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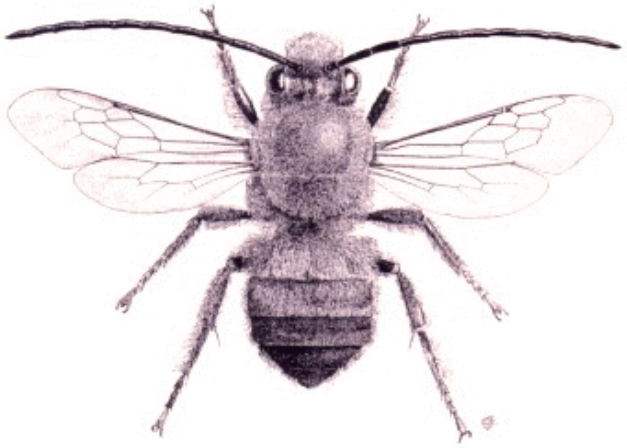
Science

A provisional checklist of the invertebrates recorded from Wales

2. Aculeate wasps, bees and ants (Hymenoptera: Aculeata)



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A provisional checklist of the invertebrates recorded from Wales.

2. Aculeate wasps, bees and ants (*Hymenoptera: Aculeata*)

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CCW 1996

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1. Introduction

There are more than six and a half thousand species of Hymenoptera present in Britain, but the majority of these (over 5,500 species) belong to the Parasitica. The Symphyta (or sawflies) contribute another 500 or so species and the remaining 595 species belong to the Hymenopteran division known as the Aculeata. As currently recognised (Gauld & Bolton 1988), the Aculeata consists of three super-families, comprising the Chrysidoidea (jewel wasps and allies), Vespoidea (ants, social wasps and some solitary wasps) and the Apoidea (most solitary wasps, social and solitary bees). In Britain these super-families contain 87, 127 and 381 species respectively, whilst in Wales 390 aculeate species have been recorded, consisting of 37 chrysids, 95 vespids and 258 apids. Most British entomologists will be more familiar with the traditional taxonomic arrangement of Kloet & Hincks (Fitton *et al* 1978), which is employed in this provisional checklist. The Welsh fauna can be summarised under this system as consisting of 17 jewel wasps (Chrysidoidea: Chrysididae), 20 other Chrysidoidea spp. (bethylids, dryinids, embolemids), 33 ants (Formicoidea), 142 social and solitary wasps (Scolioidea, Pompiloidea, Vespoidea & Sphecoidea) and 178 bees (Apoidea).

Gauld, Collins & Fitton (1990) provide an interesting summary of the significance of Hymenoptera ecologically and economically, beginning with the comment that "few animals have had as much an impact on the human race as members of the insect order Hymenoptera". This surprising statement is backed up with a description of the role Hymenoptera play in pollination, pest control, honey, beeswax and royal jelly production, etc. Ecologically, Hymenoptera, especially the aculeates, have helped to shape the evolution of flowering plants through their role as pollinators, whilst innumerable other invertebrate species are inextricably linked to aculeates as inquilines in their nests, as parasites of adults and larvae, as cleptoparasites of food stored in nest cells, etc. Day (1991) notes that the decline of aculeate species in the wider countryside "is a reliable indicator of profound local environmental poverty". Aculeates are a key piece in the ecological jigsaw and as they decline or become extinct at local or national levels so does a myriad of other organisms.

Clear evidence that they are declining has been provided by several county surveys in England, whilst at a national scale the alarming impoverishment of our bumblebee fauna was demonstrated by the nationwide mapping scheme undertaken in the 1970s (IBRA 1980, Williams 1982, 1986). Attention was drawn to the plight of our aculeate fauna by Else, Felton & Stubbs (1979), and Shirt (1987) highlighted the fact that proportionally there are more aculeate species classified as being of Red Data Book status in Britain than any other insect group. A detailed discussion of the threats facing aculeates is provided by Falk (1991). In general, the aculeates are thermophilous insects that are very sensitive to local microclimates. As a result their nest sites are often situated in specific substrates with a favourable aspect and are frequently highly localised in sites that superficially may contain large areas of favourable habitat. Their dependence on particular types of vegetation for pollen, nectar, seeds, honeydew, or prey is another factor in their distribution as nest sites must be within reach of viable food sources. Changes to the environment brought about through natural succession, agricultural improvement, habitat destruction or fragmentation can, therefore, be devastating to local aculeate populations.

The invertebrate fauna of any particular site, district, region or country is dynamic and individual species will come and go in response to subtle (or catastrophic) changes in their environment. In this sense we can never really say that a checklist is definitive because extinctions and colonisations will be inevitable. Nonetheless, we are in a position whereby the composition of the Welsh fauna (at 65.5% of the British fauna) is reasonably well-known. Undoubtedly some species currently resident in Wales will have been over-looked, but it is anticipated that this will consist of comparatively few species. This state of knowledge has been reached despite the fact that, historically, the aculeate Hymenoptera have been studied by only a small number of entomologists in Wales. Hymenopterists visiting Wales from England have added considerably to our understanding of the fauna, but much of our data derives from the outstanding contribution made by the Glamorgan naturalist H. M. Hallett in the period between 1910 and 1935. Relatively

few resident entomologists concentrated on the aculeate Hymenoptera up until the last decade or so, but recently there has been renewed interest in the group, particularly in Glamorgan (VC41), Carmarthen (VC44), Pembroke (VC45), and Denbigh (VC50) for the bees and wasps, and Cardigan (VC46) for ants. As with most invertebrate recording in Wales, current activity is patchy and dependent upon the enthusiasm of a few key individuals. However, the impetus provided by the national Bees, Wasps and Ants Recording Society, the increasing recognition of the importance of aculeates ecologically, and the publicity demonstrating the threats aculeates face and their need for positive conservation, will hopefully stimulate others to take an interest in these fascinating insects.

The Hymenoptera Aculeata as a whole have complex and diverse life-histories. Most naturalists are broadly familar with the biologies of the social species, living in highly-organised colonies with worker castes serving one or more queens, as found in the bumble-bees, the hive-bee, most ants and the social wasps. At the other extreme are the solitary species, bees and wasps that provision their own nest cells with pollen or prey for their larvae to develop on. In between these two extremes there is a vast range of intermediate or alternative strategies; species that live socially in other social species nests, species that nest in aggregations but tend their own cells, species that share communal burrow entrances to reach their own cells, species that are cleptoparasites (usurping the food collected by other species for their own brood), species that are external or internal parasitoids of other aculeates, beetle larvae, leafhoppers, etc. Successful study or rewarding survey depends on an understanding of these varied life-histories and different techniques will be required to find species with different habits.

Collecting techniques

The standard piece of equipment for most hymenopterists is a collecting net. By investigating potential pollen or nectar sources many of the bees and wasps can be collected by patient survey in suitable habitat. Ground-nesting bees and wasps can also be found by examination of favourable substrates, such as bare, sandy cliff faces, whilst species that nest in cavities, such as hollow twigs, can often be successfully reared. Rearing is often the best way to find cleptoparasitic aculeates, and is certainly more rewarding and more informative than the chance capture of adults in the field. The attraction of many aculeates to flowers for nectar, pollen or prey is exploited by the use of the water-trap as a method of survey. Coloured bowls part-filled with a liquid preservative are left out in suitable places and the contents collected a week or two later. Amongst the inevitable bulk of flies can be found a wide range of bees and wasps, including species that may rarely be seen by direct field survey. More comprehensive site collections can be made by using Malaise traps. These tent-like nets intercept flying insects on their flight path and direct them into collecting jars. If correctly sited, Malaise traps can be very productive and yield large volumes of material, again dominated by Diptera but also yielding large numbers of aculeates.

Malaise-traps will catch species of the Dryinidae, Bethylidae, Embolemidae and winged ants, but generally these groups are recorded by different methods from the bees and wasps. Dryinids, etc., are parasitoids of leafhopper nymphs and beetle and moth larvae. They are chiefly found by beating or sweeping vegetation or by sieving litter and 'tussocking'. Most ants are conspicuous as workers actively foraging for food and many species can be recorded easily by looking for their nests under stones, in crevices, etc. Some species are chiefly subterranean or inhabit dead wood and they need to be specifically searched for. Others are inquilines, without a worker caste of their own, living in the nests of related ant species and using the host workers to raise the next generation of sexuals (males and queens). Pitfall-traps can be an adjunct to field survey but it is only in rare instances that pitfall-traps will capture species not found by more direct survey methods. The *Starter Pack* for members of the Bees, Wasps & Ants Recording Society has useful sections on collecting techniques (Burn 1996, Else 1996, Field 1996). The Amateur Entomologist's Society publication, *The Hymenopterist's Handbook* (Betts 1986), is also full of helpful introductory material.

Identification

The identification of aculeate Hymenoptera is not easy; however, perseverance is a valuable attribute and access to a comprehensive reference collection makes the task easier. A starting point for identification is the AIDGAP key to aculeate genera, excluding Chrysidoidea (Willmer 1985), or the more comprehensive treatment of Richards (1977). All groups, except the bees, are covered by Royal Entomological Society *Handbooks* (Bolton & Collingwood 1975, Perkins 1976, Richards 1980, Morgan 1984, Day 1988). These are regarded as the standard texts, but, with the exception of the Pompilidae, there have been nomenclatural changes, or additions and revisions to the fauna, since publication of the *Handbooks* and the entomological journals may need to be consulted to confirm identification. The Newsletters of the Bees, Wasps and Ants Recording Society include useful updates on nomenclature, taxonomic revisions, etc. Published keys which update Richards (1980) include Pulawski (1984) for *Trypoxylon*, Felton (1987) for *Nitela*, Allen & Archer (1989) for *Dolichovespula*, Guichard (1991) for *Eumenes*, and Else (1994a) for the social wasps (*Vespa*, *Vespula* & *Dolichovespula*).

The last systematic account of Britain's bee fauna was that of Saunders (1896) and the publication of a new comprehensive treatment of the Apoidea by Else (*in prep.*) is eagerly awaited. Perkins published many papers on the British bee fauna in the first half of this century and his reviews of the solitary bee genera *Andrena* and *Nomada* (Perkins 1919), *Halictus* and *Sphecodes* (Perkins 1922), and *Megachile* (Perkins 1925) are still widely used. Other keys to specific bee genera available in the British literature include Richards (1937) for *Epeolus*, Alford (1970-1972) for *Bombus* and *Psithyrus*, and Guichard (1974) for *Colletes*. Valuable keys (in English) have also been produced in the series *Fauna Entomologica Scandinavica*, covering the British fauna of ants (Collingwood 1979), sphecid wasps (Lomholdt 1984) and dryinids and embolemids (Olmi 1994). 'User-friendly' keys to solitary wasps (Yeo & Corbet 1983) and bumblebees (Prys-Jones & Corbet 1987) have been published in the *Naturalists' Handbooks* series.

2. Studies of the Welsh fauna

History of recording

At the end of the nineteenth century there was considerable interest in the aculeates nationally, typified, and doubtless encouraged, by the publication of *The Hymenoptera Aculeata of the British Islands* (Saunders 1896). E.Y. Steele (1869) and T.A. Chapman (1869, 1878) had published fascinating observations of the solitary wasp *Odynerus spinipes* (L.) and its jewel wasp cleptoparasites, but, with the notable exception of Willoughby Gardner at Deganwy in the Conwy Valley, there was little evidence of naturalists resident in Wales taking an interest in the group. Fortunately the popularity of the Welsh coast as a holiday destination saw several eminent hymneopterists collecting locally. In the next decade or so articles appeared in the enomological literature from hymenopterists such as A.E. Bradley, C.H. Mortimer, E.B. Nevinson and E. Saunders, describing some of the riches that could be found on our dunes or coastal cliffs and along our country lanes. It should be noted that the practice at this time was to give the name of the nearest town as the collecting locality. Hence, records from Criccieth and Portmadoc may refer to the dune system at Morfa Bychan as well as other localities along the south coast of the Lleyn, 'Barmouth' probably includes Morfa Dyffryn, etc. Following the First World War accounts of the Welsh fauna by visiting hymenopterists virtually disappear from the literature, apart from occasional collecting trips by R.C. Bradley, O.W. Richards, C.A. Collingwood, etc., until recent years.

Our knowledge of the Welsh fauna at this time would have been very poor if it were not for the contribution of one man, Henry Mortimer Hallett, who began to study the aculeates of Glamorgan (and, to a lesser extent, Monmouthshire) in 1909. For the next twenty-six years, until he moved to Herefordshire in 1935, he collected extensively in east Glamorgan and made

frequent collecting trips to the west of the county. After his move he continued to collate data on aculeates from other naturalists working throughout Wales. His vice-county compilations of Glamorgan (Hallett 1928) and Monmouth (Hallett 1956a) provide an invaluable insight into the state of the aculeate fauna of southern Wales in the first half of the twentieth century. Unfortunately, he did not publish his review of the Welsh fauna, *The Hymenoptera Aculeata of Wales* (Hallett 1956b) before his death in 1958, although he donated the manuscript to the National Museum of Wales where it may be consulted in the Department of Zoology. Hallett had a close association with the Museum, having served on its Court of Governors and Museum Council, and personally arranged their Hymenoptera collections, which include his own series of some 3,500 specimens (Matheson 1958). He also wrote the Museum's *Guide to the Collection of British Hymenoptera* (Hallett 1947) and published a further 32 papers (chiefly in the *Transactions of the Cardiff Naturalists' Society*) that included information on Welsh aculeates.

Hallett lived in Penarth, close to ideal aculeate habitat on the South Glamorgan coast and his list of species from the area around Sully is most impressive. Here he collected six Red Data Book species, including the only confirmed Welsh records of *Andrena niveata* Friese, *Sphecodes spinulosus* Hagens, *Coelioxys quadridentata* (L.), *Nomada fulvicornis* F. and *N. hirtipes* Pérez, and added the ant *Myrmica schencki* Emery to the British list (Donisthorpe 1915). His other favourite collecting locality was 'Porthcawl'. Records from this area are included under several different names in his papers but it is clear that he collected entirely on the dunes between Newton and Candleston, an area known today as Merthyr Mawr Warren (Hallett 1916a). Here he recorded seven Red Data Book species, including the last Welsh records of the spider wasp *Cryptocheilus notatus* (Rossius) and the only Welsh record of the solitary wasp *Mimesa bicolor* Jurine.

Until recently, few other Welsh entomologists have concentrated on the aculeate Hymenoptera. Mention should, however, be made of C.L. Walton who studied the bumblebees of north Wales in relation to their role as pollinators (Walton 1922, 1923, 1927), T.B. Poole of Aberystwyth who collected bees and wasps locally in the 1960s, and Peter Crow of Merioneth (whose interests extended to several insect orders) who compiled a representative collection of bees and wasps in the vice-county between 1968 & 1987. The situation in recent years has improved considerably. In south Wales, I.K. Morgan and S.J. Coker have substantially furthered our knowledge of the faunas of Carmarthenshire and Pembrokeshire, respectively, whilst P.M. Pavett has taken up where Hallett left off and has collected widely in Glamorgan, concentrating particularly on the west of the county. A useful compilation of modern records of bees and wasps, mainly from these three vice-counties, has been produced (Morgan & Pavett 1995). Blacker (1989) has surveyed the ants of the Gower peninsula and A.O. Chater embarked upon an investigation of the ants of Cardiganshire in 1986 (Chater 1994). In the north, B. Formstone (1993a) has been refuting the observation that "North Wales is by no means a locality rich in Aculeata" (Smith 1875a), particularly through his investigations of the important sand quarries of Denbighshire (Formstone 1993b). Three field meetings held by the Bees, Wasps & Ants Recording Scheme (now Society) in south Wales in 1988, 1992 & 1993 (Else 1989, Falk 1992) have been extremely useful in generating interest in aculeates locally and providing lists of species from a range of sites.

Research & survey

Specific projects or studies on the Welsh aculeate fauna are relatively few but wide-ranging. In addition to the nineteenth century observations of *Odynerus spinipes* mentioned above, only five aculeate species (four of which are ants) have been the subject of detailed investigations. O'Toole's work on the mining bee *Colletes cunicularius* (L.) was largely undertaken on the Lancashire dunes but he also examined populations on Newborough Warren and several sites in south Wales (O'Toole 1974, 1989). Hughes (1975) carried out extensive surveys of wood ant populations in north and mid Wales, highlighting the ecological differences between the habitats occupied by *Formica rufa* L. and *F. lugubris* Zetterstedt. The distribution and status of *F. rufa* in Cardiganshire was explored by Chater & Spencer (1989), whilst Fowles (1994) reviewed

historical records and current knowledge of this species in Wales. *F. rufa* is also the subject of research being undertaken by D.C. Boyce for an M. Phil. at the University of Wales, Cardiff. As well as confirming the current distribution of the species in Wales, he is studying the increase and subsequent decline in density of nests following clear-fell and replanting in conifer plantations in Gwent. At Bath University, G. Orledge is analysing morphometric differences in populations of the ant *Leptothorax tuberum* (F.), including material collected from sites on the Gower and in north Wales. Finally, following on from a baseline survey (Bagley 1992), the discovery of the bog ant *Formica candida* Smith in Carmarthenshire has necessitated the instigation of a monitoring programme, involving annual nest counts on a permanently established quadrat (Franks 1993, Fowles & Hurford 1996).

Particular habitat types of potential significance for aculeates have been targetted for several surveys. Archer (1992) has begun to compile an inventory of the fauna of the Welsh sand dunes and as part of this study was funded by the Countryside Council for Wales to visit sites along the south coast (Archer 1994). The aculeate bees and wasps have been documented for the dune system of Pembrey in Carmarthenshire (Pavett 1993) and Liverpool Museum are currently investigating the aculeates of Talacre Warren in Flintshire as part of a wider invertebrate survey (Liverpool Museum 1994a). The ecology of the ant species inhabiting Newborough Warren NNR on Anglesey was studied by Stradling (1968, 1970). Coastal cliffs are also important for aculeates and the National Trust has commissioned a survey of its properties on the Lleyn peninsula (Edwards 1993), whilst the Countryside Council for Wales has funded surveys of the Lleyn soft-rock cliffs (Clee 1995) and the south coast of the Gower (Abbot 1992). Also on the coast, Doncaster (1981) investigated the factors influencing the distribution of ant nests on Ramsey Island, Pembrokeshire, and Doncaster (1983) extended this study by investigating the factors influencing foraging activity in different habitats.

Another valuable aculeate habitat is the sparsely-vegetated workings of sand quarries. In response to the interesting discoveries made in Denbighshire by Formstone (1993b), the Countryside Council for Wales commissioned a survey of fifteen potentially suitable quarries in Denbighshire and Flintshire (Edwards 1994). Chater (1988), in an ongoing study, has reported on the ant fauna of a lowland raised mire after an extensive fire, but, apart from ant recording, Other habitats have been largely neglected. Material collected during the Nature Conservancy Council's Welsh Peatland Invertebrate Survey between 1987 & 1989 has added to knowledge of the distribution of peatland ants in Wales but most of the aculeate bees and wasps taken in water-traps have still to be identified. However, J.T. Burn has identified all of the dryinids, bethylids and embolemids and a total of eleven species were collected. Surveys of the peatland and scrub habitats of the raised mire at Fenn's Moss in Denbighshire (Liverpool Museum 1994b) yielded records of 52 aculeate species. The only systematic work in woodlands is that of Thomas (1991), who collected invertebrates in water-traps on Coedmore NNR in Cardiganshire. The aculeate Hymenoptera were not identified in the original study but subsequently it was found that these samples contained 34 species of aculeate wasps and bees (A.P. Fowles & M. Edwards, unpublished data).

Important sites & habitats

The term 'honeypot recording', which reflects the tendency for naturalists to repeatedly visit well known sites, could have been specifically coined for hymenopterists studying the aculeate bees and wasps. However, there are two very good reasons why sites of known importance receive more than their fair share of recording: repeated visits are essential in order to build up a reasonably complete inventory of the aculeate fauna at a particular site (cf. Archer (1988), and sites with a rich diversity of species are relatively uncommon. A handful of Welsh sites feature prominently in the literature, beginning with Criccieth on the Lleyn. In the early 1900s several hymenopterists visited the coast here to collect *Osmia xanthomelana* (Kirby) and other local species, but it is only recently that other stretches of cliff on the Lleyn coast have been investigated. Hallett concentrated largely on the area around Sully, to the south of Cardiff, and his visits were rewarded with six Red Data Book and twenty-six Nationally Scarce species.

Hallett also collected extensively at Merthyr Mawr to the east of Porthcawl and this site is still a popular area with hymenopterists. Eight Red Data Book species are known from the site (or eleven if Blomer's 'Bridgend' records originate here, as seems likely (Blomer 1833)) and at least five of them are still present. Other well-recorded dune systems of importance include Kenfig & Oxwich NNRs (both of which have five Red Data Book species), Llangennith Burrows (four RDB species), and Newborough Warren NNR (two RDB species). By comparison, several other potentially important dune systems seem to be considerably under-worked. Notable examples include Whiteford Burrows NNR on the Gower, Stackpole NNR and Broughton Burrows in Pembrokeshire, Morfa Dyffryn & Morfa Harlech NNRs in Merionethshire, and Tywyn Aberffraw on Anglesey. The MoD property of Pendine in Carmarthenshire also requires detailed survey. Recent work on Talacre Warren in Flintshire by C. Clee and others from Liverpool Museum, recording three Red Data Book species, has demonstrated the value of surveying in previously unworked areas. Four aculeate species (*Arachnospila consobrina* Dahlbohm, *Mimumesa littoralis* Bondroit, *Colletes cunicularius* and *Coelioxys mandibularis* Nylander) on Welsh dunes are of particular importance in a national context as a high proportion of their British populations is found here. The distribution of each of these species can almost certainly be extended and it is hoped that hymenopterists will be persuaded to visit some of the lesser-known dune systems in the future. More work also needs to be done on the soft-rock cliffs of the Gower and Lleyn and there is still plenty to be learnt about the faunas of the sand quarries of Wales.

Away from the coast, large areas of inland Wales are virtually unknown and basic recording is necessary for all of the eastern vice-counties. Few nationally important sites are likely to occur in these areas but there is a real possibility of finding localities for rare species, such as *Stelis phaeoptera* (Kirby), *Nomada lathburiana* (Kirby) or *N. roberjeotiana* Panzer. Rhossili Down on the Gower should be the first area to survey for the bog ant *Formica candida* but other lowland raised mires in south and west Wales would be worth investigating, including Esgyrn Bottom (Pembs.), Cors Fochno (Cards.) and Arthog Bog (Merioneth). The discovery of *F. candida* on Cors Goch Llanllwch (Fowles 1992) and the ant *Myrmecina graminicola* (Latreille) on Cors Fochno (Chater 1988) demonstrates that interesting discoveries can be made in unlikely places. Reviewing the available records also suggests that limestone grasslands in Wales have been somewhat neglected, considering the rich faunas they support in southern England. The presence of the ant *Leptothorax tuberum* (F.) (Fowles & Morris 1994) on Great Orme's Head suggests that other thermophilous aculeates may be present, but this site has apparently never been properly worked for bees and wasps. Other limestone grasslands in Glamorgan, Carmarthen, Pembroke, Caernarvon, Denbigh and Flint would also repay survey.

Extinct or over-looked species

Hallett's manuscript (Hallett 1956b) contains details of 346 species of aculeate Hymenoptera and in the forty years since then the total for Wales has risen to 390. Offsetting these forty-four additions, there are thirty-three species listed by Hallett that have not been recorded in Wales in the past forty years (at least). More recently, taking 1980 as a threshold, thirty-nine species previously known from Wales have not been recorded in the last fifteen years. Of these species, perhaps only nine - *Cryptocheilus notatus*, *Psen ater* (Olivier), *Mimesa bicolor*, *Mellinus crabroneus* (Thunberg), *Andrena niveata*, *A. proxima* (Kirby), *Osmia xanthomelana*, *Nomada armata* Herrich-Schäffer and *N. fulvicornis* - can be regarded with some confidence as being extinct in Wales. Potentially, the remaining thirty species could all still be present, though it is likely that some of them have indeed become extinct in the years since they were last recorded.

Species known from Wales but not recorded in the period 1980-1995

	Year of last record
Anteon infectum	1936
Gonatopus distinguendus	1979
Gonatopus bicolor	1947
Gonatopus distinctus	1927
Chrysis illigeri	<1956
Formica sanguinea	1965
Cryptocheilus notatus	1914
Priocnemis agilis	1928
Priocnemis coriacea	1939
Eumenes coarctatus	1892
Ancistrocerus antilope	1875
Astata boops	1887
Psen ater	1832
Mimesa bicolor	1916
Spilomena troglodytes	1941
Gorytes quadrifasciatus	1968
Argogorytes fargei	1916
Mellinus crabroneus	1921
Hylaeus pictipes	1916
Andrena riparia	1974
Andrena fulvago	1911
Andrena falsifica	1929
Andrena minutuloides	1921
Andrena niveata	1916
Andrena proxima	1902
Lasioglossum quadrinotatum	1912
Sphecodes spinulosus	1935
Melitta tricincta	1911
Osmia pilicornis	1923
Osmia xanthomelana	1921
Osmia parietina	1979
Coelioxys quadridentata	1935
Nomada armata	1854
Nomada fulvicornis	1938
Nomada roberjeotiana	1953
Nomada sheppardana	1973
Anthophora quadrimaculata	<1956
Bombus subterraneus	1922
Bombus ruderatus	1940

From the preceding discussion, it is evident that there is plenty of scope for aculeate recording in Wales. A considerable body of information exists as a baseline for future studies but there is far more to do than can be tackled by the few resident hymenopterists. The addresses of relevant organisations involved with the study, recording and conservation of aculeate Hymenoptera in Britain are included in the section 8 and the Countryside Council for Wales would be pleased to receive information on any aculeate Hymenoptera studies carried out in Wales, especially for Red Data Book species, any species recorded from Wales not included in this provisional checklist, or of any records post-dating those included in the above table.

3. Red Data Book species recorded from Wales

Falk (1991) provides a thorough account of the status, ecology and conservation needs of all of the Red Data Book and Nationally Scarce aculeate Hymenoptera known from Wales. Else (*in prep.*) provides detailed information on ecology and distribution for all of the bees. In the following accounts, information on ecology and range is largely taken from these works. In the list of Welsh records for each species, doubtful records are placed in square brackets. An explanation of the RDB status codes can be found in section 6.

Formicoidea

***Myrmica (=Sifolinia) karavajevi* (Arnoldi 1930)** **RDB K**

Although found widely across central and northern Europe, this is considered to be a very local species throughout its range (Collingwood 1979). It was only added to the British list in 1968 on the basis of specimens collected from heathland localities in Surrey and Dorset. The only other British records are from Avon Common, South Hampshire (1971), and Skomer Island, Pembrokeshire (1988). On Skomer, a single queen was captured in a pitfall-trap situated in a rabbit-grazed field in 1988 (Loxton 1988, 1989).

M. karavajevi is a social parasite that lives permanently in nests of other *Myrmica* species (in Britain it is recorded from *M. sabuleti* Meinert and *M. scabrinodis* Nylander nests). There is no worker caste and the sexuals (males and queens) are fed by workers of the host species. Sexuals were present throughout the summer months for four years in a colony studied in Dorset. The few British records suggest that it parasitises nests in warm, open habitats, perhaps exclusively in heathland as the Skomer specimen could have originated from the island's coastal heaths. However, the sexuals of *karavajevi* closely resemble those of its hosts and hence it is probable that this species is under-recorded. Apart from chance captures, as in the case of the Skomer record, close examination of host nests will be necessary to locate this species and surveys may show that it is more widely distributed along the coast of south Wales.

Records: Skomer NNR SM722094, VC45, May-Aug 1988, one female, R.G. Loxton.

Sources: Loxton (1988, 1989), Hoy 1992.

***Formica candida (=transkaucasica)* Smith, 1878** **RDB 1**

Recorded across Europe and east to Japan but it is undoubtedly rare in many parts of its range and is described as endangered in western Germany and of conservation concern in Norway. As an inhabitant of sphagnum bogs it is vulnerable to drainage and this is probably the major threat to the species in Britain and elsewhere. It is very local on the valley bogs of the New Forest and the Dorset Heaths, the only localities known outside Wales, and colonies there appear to consist of small concentrations of nests.

The first Welsh record, reported as *F. fusca* ssp. *picea*, is of a worker collected by J.W. Allen "in a marshy spot" at Rhossili on the Gower in 1913. This record was subsequently called into doubt by Yarrow (1954), who considered it probably to be a mis-identification of *F. lemani* Bondroit. Blacker (1989) and Falk (1991), no doubt influenced by Yarrow, also dismiss the record as probably erroneous. Unfortunately, the specimen is not amongst Donisthorpe's collection of ants in the Leicester Museum (Collingwood 1957) and presumably it is not in the national collections at the Natural History Museum, London. On the basis of the known distribution of this species in Britain the suspicion surrounding this record is understandable. However, in 1991 *F. candida* was found on degraded raised mire on the Dyfed Wildlife Trust reserve of Cors Goch Llanllwch in Carmarthenshire (Fowles 1992). Subsequent investigations (eg. Bagley 1992, Franks 1993,

Fowles & Hurford 1996) have demonstrated that this is probably the largest colony in Britain, with c.130 nests in wet heath and on the intact raised mire. A permanent monitoring plot, measuring 30x15 metres, has been established in the core of the colony, yielding counts of 60 occupied nests in 1993 and 64 nests in 1995.

At Cors Goch Llanllwch the *F. candida* nests are made from fragments of *Molinia, Sphagnum* and *Hypnum jutlandicum* formed into a small mound around tussocks. Nests appear to be more frequent in areas of open wet heath on the degraded part of the mire but they are also found on the dome of the intact raised mire. The nests are not conspicuous and it is quite feasible that the species could still occur on the Gower (certainly there is no reason now to doubt the Rhossili record). A brief search of suitable habitat on Rhossili Down in 1992 by members of the Bees, Wasps & Ants Recording Scheme was unsuccessful, but a more extensive search is required.

Records: Rhossili SS48/SS49, VC41, 1913, one worker, J.W. Allen
Cors Goch Llanllwch SSSI, SN363184, VC44, Sept 1991, L. Gander
Cors Goch Llanllwch SSSI, SN363184, VC44, June-Aug 1992, L. Gander, M. Bagley, etc.
Cors Goch Llanllwch SSSI, SN363184, VC44, 21 & 22/7/93, N. Franks, etc.
Cors Goch Llanllwch SSSI, SN363184, VC44, 17/7/95, A.P. Fowles, C. Hurford, etc.

Sources: Bagley (1992), Blacker (1989), Donisthorpe (1927), Fowles (1992), Fowles & Hurford (1996), Franks (1993), Gander (1992), Hallett (1915, 1928, 1936, 1947, 1956b), Hoy (1992), Yarrow (1954).

[Note: the collector of the Rhossili specimen is given as T.W. Allen by Donisthorpe but, correctly, as J.W. Allen by Hallett]

Pompiloidea

Cryptocheilus notatus (Rossius, 1792) RDB 2

A large and conspicuous spider wasp that has declined considerably in Britain, especially in inland localities but also on the coast. Formerly recorded at suitable localities along the coast of southern England, it is now an extremely scarce species with records mainly from the coast of Dorset and south Devon. *Cryptocheilus* chiefly inhabits warm, sandy localities where it burrows into firm ground and provisions its nests with large spiders, chiefly species of the families Agelenidae and Dictynidae, although Lycosidae and Gnaphosidae are also reported as prey. Adults are on the wing between June and September and are known to visit wild carrot *Daucus carota* and yarrow *Achillea millefolium* for nectar.

There have been no records in Wales for at least forty (probably seventy) years and *Cryptocheilus* is now probably extinct here. Hallett (1928) commented that it was "not uncommon at Horton in July 1914, and has also occurred at Kenfig and Porthcawl" and he later wrote (Hallett 1956b) that it occurred on the "Porthcawl and Gower sandhills in fair numbers". However, Hallett's published records (as *Salius affinis*) in the *Transactions of the Cardiff Naturalists' Society* refer to only three males at Kenfig on 1 June 1914 and three at Horton in July 1914 (Hallett 1915). The following year (Hallett 1916a) he noted that he had recorded "a few" at Porthcawl, but obviously did not regard this as a particularly significant observation.

Cryptocheilus is reliably known only from Glamorgan in Wales but there is a published record for Barmouth (Saunders 1896). Spooner (1942) dismisses this as a transcription error for Bournemouth, Hants. Hallett (1956b) also lists Barmouth as a locality on the basis of records from E.B. Nevinson, who collected in North Wales in the first decade of this century, but Falk (1991) regards this as unconfirmed.

The Glamorgan dune systems have been sufficiently well surveyed for Hymenoptera in recent years to suggest that this species is no longer present but it is feasible that it still survives and hymenopterists working the dunes of Glamorgan, Carmarthen and Pembroke should be aware of the possibility.

Records: **Kenfig NNR** SS78, VC41, 1/6/14, three males, H.M. Hallett
Horton SS4785, VC41, July 1914, three, H.M. Hallett
Merthyr Mawr SSSI SS87, VC41, 1915-1916, "a few", H.M. Hallett
[**Barmouth** SH61, VC48, pre-1896 (Saunders 1896)]
[**Barmouth** SH61, VC48, c.1900, E.B. Nevinson]

Sources: Hallett (1915, 1916a, 1928, 1947, 1956b), Saunders (1896), Spooner (1942)

Arachnospila consobrina (Dahlbom, 1843) RDB 3

Abroad, this species is recorded widely across Europe and Africa but it is a rare spider wasp in Britain, with modern records confined to Suffolk and Glamorgan. Its British distribution formerly ranged from Norfolk around the southern coasts to Cheshire but it has declined markedly. The reasons for this decline are unclear but the most likely causes are deterioration of its sand dune habitat due to public pressure, habitat loss from development, or natural succession. Little is known of its biology but it probably burrows in bare sand, provisioning its nest cells with spiders. Adults have been recorded from June to September.

In Wales, *A. consobrina* is known from Glamorgan, Pembroke and (possibly) Merioneth. It was first recorded by D. Sharp on the Gower in July 1897 (Hallett 1915) and there is a specimen in the Natural History Museum (London) collected by Yerbury at Porthcawl in 1903. Subsequently Hallett collected at least six specimens from Mid and West Glamorgan between 1914 and 1929. Later he wrote (Hallett 1956b), without giving any further details, that it is "not very uncommon on sandhills at Porthcawl and Gower". Hallett's manuscript review of the aculeate Hymenoptera of Wales (Hallett 1956b) includes an undated record for Broadhaven, Pembrokeshire, which is attributed to Daltry; other Daltry records in the manuscript are dated 1938. *A. consobrina* has also been reported from Fairbourne in Merioneth (Kloet 1941) but there is some confusion surrounding this record. On the advice of Hallett and G.M. Spooner, Kloet (1942) subsequently withdrew the majority of the records, including all of the Pompilidae, in his earlier paper as it was apparent that a number of them were erroneous. However, Hallett (1956b) includes the record of *A. consobrina* in his manuscript, giving the impression that this species was one of those that had been correctly identified. [Note: From data attached to specimens in Liverpool Museum collected by Kloet it is evident that he visited Fairbourne in June 1941. However, there are no pompilid specimens amongst the Kloet material held at Liverpool (C. Clee, pers. comm.)]

Records: **Gower** VC41, July 1897, D. Sharp
Porthcawl SS87, VC41, 7/6/03, J.W. Yerbury
Port Eynon SS4684, VC41, July 1914, one female, H.M. Hallett
Merthyr Mawr SSSI SS87, VC41, June 1915, two females, H.M. Hallett
Merthyr Mawr SSSI SS87, VC41, July 1916, one female, H.M. Hallett
Llangennith SS4091, VC41, July 1921, one female, H.M. Hallett
Kenfig NNR SS78, VC41, August 1929, one male, H.M. Hallett
Broad Haven, Stackpole NNR, SR9794, VC45, c.1938, Daltry
[Fairbourne SH6114, VC48, June 1941, G.S. Kloet]
Oxwich NNR SS5087, VC41, 11&12/8/73, M.C. Day & G.R. Else
Merthyr Mawr SSSI SS871774, VC41, one male & one female, 6/7/91, P.M. Pavett
Kenfig NNR SS783832, VC41, one male, 9/6/93, P.M. Pavett

Sources: Hallett (1915, 1916a, 1916b, 1920, 1924, 1928, 1956b), Kloet (1941, 1942), NMW.Z.

(31.358.2432-2437)

Vespoidea

***Ancistrocerus antilope* (Panzer, 1798)** **RDB 3**

British records of this mason wasp are widespread, from Kent to Ayrshire, but it has always been rather scarce and modern records are confined to Yorkshire and Devon. Its nests are built in a very wide range of cavities, including hollow twigs, sandy banks and mortared walls, and there is no particular association with a specific habitat type. Nest cells are stocked with insect larvae, chiefly micro-moths but beetle and sawfly larvae are also recorded as prey. In Britain, adults have been found from May to August.

This species has been recorded from Wales on two occasions, both in the second half of the last century. Chapman collected *A. antilope* at Abergavenny in 1868 (Hallett 1956a) and Smith (1875a) included it in a list of Hymenoptera captured at Barmouth at the end of July 1875.

Records: **Abergavenny** SO21/SO31, VC35, 1868, T.A. Chapman
Barmouth SH61, VC48, July 1875, F. Smith

Sources: Hallett (1956a, 1956b), Smith (1875a)

***Symmorphus crassicornis* (Panzer, 1798)** **RDB 3**

An uncommon mason wasp, though records are widespread across southern England and Wales, this species nests in cavities and frequently utilises old burrows in dead wood. Adults are on the wing from June to August and they are found in damp habitats where they forage for beetle larvae (perhaps exclusively the leaf beetle *Chrysomela populi*) on poplar, aspen and creeping willow. Their attachment to tree foliage may mean that they are somewhat overlooked but this is a large and handsome species and is undoubtedly scarce in Wales.

There are four records of this species in Wales. One of the earliest British specimens was captured at Abergavenny, Monmouthshire. Guichard (1972) records this specimen as being taken in 1848 by F. Smith, but Perkins (1917a) examined the specimen in Oxford University Museum and stated that it was collected in 1868. Perkins (1917a) refers to another nineteenth century record from Abergavenny by Chapman, but this is almost certainly a mistake as Hallett (1928, 1956a, 1956b) states that *S. crassicornis* was taken at Abergavenny in 1868 by T.A. Chapman. Presumably Chapman sent his specimen to Smith for identification and it was retained in the latter's collection. There were no further records until 1931 when a female was taken at Merthyr Mawr, Glamorgan. Since then there have been only two other specimens recorded, a male at Merthyr Mawr in 1984 and a female at Pembrey Forest, Carmarthenshire, in 1985.

Records: **Abergavenny** SO21/SO31, VC35, 1868, T.A. Chapman
Merthyr Mawr SSSI SS87, VC41, 2/8/31, one female, J.E. Delhanty
Merthyr Mawr SSSI SS87, VC41, 4/7/84, one male, J. Cooter
Pembrey Forest SN394028, VC44, 6/8/85, one female, S.J. Falk

Sources: Cooter (1987), Guichard (1972), Hallett (1928, 1956a, 1956b), Hallett & Norton (1933), Halstead (1990), Pavett & Morgan (1994), Perkins (1917a), Saunders (1896)

Sphecoidea

***Psen ater* (Olivier, 1792)** **Extinct**

There are no records of this solitary wasp in Britain for the last one hundred and fifty years. In the first half of the nineteenth century it was collected from East Suffolk and Hampshire. *P. ater* nests in sandy habitats, probably in the vicinity of scrub as it stocks its cells with leafhopper nymphs occurring on the foliage of trees and bushes. Lomholdt (1980) reports that it is widely distributed across Europe and that its range extends eastwards to Japan, but there is only a single confirmed record from Scandinavia.

The status of *P. ater* as a Welsh species rests on its inclusion (as *P. compressicornis*) in a list of insects collected at Bridgend, Glamorgan, in 1832 (Blomer 1833). Hallett (1928) comments (under *P. atra* Fab.) that Blomer's records "must be accepted with reserve" and suggests that a mis-identification of *Mimumesa littoralis* Bondroit had occurred. However, he goes on to point out that the male, at least, is an unmistakeable species and suggests, citing the case of the black-veined white *Aporia crataegi* L., that its occurrence in Glamorgan was a possibility. Later (Hallett 1936), he notes that Blomer's specimens were identified by "the well-known Entomologist J.C. Dale, but a few of them are so remarkable that modern examination of the specimens would be necessary before we could feel quite certain of the identity ascribed to them". Twenty years later, Hallett (1956b) seems to have become convinced enough to include *P. ater* in his manuscript list of the Hymenoptera Aculeata of Wales without qualification. Richards (1980) obviously remained to be convinced and questioned the Glamorgan record in his notes on the former distribution of the species and Falk (1991) omits the record altogether. The inclusion of *P. ater* on a list of Welsh aculeates is, therefore, a tenuous one. However, there are comparable examples of rare insects from other Orders recorded in Wales (eg. the robber fly *Dasypogon diadema* F., and there seems little justification for ignoring Blomer's extraordinary record altogether.

Records: Bridgend SS87, VC41, 1832, C. Blomer

Sources: Blomer (1833), Falk (1991), Hallett (1928, 1936, 1956b), Lomholdt (1980), Richards (1980)

***Mimumesa (=Psen) littoralis* (Bondroit, 1933)** **RDB 3**

M. littoralis is apparently widespread in Europe and Asia. The British range of this solitary wasp is practically confined to the west coast of England and Wales from Devon to Lancashire, and Wales can be regarded as the stronghold of its distribution. These west coast populations occur in the unstabilised zone of dune systems, where the wasps are believed to nest in marram *Ammophila arenaria* roots and stems, but recently a population has been identified on a landslip at Charmouth, Dorset (Else & Felton 1994). The wasps are said to freely visit flowers, especially those of sea spurge *Euphorbia paralias*, and are on the wing between June and August. There are few British records of prey but in Japan nests have been recorded as provisioned with leafhoppers (Hemiptera: Homoptera) and Else & Felton (1994) observed *M. littoralis* carrying leafhopper nymphs at Charmouth.

In Wales this species is widely distributed on sand dunes from Glamorgan to Anglesey, with several authors describing it as abundant at the beginning of the century. By comparison, there are relatively few modern records and increased disturbance of foredune habitats as a result of tourist pressure is a potential threat to populations. However, it is likely that the species is still well established in Wales and, for instance, the lack of post-1980 records from the northern dunes is almost certainly due to under-recording.

Records: **Barmouth** SH61, VC48, Aug 1875, 'abundant', F. Smith
Gower, VC41, 1897, D. Sharp
Towyn SH50, July 1899, E.B. Nevinson
Criccieth SH4937/SH5038, VC49, July 1900, E.B. Nevinson
Morfa Harlech SH53, VC48, 8/7/02, one male, J.W. Yerbury
Pen-sarn SH5727, VC48, 1/8/02, R.C. Bradley
Towyn SH50, VC48, Aug 1902, R.C. Bradley
Aberdovey SN59/SN69, VC48, July 1904, 'not uncommon', C.H. Mortimer
Porthcawl SS87, VC41, 27/7/13, one male, T.H. Salmon
Merthyr Mawr SSSI SS87, VC41, June 1915, one female & five males, H.M. Hallett
Merthyr Mawr SSSI SS87, VC41, 1918, 'abundant', H.M. Hallett
Tywyn Aberffraw SSSI SH3568, VC52, 30/8/50, two females, O.W. Richards
Oxwich NNR SS5087, VC41, 23/6/52, J. Cowley
Newborough Warren NNR SH46, VC52, 1966-1979, C. O'Toole
Oxwich NNR SS5087, VC41, 11&12/8/73, M.C. Day & G.R. Else
Morfa Harlech NNR SH53, VC48, 8/8/77, J.T. Burn
Oxwich NNR SS5087, VC41, 3/9/77, M.C. Day
Pembrey Forest SN392012, VC44, 6/8/90, one male & one female, P.M. Pavett
Nicholaston Burrows SSSI SS515880, VC41, 7/8/90, one female, P.M. Pavett
Kenfig NNR SS78, VC41, 12/7/92, one, A.E. Stubbs
Kenfig NNR S801826, VC41, 7/6/93, one female, P.M. Pavett
Portmadoc SH53, VC49, 4&20/8/16, 2♀♀ [specimens in Nat. Hist. Mus., London]

Sources: Bradley (1902), d'Assis-Fonseca & Cowley (1953), Else & Felton (1994), Falk (1992), Hallett (1914, 1916a, 1916b, 1920, 1928, 1956b), Loxton (1981), Morgan & Pavett (1995), Mortimer (1905), Nevinson (1900, 1901), NMW.Z. 31.358.1757-1765), Pavett (1993), Richards (1952), Smith (1875a), Spooner (1948)

Mimesa (=Psen) bicolor Jurine, 1807 **RDB 2**

There are historical records of this solitary wasp from localities across southern Britain and in some areas it was apparently locally abundant. Since the 1940s, however, it has become much scarcer and appears to have been recorded only once in Britain in the last twenty-five years (Yorkshire in 1979). There is some indication that the species was prone to periodic fluctuations, becoming commoner when there were several consecutive years of hot, dry summers. Its preferred habitat appears to have been sandy heathland and habitat loss has no doubt hastened its decline. Nests, often in aggregations, are excavated in bare, sandy ground and are stocked with leafhopper nymphs (Hemiptera: Homoptera), especially Cicadellidae. Adults are on the wing between June and August.

Although there are many records of '*Psen bicolor*' from Wales in the literature, these all refer to *Mimesa equestris* F., as the two species had been confused in the past. The situation was clarified by Spooner (1948) and *M. bicolor* was then known as *Mimesa rufa* (Panzer), which was later synonomised with *bicolor*. Only a single specimen has been recorded from Wales (as *Psen equestris*), by Hallett in 1916 (Hallett 1920, 1928) at Merthyr Mawr, Glamorgan. In his manuscript of the Hymenoptera Aculeata of Wales (Hallett 1956b) the year of capture is recorded as 1925, but this is clearly a mistake.

Records: **Merthyr Mawr SSSI** SS87, VC41, 15/7/16, one male, H.M. Hallett

Sources: Hallett (1920, 1928, 1956b), Spooner (1948)

***Podalonia affinis* (Kirby, 1798)** **RDB 3**

P. affinis is the rarest of the four British sand wasps, all of which have been recorded from Wales. Its British stronghold is East Anglia but it is also found in several other south-eastern counties of England and, very locally, in parts of northern England. It is a widespread species in Europe and Asia. This solitary wasp inhabits sandy habitats, both inland and on the coast, nesting in bare sand. The cells are stocked with the larvae of noctuid moths, usually one per cell. Adults are on the wing between May and September and the females are believed to overwinter in burrows in the sand. They occasionally visit dune flowers, such as sea holly *Eryngium maritimum*, for nectar.

This species has been added to the Welsh list recently (C. Clee, pers. comm.). A pair of sand wasps were seen *in cop.* amongst dunes on the Flintshire coast in August 1995 and one was collected in the belief that the species concerned was *P. hirsuta* (Scopoli). Subsequently it was confirmed that the specimen was a female *P. affinis*. *P. hirsuta* is a common species in sandy habitats all along the Welsh coast and it is possible that *P. affinis* is also more widely distributed but overlooked amongst its more abundant congener.

Records: **Talacre Warren SSSI** SJ110848, VC51, 9/8/95, male & female, C. Clee

***Mellinus crabroneus* (Thunberg, 1791)** **RDB 1**

M. crabroneus is widely distributed in Europe and its range extends into Asia. British records of this solitary wasp are scattered across England and Wales and in some localities it was reported as being locally abundant. A rapid decline began to occur in the 1920s and the last confirmed record for Britain was in 1952. The reasons for this dramatic decline are unknown but it may possibly be linked to a series of wet summers in the 1920s. *M. crabroneus* nests in open, sandy habitats, including heathland, dunes and coastal soft-rock cliffs, and suitable habitat would still appear to be widespread. Nest burrows are excavated in sandy soil, often in aggregations, and stocked with flies that are predominantly captured on umbellifers. Adults are on the wing between July and September.

There are only a handful of records of this species from Wales and it has not been seen here for at least forty years. There is only a single record with full data in the last 125 years, but a Pembrokeshire record (Hallett 1956b) probably also refers to the first half of this century. Kloet (1941) reported *M. sabulosus* F. (as this species was formerly known) from Cardiff between 1938 and 1941, but the record (along with many others) was subsequently withdrawn (Kloet 1942). This record has been plotted in error by Falk (1990, 1991) for 10km square ST16. The Anglesey record mapped by the same author for SH47 refers to Smith's 1873 record from Beaumaris-Garth Ferry, which is actually within SH57.

Records: **Bridgend** SS87, VC41, 1832, C. Blomer
Beaumaris-Garth Ferry SH57, VC52, August 1873, F. Smith
Llangennith SS4091, VC41, 21/7/21, H.M. Hallett
Milford Haven SM80/SM90, VC45, undated (pre-1956), Marshall

Sources: Blomer (1833), Falk (1990, 1991), Hallett (1924, 1928, 1956b), Kloet (1941, 1942), NMW.Z. (31.358.2195), Smith (1875b)

***Philanthus triangulum* (Fabricius, 1775)** **RDB 2**

The range of *P. triangulum* extends from Scandinavia to southern Africa and eastwards to Iran, but (until recently) it has been extremely rare in Britain with established colonies known only from the Isle of Wight. In the 1980s a few records from Hampshire and East Anglia indicated that there was a small expansion of its British distribution. This expansion increased dramatically in 1992 and has continued in subsequent years (Else 1993, 1995a, 1995b), with several new vice-county records in southern England and the first record from Wales (Else 1995c). Else (1993) considered this expansion to be largely due to dispersion of adults from British colonies, although continental immigration is also a possibility. *P. triangulum* nests colonially in bare sand and provisions its nest burrows with paralysed bees, almost exclusively honey bees *Apis mellifera* L. although solitary bees have also been recorded as prey. It has earned the vernacular name of 'bee wolf' and can cause the failure of hives in the vicinity of colonies. The adult wasps visit a wide range of nectar sources and are on the wing in July and August.

Else & Spooner (1987) refer to "ancient record(s)" of *P. triangulum* from south Wales, but this was subsequently reported to be an error (Else 1993). The only confirmed record from Wales is of a single male specimen captured on the dunes at Talacre Warren, Flintshire, in August 1995 (C. Clee, pers. comm.). If the recent run of good summers continues then it is likely that *P. triangulum* will occur more widely in Wales, but equally its range could contract if wet weather prevails. Its Red Data Book status will need to be reassessed in the future if its range expansion is maintained.

Records: **Talacre Warren SSSI** SJ112850, VC51, 23/8/95, one male, C. Clee.

Sources: Else (1993, 1995a, 1995b, 1995c), Else & Spooner (1987).

Apoidea

***Colletes cunicularius* (Linnaeus, 1761)** **RDB 3**

The continental distribution of this mining bee ranges across central and northern Europe to Soviet Aisa, where it occupies a variety of sandy habitats. British populations are confined to the west coast dunes from Lancashire to Glamorgan and colonies are restricted to open sand in the yellow dune zone, especially where old blow-outs are stabilising. Ecological and morphological differences suggest that the British populations should be recognised as a distinct sub-species, *Colletes cunicularius celticus* (O'Toole 1974). Subsequent studies on the Dufour's gland secretions in samples of this species from Britain and Europe (Albans et al 1980) have provided evidence that the biochemical differences are sufficient to regard the British sub-species as a distinct species, ie. *Colletes celticus* O'Toole, 1974, although this has not been formally published (cf. O'Toole 1989).

The ecology of *C. cunicularius* has been studied in detail in Britain and the literature contains extensive accounts of phenology, nesting behaviour, etc. (O'Toole 1974, 1989; O'Toole & Raw 1991). Nest burrows are constructed in firm, open sand and aggregations of up to 18,000 nests are reported from some sites, including Kenfig Burrows (Archer, Field & Else 1992). South-facing slopes in old blow-outs are favoured nest sites. The bees emerge *en masse* in fine weather in late March and continue on the wing to late May. Emergence is synchronised with the appearance of male catkins on creeping willow *Salix arenaria*, from which the females collect pollen to stock their nest cells. Nectar is also taken from male creeping willow catkins and there are very few observations of *C. cunicularius* visiting any other plant species for nectar.

Apart from the Formby coast of Lancashire, the Welsh dunes represent the stronghold of this unique sub-species. It was first recorded in Wales at Abersoch in 1917 (where it is probably now

extinct) and since then it has been recorded at nine sites (assuming that P. Crow's Talsarnau specimens originate from the Morfa Harlech population) in Glamorgan, Merioneth, Anglesey and Flintshire. The populations at Kenfig, Whiteford, Oxwich and Newborough NNRs are very large. Further information on its status at Merthyr Mawr and Morfa Harlech would be valuable. Although nesting aggregations are highly conspicuous, the early emergence of this bee has probably led to it being overlooked on a number of Welsh dune systems and it would be surprising if it did not occur in Carmarthenshire and Pembrokeshire.

Records: **Abersoch** SH32, VC49, June 1917, one worn female, A.E. Bradley
Newborough Warren NNR SH46, VC52, 18/4/68, male (*ssp.* holotype), C. O'Toole
Newborough Warren NNR SH46, VC52, 29/4/69, 'mass emergence of males', C. O'Toole
Kenfig NNR SS78, VC41, pre-1974, R. Payne
Whiteford Burrows NNR SS49, VC41, pre-1974, G.M. Spooner
Kenfig NNR SS78, VC41, 5/4/74, C. O'Toole
Morfa Harlech NNR SH53, VC48, 5/4/74, 'common', P. Crow
Merthyr Mawr SSSI SS87, VC41, 6/4/74, C. O'Toole
Talsarnau SH6035, VC48, 10/4/76, two females, P. Crow
Morfa Harlech NNR SH53, VC48, 15/4/76, five males, P. Crow
Morfa Harlech NNR SH53, VC48, 4&5/5/77, five males, three females, P. Crow
Kenfig NNR SS78, VC41, 1977, 'aggregation', C. O'Toole
Morfa Harlech NNR SH53, VC48, 7/4/78, one male, P. Crow
Morfa Harlech NNR SH53, VC48, 3/5/78, 'a few', P. Crow
Whiteford Burrrows NNR SS49, VC41, pre-1989, 'aggregations', C. O'Toole
Nicholaston Burrows SSSI, SS515880, VC41, 31/3/90, one male & one female, P.M. Pavett
Tywyn Aberffraw SSSI SH348679, VC52, 10/4/93, 'aggregation', J.B. Ratcliffe
Whiteford Burrows NNR SS443947, VC41, 23/4/93, 'frequent', P.M. Pavett/S.J. Falk/A.P. Fowles
Oxwich NNR SS510876, VC41, 23/4/93, several males & females, P.M. Pavett & S.J. Falk
Kenfig NNR SS7981, VC41, 27/4/93, several males & females, S.J. Falk
Talacre Warren SSSI SJ112849, VC51, 15/4/94, one male, C. Clee
Talacre Warren SSSI SJ112849, VC51, April 1995, 'several', C. Clee
Newborough Warren NNR SH428641, VC52, 14/4 & 6/5/95, 'aggregation', M.A. & E.A. Howe
Newborough Warren NNR SH428641, VC52, 11/6/95, 'one worn ♀', M.A. & E.A. Howe

[Note: this compilation of records is likely to be incomplete as several hymenopterists may have collected *C. cunicularius* at its known sites (particularly the NNRs) without publishing or reporting their records]

Sources: Albans *et al* (1980), Anon. (1980a, 1980b), Archer, Field & Else (1992), Hallett (1956b), Loxton (1981), Morgan & Pavett (1995), O'Toole (1974, 1989), O'Toole & Raw (1991)

Andrena rosae Panzer, 1800 — RDB 2

Both sexes of this species (and its close relative *A. trimmerana* (Kirby)) are sexually dimorphic and this led to considerable taxonomic confusion in the British liiterature until Perkins (1913, 1916a, 1919) clarified the position. Some continental authors still regard the two broods of *A. rosae* as separate species, referring to the spring brood as *A. eximia* but there seems to be no evidence to support this from British studies (Else *in prep.*). Abroad *A. rosae* ranges across

central and southern Europe to the Far East. In Britain this is a species of southern England and Wales but there are post-1970 records only for Kent, Cornwall, Devon and Pembrokeshire. It has apparently become extinct in many of its inland localities in England. Only six specimens have been recorded in Wales, with just a single female having been seen since 1951.

This mining bee nests in bare ground on light soils, including well used paths, and possibly shares a communal nest entrance to its burrow with other females, as closely related species do. However, the life history of *A.rosae* has not been studied in Britain and it is still unclear, for instance, which plant species are visited for pollen. The summer brood probably collects umbellifer pollen but the spring brood might use a variety of early flowering plants. First brood adults are on the wing between late March and the end of May, whilst the summer brood appears between mid July and early September. It is not closely tied to any particular habitat and is known from moorland, heathland and coastal cliffs in Britain. It is quite possibly under-recorded in Wales and cliff-top localities on the Gower and in Pembrokeshire would probably repay survey.

Records: **Raglan** SO40, VC35, c.1897, R.C.L. Perkins
Horton SS4785, VC41, 20/7/14, one female, H.M. Hallett
Lavernock ST1868, VC41, 15/8/15, one female, H.M. Hallett
Dinas Head SN0041, VC45, 29/8/48, one male, O.W. Richards
Gower, VC41, 17/8/51, C.H. Andrewes
Trefeiddan SM733253, VC45, 24/8/85, one female, S.J. Coker

[Note: Perkins' record from Raglan (in Hallett 1956a) is undated. However, between 1897 and 1899 Perkins visited his father (who was Vicar of Raglan) on several occasions and most of his collecting appears to have taken place in 1897]

Sources: Else (*in prep.*), Hallett (1916b, 1928, 1956a, 1956b), Morgan & Pavett (1995), Perkins (1913, 1916a, 1919), Richards (1950)

Andrena hattorfiana (Fabricius, 1775) **RDB 3**

This species occurs throughout Europe, northwards to southern Scandinavia and east to Caucasus and Transcaspia, and has also been reported from North Africa. Its British distribution ranges widely across southern England but in Wales it has been recorded only from Glamorgan. It nests in light, free-draining soils in areas that support populations of its pollen source, field scabious *Knautia arvensis* (although small scabious *Scabiosa columbaria* is also occasionally visited for pollen). Although it has always been a local species, it has undergone a substantial decline this century as the calcareous grasslands that support its host plant have been destroyed by agricultural improvement or industrial development. Adults are on the wing between June and August.

Hallett (1956b) considered that *A. hattorfiana* "probably occurs all along the South Wales coast sandhills" but this is clearly not the case as this large and unmistakeable mining bee has been found in only one locality in Wales since 1934. It was first reported in 1854 (Smith 1861) from Clyne Wood, Swansea, and there was evidently a colony established here as the host-specific parasite *Nomada armata* H.-S. (q.v.) was also collected at the same time. There were no further records until Hallett (1921, 1924) took several females at Llangennith on the Gower in 1921. The following year (Hallett 1925, 1928, Hallett & Norton 1930) he discovered a colony on sandy loam in a railway cutting at Sully and this colony persisted until at least 1934. Another long period without records was broken recently when P.M. Pavett collected two males on clifftop limestone grassland at Horton in 1993 and *hattorfiana* was also present there in 1995.

In the National Museum of Wales there is a specimen in the Gardner Collection which is labelled as taken by E.B. Nevinson at Towyn in 1899. Nevinson was collecting at Towyn in Merioneth

that year (Nevinson 1900), but curiously did not publish this most interesting record. The specimen is not referred to in Gardner's specimen notebooks. If correct, this would be the northernmost British record but in view of the lack of supporting information it seems best to regard this record as unconfirmed.

Records: **Clyne Wood, Swansea** SS6091, VC41, 1854, T.P. Dossetor
[**Towyn** SH50, VC48, 1899, one, E.B. Nevinson]
Llangennith SS4091, VC41, July 1921, several females, H.M. Hallett
Swanbridge ST1768, VC41, 20/8/22, females plentiful, H.M. Hallett
Swanbridge ST1768, VC41, July 1923, one, H.M. Hallett
Swanbridge ST1768, VC41, 1928, H.M. Hallett
Swanbridge ST1768, VC41, 7/8/32, one, H.M. Hallett
Swanbridge ST1768, VC41, 29/7/34, one , H.M.. Hallett
Horton SS482855, VC41, 2/7/93, two males, P.M. Pavett
Horton SS484855, VC41, 1/8/95, c.10 females, P.M. Pavett

Sources: Hallett (1921, 1922, 1924, 1925, 1928, 1935, 1956b), Hallett & Norton (1930), Morgan & Pavett (1995), NMW.Z. (31.358.449-457, 32. 362.4, 33.329.4, 34.666.2, 52.34.856M)

Andrena niveata Friese, 1887 **RDB 2**

This mining bee is widely distributed across central and southern Europe and its range extends eastwards at least to Israel. It is a very rare species in Britain, with modern records confined to East Kent, but it was formerly more widespread in the southern counties of England. A considerable decline in its British range has undoubtedly taken place but it is possibly under-recorded to an extent as it is easily confused with several other small *Andrena* species in the field. Adults are on the wing in May and June and they inhabit coastal localities where nests are probably made in light, sandy soils on sparsely vegetated ground. Pollen is collected from a variety of crucifers.

In Wales there are confirmed records of *A. niveata* from a single locality (Sully in Glamorgan), where it was reported as plentiful between 1914 and 1916 (Hallett 1915, 1928). Hallett obviously recorded the species at Sully in subsequent years as he comments that it "has seldom occurred since" in reference to the 1916 record (Hallett 1928). Later records are also implied in his manuscript notes (Hallett 1956b) as he states that *A. niveata* "appears to prefer the coast, Lavernock to Sully at flowers of *Brassica* and *Conium*, fairly plentiful". In the margin of his manuscript account, Hallett notes that Gardner recorded *A. niveata* at Talycafn in the Conwy Valley on 26 July 1913. In view of the late date of the record, this is almost certainly a mis-identification. There have been no records in Wales for at least forty years (and probably considerably more) and this species may now be extinct here. However, in view of the possibility of specimens being over-looked in the field, hymenopterists surveying coastal localities in south Wales during the flight period would be advised to pay attention to small *Andrena*s visiting crucifers.

Records: [**Talycafn** SH7871, VC50, 26/7/13, W. Gardner]
Sully ST16, VC41, 15/5/14, one, H.M. Hallett
Sully ST16, VC41, 24/5/14, 'very plentiful', H.M. Hallett
Sully ST16, VC41, 1915, 'very abundant', H.M. Hallett
Sully ST16, VC41, 28/5/16, 'very abundant', H.M. Hallett
Sully ST16, VC41, 1917-1928, 'seldom', H.M. Hallett

Sources: Hallett (1915, 1928, 1956b), NMW.Z. (14.353.568-570, 31.358.491-501)

Andrena proxima **(Kirby, 1802)** **RDB 3**

A widely distributed species abroad, occurring across central and southern Europe to Russia and also in North Africa. Its nesting habits are unknown in Britain but abroad it is reported as nesting solitarily or in small aggregations. Firm, bare soil is probably favoured for nesting and most British records are for hedgebanks and footpaths in both inland and coastal situations. It has been recorded from a number of counties in southern England but now appears to be more or less confined to districts along the south coast, having undergone a significant decline in its inland sites. Adults are on the wing from mid May to early July and pollen is collected from a variety of umbellifers.

The only Welsh records of *A. proxima* are from Barmouth in June and July 1902 (Saunders 1903). This is the northernmost record of the species in Britain and as there has been an apparent contraction of range to the south it is likely that *A. proxima* is now extinct in Wales. However, away from the dune systems, very little recording of aculeates has taken place in Merioneth and the possibility exists that an undiscovered population still survives.

Records: **Barmouth** SH61, VC48, June & July 1902, J.W. Yerbury

Sources: Hallett (1956b), Saunders (1903)

Sphecodes spinulosus **von Hagens, 1875** **RDB 2**

This cuckoo bee is widely distributed across central and southern Europe and its range extends into Asia and North Africa. In Britain it has occurred in scattered localities in many counties of southern England, as well as Glamorgan. However, it has undergone a substantial decline and there have been few British records in the last twenty years. *S. spinulosus* is a cleptoparasite of the mining bee *Lasioglossum xanthopum* (Kirby), which has also become much rarer in Britain in recent years. Neither host nor parasite are associated with a specific habitat and they have been recorded from a wide range of situations in coastal and inland localities, although *L. xanthopum* requires firm, bare soil for nesting. *S. spinulosus* is on the wing from mid May to late June, the females entering the burrows of the host to deposit an egg on the host's food mass. It is thought that the female *S. spinulosus* eats or destroys the host's egg and the former's larva then develops on the pollen collected by the female *L. xanthopum*.

There are no records of this species from Wales since 1935 (Hallett & Norton 1937). Between 1916 and 1935 H.M. Hallett frequently recorded it, sometimes in considerable abundance, from the banks of a railway cutting near Swanbridge. *L. xanthopum* is also rare in Wales and was known only from this same site, where it was last recorded in 1919. However, P.M. Pavett has recently discovered *L. xanthopum* at Bull Cliff, Porthkerry (approximately nine kilometres west of Swanbridge), and hence it is possible that *S. spinulosus* still survives in this area.

Records: **Swanbridge** ST1678, VC41, 28/5/16, one male & one female, H.M. Hallett
Swanbridge ST1678, VC41, May 1918, one female, four males, H.M. Hallett
Swanbridge ST1678, VC41, 1916-19, "in varying numbers", H.M. Hallett
Swanbridge ST1678, VC41, 1919, "occurred in the greatest abundance", H.M. Hallett
Swanbridge ST1768, VC41, 27/5/34, one male & one female, H.M. Hallett
Swanbridge ST1768, VC41, 26/5/35, two males, H.M. Hallett
Swanbridge ST1678, VC41, June & July 1935, "not uncommon", H.M. Hallett

Sources: Hallett (1920, 1922, 1928, 1935, 1956b), Hallett & Norton (1937), NMW.Z. (31.358. 882-887, 34.332.1-2, 35.323.9-10)

***Stelis ornatula* (Klug, 1808)** **RDB 3**

A widely distributed species in Europe, ranging north to southern Scandinavia and eastwards to Siberia. It is a southern species in Britain, occurring in scattered localities north to Lancashire, but in Wales it has been recorded only from Glamorgan. *S. ornatula* is a cuckoo bee and is cleptoparasitic on the mining bee *Hoplitis claviventris* (Thomson), which is frequently referred to (erroneously) as *Osmia leucomelana* in the older entomological literature. *H. claviventris* nests in the stems of pithy plants, such as ragwort *Senecio jacobaea*, bramble *Rubus* spp. and rose *Rosa spp. S. ornatula* lays its eggs in the cells of the host and the emerging larva feeds on the pollen mass stored by the host. The overwintering stage is a diapausing pupa and the adults are on the wing from late May to early August.

The host is not common in Wales and is apparently confined to the counties of Dyfed and Glamorgan, where it chiefly occurs on sand dunes. The handful of Welsh records of *S. ornatula* are all from dune systems in Glamorgan. It was first recorded by Hallett in 1916 and he subsequently reared specimens from host cells in a dead ragwort stem collected at Merthyr Mawr. There are only two modern records but Hallett (1927a) considers that "no doubt it escapes notice as it is a most unobtrusive insect in its habits". It is probably most easily recorded by collecting ragwort stems utilised by *H. claviventris* and rearing the occupants. Suitable (prostrate) stems can be identified by the plugged end, which is green at first but dries to dark brown.

Records: **Merthyr Mawr SSSI** SS87, VC41, 9/7/16, one male, three females, H.M. Hallett
Merthyr Mawr SSSI SS87, VC41, 23/7/16, one female, H.M. Hallett
Merthyr Mawr SSSI SS87, VC41, Aug 1924, two adults & others reared, H.M. Hallett
Oxwich NNR SS5087, VC41, 23/6/52, J. Cowley
Nicholaston Burrows SSSI SS515880, VC41, 23/6/91, one male, P.M. Pavett
Merthyr Mawr SSSI SS870763, 15/7/92, "several specimens", S.J. Falk

Sources: d'Assis-Fonseca & Cowley (1953), Falk (1992), Hallett (1916a, 1920, 1927a, 1928, 1956b), Morgan & Pavett (1995), NMW.Z. (31.358. 1435-1442)

***Stelis phaeoptera* (Kirby, 1802)** **RDB 2**

This cuckoo bee is recorded widely across much of Europe and into Asia and North Africa. Its range in Britain formerly covered much of southern England, although always local and scarce, but it has seriously declined and there are few recent records, mainly from Devon. The nesting biology of *S. phaeoptera* is little known in Britain but it is suspected to be cleptoparasitic on *Osmia leaiana* (Kirby) and possibly *O. caerulescens* (L.). However, it has a much broader range of hosts in Europe, including several species that are widespread in Britain. *O. leaiana* occurs in sunny situations in a variety of habitats, nesting in existing burrows in dead wood and masonry. The biology of *S. phaeoptera* is probably similar to that of *S. ornatula* (Klug) (q.v.). Adults are on the wing from late May to mid August.

The potential hosts are widespread but local in the southern half of Wales. *S. phaeoptera*, however, has been definitely recorded on just four occasions. Hallett (1956a) records that Perkins took a male at Raglan in Gwent, presumably around 1897 (q.v. *Andrena rosae*), and Pavett has taken specimens at three sites in Glamorgan in recent years. Hallett (1956b) notes in his manuscript that Mortimer recorded this species at Borth, Cardiganshire (no date), but it is probably best to treat this record as 'unconfirmed' (q.v. *Osmia parietina*, *O. xanthomelana*).

Records: **Raglan** SO40, VC35, one male, c.1897, R.C.L. Perkins
Penywaun SS985048, VC41, 3/7/91, one male, P.M. Pavett

Cwmbach SO024016, VC41, 17/8/94, one female, PM Pavett
Kenfig NNR SS783832, VC41, 7/7/95, one male, P.M. Pavett
[**Borth** SN68/SN69, VC46, undated, CH Mortimer]

Sources: Hallett (1956a, 1956b), Morgan & Pavett (1995)

Osmia parietina Curtis, 1828 **RDB 3**

This mason bee is one of the few aculeates that, in Britain, are commonest in the north and west, with records extending throughout Scotland and north-west England into north Wales. Abroad it has a similarly northern distribution, although it occurs as far south as Spain and Greece, extending into Russia. Nests are constructed in cavities in rocks and dead wood, with many British records for stone walls. At Criccieth, Nevinson (1908) reported that nests were constructed in "small cavities of a stone that is occasionally used in the field walls". Pollen is collected from a wide range of low-growing plants, including bird's-foot trefoil *Lotus corniculatus* and red clover *Trifolium pratense*. There is no indication that a specific habitat is preferred. The adults are on the wing from May to July.

There are very few modern records of this bee in Britain but it is localised and prone to under-recording. It was last seen in Wales in 1979 in Pembrokeshire but most of its Welsh records are from Merioneth and Caernarvonshire. It has also been recorded from Denbighshire and Hallett (1956b) reports that Mortimer collected it from Cardiganshire. In view of the occurrence of *O. parietina* in Pembrokeshire and Merioneth, this latter record is perhaps more feasible than some of Mortimer's other records (q.v. *Stelis phaeoptera, Osmia xanthomelana*), but is probably best regarded as unconfirmed. The first record of the species in Wales is that of Blomer (1833) from Bridgend, Glamorgan, which is the southernmost record for this species in Britain. Hallett (1928, 1936) considers that this record needs to be confirmed, but remarks that it is probably correct as it was identified by J.C. Dale, a prominent entomologist at the time.

Records: **Bridgend** SS87, VC41, 1832, C. Blomer
Barmouth SH61, VC48, June 1884, F. Saunders
Criccieth SH4937/SH5038, VC49, July 1898, E.B. Nevinson
Towyn SH50, VC48, July 1899, E.B. Nevinson
Criccieth SH4937/SH5038, VC49, July 1900, "scarce", E.B. Nevinson
Criccieth SH4937/SH5038, VC49, early Spring 1901, two males, E.B. Nevinson & W. Gardner
Criccieth SH4937/SH5038, VC49, 4/5/01, one female & two males, W. Gardner
Llanbedr SH5726, VC48, 2/7/02, worn male, J.W. Yerbury
Criccieth SH4937/SH5038, VC49, undated, "burrows", A.E. Bradley
Aberdovey SN59/SN69, VC48, July 1905, one female, C.H. Mortimer
[**Borth** SN68/SN69, VC46, undated, C.H. Mortimer]
Criccieth SH4937/SH5038, VC49, June 1907, "scarce", E.B. Nevinson
Abersoch SH32, VC49, June 1907, "scarce", E.B. Nevinson
Ruthin SJ15, VC50, pre-1896, W. Gardner
Betws-y-Coed, SH7956, VC49, 29 & 31/5/18, three specimens, W. Gardner
Dolwyddelan SH7352, VC49, 1/6/18, two specimens, W. Gardner
Betws-y-Coed SH7956, VC49, 19, 21 & 24/5/19, seven specimens, W. Gardner
Nefyn SH24/SH34, VC49, May 1919, A.E. Bradley
Nefyn SH24/SH34, VC49, May 1921, A.E. Bradley
Criccieth SH4937/SH5038, VC49, May 1921, Harwood Collection (NHM)
Arthog SH6414, VC48, 1922, E.B. Nevinson
Nefyn SH24/SH34, VC49, May 1927, A.E. Bradley

Plas Tanybwlch SH6540, VC48, 14/4/74, one specimen, P. Crow
Moelwyn Bach SH6543, VC48, 11/5/75, one female, P. Crow
Penmachno SH7950, VC49, 24/6/75, one, P. Crow
Hafod Fawr SH7240, VC48, 7/8/75, one female, P. Crow
Talsarnau SH6135, VC48, 16/4/76, one male, one male, P. Crow
Talsarnau SH6135, VC48, 26/4/76, one male, one female, P. Crow
Plas Tanybwlch SH6540, VC48, 2/6/76, two specimens, P. Crow
Plas Tanybwlch SH6540, VC48, 2/6/76, one female, P. Crow
Hafod Fawr SH7240, VC48, 24/7/77, one male, P. Crow
Caerfai SM7524, VC45, 7/6/79, 2♀♀, K. Booker

Sources: Blomer (1833), Hallett (1928, 1936, 1956b), Morgan (1993), Mortimer (1907), Nevinson (1900, 1901, 1902, 1908), NMW.Z. (1952.34), Rowland-Brown (1902), Saunders (1896, 1900, 1903)

Osmia xanthomelana (Kirby, 1802) RDB 1

The European distribution of this mason bee extends across central and southern Europe eastwards to Russia, although it is regarded as very rare in western Europe (Else 1994b). In Britain it has been recorded from widely scattered localities from the south coast to Cumbria (there are also unconfirmed literature records from Durham). However, the species apparently began to decline at the beginning of this century and, with the exception of a record from East Sussex in 1968, no specimens have been found on the British mainland since 1928. *O. xanthomelana* is now believed to be restricted to a single breeding locality on the south coast of the Isle of Wight. The reasons for this decline are unclear as there has been little obvious change to its favoured habitat of coastal soft-rock cliffs in many of its former localities. The adult flight period on the Isle of Wight is usually between late May and mid June, with British records ranging from April to mid July. Females build pitcher-shaped mud cells at the base of overhanging vegetation, usually five or six in an exposed cluster but sometimes they are constructed within a burrow. The cells are provisioned with pollen from bird's-foot trefoil *Lotus corniculatus* or horseshoe vetch *Hippocrepis comosa*.

The history of *O. xanthomelana* in Wales is a brief one, having been discovered here in 1898 and last recorded in 1921 (Else 1994b). Its stronghold was the Lleyn peninsula where records exist for three separate localities (Criccieth, Pwllheli and Nefyn). It was possibly also collected at Abersoch (Nevinson 1908), although there are no extant specimens to confirm this and it is more likely that the specimens referred to were collected solely at Criccieth. In the early years of the century *O. xanthomelana* was reported more frequently from north Wales than elsewhere in Britain and several hymenopterists visited the area to collect specimens. Away from the Lleyn, Gardner (Rowland-Brown 1903, Anon. 1903) found a nest amongst grass roots at Conwy. Specimens in the National Museum of Wales collected by Gardner indicate that *O. xanthomelana* survived at Deganwy in the Conwy Valley until at least 1918. Mortimer (1905) reported several females at their burrows, attended by the cleptoparasitic wasp *Sapyga quinqepunctata* (F.), near Aberdovey in July 1904. The circumstances of this observation are a little peculiar and, in view of the fact that Mortimer is also credited with some other dubious records (q.v. *Stelis phaeoptera, Osmia parietina*), it is perhaps best to treat this record as unconfirmed. Hallett (1956b) reports that Mortimer also recorded *O. xanthomelana* at Borth in Cardiganshire and this record should also be regarded as unconfirmed.

It is unfortunate that Gardner did not leave more details about the location of his discovery at Conwy. The Conwy estuary at Deganwy (where Gardner lived) has undergone dramatic changes in the last twenty years or so and it is difficult now to imagine where *O. xanthomelana* could have nested. However, he does mention (Gardner 1901) that he recorded it in two localities in North Wales "in conditions similar to those described by Mr Waterhouse" (the discoverer of the

first British *xanthomelana* nest), i.e. "a perpendicular bank by the riverside". There are still some low earth cliffs alongside the estuary at Conwy and bird's-foot trefoil is abundant on the sand dune golf courses at Morfa Conwy and Deganwy so the area may still be worth surveying in early summer.

The presumed extinction of *O. xanthomelana* on the Lleyn is more difficult to explain. At both Criccieth and Pwllheli tourist developments have destroyed soft-rock cliff habitat, but this habitat is still widespread on the Lleyn with several extensive sites along the south coast (especially at Porth Neigwl) and the habitat at Morfa Nefyn and the adjacent cliffs of Porth Dinllaen on the north coast look very promising. In June 1995 the Countryside Council for Wales funded a survey of potentially suitable sites on the Lleyn (Clee 1995). *O. xanthomelana* was not found but several sites were considered to contain suitable habitat and it is hoped that further surveys will be undertaken in the future.

Records: **Criccieth** SH4937/SH5038, VC49, May 1898, M.S. le Marchand
Criccieth SH4937/SH5038, VC49, 10/7/00, worn females only, E.B. Nevinson
Criccieth SH4937/SH5038, VC49, 4/5/01, "males fairly abundant", E.B. Nevinson
Criccieth SH4937/SH5038, VC49, 4/5/01, seven specimens, W. Gardner
Conwy SH7779, VC49, c.1902, nest, W. Gardner
Deganwy SH7779, VC49, 21/6/02, four specimens, W. Gardner
Criccieth SH4937/SH5038, VC49, 18/5/03, E.B. Nevinson
Criccieth SH4937/SH5038, VC49, 19/5/03, three specimens, E.B. Nevinson
Deganwy SH7779, VC49, 26/5/03, one specimen, W. Gardner
Criccieth SH4937/SH5038, VC49, 24/5/05, E.B. Nevinson
Nefyn SH24/SH34, VC49, undated, A.E. Bradley
Criccieth, SH4937/SH5038, VC49, undated, A.E. Bradley
[**Aberdovey** SN59/SN69, VC48, July 1904, several females at burrows, C.H. Mortimer]
[**Borth** SN68/SN69, VC46, undated, C.H. Mortimer]
Deganwy SH7779, VC49, 29/5/07, W. Gardner
Deganwy SH7779, VC49, 12/6/07, W. Gardner
Criccieth SH4937/SH5038, VC49, early June 1907, "scarce", E.B. Nevinson
Deganwy SH7779, VC49, 27/6/08, W. Gardner
Criccieth SH4937/SH5038, VC49, 17/7/11, E.B. Nevinson
Deganwy SH7779, VC49, 17/5/18, one specimen, W. Gardner
Criccieth SH4937/SH5038, VC49, May 1919, E.B. Nevinson
Pwllheli, SH33, VC49, May 1919, E.B. Nevinson
Criccieth SH4937/SH5038, VC49, May 1921, M.S. le Marchand

Sources: Anon. (1903), Clee (1995), Else (1994b), Felton (1963), Gardner (1901), Hallett (1956b), Morgan (1992), Mortimer (1905), Nevinson (1901, 1902, 1908), NMW.Z. (1952.34), Rowland-Brown (1902, 1903)

Coelioxys quadridentata (Linnaeus, 1758) RDB 3

C. quadridentata is a cuckoo bee that is widely distributed across Europe to Turkey and it has also been recorded from Asia. In Britain it is a very local species of southern England as far north as Yorkshire and there is a single record from Glamorgan. It is reported as a cleptoparasite of the flower bees *Anthophora furcata* (Panxer) and *A. quadrimaculata* (Panzer) in Britain, although the leaf-cutter bee *Megachile circumcincta* (Kirby) is also considered to be a possible host. The egg is laid on or within the host's food mass. Adults are on the wing from June to August. Recorded habitats in Britain include heathland, woodland, sand dunes and calcareous grassland, reflecting the variety of situations in which the hosts nest.

A male of this species was collected in a railway cutting at Swanbridge in Glamorgan in 1935 (Hallett & Norton 1937). There are no other records for Wales. *Anthophora furcata* and *Megachile circumcincta* are not uncommon in suitable habitats in Wales, the former nesting in dead wood and the latter in sandy soil. There is only a single, old, record of *Anthophora quadrimaculata* from Criccieth on the Lleyn peninsula. *Coelioxys* species are prone to under-recording and it is possible that *C. quadridentata* will be rediscovered as a Welsh species in the future.

Records: **Swanbridge** ST1678, VC41, 16/6/35, one male, H.M. Hallett

Sources: Hallett (1935, 1956b), Hallett & Norton (1937), NMW.Z. (35.404.1)

Coelioxys mandibularis Nylander, 1848 **RDB 3**

This cuckoo bee is widely distributed across Europe from southern France to Scandinavia and eastwards to Siberia, but it is apparently scarce throughout its range. It has a curious distribution in Britain with records from Kent and West Sussex, Lancashire and Cheshire, and the south coast of Wales. The populations of Kent and Wales are strong, but there is only a single record for West Sussex and there are very few modern records from north-west England. It is cleptoparasitic on *Megachile* leaf-cutter bees, the females laying their eggs on or within the host's food mass. In Britain it is thought that *Megachile leachella* Curtis is the host in southern England, whilst *M. maritima* (Kirby) is probably the host in the west. However, this has not been confirmed by rearing. *C. mandibularis* is confined to dune systems in Britain, where the hosts nest in open sand. The adults are on the wing between June and August.

The sand dunes of Glamorgan, Carmarthenshire and Pembrokeshire constitute the British stronghold of this species. It has been recorded from nine dune systems (although it is probably now extinct at Port Eynon) and in some years is regarded as abundant. The probable host in Wales, *Megachile maritima*, is frequent on dunes all around the Welsh coast and it is possible that *C. mandibularis* has a more extensive range than that already known. As one of the most important aculeates found in Wales, it would be valuable to have more detailed information on its distribution and ecology.

Records: **Merthyr Mawr SSSI** SS87, VC41, 8/7/03, one female, J.W. Yerbury
Merthyr Mawr SSSI SS87, VC41, 24 & 30/6/06, "both sexes", J.W. Yerbury
Port Eynon SS4684, VC41, 25/7/14, "females fairly common", H.M. Hallett
Merthyr Mawr SSSI SS87, VC41, 29/6/15, "not uncommon", H.M. Hallett
Merthyr Mawr SSSI SS87, VC41, 1916, "exceedingly abundant", H.M. Hallett
Kenfig NNR SS78, VC41, 1916, H.M. Hallett
Gower VC41, 12 & 16/8/51, C.H. Andrewes
Llangennith SS4091, VC41, 21/7/68, female, M.E. Archer
Oxwich NNR SS5087, VC41, 12/8/73, M.C. Day & G.R. Else
Oxwich NNR SS5087, VC41, 7/8/75, K.M. Guichard
Merthyr Mawr SSSI SS8576, VC41, 17/7/80, I.F.G. McLean
Broad Haven, Stackpole NNR SR9794, VC45, 4/6/82, one female, S.J. Falk
Pembrey Forest SN391024, VC44, 6/8/85, one female, I.K. Morgan
Mere Pool Valley, Stackpole NNR SR9794, VC45, 5/7/87, S.J. Coker
Oxwich NNR SS5087, VC41, 18/7/88, G.R. Else
Stackpole NNR SR9795, VC45, 20/7/88, G.R. Else & S.J. Falk
Whiteford Burrows NNR SS436941, VC41, 21/7/90, one female, P.M. Pavett
Kenfig NNR SS802820, VC41, 18/7/93, one female, P.M. Pavett
Oxwich NNR SS505870, VC41, 28/7/93, three females, P.M. Pavett

Oxwich NNR SS5087, VC41, 29/6/94, female, M.E. Archer
Whiteford Burrows NNR SS4494, VC41, 30/6/94, female, M.E. Archer
Broughton Burrows SSSI SS4293, VC41, 2/7/94, female, M.E. Archer
Llangennith SS4091, VC41, 2/7/94, female, M.E. Archer
Pembrey Burrows SSSI SS4199, VC41, 8/7/94, female, M.E. Archer
Stackpole NNR SR9793, VC45, 11/7/94, female, M.E. Archer
Nicholaston Burrows SSSI SS518880, VC41, 3/8/95, one female, PM Pavett

Sources: Archer (1992, 1994), Coker (1988), Else (1989), Hallett (1912, 1915, 1916a, 1916b, 1920, 1928, 1956b), Morgan & Pavett (1995), NMW.Z. (14.353.861-862, 31.358.1404-1414), Pavett (1993), Saunders (1904, 1907)

Nomada armata Herrich-Schäffer, 1839 — RDB 1

N. armata is a nomad bee (members of the genus are also known as wasp-bees because of their banded coloration) that is recorded from Scandinavia and further south in Europe, but there is little detailed information available on its continental distribution. It has been recorded from widely scattered localities in the southern half of Britain but it has become increasingly rare throughout this century and the only modern records are for Oxfordshire and Wiltshire, where it has recently been discovered to be not uncommon on Salisbury Plain (Else & Roberts 1994). *N. armata* is a cleptoparasite of the Red Data Book mining bee *Andrena hattorfiana* (F.) (q.v.). Female *Nomada* spp. enter the host burrow and lay an egg in the wall of the burrow through the cell lining. On hatching, the larva destroys any other *Nomada* eggs present and then eats the host egg before subsequently developing on the stored food mass. *N. armata* is usually found, along with its host, on the flowers of field scabious *Knautia arvensis*. The adults are on the wing in June and July.

Not surprisingly, in view of the rarity of the host, there is only a single record of *N. armata* in Wales. Two males, along with specimens of *Andrena hattorfiana* were collected at Swansea in 1854 and subsequently confirmed by F. Smith and R.C.L. Perkins. It is probably unlikely that *N. armata* still occurs in Wales but as *A. hattorfiana* has recently been rediscovered here it would be worth surveying suitable localities on the south Gower coast.

Records: Clyne Wood, Swansea SS6091, VC41, 1854, two males, T.P. Dossetor

Sources: Else & Roberts (1994), Hallett (1922, 1928, 1956b), Smith (1861)

Nomada fulvicornis Fabricius, 1793 — RDB 3

Abroad this nomad bee occurs throughout much of Europe and it is also recorded from Japan and North Africa. Its British distribution formerly extended from the south coast to Nottinghamshire, though in widely scattered localities. It has undergone a considerable decline and most modern records are for the Isle of Wight and the south-eastern corner of England. It is a cleptoparasite of three Nationally Scarce species of *Andrena* mining bees in Britain - *tibialis* (Kirby), *bimaculata* (Kirby), and *riparia* (Scopoli). Female *Nomada* spp. enter the host burrow and lay an egg in the wall of the burrow through the cell lining. On hatching, the larva destroys any other *Nomada* eggs present and then eats the host egg before subsequently developing on the stored food mass. *N. fulvicornis* is double-brooded, like its hosts, and can be found on the wing from late March to the end of August, with a short gap in mid June.

Hallett recorded *N. fulvicornis* (as *N. lineola* Panzer) in Glamorgan in 1911, originally stating that he had found both sexes (Hallett 1912) but subsequently stating that a single female had

been taken (Hallett 1928, 1956b). Hallett's manuscript (1956b) also mentions that Daltry recorded the species at Flimston Down in Pembrokeshire (probably around 1938), but this record should be regarded as unconfirmed. Neither *Andrena tibialis* nor *A. bimaculata* are known to occur in Wales and it is curious that *A. riparia* has been recorded (on single occasions in each case) from only Montgomeryshire, Merionethshire and Caernarvonshire. One of the hosts must presumably have occurred in Glamorganshire (and perhaps Pembrokeshire) in the past but the absence of recent records of any of the possible hosts in Wales suggests that it is unlikely that *N. fulvicornis* still occurs here.

Records: **Dinas Powis** ST17, VC41, May 1911, one female, HM Hallett
[**Flimston Down** SR9295, VC45, c.1938, Daltry]

Sources: Hallett (1912, 1928, 1956b)

Nomada hirtipes Pérez, 1884 — RDB 3

Considered rare and sporadic throughout its central European range, in southern Britain *N. hirtipes* is very scarce and local north to Gloucestershire. However, it can be occasionally numerous at colonies of its host, the Nationally Scarce mining bee *Andrena bucephala* Stephens. Both parasite and host are found in a variety of habitats on light soils, particularly calcareous and coastal grassland. The pollen source of *A. bucephala* has not been confirmed but it seems likely that spring flowering shrubs and trees are utilised, especially hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa* and sycamore *Acer pseudoplatanus*, hence the presence of scrub near to nesting sites of the host is important. Female *Nomada* spp. enter the host burrow and lay an egg in the wall of the burrow through the cell lining. On hatching, the larva destroys any other *Nomada* eggs present and then eats the host egg before subsequently developing on the stored food mass. *N. hirtipes* is on the wing from late April to mid June.

N. hirtipes was apparently first reported in Wales (as *N. lateralis*) from Llanbedr, Merioneth, in 1902 (Bradley 1902). Perkins (1917b) notes that *N. lateralis* Smith (nec Panzer) should be referred to *N. bucephalae (=hirtipes)* and Hallett (1956b) accordingly attributes this Llanbedr record to *hirtipes* (cf. *N. xanthosticta* (Kirby). Most records of *N. hirtipes* in Wales are from Glamorgan, where it was discovered by Hallett (1920, 1923) at Cwrt-yr-ala (Dinas Powis). The date of the earliest record is given both as 21/5/16 (Hallett 1920) and 21/4/16 (Hallett 1928), although the former is assumed correct as Hallett (1928) states that *A. bucephala* was taken at Cwrt-yr-ala on this date and there is a corresponding specimen of *N. hirtipes* in the National Museum of Wales. Hallett regularly visited the site (which he usually refers to as Dinas Powis in his papers) and reported that both *N. hirtipes* and *A. bucephala* were common there from 1920 to 1930, when the colony of the host disappeared. Although the Dinas Powis colony that Hallett knew so well may have vanished, *A. bucephala* is currently known from nearby Porthkerry and Swanbridge and it is possible that *N. hirtipes* is also present.

Kloet (1941) reported *N. hirtipes* from Fairbourne, Merioneth but subsequently retracted the record (Kloet 1942). The only positive record since 1930 is of a single male collected at Erbistock, Denbighshire, in May 1994 (B. Formstone, pers. comm.) from south-facing unimproved grassland on the banks of the River Dee. *A. bucephala* is a scarce bee in Wales and is known only from Glamorgan and Carmarthenshire. It has not been recorded from Merioneth or Denbighshire.

Records: **Llanbedr** SH5726, VC48, May 1902, R.C. Bradley
Cwrt-yr-ala ST1473, VC41, 21/5/16, one female, H.M. Hallett
Dinas Powis ST1473, VC41, June 1920, "not uncommon", H.M. Hallett
Dinas Powis ST1473, VC41, 1/5/21, "very abundant", H.M. Hallett
Cwrt-yr-ala ST1473, VC41, 25/5/21, one female, H.M. Hallett

Cwrt-yr-ala ST1473, VC41, 22/6/21, one female, H.M. Hallett
Cwrt-yr-ala ST1473, VC41, 1922, H.M. Hallett
Cwrt-yr-ala ST1473, VC41, May 1923, H.M. Hallett
Cwrt-yr-ala ST1473, VC41, 16/5/27, one male, H.M. Hallett
Cwrt-yr-ala ST1473, VC41, 22/5/27, one male, H.M. Hallett
Dinas Powis ST1473, VC41, "abundant from June 1920 until 1930 when the colony disappeared", H.M. Hallett
Erbistock SJ354422, VC50, 11/5/94, one male, B. Formstone

Sources: Bradley (1902), Hallett (1920, 1923, 1924, 1928, 1956b), Kloet (1941, 1942), NMW.Z. (31.358.1141, 31.358.1143-1148), Perkins (1916b, 1917b)

Nomada lathburiana (Kirby, 1802) RDB 3

This nomad bee is distributed across Europe to Siberia. In Britain its range is similar to that of its host, the mining bee *Andrena cineraria* (L.), in that it is most frequent in northern and western England and Wales with relatively few records from the south-eastern counties of England. It has become much scarcer during this century and there are relatively few modern records. *A. cineraria* nests, sometimes in large aggregations, in light soils in a variety of warm, open habitats, including moorland. Female *Nomada* spp. enter the host burrow and lay an egg in the wall of the burrow through the cell lining. On hatching, the larva destroys any other *Nomada* eggs present and then eats the host egg before subsequently developing on the stored food mass. Adult *N. lathburiana* are on the wing between mid April and early June.

A. cineraria is widespread and not uncommon throughout Wales on friable soils. However, *N. lathburiana* has been recorded with certainty from just three vice-counties - Glamorgan, Carmarthenshire and Radnorshire. Hallett (1927b) knew of a strong colony associated with a large aggregation of the host on the slopes of Garth Hill above Taff's Well. Yarrow (Hallett 1956b) collected it in the Elan Valley, Radnorshire, in 1939, and in recent years it has been found at three localities in inland valleys on the flanks of the Brecon Beacons (Morgan & Pavett 1995). There are no records from the conspicuous aggregations of *A. cineraria* that can be found in suitable habitats along the Welsh coast. *N. lathburiana* was also recorded during a field meeting of the Lancashire & Cheshire Entomological Society at 'Whixall Moss' in 1972 (Anon. 1976). Fortunately, this specimen, which was collected by E.G. Hancock, is in the collections at Liverpool Museum and has been verified as *N. flava* Panzer by C. Clee (pers. comm.).

Records: **Garth Hill** ST1083, VC41, 23/5/26, one female, H.M. Hallett
Garth Hill ST1083, VC41, 15/5/27, "plentiful", H.M. Hallett
Garth Hill ST1083, VC41, 4/5/28, "plentiful", H.M. Hallett
Elan Valley SN96, VC43, 29/5/39, "both sexes", I.H.H. Yarrow
Gwydre SN789279, VC44, 9/5/91, one specimen, I.K. Morgan
Cwmbach SO027032, VC41, 28/4/93, one female, P.M. Pavett
Craig y Dyffryn SO034002, VC41, 29/6/94, one female, P.M. Pavett

Sources: Anon. (1976), Hallett (1928, 1927b, 1956b), Morgan & Pavett (1995), NMW.Z. (31.358.1093-1095, 31.358.1097-1099, 31.358.3148)

Nomada roberjeotiana Panzer, 1799 RDB 3

The continental distribution of this nomad bee encompasses much of northern and central Europe and it is also known from Japan. In Britain it is widespread but rare in England and Wales, with records also from southern Scotland. It has declined in south-eastern England but it is probably over-looked in its moorland habitats in northern and western Britain. *N. roberjeotiana* is a cleptoparasite on the mining bee *Andrena tarsata* Nylander, which nests in sparsely vegetated sand and peat on heaths and moorlands and is widely distributed in Britain. The host collects pollen from cinquefoils, especially tormentil *Potentilla erecta*, and *N. roberjeotiana* can also be found visiting *Potentilla* flowers. Female *Nomada* spp. enter the host burrow and lay an egg in the wall of the burrow through the cell lining. On hatching, the larva destroys any other *Nomada* eggs present and then eats the host egg before subsequently developing on the stored food mass. Adult *N. roberjeotiana* are on the wing from the end of June to late August.

A. tarsata is widely distributed but local in Wales and the records of *N. roberjeotiana* are similarly scattered. It was first recorded in Caernarvonshire in 1898 (as *N. tormentillae* Alfken) and it has also been found in Glamorgan and Anglesey, but there are no Welsh records since 1953. Norton recorded it, with its host, visiting flowers of marsh cinquefoil *Potentilla palustris* (Hallett & Norton 1928), which is a rarely recorded pollen or nectar source for both species. Nevinson (1901) observed specimens investigating the burrows of the mining bee *Halictus rubicundus* (Christ), but this species is not a host of *N. roberjeotiana*. Despite the lack of modern records in Wales it would seem very unlikely that *N. roberjeotiana* no longer occurs here and examination of *Potentilla* flowers in suitable localities may reveal its presence.

Records: **Criccieth** SH4937/SH5038, VC49, July 1898, E.B. Nevinson
Criccieth SH4937/SH5038, VC49, July 1900, E.B. Nevinson
Roman Bridge SH7151, VC49, 25/6/13, three females, W. Gardner
Welsh St Donat's ST0376, VC41, 25/6/27, one male, F. Norton
Welsh St Donat's ST0376, VC41, 8/7/27, one male, F. Norton
Holyhead SH28, VC52, 1953, C.H. Andrewes

Sources: Hallett (1928, 1956b), Hallett & Norton (1928), Nevinson (1900, 1901), NMW.Z. (31.358.1060-1061)

Nomada signata Jurine, 1807 **RDB 2**

Widely distributed across northern and central Europe eastwards to Turkey. There are only three post-1970 records of this nomad bee in Britain but its distribution formerly extended through southern and central England as far north as Salop. By contrast, its host, the tawny mining bee *Andrena fulva* Müller, is locally common throughout Britain forming compact nesting aggregations in a wide range of habitats. *A. fulva* is particularly conspicuous in lawns on well-drained soils, visiting spring flowering shrubs for pollen, but *N. signata* does not apparently favour such habitats. Female *Nomada* spp. enter the host burrow and lay an egg in the wall of the burrow through the cell lining. On hatching, the larva destroys any other *Nomada* eggs present and then eats the host egg before subsequently developing on the stored food mass. *N. signata* is on the wing during April and May.

There are only two records of this rare bee from Wales. Perkins (1916b, 1919) recorded it at Raglan in Monmouthshire at the end of the last century (presumably between 1897 & 1899, q.v. *Andrena rosae*) and recently it has been found at Bute Park in Glamorgan. Until the ecology of this species is better understood its true status in Wales, as elsewhere in Britain, will be obscure but it would certainly be worth examining nesting aggregations of the host anywhere in the southern half of Wales, especially in semi-natural situations.

Records: **Raglan Vicarage** SO40, VC35, c.1897, R.C.L. Perkins
Bute Park, Cardiff ST1777, VC41, 1987, R.J. Paxton

Sources: Hallett (1956a, 1956b), Perkins (1916b, 1919, 1924)

4. UNCONFIRMED RED DATA BOOK ACULEATES IN WALES

In addition to the species dealt with above, there are three more Red Data Book aculeates reported from Wales that are considered erroneous or unlikely and in need of confirmation.

***Gorytes laticinctus* (Lepeletier, 1832), RDB 3**: This solitary wasp was recorded from Cardiff by Kloet (1941), but the record was not subsequently retracted (Kloet 1942) as the majority of the species listed in this paper were. However, Hallett (1956b), who initially advised Kloet on the errors in his 1941 list, does not include the species in his manuscript list, nor is Glamorgan mentioned in the species' account in Richards (1980). *G. laticinctus* is a rare species of southern England and, whilst its occurrence in Wales is not impossible, it would seem that Kloet mistakenly omitted to withdraw the record. Some of Kloet's Hymenoptera specimens, including a few taken at Cardiff in August 1940, are held in the collections at Liverpool Museum but there are no examples of *G. laticinctus*.

***Andrena nitidiusculus* Schenck, 1853, RDB 3:** Bradley (1902) recorded "a fine female" of this mining bee (as *A. lucens*) from Llanbedr, Merioneth, in May 1902. Confirmed records of this species in Britain are from the southern coastal counties of England and, formerly, the Surrey heaths. Falk (1991) considers that the record needs to be confirmed and Else (*in prep.*) suggests that it is the result of an erroneous identification.

***Nomada xanthosticta* (Kirby, 1802), RDB 1:** Falk (1991) includes Merioneth in the list of counties from which *N. xanthosticta* has been recorded in Britain. This appears to be based on the report of *N. lateralis* from Llanbedr in May 1902 (Bradley 1902). Fitton *et al* (1978) give *lateralis* Saunders as a synonym of *N. xanthosticta*, but Perkins (1917b) notes that *lateralis* Smith (nec Panzer) should be referred to *N. bucephalae (=hirtipes* Pérez) (q.v.), and Hallet (1956b) considered that the Llanbedr record refers to *N. hirtipes*. If Bradley (1902) had intended to record the species now known as *N. xanthosticta* then it is much more likely that it was a mis-identification of *N. obtusifrons* Nylander, as appears to be the case with most records of *xanthosticta* away from southern England (Else & Spooner 1987). There would therefore seem to be little justification for maintaining that *N. xanthosticta* has ever occurred in Wales.

5. NATIONAL STATUS CATEGORY DEFINITIONS AND CRITERIA

Criteria for the selection of species into the Red Data Book categories follow Bratton (1991).

Extinct

Taxa which formerly had wild breeding populations in Great Britain but which are now believed to have died out.

Red Data Book Category 1. RDB 1 - ENDANGERED

Taxa in danger of extinction and whose survival is unlikely if causal factors continue operating. Included are taxa which are known only as a single population in only one 10km square, taxa which only occur in habitats known to be especially vulnerable, and taxa which have shown a continous decline over the last twenty years and now exist in five or fewer 10km squares.

Red Data Book Category 2. RDB 2 - VULNERABLE

Taxa believed likely to move into the Endangered category in the near future. Included are taxa of which most or all of the populations are decreasing because of over-exploitation, extensive destruction of habitat or other environmental disturbance; taxa with populations that have been seriously depleted and whose ultimate security is not yet assured; and taxa with populations that are still abundant but are under threat from serious adverse factors throughout their range.

Red Data Book Category 3. RDB 3 - RARE

Taxa with small populations that are not at present Endangered or Vulnerable, but are at risk. These taxa are usually localised within restricted geographical areas or habitats, or they are thinly scattered over a more extensive range. Usually, such taxa are not likely to exist in more than fifteen 10km squares. This criterion may be relaxed where populations are likely to exist in over fifteen 10km squares but occupy small areas of especially vulnerable habitat.

Red Data Book Category K. RDB K - INSUFFICIENTLY KNOWN

Taxa suspected of falling within categories 1-3, but about which there is insufficient information to be certain. For example, such taxa may be recently discovered or recognised; belong to under-recorded groups of organisms; be difficult to identify; or live in habitats where they are likely to be overlooked. There may be doubts about whether a recently discovered species is native or has been recently introduced by man, and this uncertainty could result in the species being placed in category K.

Nationally Notable (Scarce) Category A - Notable A

Taxa which do not fall within RDB categories but which are nonetheless uncommon in Great Britain and thought to occur in 30 or fewer 10km squares of the National Grid or, for less well-recorded groups, within seven or fewer vice-counties.

Nationally Notable (Scarce) Category B - Notable B

Taxa which do not fall within RDB categories but which are nonetheless uncommon in Great Britain and thought to occur in between 31 and 100 10km squares of the National Grid or, for less well recorded groups, between eight and twenty vice-counties.

Local

The term local is not rigidly defined, but is generally applied to species confined to a particular habitat type or a particular geographic area, or which are too widespread to warrant Nationally Scarce status but which are nevertheless infrequently encountered.

Common

Common or widespread species that are frequently recorded.

Synanthropic

Species dependent on man, his buildings, livestock or crops.

Unknown

Species where no specific status has been attributed. This is usually because there may be confusion over the species' taxonomy or its true status may be uncertain because the species belongs to a poorly recorded group or may occur in an infrequently sampled habitat.

6. PROVISIONAL CHECKLIST OF THE ACULEATE WASPS, BEES AND ANTS RECORDED FROM WALES

The taxonomic classification of the aculeate Hymenoptera followed here reflects the traditional arrangement familiar to most entomologists and is that adopted by Fitton *et al* (1978), Richards (1980), Falk (1991), etc. In recent years, however, this hierarchy has been simplified and the number of super-families reduced from seven to three, the Chrysidoidea, Vespoidea and Apoidea (Gauld & Bolton 1988), with corresponding revisions to family and sub-family taxonomy. The most recent taxonomic checklist for the British aculeate Hymenoptera is that of Fitton *et al* (1978), but there have been numerous nomenclatural revisions and additions to the British fauna since then. In the following checklist, nomenclature has been taken from more recent sources where available and updated as necessary: Chrysidoidea - Burn (*in prep.*) & Day & Felton (1992); Formicoidea - Fitton *et al* (1978); Pompiloidea - Day (1988); Scolioidea, Vespoidea & Sphecoidea - Richards (1980); Apoidea - Fitton *et al* (1978). The nomenclatural revisions proposed by Day (1979) for several *Bombus* species have not been adopted here. The national statuses given in the right-hand column are taken from Ball (1995) and are explained in section 5.

Chrysidoidea

Aphelopus melaleucus (Dalman, 1818)	Dryinidae	Unknown
Anteon jurineanum Latreille, 1809	Dryinidae	Unknown
Anteon brachycerum (Dalman, 1823)	Dryinidae	Unknown
Anteon exiguum (Haupt, 1941)	Dryinidae	Unknown
Anteon infectum (Haliday, 1837)	Dryinidae	Unknown
Anteon pubicorne (Dalman, 1818)	Dryinidae	Unknown
Anteon ephippiger (Dalman, 1818)	Dryinidae	Unknown
Anteon gaullei Kieffer, 1905	Dryinidae	Unknown
Anteon fulviventre (Haliday, 1828)	Dryinidae	Unknown
Lonchodryinus ruficornis (Dalman, 1818)	Dryinidae	Unknown
Gonatopus clavipes (Thunberg, 1827)	Dryinidae	Common
Gonatopus striatus Kieffer, 1905	Dryinidae	Unknown
Gonatopus distinguendus Kieffer, 1905	Dryinidae	Unknown
Gonatopus lunatus Klug, 1810	Dryinidae	Unknown
Gonatopus bicolor (Haliday, 1828)	Dryinidae	Unknown
Gonatopus pallidus (Ceballos)	Dryinidae	Unknown
Gonatopus distinctus Kieffer, 1906	Dryinidae	Unknown
Embolemus rudii Westwood, 1833	Embolemidae	Unknown
Bethylus cephalotes Forster, 1860	Bethylidae	Common
Bethylus fuscicornis (Jurine, 1807)	Bethylidae	Local
Cleptes semiauratus (Linnaeus, 1761)	Chrysididae	Notable B
Hedychridium ardens (Latreille, 1801)	Chrysididae	Common
Hedychridium cupreum (Dahlbom, 1845)	Chrysididae	Notable B
Omalus puncticollis (Mocsáry, 1887)	Chrysididae	Notable A
Pseudomalus auratus (Linnaeus, 1758)	Chrysididae	Common
Pseudomalus violaceus (Scopoli, 1763)	Chrysididae	Notable B
Chrysis angustula Schenck, 1856	Chrysididae	Local
Chrysis ignita (Linnaeus, 1758)	Chrysididae	Common
Chrysis impressa Schenck, 1856	Chrysididae	Common
Chrysis mediata Linsenmaier, 1951	Chrysididae	Common
Chrysis ruddii Shuckard, 1836	Chrysididae	Local
Chrysis rutiliventris de Perrin, 1879	Chrysididae	Local

Chrysis illigeri Wesmael, 1839	Chrysididae	Notable B
Chrysis viridula Linnaeus, 1761	Chrysididae	Local
Chrysura radians (Harris, 1776)	Chrysididae	Notable A
Psudospinolia neglecta (Shuckard, 1836)	Chrysididae	Local
Trichrysis cyanea (Linnaeus, 1758)	Chrysididae	Common

Scolioidea

Sapyga clavicornis (Linnaeus, 1758)	Sapygidae	Notable B
Sapyga quinquepunctata (Fabricius, 1781)	Sapygidae	Local
Tiphia femorata Fabricius, 1775	Tiphiidae	Local
Tiphia minuta Vander Linden, 1827	Tiphiidae	Notable B
Methocha ichneumonides Latreille, 1804	Tiphiidae	Notable B
Myrmosa atra Panzer, 1801	Tiphiidae	Local

Formicoidea

Hypoponera punctatissima (Roger, 1859)	Formicidae	Naturalised
Ponera coarctata (Latreille, 1802)	Formicidae	Notable B
Myrmica lobicornis Nylander, 1846	Formicidae	Common
Myrmica rubra (Linnaeus, 1758)	Formicidae	Common
Myrmica ruginodis Nylander, 1846	Formicidae	Common
Myrmica sabuleti Meinert, 1860	Formicidae	Local
Myrmica scabrinodis Nylander, 1846	Formicidae	Common
Myrmica schencki Emery, 1895	Formicidae	Notable B
Myrmica sulcinodis Nylander, 1846	Formicidae	Local
Myrmica karavajevi Arnoldi, 1930	Formicidae	RDB K
Formicoxenus nitidulus (Nylander, 1846)	Formicidae	Local
Leptothorax acervorum (Fabricius, 1793)	Formicidae	Common
Leptothorax nylanderi (Förster, 1850)	Formicidae	Local
Leptothorax tuberum (Fabricius, 1775)	Formicidae	Notable A
Tetramorium caespitum (Linnaeus, 1758)	Formicidae	Local
Monomorium pharaonis (Linnaeus, 1758)	Formicidae	Naturalised
Stenamma debile (Förster, 1850)	Formicidae	Local
Myrmecina graminicola (Latreille, 1802)	Formicidae	Local
Formica cunicularia Latreille, 1798	Formicidae	Local
Formica fusca Linnaeus, 1758	Formicidae	Common
Formica lemani Bondroit, 1917	Formicidae	Local
Formica lugubris Zetterstedt, 1838	Formicidae	Local
Formica rufa Linnaeus, 1758	Formicidae	Local
Formica sanguinea Latreille, 1798	Formicidae	Notable B
Formica candida Smith, 1878	Formicidae	RDB1
Lasius alienus (Förster, 1850)	Formicidae	Local
Lasius brunneus (Latreille, 1798)	Formicidae	Notable A
Lasius flavus (Fabricius, 1781)	Formicidae	Common
Lasius fuliginosus (Latreille, 1798)	Formicidae	Common
Lasius meridionalis (Bondroit, 1920)	Formicidae	Local
Lasius mixtus (Nylander, 1846)	Formicidae	Local
Lasius niger (Linnaeus, 1758)	Formicidae	Common
Lasius umbratus (Nylander, 1846)	Formicidae	Local
Paratrechina vividula (Nylander, 1846)	Formicidae	Naturalised

Pompiloidea

Cryptocheilus notatus (Rossius, 1792)	Pompilidae	RDB2

Priocnemis agilis (Shuckard, 1837)	Pompilidae	Notable B
Priocnemis exaltata (Fabricius, 1775)	Pompilidae	Local
Priocnemis fennica Haupt, 1927	Pompilidae	Local
Priocnemis hyalinata (Fabricius, 1793)	Pompilidae	Notable B
Priocnemis parvula Dahlbom, 1845	Pompilidae	Local
Priocnemis pusilla Schiødte, 1837	Pompilidae	Local
Priocnemis schioedtei Haupt, 1927	Pompilidae	Notable B
Priocnemis coriacea Dahlbom, 1843	Pompilidae	Notable A
Priocnemis perturbator (Harris, 1780)	Pompilidae	Local
Priocnemis susterai Haupt, 1927	Pompilidae	Local
Caliadurgus fasciatellus (Spinola, 1808)	Pompilidae	Local
Dipogon subintermedius (Magretti, 1886)	Pompilidae	Local
Dipogon variegatus (Linnaeus, 1758)	Pompilidae	Local
Auplopus carbonarius (Scopoli, 1763)	Pompilidae	Notable B
Agenioideus cinctellus (Spinola, 1808)	Pompilidae	Local
Pompilus cinereus (Fabricius, 1775)	Pompilidae	Local
Episyron rufipes (Linnaeus, 1758)	Pompilidae	Local
Anoplius caviventris (Aurivillius, 1907)	Pompilidae	Notable B
Anoplius concinnus (Dahlbom, 1845)	Pompilidae	Local
Anoplius nigerrimus (Scopoli, 1763)	Pompilidae	Local
Anoplius infuscatus (Vander Linden, 1827)	Pompilidae	Local
Anoplius viaticus (Linnaeus, 1758)	Pompilidae	Local
Arachnospila anceps (Wesmael, 1851)	Pompilidae	Local
Arachnospila consobrina (Dahlbom, 1843)	Pompilidae	RDB3
Arachnospila trivialis (Dahlbom, 1843)	Pompilidae	Local
Arachnospila wesmaeli (Thomson, 1870)	Pompilidae	Notable A
Arachnospila minutula (Dahlbom, 1842)	Pompilidae	Notable B
Arachnospila spissa (Schiødte, 1837)	Pompilidae	Local
Evagetes crassicornis (Shuckard, 1837)	Pompilidae	Local
Aporus unicolor Spinola, 1808	Pompilidae	Notable A
Ceropales maculata (Fabricius, 1775)	Pompilidae	Local

Vespoidea

Eumenes coarctatus (Linnaeus, 1758)	Eumenidae	Notable A
Odynerus melanocephalus (Gmelin, 1790)	Eumenidae	Notable A
Odynerus spinipes (Linnaeus, 1758)	Eumenidae	Common
Gymnomerus laevipes (Shuckard, 1837)	Eumenidae	Local
Ancistrocerus antilope (Panzer, 1798)	Eumenidae	RDB3
Ancistrocerus gazella (Panzer, 1798)	Eumenidae	Common
Ancistrocerus nigricornis (Curtis, 1826)	Eumenidae	Local
Ancistrocerus oviventris (Wesmael, 1836)	Eumenidae	Local
Ancistrocerus parietinus (Linnaeus, 1761)	Eumenidae	Common
Ancistrocerus parietum (Linnaeus, 1758)	Eumenidae	Common
Ancistrocerus scoticus (Curtis, 1826)	Eumenidae	Local
Ancistrocerus trifasciatus (Müller, 1776)	Eumenidae	Local
Symmorphus crassicornis (Panzer, 1798)	Eumenidae	RDB3
Symmorphus gracilis (Brullé, 1832)	Eumenidae	Local
Symmorphus bifasciatus (Linnaeus 1758)	Eumenidae	Common
Vespa crabro Linnaeus, 1758	Vespidae	Local
Dolichovespula media (Retzius, 1783)	Vespidae	Notable A
Dolichovespula norwegica (Fabricius, 1781)	Vespidae	Common
Dolichovespula sylvestris (Scopoli, 1763)	Vespidae	Common
Vespula austriaca (Panzer, 1799)	Vespidae	Local
Vespula rufa (Linnaeus, 1758)	Vespidae	Common

Vespula germanica (Fabricius, 1793)	Vespidae	Common
Vespula vulgaris (Linnaeus, 1758)	Vespidae	Common

Sphecoidea

Astata boops (Schrank, 1781)	Sphecidae	Local
Astata pinguis (Dahlbom, 1832)	Sphecidae	Local
Tachysphex pompiliformis (Panzer, 1803)	Sphecidae	Local
Tachysphex unicolor (Panzer, 1809)	Sphecidae	Local
Trypoxylon attenuatum Smith, F., 1851	Sphecidae	Common
Trypoxylon clavicerum Lep. & Serv., 1828	Sphecidae	Common
Trypoxylon figulus (Linnaeus, 1758)	Sphecidae	Common
Trypoxylon medium de Beaumont, 1945	Sphecidae	Common
Crabro cribrarius (Linnaeus, 1758)	Sphecidae	Local
Crabro peltarius (Schreber, 1784)	Sphecidae	Local
Crossocerus elongatulus (Vander Linden, 1829)	Sphecidae	Common
Crossocerus ovalis Lep. & Brullé, 1835	Sphecidae	Local
Crossocerus pusillus Lep. & Brullé, 1835	Sphecidae	Common
Crossocerus tarsatus (Schuckard, 1837)	Sphecidae	Common
Crossocerus wesmaeli (Vander Linden, 1829)	Sphecidae	Common
Crossocerus annulipes (Lep. & Brullé, 1835)	Sphecidae	Common
Crossocerus capitosus (Shuckard, 1837)	Sphecidae	Local
Crossocerus cetratus (Shuckard, 1837)	Sphecidae	Local
Crossocerus megacephalus (Rossius, 1790)	Sphecidae	Common
Crossocerus nigritus (Lep. & Brullé, 1835)	Sphecidae	Local
Crossocerus styrius (Kohl, 1892)	Sphecidae	Local
Crossocerus walkeri (Schuckard, 1837)	Sphecidae	Notable B
Crossocerus podagricus (Vander Linden, 1829)	Sphecidae	Common
Crossocerus quadrimaculatus (Fabricius, 1793)	Sphecidae	Common
Crossocerus binotatus Lep. & Brullé, 1835	Sphecidae	Notable A
Crossocerus dimidiatus (Fabricius, 1781)	Sphecidae	Local
Ectemnius dives (Lep. & Brullé, 1835)	Sphecidae	Local
Ectemnius cavifrons (Thomson, 1870)	Sphecidae	Common
Ectemnius lapidarius (Panzer, 1804)	Sphecidae	Local
Ectemnius ruficornis (Zetterstedt, 1838)	Sphecidae	Notable B
Ectemnius sexcinctus (Fabricius, 1775)	Sphecidae	Notable B
Ectemnius continuus (Fabricius, 1804)	Sphecidae	Common
Ectemnius rubicola (Dufour & Perris, 1840)	Sphecidae	Local
Ectemnius cephalotes (Olivier, 1792)	Sphecidae	Common
Ectemnius lituratus (Panzer, 1804)	Sphecidae	Local
Lindenius albilabris (Fabricius, 1793)	Sphecidae	Common
Entomognathus brevis (Vander Linden, 1829)	Sphecidae	Local
Rhopalum clavipes (Linnaeus, 1758)	Sphecidae	Local
Rhopalum coarctatum (Scopoli, 1763)	Sphecidae	Local
Oxybelus argentatus Curtis, 1833	Sphecidae	Notable A
Oxybelus mandibularis Dahlbom, 1845	Sphecidae	Notable A
Oxybelus uniglumis (Linnaeus, 1758)	Sphecidae	Common
Psen ater (Olivier, 1792)	Sphecidae	Extinct
Mimumesa (=Psen) dahlbomi (Wesmael, 1852)	Sphecidae	Local
Mimumesa (=Psen) littoralis (Bondroit, 1933)	Sphecidae	RDB3
Mimesa (=Psen) bicolor Jurine, 1807	Sphecidae	RDB2
Mimesa (=Psen) bruxellensis (Bondroit, 1933)	Sphecidae	Notable A
Mimesa (=Psen) equestris (Fabricius, 1804)	Sphecidae	Common
Mimesa (=Psen) lutarius (Fabricius, 1804)	Sphecidae	Common
Psenulus pallipes (Panzer, 1798)	Sphecidae	Common
Spilomena troglodytes (Vander Linden, 1829)	Sphecidae	Common

Stigmus solskyi Morawitz, A., 1864	Sphecidae	Local
Pemphredon lugubris (Fabricius, 1793)	Sphecidae	Common
Pemphredon inornatus Say, 1824	Sphecidae	Common
Pemphredon lethifer (Shuckard, 1837)	Sphecidae	Common
Pemphredon clypealis Thomson, 1870	Sphecidae	Notable B
Pemphredon morio Vander Linden, 1829	Sphecidae	Notable B
Diodontus luperus Schuckard, 1837	Sphecidae	Local
Diodontus minutus (Fabricius, 1793)	Sphecidae	Common
Diodontus tristis (Vander Linden, 1829)	Sphecidae	Local
Passaloecus corniger Schuckard, 1837	Sphecidae	Common
Passaloecus gracilis (Curtis, 1834)	Sphecidae	Common
Passaloecus insignis (Vander Linden, 1829)	Sphecidae	Local
Passaloecus monilicornis Dahlbom, 1842	Sphecidae	Local
Passaloecus singularis Dahlbom, 1844	Sphecidae	Common
Ammophila pubescens Curtis, 1836	Sphecidae	Local
Ammophila sabulosa (Linnaeus, 1758)	Sphecidae	Local
Podalonia affinis (Kirby, 1798)	Sphecidae	RDB 3
Podalonia hirsuta (Scopoli, 1763)	Sphecidae	Notable B
Mellinus arvensis (Linnaeus, 1758)	Sphecidae	Common
Mellinus crabroneus (Thunberg, 1791)	Sphecidae	RDB1
Nysson dimidiatus Jurine, 1807	Sphecidae	Notable B
Nysson spinosus (Forster, 1771)	Sphecidae	Common
Nysson trimaculatus (Rossius, 1790)	Sphecidae	Notable B
Gorytes quadrifasciatus (Fabricius, 1804)	Sphecidae	Local
Gorytes tumidus (Panzer, 1801)	Sphecidae	Local
Argogorytes fargei (Schuckard, 1837)	Sphecidae	Notable A
Argogorytes mystaceus (Linnaeus, 1761)	Sphecidae	Local
Cerceris arenaria (Linnaeus, 1758)	Sphecidae	Common
Philanthus triangulum (Fabricius, 1775)	Sphecidae	RDB2

Apoidea

Colletes daviesanus Smith, F., 1846	Colletidae	Common
Colletes fodiens (Geoffroy, 1785)	Colletidae	Common
Colletes marginatus Smith, F., 1846	Colletidae	Notable A
Colletes similis Schenck, 1843	Colletidae	Local
Colletes succinctus (Linnaeus, 1758)	Colletidae	Local
Colletes cunicularius (Linnaeus, 1761)	Colletidae	RDB3
Hylaeus communis Nylander, 1852	Colletidae	Local
Hylaeus brevicornis Nylander, 1852	Colletidae	Local
Hylaeus confusus Nylander, 1852	Colletidae	Local
Hylaeus pictipes Nylander, 1852	Colletidae	Notable A
Hylaeus hyalinatus Smith, F., 1843	Colletidae	Local
Hylaeus annularis (Kirby, 1802)	Colletidae	Local
Andrena apicata Smith, F., 1847	Andrenidae	Notable B
Andrena clarkella (Kirby, 1802)	Andrenidae	Common
Andrena fucata Smith, F., 1847	Andrenidae	Local
Andrena fulva (Müller, 1766)	Andrenidae	Common
Andrena helvola (Linnaeus, 1758)	Andrenidae	Local
Andrena lapponica Zetterstedt, 1838	Andrenidae	Local
Andrena praecox (Scopoli, 1763)	Andrenidae	Local
Andrena synadelpha Perkins, R.C.L., 1914	Andrenidae	Local
Andrena varians (Rossius, 1792)	Andrenidae	Notable B
Andrena bucephala Stephens, 1846	Andrenidae	Notable A
Andrena scotica Perkins, R.C.L., 1919	Andrenidae	Common

Andrena rosae Panzer, 1800	Andrenidae	RDB2
Andrena trimmerana (Kirby, 1802)	Andrenidae	Notable B
Andrena bicolor Fabricius, 1775	Andrenidae	Common
Andrena angustior (Kirby, 1802)	Andrenidae	Local
Andrena cineraria (Linnaeus, 1758)	Andrenidae	Local
Andrena nigroaenea (Kirby, 1802)	Andrenidae	Common
Andrena pubescens Olivier, 1789	Andrenidae	Common
Andrena thoracica (Fabricius, 1775)	Andrenidae	Common
Andrena denticulata (Kirby, 1802)	Andrenidae	Local
Andrena fuscipes (Kirby, 1802)	Andrenidae	Local
Andrena nigriceps (Kirby, 1802)	Andrenidae	Notable B
Andrena haemorrhoa (Fabricius, 1781)	Andrenidae	Common
Andrena riparia (Scopoli 1763) (= carbonaria)	Andrenidae	Notable B
Andrena flavipes Panzer, 1798	Andrenidae	Local
Andrena tarsata Nylander, 1848	Andrenidae	Local
Andrena coitana (Kirby, 1802)	Andrenidae	Local
Andrena barbilabris (Kirby, 1802)	Andrenidae	Local
Andrena chrysosceles (Kirby, 1802)	Andrenidae	Local
Andrena fulvago (Christ, 1791)	Andrenidae	Notable A
Andrena humilis Imhoff, 1832	Andrenidae	Notable B
Andrena hattorfiana (Fabricius, 1775)	Andrenidae	RDB3
Andrena labiata Fabricius, 1781	Andrenidae	Notable A
Andrena marginata Fabricius, 1777	Andrenidae	Notable A
Andrena labialis (Kirby, 1802)	Andrenidae	Local
Andrena falsifica Perkins, R.C.L., 1914	Andrenidae	Notable A
Andrena minutula (Kirby, 1802)	Andrenidae	Common
Andrena minutuloides Perkins, R.C.L., 1914	Andrenidae	Notable A
Andrena niveata Friese, 1887	Andrenidae	RDB2
Andrena proxima (Kirby, 1802)	Andrenidae	RDB3
Andrena saundersella Perkins, R.C.L., 1914	Andrenidae	Common
Andrena subopaca Nylander, 1848	Andrenidae	Common
Andrena congruens Schmiedeknecht, 1883	Andrenidae	Notable A
Andrena dorsata (Kirby, 1802)	Andrenidae	Local
Andrena ocreata (Christ, 1791)	Andrenidae	Notable B
Andrena ovatula (Kirby, 1802)	Andrenidae	Common
Andrena wilkella (Kirby, 1802)	Andrenidae	Common
Panurgus calcaratus (Scopoli, 1763)	Andrenidae	Local
Panurgus banksianus (Kirby, 1802)	Andrenidae	Local
Halictus rubicundus (Christ, 1791)	Halictidae	Common
Halictus tumulorum (Linnaeus, 1758)	Halictidae	Common
Lasioglossum laevigatum (Kirby, 1802)	Halictidae	Local
Lasioglossum lativentris (Schenck, 1853)	Halictidae	Unknown
Lasioglossum leucozonium (Schrank, 1781)	Halictidae	Common
Lasioglossum prasinum (Smith, F., 1845)	Halictidae	Local
Lasioglossum quadrinotatum (Kirby, 1802)	Halictidae	Notable A
Lasioglossum xanthopum (Kirby, 1802)	Halictidae	Notable B
Lasioglossum zonulus (Smith, F., 1849)	Halictidae	Unknown
Lasioglossum albipes (Fabricius, 1781)	Halictidae	Common
Lasioglossum calceatum (Scopoli, 1763)	Halictidae	Common
Lasioglossum fratellum (Pérez, 1903)	Halictidae	Common
Lasioglossum fulvicorne (Kirby, 1802)	Halictidae	Local
Lasioglossum minutissimum (Kirby, 1802)	Halictidae	Common
Lasioglossum nitidiusculum (Kirby, 1802)	Halictidae	Local
Lasioglossum parvulum (Schenck, 1853)	Halictidae	Common
Lasioglossum punctatissimum (Schenck, 1853)	Halictidae	Local

Lasioglossum rufitarse (Zetterstedt, 1838)	Halictidae	Local
Lasioglossum villosulum (Kirby, 1802)	Halictidae	Common
Lasioglossum cupromicans (Pérez, 1903)	Halictidae	Local
Lasioglossum leucopum (Kirby, 1802)	Halictidae	Local
Lasioglossum morio (Fabricius, 1793)	Halictidae	Common
Lasioglossum smeathmanellum (Kirby, 1802)	Halictidae	Unknown
Sphecodes crassus Thomson, 1870	Halictidae	Notable B
Sphecodes ephippius (Linnaeus, 1767)	Halictidae	Common
Sphecodes geoffrellus Kirby, 1802	Halictidae	Common
Sphecodes ferruginatus von Hagens, 1882	Halictidae	Notable B
Sphecodes gibbus (Linnaeus, 1758)	Halictidae	Common
Sphecodes hyalinatus von Hagens, 1882	Halictidae	Common
Sphecodes monilicornis (Kirby, 1802)	Halictidae	Local
Sphecodes pellucidus Smith, F., 1845	Halictidae	Local
Sphecodes puncticeps Thomson, 1870	Halictidae	Unknown
Sphecodes rubicundus von Hagens, 1875	Halictidae	Notable A
Sphecodes spinulosus von Hagens, 1875	Halictidae	RDB2
Melitta haemorrhoidalis (Fabricius, 1775)	Melittidae	Local
Melitta leporina (Panzer, 1799)	Melittidae	Local
Melitta tricincta (Kirby, 1802)	Melittidae	Notable B
Dasypoda altercator (Harris, 1780)	Melittidae	Notable B
Anthidium manicatum (Linnaeus, 1758)	Megachilidae	Common
Stelis ornatula (Klug, 1808)	Megachilidae	RDB3
Stelis phaeoptera (Kirby, 1802)	Megachilidae	RDB2
Stelis punctulatissima (Kirby, 1802)	Megachilidae	Notable B
Chelostoma florisomne (Linnaeus, 1758)	Megachilidae	Local
Osmia rufa (Linnaeus, 1758)	Megachilidae	Common
Osmia parietina Curtis, 1828	Megachilidae	RDB3
Osmia pilicornis Smith, F., 1846	Megachilidae	Notable A
Osmia xanthomelana (Kirby, 1802)	Megachilidae	RDB1
Osmia caerulescens (Linnaeus, 1758)	Megachilidae	Common
Osmia leaiana (Kirby, 1802)	Megachilidae	Common
Osmia aurulenta (Panzer, 1799)	Megachilidae	Local
Osmia bicolor (Schrank, 1781)	Megachilidae	Notable B
Hoplitis claviventris (Thomson, 1872)	Megachilidae	Common
Hoplitis spinulosa (Kirby, 1802)	Megachilidae	Local
Megachile centuncularis (Linnaeus, 1758)	Megachilidae	Local
Megachile ligniseca (Kirby, 1802)	Megachilidae	Common
Megachile versicolor Smith, F., 1844	Megachilidae	Local
Megachile leachella Curtis, 1828	Megachilidae	Notable B
Megachile willughbiella (Kirby, 1802)	Megachilidae	Common
Megachile circumcincta (Kirby, 1802)	Megachilidae	Common
Megachile maritima (Kirby, 1802)	Megachilidae	Unknown
Coelioxys quadridentata (Linnaeus, 1758)	Megachilidae	RDB3
Coelioxys elongata Lepeletier, 1841	Megachilidae	Local
Coelioxys inermis (Kirby, 1802)	Megachilidae	Local
Coelioxys mandibularis Nylander, 1848	Megachilidae	RDB3
Coelioxys rufescens Lep. & Serville, 1815	Megachilidae	Unknown
Coelioxys conoidea (Illiger, 1806)	Megachilidae	Local
Nomada armata Herrich-Schäffer, 1839	Anthophoridae	RDB1
Nomada fabriciana (Linnaeus, 1767)	Anthophoridae	Common
Nomada flava Panzer, 1798	Anthophoridae	Common
Nomada flavoguttata (Kirby, 1802)	Anthophoridae	Common

Nomada flavopicta (Kirby, 1802)	Anthophoridae	Notable B
Nomada fucata Panzer, 1798	Anthophoridae	Notable A
Nomada fulvicornis Fabricius, 1793	Anthophoridae	RDB3
Nomada goodeniana (Kirby, 1802)	Anthophoridae	Common
Nomada hirtipes Pérez, 1884	Anthophoridae	RDB3
Nomada lathburiana (Kirby, 1802)	Anthophoridae	RDB3
Nomada leucophthalma (Kirby, 1802)	Anthophoridae	Local
Nomada marshamella (Kirby, 1802)	Anthophoridae	Common
Nomada obtusifrons Nylander, 1848	Anthophoridae	Local
Nomada panzeri Lepeletier, 1841	Anthophoridae	Common
Nomada pleurosticta Herrich-Schäffer, 1839	Anthophoridae	Notable A
Nomada roberjeotiana Panzer, 1799	Anthophoridae	RDB3
Nomada ruficornis (Linnaeus, 1758)	Anthophoridae	Local
Nomada rufipes Fabricius, 1793	Anthophoridae	Common
Nomada sheppardana (Kirby, 1802)	Anthophoridae	Unknown
Nomada signata Jurine, 1807	Anthophoridae	RDB2
Nomada striata Fabricius, 1793	Anthophoridae	Local
Epeolus cruciger (Panzer, 1799)	Anthophoridae	Local
Epeolus variegatus (Linnaeus, 1758)	Anthophoridae	Local
Eucera longicornis (Linnaeus, 1758)	Anthophoridae	Notable A
Anthophora plumipes (Pallas, 1772)	Anthophoridae	Common
Anthophora quadrimaculata (Panzer, 1798)	Anthophoridae	Notable B
Anthophora furcata (Panzer, 1798)	Anthophoridae	Unknown
Melecta albifrons (Forster, 1771)	Anthophoridae	Local
Bombus lucorum Linnaeus, 1761	Apidae	Common
Bombus terrestris (Linnaeus, 1758)	Apidae	Common
Bombus soroeensis (Fabricius, 1777)	Apidae	Local
Bombus lapidarius (Linnaeus, 1758)	Apidae	Common
Bombus jonellus (Kirby, 1802)	Apidae	Local
Bombus monticola Smith, F., 1849	Apidae	Local
Bombus pratorum (Linnaeus, 1761)	Apidae	Common
Bombus distinguendus Morawitz, F., 1869	Apidae	Notable B
Bombus subterraneus (Linnaeus, 1758)	Apidae	Notable A
Bombus hortorum (Linnaeus, 1761)	Apidae	Common
Bombus ruderatus (Fabricius, 1775)	Apidae	Notable B
Bombus humilis Illiger, 1806	Apidae	Local
Bombus muscorum (Linnaeus, 1758)	Apidae	Local
Bombus pascuorum (Scopoli, 1763)	Apidae	Common
Bombus ruderarius (Müller, 1776)	Apidae	Local
Bombus sylvarum (Linnaeus, 1761)	Apidae	Notable B
Psithyrus barbutellus (Kirby, 1802)	Apidae	Common
Psithyrus bohemicus (Seidl, 1837)	Apidae	Common
Psithyrus campestris (Panzer, 1800)	Apidae	Common
Psithyrus rupestris (Fabricius, 1793)	Apidae	Notable B
Psithyrus sylvestris Lepeletier, 1833	Apidae	Common
Psithyrus vestalis (Goeffroy, 1785)	Apidae	Common
Apis mellifera Linnaeus, 1758	Apidae	Common

Note: A further seven species have been reported from Wales which are either known to be erroneous or else require confirmation before they could be accepted on to the Welsh list. Three of these species (*Gorytes laticinctus*, *Andrena nitidiusculus* and *Nomada xanthosticta*) are given Red Data Book status in Britain and are discussed in section 4 above. The remaining four are all bees in the difficult family Halictidae. *Lasioglossum pauxillum* (Schenck) and *L. puncticolle* (Morawitz, F.) were recorded by Hallett in Glamorgan in 1910 & 1911, respectively (Hallett 1912). However, these records were not repeated in any of Hallett's later compilations of

Glamorgan aculeates (Hallett 1928, 1936, 1956b) and it can be assumed that he had subsequently recognised that they were mis-identifications. *Sphecodes longulus* von Hagens was reported by Smith (1969) from Montgomeryshire. Although in Britain this species is currently known only from southern England, its presence in Wales is not implausible, but confirmation of voucher specimens is essential. Finally, *Sphecodes miniatus* (Schenck) was included by Richards (1950) in a list of aculeates collected in Pembrokeshire. It is a difficult species to identify and Hallett (1956b) attributes this record to *Sphecodes geoffrellus (=fasciatus)* in his manuscript, presumably as a result of the record having been subsequently corrected.

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8. Relevant Addresses

British Isles Bee Breeders' Association (BIBBA), A. Knight (Secretary), 11 Thomson Drive, Codnor, Ripley, Derbyshire, DE5 9RU

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POSTSCRIPT (FEBRUARY 2003)

CORRIGENDA

Page 6: The allocation of Hallett's Porthcawl records to Merthyr Mawr SSSI is probably inaccurate. It seems likely that most of his collecting was undertaken at Newton Burrows (Hallett 1916a) and Rest Bay. Both of these sites were effectively destroyed sometime after the Second World War when the caravan park was established. This applies to Hallett's records for *Cryptocheilus notatus, Arachnospila consobrina, Minumesa littoralis, Stelis ornatula* and some of his records of *Coelioxys mandibularis*. The early records for *Symmorphus crassicornis* (coll. Delhanty) and *Psen bicolor* (coll. Hallett) are correctly attributed to Merthyr Mawr Warren. There is, therefore, no certainty that *Cryptocheilus notatus* and *Minumesa littoralis* have been recorded from Merthyr Mawr.

ADDENDA

Since publication of this review in 1996 there has been a considerable amount of Hymenoptera recording in Wales and eight of the forty species reported above as not having been seen in Wales since 1980 have been re-discovered.

Priocnemis coriacea (Pompilidae) - Marford (Denbs.) - 4 May 1997 - JB Formstone
- Great Hardwick (Monms.) - 10 June 1997 - A. Davidson
Spilomena troglodytes (Sphecidae) - Gresford (Denbs.) - 1998 - JB Formstone
Hylaeus pictipes (Colletidae) - Overton Cliff (Glam.) - July 1998 - P Skidmore
Sphecodes spinulosus (Halictidae) - Caer Bwdy (Pembs.) - 1 July 1994 - A. Foster
Osmia xanthomelana (Megachilidae) - Porth Ceiriad (Caerns.) - 21 June 1998
- C. Clee & T. Green
Osmia parietina (Megachilidae) - Powis Castle (Monts.) - 29 May 1997 - C. Clee
Nomada robertjeotiana (Anthophoridae) - Banc y Warren (Cards.) - 4 July 2000
- P Skidmore
Melecta albifrons (Anthophoridae) - Sully (Glam.) - 1997 - PM Pavett

Later records than those given in the review have since come to light for two species:
Gonatopus distinctus (Dryinidae) - Whiteford Burrows (Glam.) - 1960 - MJ Cotton
Bombus ruderatus (Apidae) - Bow Street (Cards.) - Aug 1958 - PM Miles
In addition there are several reports of *Bombus ruderatus* in Wales from the 1970s but these are unconfirmed and given the difficulties of identifying *Bombus* species with literature available in that period it is considered best to regard these records as in need of verification.

A further ten species have been added to the Welsh list, bringing the total of aculeate Hymenoptera species known from Wales to 400.
Cephalonomia formiciformis (Bethylidae) - Clytha Park (Monms.) - 2002
- P Skidmore
Aphelopus serratus (Dryinidae) - Parc Lodge (Monms.) - 2002 - P Skidmore
Chrysis schenkei (Chrysididae) - Great Orme (Caerns.) - 7 July 1987 - WA Ely
Omalus aeneus (Chrysididae) - Alltybwla (Cards.) - 20 Aug 1991 - AP Fowles
Lasius platythorax (Formicidae) - a recent taxonomic split from *Lasius niger*, this species is now recorded from several bogs and wet heaths in Wales.

Dolichovespula saxonica (Vespidae) - Mynydd Du Forest (Monms.) - 11 June 1997 - AE Stubbs & R. Underwood

Crossocerus vagabundus (Sphecidae) - Crymlyn Bog (Glam.) - 7 Aug 1998 - PM Pavett (Pavett 1999)

Lasioglossum puncticolle (Halictidae) - Overton (Glam.) - 3 July 1999 - P. Skidmore

Sphecodes scabricollis (Halictidae) - Llanrhidian (Glam.) - 28 May 1997 - M. Edwards

Sphecodes reticulatus (Halictidae) - Borras (Denbs.) - 6 July 2000 - JB Formstone (Formstone 2001)

By far the most important of these records is the re-discovery of *Osmia xanthomelana* on the sandy cliffs of the Lleyn peninsula, Caernarvonshire. Following the records of single females on two dates in June 1998 at Porth Ceiriad, a single male was found further west at Porth Neigwl in June 1999. Subsequently small breeding populations have been located at both sites. This species has not been seen in its only other modern British locality on the south coast of the Isle of Wight since 1994 and therefore the Welsh populations, which have been the subject of detailed investigations in the last couple of years, are quite probably the last remaining in Britain.

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