens (Burmeister)	B12, B23, M
Systellonotus triguttatus (L.)	B12, B23, M
Macrolophus nubilus (H.-S.)	M
Dicyphus constrictus (Boheman)	B23, H, M
Dicyphus epilobii Reuter	B12, B23, H, IKM, K, M, N, W
Dicyphus errans (Wolff, J F)	B12, B23, H, IKM, M, W
Dicyphus stachydis Reuter	B12, B23, M
Dicyphus pallicornis (Meyer-Dur)	B12, B23, M, N
Dicyphus annulatus (Wolff, J F)	B12, B23, H, IKM, K, M, Sto
Campyloneura virgula (H.-S.)	B12, B23, H, M, N
Pilophorus clavatus (L.)	B11, B12, B23, M
Orthocephalus coriaceus (Fab.)	K
Orthocephalus saltator (Hahn)	B12, B23, IKM, M
Malacocoris chlorizans (Panzer)	B12, B23, H, M
Cyllecoris histrionicus (L.)	MJM
Dryophilocoris flavoquadrimaculatus (DeGeer)	IKM
Globiceps cruciatus Reuter	B12, B23, H, M
Heterotoma meriopterum (Scopoli)	B23, H, IKM, M
Blepharidopterus angulatus (Fallen)	B12, B23, H, IKM, M, N
Pachylops bicolor (Douglas & Scott)	B12, B23, IKM, M
Orthotylus tenellus (Fallen)	B12, B23, M
Orthotylus flavinervis (Kirschbaum)	B12
Orthotylus marginalis Reuter	B12, B23, M, N
Orthotylus ochrotrichus Fieber	B12, B23, H, M
Orthotylus prasinus (Fallen)	B23
Orthotylus virescens (Douglas & Scott)	H

Orthotylus flavosparsus (Sahlberg)	H, IKM
Orthotylus moncreaffi (Douglas & Scott)	N
Orthotylus diaphanus (Kirschbaum)	B12, B23, M
Cyrtorhinus caricis (Fallen)	B12, B23, IKM, M
Mecomma ambulans (Fallen)	B12, B23, H, M, N
Pithanus maerkeli (H.-S.)	B12, B23, IKM, M, TH, W
Lygus maritimus Wagner	H, IKM, N
Lygus wagneri Remane	W
Lygus rugulipennis Poppius	H, IKM, S
Liocoris tripustulatus (Fab.)	B12, B23, H, IKM, M, N
Orthops cervinus (H.-S.)	B12, B23, H, IKM, M
Orthops campestris (L.)	B12, B23, H, IKM, K, M, N, W
Lygocoris pabulinus (L.)	B12, B23, H, IKM, M
Lygocoris contaminatus (Fallen)	IKM
Lygocoris viridis (Fallen)	B12, B23, K, M, N
Lygocoris lucorum (Meyer-Dur)	B12, B23, IKM, M, N
Lygocoris spinolai (Meyer-Dur)	B12, B23, M, N
Camptozygum aequale (Villers)	B12, B23, M
Plesiocoris rugicollis (Fallen)	B11, B12, B23, M
Polymerus palustris (Reuter)	B10, B11, B12, B23, IKM, M, MJM, W
Polymerus unifasciatus (Fab.)	H
Polymerus nigritus (Fallen)	W
Miris striatus (L.)	IKM, Mo91
Calocoris quadripunctatus (Villers)	IKM, Pa, W
Calocoris stysi Wagner	B12, B23, IKM, M, N
Calocoris norvegicus (Gmelin)	B12, B23, H, IKM, K, M, N, W
Calocoris roseomaculatus (DeGeer)	Pa
Adelphocoris lineolatus (Goeze)	B12, B23, H, IKM, K, M
Adelphocoris seticornis (Fab.)	H
Stenotus binotatus (Fab.)	B23, H, IKM, K, M, MJM, N
Phytocoris dimidiatus Kirschbaum	H
Phytocoris longipennis Flor	B12, H, IKM
Phytocoris tiliae (Fab.)	M, Sto
Phytocoris ulmi (L.)	B12, B23, M, N
Phytocoris varipes Boheman	B12, B23, H, IKM, M, TH
Capsus ater (L.)	B12, B23, IKM, M, MJM, Pa, W
Pantilius tunicatus (Fab.)	IKM
Stenodema calcaratum (Fallen)	B12, B23, H, IKM, M, Pa, W
Stenodema holsatum (Fab.)	B12, B23, IKM, M, W
Stenodema laevigatum (L.)	B12, B23, H, IKM, M, N, TH
Notostira elongata (Geoffroy)	H, IKM, W
Trigonotylus psammaecolor Reuter	B12, B23, H, M
Trigonotylus ruficornis (Geoffroy)	B12, B23, M, W
Teratocoris antennatus (Boheman)	IKM
Teratocoris saundersi Douglas & Scott	IKM, W
Leptopterna dolabrata (L.)	B12, B23, H, IKM, M, N, TH
Leptopterna ferrugata (Fallen)	B12, B23, H, M, TH, W
DIPSOCORIDAE	
Ceratocombus coleoptratus (Zetterstedt)	B23, M
Cryptostemma alienum (H.-S.)	B12, B23, M
SALDIDAE	
Salda littoralis (L.)	IKM, Pa
Salda morio Zetterstedt	W
Salda muelleri (Gmelin)	W
Saldula scotica (Curtis)	B12, B23, M
Saldula orthochila (Fieber)	B12, B23, M
Saldula c-album (Fieber)	B12, B23, IKM, M

Saldula pallipes (Fab.)	H
Saldula palustris (Douglas)	IKM
Saldula saltatoria (L.)	B12, H, IKM, K, W
Chartoscirta cincta (H.-S.)	H, IKM, K, W
Chartoscirta cocksi (Curtis)	W
HEBRIDAE	
Hebrus ruficeps (Thomson)	W
HYDROMETRIDAE	
Hydrometra stagnorum (L.)	B12, B23, H, IKM, J48, M, W
VELIIDAE	
Velia caprai Tamanini	Br, H, IKM, M, W
Velia saulii Tamanini	IKM
Microvelia reticulata (Burmeister)	H
GERRIDAE	
Gerris thoracicus Schummel	J48, H, S
Gerris gibbifer Schummel	B23, IKM, J48, Pa, S, TH
Gerris argentatus Schummel	Pa
Gerris lacustris (L.)	B23, H, J48, J51, M, Pa, S, TH
Aquarius najus (DeGeer)	B12, B23, J51, M, S
NEPIDAE	
Nepa cinerea L.	B12, B23, IKM, M, Mi59, Mo91
Ranatra linearis (L.)	Mi59, P
NAUCORIDAE	
Ilyocoris cimicoides (L.)	IKM, Mo91, P, Pa
APHELOCHEIRIDAE	
Aphelocheirus aestivalis (Fab.)	J51, S
PLEIDAE	
Plea minutissima Leach	G, IKM, J51, M, Pa, S
NOTONECTIDAE	
Notonecta glauca L.	B12, B23, IKM, J51, M, Pa, S, TH
Notonecta marmorea Fab.	IKM, J48, S
Notonecta obliqua Gallen	IKM, J48, P, S
Notonecta maculata Fab.	IKM, H, J48, P, S
CORIXIDAE	
Micronecta poweri (Douglas & Scott)	J51, Mi59
Cymatia coleoptrata (Fab.)	P
Corixa punctata (Illiger)	B12, B23, H, IKM, M, Pa
Corixa panzeri (Fieber)	Mi59
Hesperocorixa linnei (Fieber)	H
Hesperocorixa sahlbergi (Fieber)	J48
Hesperocorixa castanea (Thomson)	J48, TH
Sigara dorsalis (Leach)	B12, B23, H, IKM, J48, J51, M, Pa
Sigara distincta (Fieber)	IKM
Sigara falleni (Fieber)	B12, B23, IKM, J51, M
Sigara lateralis (Leach)	IKM
Sigara nigrolineata (Fieber)	IKM, J48
Sigara concinna (Fieber)	IKM, Mi59
Sigara venusta (Douglas & Scott)	B12, B23, M
Sigara stagnalis (Leach)	Pa

DOUBTFUL AND ERRONEOUS RECORDS

Sehirus biguttatus (L.) - This species is listed in the county distribution table in Bedwell & Massee (1945). Carmarthenshire is omitted from the distribution in Massee (1955), and the record is deleted from the distribution records in Massee's notes, now archived in the Biological Records Centre at Monks Wood.

Nysius thymi (Wolff) - Records of this species in Butler (1912, 1923) and Massee (1955) predate the recognition of a further species, N ericae (Woodroffe 1959). Both species have been recorded in Carmarthenshire and the older records, which could refer to either, have been omitted from the table.
Trapezonotus arenarius (L.) - Records of this species in Butler (1912, 1923) and Massee (1955) could refer either to T. arenarius or T. desertus, which were not generally regarded as distinct in Britain until a review of the genus by Woodroffe (1960). Both species have been reliably recorded from the county in recent years.

Plagiognathus albipennis (Fallen) and *P. litoralis* Wagner - Continental literature generally recognises several species closely allied to Plagiognathus albipennis, of which P. litoraiis is one. British workers, following Southwood & Leston (1959) have usually regarded them as being simply forms of a single species. Nau (1991) provided a key to separate the three forms included in P. albipennis s.l. in Britain, and recommends recording them separately in the future. Specimens of Plagiognathus conforming to P. litoraiis were found during the 1991 Heteroptera Study Group field meeting on Artemisia maritima, its usual foodplant. Following Nau's recommendation, this record is listed separately in the table. Old records of P. albipennis, which cannot now be assigned to any of the recognised forms (or species) are given under the general name Plagiognathus albipennis s.l.

Macrolophus nubilus H.-S. - This species is recorded for Carmarthenshire by Butler (1912, 1923) and Massee (1955). A further species was recognised by Woodroffe (1957). While M. nubilus feeds on Stachys sylvatica, the new species, M. rubi Woodroffe, feeds on Rubus fruticosus agg. Old records could refer to either species. There is a recent confirmed record of M. nubilus for Carmarthenshire, but the circumstances of capture of Butler's specimens, which were taken from Rubus (Butler 1912) suggests that they may well have been M. rubi. The record is not included in the table.

Globiceps woodroffei Wagner - I identified as this species an incomplete specimen in alcohol, collected by B J Tigar and P S Hyman in August 1985 from Pembrey Forest. In view of the fact that G. cruciatus has since proved to be quite common at the site, and that the habitat is not typical of that in which G. woodroffei usually occurs (typically scrubby heathland) this record must be assumed to be incorrect. It is excluded from the table.

Orthops kalmi (L.) was recorded by Butler (1912, 1923) and Massee (1955). It has since been recognised that two species had been confused under this name in Britain (Woodroffe 1973). Old records could refer either to O. kalmi or O. basalis (Costa), and are therefore omitted from the table.

Notostira erratica (L.) - This species was widely recorded until it was recognised that British specimens belonged to the closely related N. elongata. Records of N. erratica in Butler (1912, 1923) and Massee (1955) almost certainly refer to N. elongata. However, Irish specimens of Notostira have been shown to belong to the true N. erratica (Woodroffe 1977), and there is a single ambiguous female specimen known from England. The possibility of N. erratica occurring in Wales cannot be entirely ruled out, and older records are therefore omitted from the table.

Saldula pallipes (Fab.) - Records of this species in Butler (1912, 1923) and Massee (1955) could refer to either of the two closely related species S. palliipes or S. palustris (Southwood & Leston 1959; Woodroffe 1966) and are omitted from the table. Both species have been recently recorded from Carmarthenshire.

Velia currens (Fab.), recorded by Butler (1912,1923) and Jones (1948) is now known not to occur in Britain. Two species, V. caprai and V. saulii had been confused under the name. Both species have now been reliably recorded from Carmarthenshire. The old records cannot be reliably placed, and are omitted from the table, though the record of V. caprai for Carmarthenshire in Brown (1951) is based on re-examination of Butler's specimens, which are probably the source of Butler's original records of V. currens.

Sigara striata (L). Since this species was recorded for the county by Butler (1912, 1923), Jones (1948) and Massee (1955) it has been recognised that the vast majority of British specimens referred to S. striata in fact belong to the closely related S. dorsalis. The true S. striata is known only from a small area of south-east England. All S. striata records have been referred to S. dorsalis in the table.

NOTES ON RARER SPECIES

Few of the species so far recorded from Carmarthenshire are particularly rare over Britain as a whole, although there are a number of very local species, particularly in the fauna of the coastal dunes. Brief notes are given below on those species considered by the Nature Conservancy Council and, since that organisation's split, by the Joint Nature Conservation Committee, to qualify for Red Data Book or Nationally Notable status. Information on RDB status is taken from Shirt (1987) and on Nationally Notable status (species believed to occur in 100 or fewer 10-km squares in Britain) from Kirby (In Press).

Dicranocephalus agilis (Notable). A coastal species, feeding on Euphorbia paralias and E. portlandica on dunes, shingle and cliffs. It is widespread on western coasts north to Caernarvon, and most frequent in the south-west. There are a few scattered records from southeast England and an old unconfirmed record for Scotland. Butler (1912) recorded it from St Ishmael's; Stokes (1952) found it at Pendine in August 1951; Mark Pavett recorded it from Pembrey (22/397007) on 31 May 1985; Ian Morgan recorded the bug on Euphorbia portlandica at Dolwen Point, Pendine (22/233073) on 23 May 1990, and nymphs were found at Pembrey Country Park (21/404977) on 10 August 1991 during the Heteroptera Study group field meeting.

Megalonotus praetextatus (Notable). A groundbug of dry, well-drained places. It is most often recorded on sand, but there are also records from rock debris on cliffs and in quarries. The bug is believed to be seed-feeding and polyphagous, with Erodium one likely host. It occurs both on the coast and inland in south-east England, but is largely coastal in much of its British range, which extends from Yorkshire in the east to Carmarthen in the west. It has not been recorded from the county since Butler (1912) listed it from "sandhills".

Systellonotus triguttatus (Notable). A local bug, and one which may well have declined in recent years. It occurs on bare ground and amongst low and sparse vegetation, where it runs with ants, especially Lasius niger, of which the female is a very effective mimic. The recorded distribution in Britan is wide but rather scattered. It extends north to Fife, but records are far more frequent in south-east England than elsewhere. Most records are from open areas of coastal dunes, sandy heaths, and chalk pits and downs. Lack of management of such sites in recent years, coupled with great reductions in rabbit populations, may have led to loss of the open and sparse vegetation which this species requires. Carmarthenshire is the only Welsh county from which S. triguttatus has been recorded, and it seems not to have been found here since Butler (1912) noted "one specimen on Kidwelly sandhills".

Globiceps cruciatus (Notable). A plant bug usually, in lowland Britain, associated with low- growing willows, especially Salix repens. Most records are from dune slacks or wet heaths. Adults and nymphs are largely predacious. This species appears to have declined in recent decades, particulary in the east, probably largely as a result of habitat destruction. Its distribution extends from Inverness-shire to Kent and Devon, but its stronghold now appears to be in slacks in the major dunes systems of the south-west, in which it is almost invariably

present if there is good growth of S. repens. In Wales it is known from Anglesey and Merioneth as well as Carmarthen. Butler (1912) recorded it from "dwarf sallows at Kidwelly". It was found commonly on S. repens in Pembrey Forest (22/392027) on 9 August 1991 during the Heteroptera Study Group meeting. A Globiceps collected from Pembrey Foresty by B J Tigar and P S Hyman in August 1985 probably belonged to this species (see above).

Adelphocoris seticornis (Red Data Book 3) in Shirt (1987); proposed for demotion to Notable in Kirby (In Press). This large and conspicuously coloured bug is found on a wide range of leguminous plants in a wide range of habitats over a broad, but very scattered, distribution. About twenty British records are spread over ten vice-counties between the Isle of Wight and Perthshire. It seems most often to be assoicated with tall vegetation in damp places, where its foodplants include Lotus uliginosus and Vicia cracca. It was from such tall herbaceous vegetation, bordering a path in Pembrey Forest, that the bug was taken on 9 August 1991 by P M Pavett during the Heteroptera Study Group meeting. This is only the second record for Wales, the first being from Pembrokeshire in 1990.

*Trigonotylus psammaecolor (*Notable). A pale grass-bug which feeds on Elymus farctus, and perhaps other grasses, on the exposed seaward edge of sand dunes. It is a very local species but has a wide, though chiefly southern, distribution, from Fifeshire in the east to Cumberland in the west. Elsewhere in Wales it has been recorded in Glamorgan and Ceredigion. Butler (1912) recorded it from sandhills at Kidwelly, and a single specimen was found at Pembrey Burrows (21/4399) on 9 August 1991 by S J J Lambert during the Heteroptera Study Group field meeting.

ACKNOWLEDGEMENTS

Thanks go to Ian Morgan, who has been responsible for much of the hard work behind this paper, and without whose assistance it would probably not have appeared. In addition to the important contribution his records have made to the county list and to his efforts in organising the Heteroptera Study Group meeting in 1991, the table of species in this paper is based on his working list for the county, and the introductory section draws heavily on his manuscript notes on the history of Heteroptera recording in Carmarthenshire.

REFERENCES

BEDWELL, E C & MASSEE, A M (1945) - The county distribution of the British Hemiptera-Heteroptera. Entomologist's Monthly Magazine 81: 253-273.

BROWN, E S (1951) - The identity of British Velia (Hem. Veliidae), with an account of a species new to Britain. Entomologist's Monthly Magazine 87: 297-306.

BUTLER, E A (1907) - Piezostethus flavipes in Carmarthenshire. Entomologist's Monthly Magazine 43: 14-15.

BUTLER, E A (1910) - Poeciloscytus palustris, Reut.: an addition to the list of British Hemiptera. Entomologist's Monthly Magazine 46: 141-142.

BUTLER, E A (1911) - Insect life on the sandhills of Carmarthenshire. Carmarthenshire Antiquarian 6: 74-76.

BUTLER, E A (1912) - Hemiptera in Carmarthenshire. Entomologist's Monthly Magazine 48: 108-111, 187-189.

BUTLER, E A (1923) - A biology of the British Hemiptera-Heteroptera. Witherby, London.

GREEN, J (1953) - Plea leachi MacGregor & Kirkaldy (Hem., Pleidae) and its epibionts in Carmarthenshire. Entomologist's Monthly Mazagine 89: 143.

JONES, J R E (1948) - The fauna of four streams in the Black Mountains district of South Wales. Journal of Animal Ecology 17: 51-65.

JONES, J R E (1949) - A further study of streams in the Black Mountains district of South Wales. Journal of Animal Ecology 18: 142-159.

JONES, J R E (1951) - An ecological study of the river Towy. Journal of Animal Ecology 20: 68-86.

KIRBY, P (In Press) - A review of the rarer British Hemiptera (Heteroptera & Auchenorhyncha). Joint Nature Conservation Committee, Peterborough.

Le QUESNE, W J (1955) - An examination of the genus Temnostethus Fieb. (Hem., Anthocoridae) in Britain and an addition to the British list. Entomologist's Monthly Magazine 91: 259-262.

LESTON, D & GARDNER, A E (1951) - Some aquatic insects from Carmarthenshire, with a note on Cordulegaster boltoni Donovan (Odonata). Entomologist's Gazette 2: 131-132.

MASSEE, A M (1955) - The county distribution of the British Hemiptera-Heteroptera. Entomologist's Monthly Magazine 91: 7-27.

MILES, P M (1959) - Field notes: insects. Nature in Wales 6: 859-863.

MILES, P M (1961a) - Field notes: insects. Nature in Wales 7: 24-26.

MILES, P M (1961b) - Field notes: insects. Nature in Wales 7: 174-177.

MORGAN, I K (1991) - Recent interesting records of Hemiptera in Carmarthenshire. Dyfed Invertebrate Group Newsletter 21: 26.

NAU, B S (1991) - Plagiognathus abrotani, P. litoralis and P. albipennis in Britain. Heteroptera Study Group Newsletter 10: 8.

PRICE, A (1961) - Aneurus avenius and other Hemiptera in Carmarthenshire. Entomologist's Monthly Magazine 88; 22.

SCUDDER, G G E (1956) - A contribution to a survey of the distribution of the Hemiptera- Heteroptera of Wales. Entomologist's Monthly Magazine 92: 54-64.

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

SOUTHWOOD, T R E & LESTON, D (1959) - Land and water bugs of the British Isles. Warne, London.

STOKES, H G (1952) - Hemiptera-Heteroptera in South Wales. Entomologist's Monthly Magazine 88: 22.

WOODROFFE, G E (1957) - On the identity of the British Macrolophus with a key to the European species. Entomologist 90: 125-127.

WOODROFFE, G. E (1959) - The identity of the British Nysius. Entomologist's Monthly Magazine 95: 265-268.

WOODROFFE, G E (1960) - The identity of the British Trapezonotus. Entomologist 93: 218- 214.

WOODROFFE, G E (1966a) - A taxonomic note on Saldula pallipes and S. palustris. Entomologist 99: 190-192.

WOODROFFE, G E (1966b) - The Lygus pratensis complex in Britain. Entomologist 99: 201- 206.

WOODROFFE, G E (1973) - Orthops basalis (Costa) in Britain, with taxonomic notes on O. kalmi (L) and O. campestris (L) (Hem, Miridae). Entomologist 106: 183-186.

WOODROFFE, G E (1977) - Notostira erratica and N. elongata in the British Isles. Entomologist's Gazette 28: 123-126.

FIELD MEETING: COEDMORE NNR (22/1943 & 22/2043) VC46, 9 JUNE 1991 - A P FOWLES

For the second year in succession the Ceredigion meeting was held in poor weather conditions which prevented the DIG members attending from seeing this splendid National Nature Reserve in its full glory and limited the opportunities for sampling many aspects of the fauna. Nevertheless, the meeting provided the chance to experience the range of habitats available in this gorge woodland and, despite the weather, a useful total of 147 species of invertebrates was recorded. The morning was spent in the Mansion woods and on the riverside meadow below. Although it was overcast and occasionally drizzling, four species of dragonflies were seen and Steve and Anne Coker found an exuvium of the club-tailed dragonfly Gomphus vulgatissimus, a scarce species nationally and only known from this stretch of the Teifi in Ceredigion. Diptera were understandably scarce but a specimen of the hoverfly Cheilosia longula was only the second county record for this uncommon woodland species. As usual, beetles provided the bulk of the records but most of the forty-four species recorded here are common in Dyfed and not worthy of further comment. The ground beetle Clivina collaris was found on the silty banks of the Teifi, where it has been recorded on previous occasions, and Agonum obscurum was also collected from the river edge. This latter species has only been recorded once before in Ceredigion, from the Teifi banks just upstream of Coedmore. Another ground beetle, Carabus granulatus, provided an interesting observation as one individual was found, feeding on an amber snail Succinea putris, while it clung to a Phalaris leaf several feet above the ground. This large predator is usually seen under logs or amongst leaf litter and is not normally considered to climb in search of prey. One of the objects of this meeting had been to survey the deadwood fauna by beating hawthorn blossom, but this was not really feasible on the day. However, several specimens of the attractive cardinal beetle Pyrochroa serraticornis were seen and a male Malthodes maurus was beaten from oak foliage. This small soldier beetle has been recorded on very few occasions in Britain in recent years but it has now been found at three different localities in the lower Teifi valley and can perhaps be regarded as a speciality of the area.

There was a slow improvement in the weather during the afternoon, allowing brief glimpses of a holly blue Celastrina argiolus, and even the dark bush crickets Pholidoptera griseoaptera began to chirp. We drove around to the eastern end of the reserve and meandered our way slowly down through Hafod Wen meadow and on to the riverside meadow at Dol Meudwy. Many of the species we recorded in the morning were also found here; one of the more notable additions being the deadwood beetle Melandrya caraboides. The grassland of Hafod Wen meadow added an extra range of species as the river meadows are rather rank - in late summer they become a jungle of Himalayan balsam and nettles. Hafod Wen used to be a site for the rare hornet robberfly Asilus crabroniformis but, as there has been no grazing for several years, Asilus, which needs cowpats for its larval development, has presumably become extinct. The grassland still has elements of its former botanical richness, however, and the uncommon phytophagous beetles Cassida vibex, Lema cyanella and Sitona cambricus were recorded. Down on the riverbank, in the steep oakwood at 22/199429, a fallen oak bough had numerous adults and larvae of the bark beetle Scolytus intricatus, which appears to be a good 'ancient woodland indicator' species in the county. Underneath the bark they had loosened, there were four specimens of the pseudoscorpion Lamprochernes nodosus, a reasonably common species in haybarns and manure heaps in the county but this was the first time that it has been found under bark. Other invertebrates of interest were the ant Stenamma debilis and the harvestman Anelasmocephalus cambridgei, both found in litter on top of the retaining

wall next to the ruined cottage of Dol Meudwy. A small collection of spiders taken by Ian Morgan included Lathys humilis, an addition to the spider fauna of Ceredigion. A new species of terrestrial snail was recorded for the reserve in the small area of poor fen in the Hafod Wen meadow. The addition of Vertigo pygmaea brings the site list to forty-nine species of land molluscs, the highest total for any single site in Ceredigion.

A useful day's recording but plenty remains to be done to document the fauna of Coedmore NNR. I am grateful to Dave Boyce, Arthur Chater, Steve and Anne Coker, and Ian Morgan for supplying invertebrate records from the visit. Ian Tillotson kindly made access arrangements and we were very grateful for the hospitality provided by Gordon Murray.

FIELD MEETING: RSPB GWENFFRWD (22/749460) VC44, 20 JULY 1991 - I K MORGAN

Established in the late 1960's on the fringes of Mynydd Mallaen and the Doethie Valley in NE Carmarthenshire to help protect the habitats of a distinctive suite of upland birds, such as raven, kite, pied flycatcher and redstart, the Gwenffrwd-Dinas reserve has not been adequately surveyed for its invertebrate fauna. The eminent local naturalist Dafydd Davies had done (and continues to do) a great deal of pioneering work in the immediate area around the nearby village of Rhandirmwyn, noting, for example, such choice Coleoptera as the longhorn beetle Prionus coriarius. Together with a host of other noteworthy records, this points to a rich invertebrate community in the general district. Indeed, it is already known (DIG 17: 9-13) that the Gwenffrwd moth fauna is diverse and includes many uncommon species of restricted distribution. However, the invertebrate content of the oak and alder woods, pastures and bogs of the Gwenffrwd is little known and it was to begin to redress this imbalance that the Dyfed Invertebrate Group visited the Reserve in pleasant, sunny weather on 20 July 1991. The principal areas surveyed were located in the valley to the east and north-east of the Warden's house at Troed Rhiw-gelynen. Repeated sampling will be necessary, but this visit did provide some valuable indications of the entomological status of this fine nature reserve.

Some twenty-seven species of hoverflies were recorded, including Brachypalpus laphriformis found by Mark Pavett feeding at a hogweed umbel (only the third vice-county record), whilst a second VCR was provided by Xylota xanthocnema, recorded by Steve and Anne Coker (the only other record being from the deadwood-rich Dinefwr Deer Park). The robust horsefly Tabanus sudeticus was observed, whilst hordes of bothersome clegs Haematopota pluvialis were impossible to overlook! Six species of tachinid flies were caught by Dave Boyce, with three probably being recorded for the first time in Carmarthenshire.

Messrs Boyce, Fowles and Pavett gave their attention to the Coleoptera. The longhorn Judolia cerambyciformis was observed; although scarce nationally it is rather frequent in northeast Carmarthenshire, albeit in small numbers. Phyllobrotica quadrimaculata was discovered on lesser skullcap in a Molinia bog, this distinctive leaf beetle is more usually associated with common skullcap as a foodplant. Another local chrysomelid recorded was Phytodecta pallida, beaten from hazel. Adrian Fowles worked hard on the Curculionoidea, recording some seventeen species of weevils, including the notable Sitona cambricus, whilst the red and black 'oak leaf-roller', Attelabus nitens, and Rhynchaenus avellanae were new county records. Two 'bark beetles' of distinction were Scolytus intricatus, which was locally frequent on recently dead oak branches hanging in mid-air (and which are consequently dry), and Platypus cylindrus. Platypus, a national rarity, occurs chiefly in standing or freshly-felled oaks and excavates brood passages in the heartwood. Lastly, a click beetle, Athous hirtus, caught by the author proved to be of interest as there were no previous Carmarthenshire records for this species. Indeed, the provisional BRC atlas shows it to be uncommon in the south-west of Britain as a whole.

Arthur Chater assiduously sampled the land mollusc fauna, listing some twenty-eight species, including three typical slugs of old, acidic woodland - Limax cinereoniger, L. maximus and Arion flagellus. He also remarked that normally productive habitats, such as flushed slopes

under ash or alder or the small marshy areas by the Nant-y-gelynen, were surprisingly poor and he suggests that over-grazing in the past has had a negative effect on molluscan diversity. Arthur also looked at the ants, observing that both Myrmica rubra and M. ruginodis were common under stones in the pastures and, with M. scabrinodis (which prefers warmer, less- vegetated situations), occurring along the roadside verges. The best find, however, was of several nests of M. sabuleti (a decidedly local species in the county) in a clearing in an oakwood on the east-facing slope at 22/758458, some 250 metres south-west of Troed Rhiw- gelynen. Nests of both Lasius flavus and M. ruginodis were also found in this oakwood, while higher up on the steep, rocky slope there were nests of Formica fusca and M. scabrinodis.

About twenty species of aphids (a much-neglected group in Carmarthenshire) were recorded by CS Wood-Baker.

Gratitude is due to Mr AR Pickup, the Warden of RSPB Gwenffrwd-Dinas, for allowing the Dyfed Invertebrate Group access and for guidance to areas of interest. This report is based on records submitted by DC Boyce, AO Chater, S & A Coker, JR Ellis, AP Fowles, IK Morgan, PM Pavett and CS Wood-Baker.

FIELD MEETING: MARLOES (12/780075) VC45, 4 AUGUST 1991 - J W DONOVAN

Marloes Sands, on the south coast of the Marloes Peninsula, was the venue for the Pembrokeshire field meeting. The day was fine and sunny and the nine participants were able to apply their skills and equipment to good effect. The chosen area provided a good range of interesting habitats, particularly the coastal cliffs of Silurian age with a wealth of niches, including slumped cliff areas and a variety of coastal plant communities. The coastal path gave easy access to most habitats, although some scrambling down the crumbling cliffs led to additional discoveries. The Horse Neck (12/772074), for instance, added to the locations for the purse-web spider Atypus affinis. This uncommon species had been found in 1978 by Colin Twissell at the beach end of Sandy Lane (12/780767) and several webs were refound at the original locality during the visit. The lane itself, with earth banks, coarse herbage and mixed scrub, added to diversity. The grey bush cricket Platycleis albomaculata and the great green bush cricket Tettigonia viridissima were recorded here and there were also several specimens of the rose chafer Cetonia aurata. This handsome beetle is locally widespread along the south coasts of the vice-county but is seemingly absent from Carmarthenshire and Cardiganshire. Graylings Hipparchia semele were regularly seen along the paths and cliff slopes and the robberfly Dysmachus trigonus was frequent on a patch of recently disturbed ground behind the clifftop. Molluscs were only casually recorded but it was interesting to find several empty shells of Helicela itala on the bank alongside Sandy Lane.

The rich coastal flora yielded a good diversity of weevils during the day, with 28 species recorded, including six that are regarded as nationally notable. Three of these are 'shortnosed' species whose larvae feed on the roots of a variety of herbs - Otiorhynchus desertus, Caenopsis waltoni and Trachyphloeus aristatus. The adults are usually found at the base of plants growing in dry, often sandy, grassland but there is no specific association with an individual plant species. They are all local in Britain but probably widespread along the Dyfed coast in suitable localities. The other three species - Ceutorhynchidius dawsoni, Sibinia arenaria and S. sodalis - are host-specific and more or less exclusively coastal. C. dawsoni feeds on sea plantain and buck's horn plantain and is widely distributed on western coasts. S. arenaria feeds on spurreys Spergularia spp. and at Marloes was found on rock spurrey at the Horse Neck (12/772074). It is a rather scarce, southern, species in Britain. S. sodalis is a national rarity known from only a few sites in Devon, Hants, Glamorgan and Pembs. It feeds on thrift, adults usually occurring at the base of the foodplant, and was recorded for the first time in Pembs. at Manorbier (21/060975) in April 1990. At Marloes it was recorded commonly on thrift growing low down on the sandstone cliffs at the Horse Neck. This does seem to be a genuinely restricted species in Britain and a noteworthy addition to the Marloes fauna.

Other beetles of interest were the coastal tenebrionids Opatrum sabulosum and Cteniopus sulphureus and the phalacrids Olibrus affinis and O. aeneus. Although fairly common in southern England, the tiny ladybird Stethorus punctillum was apparently recorded for the first time in Wales when a single specimen was swept off a clump of ox-eye daisy at the edge of the cliff footpath. This plant also produced several individuals of the local bug Enoplops scapha, whilst 'grubbing' at the roots of coastal plants yielded Henestaris laticeps and Berosus maritimus, both of which are characteristic of dry coastal habitats.

One particularly important aspect arising from the meeting was the concensus of opinion on the need to reinstate grazing to the clifftop grasslands. The coastal footpath has severed the clifftop heaths and grasslands in many places from the essential grazing provided by farmers' livestock (sheep, cattle and ponies). This is perhaps an unforseen result of the otherwise splendid National Park management prescription that needs correction. Neglect has led to dominance by rank grasses and scrub and it was felt that botanical, entomological and ornithological interests would be enhanced by the reintroduction of light/moderate grazing.

The day finished with an all-too-brief visit to the adjacent Dyfed Wildlife Trust Reserve at Marloes Mere. There were no invertebrates of particular note recorded but the rich flora of the irrigation reservoir and the extensive area of wet pasture, which in winter floods to form the Mere, looked promising habitats for unusual species.

Species lists resulting from recording on Marloes cliffs have been received from Dave Boyce, Steve & Anne Coker, Adrian Fowles and Ian Morgan, to whom I am most grateful.

DYFED INVERTEBRATE BIBLIOGRAPHY, 1990 ADDENDA

WOIWOOD, I P et al (1990) - Rothamsted Insect Survey. Twenty-first annual summary. Light Traps. Rothamsted Experimental Station, Harpenden. pp. 6-41.

[Tables 3e & 3f include records of pest species of moths trapped at Rhandirmwyn (VC44) and Plas Gogerddan, Tregaron & RAE Aberporth (VC46) in 1987 and 1988]