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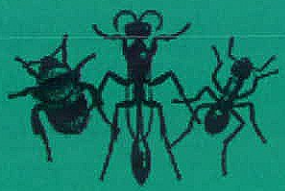
Provisional atlas of the aculeate Hymenoptera of Britain and Ireland Part 4

Robin Edwards (Editor)
Bees, Wasps and Ants Recording Society

Mark Telfer (Editor)
Biological Records Centre



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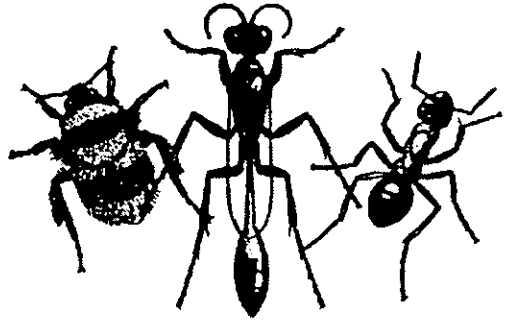

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CONTENTS

ACKNOWLEDGEMENTS

This fourth part of the Provisional atlas of the aculeate Hymenoptera (bees, wasps and ants) of Britain and Ireland is again the result of much hard work by many people. Firstly, the species for this atlas were carefully selected by Target Species Coordinator, Stuart Roberts, together with the following specialist group compilers:

Geoff Allen (Sphecidae); Michael Archer (Chrysididae, Tiphiidae, Sapygidae, Pompilidae, Vespidae, Apidae); Andy Davidson (Pompilidae); Mike Edwards (Pompilidae, Apidae); George Else (Apidae); Simon Hoy (Formicidae); Tom Ings (Vespidae); Brian Nelson (all groups from Northern Ireland); Glenda Orledge (Formicidae); John Pontin (Formicidae); Colm Ronayne (all groups from the Republic of Ireland).

The species profiles written by the compilers have been edited by Robin Edwards (BWARS) and Mark Telfer (BRC).

Next must be mentioned the large number of entomologists and naturalists who submitted records for the target species, without whom this atlas could not have been produced. The huge task of checking all the data, entering it into the BWARS database, and producing the maps has been undertaken by Mike Edwards and Stuart Roberts. Maps were drawn on computer using the DMAP mapping package developed by Alan J Morton. Our thanks go to all these contributors.

In addition, special thanks go to Jim O'Connor of the National Museum of Ireland, Dublin, and Colm Ronayne for checking and updating most of the records from Ireland. Also, we thank Martin Speight of the National Parks and Wildlife Service, Dublin, and Robert Nash and Brian Nelson of the Ulster Museum, Belfast, for their help with records from Ireland.

We are specially indebted to The Trustees of The Natural History Museum, London, and the Curator of the Hope Entomological Collections, Oxford, who have made their collections of aculeates available for study by our recorders.

The completed draft was read in its entirety by Mike Edwards, George Else and Stuart Roberts (BWARS). The Editors are grateful for their help in reducing errors to a minimum.

Finally, we are indebted to Paul Harding at the Biological Records Centre, CEH Monks Wood for his assistance with the BWARS atlases, and to Julie Gaunt at CEH Directorate for computer setting the atlas, and organising its printing and distribution.

INTRODUCTION

Three parts of the Provisional atlas have been published so far:

Part 1 with 55 species (Edwards 1997);
Part 2 with 55 species (Edwards 1998);
Part 3 with 60 species in 59 maps (Edwards & Telfer 2001).

With this fourth part, a further 55 species are added, taking the total number mapped to 225. The breakdown of atlas coverage by family is shown in Table 1.

Table 1. Breakdown of the British and Irish aculeate fauna by family, showing the coverage of the first four parts of the atlas. Figures based on the BWARS checklist of May 2002.

Family	Total no. of spp	No. spp mapped	No. left to map
Dryinidae	34	0	34
Embolemidae	1	1	0
Bethylidae	22	2	20
Chrysididae	33	10	23
Tiphiidae	3	3	0
Mutillidae	3	3	0
Scoliidae	1	0	1
Sapygidae	2	2	0
Formicidae	64	17	47
Pompilidae	44	24	20
Vespidae	34	31	3
Sphecidae	129	64	65
Apidae	270	68	202
Total	**640**	**225**	**415**

SYSTEMATIC LIST OF SPECIES MAPPED

The classification here is as used in the BWARS database with the addition of family and subfamily information derived from various taxonomic sources. Map numbers are given for each species.

HYMENOPTERA ACULEATA

CHRYSIDOIDEA

CHRYSIDIDAE

Elampinae

171 *Hedychrum niemelai*

172 *Hedychrum rutilans*

Chrysidinae

173 *Chrysis fulgida*

174 *Chrysura hirsuta*

175 *Chyrsura radians*

VESPOIDEA

FORMICIDAE

Myrmicinae

176 *Anergates atratulus*

177 *Formicoxenus nitidulus*

Formicinae

178 *Formica lugubris*

179 *Formica rufibarbis*

POMPILIDAE

Pepsinae

180 *Priocnemis coriacea*

181 *Priocnemis perturbator*

182 *Priocnemis schioedtei*

183 *Priocnemis susterai*

Pompilinae

184 *Evagetes crassicornis*

185 *Evagetes siculus*

VESPIDAE

Vespinae

186 *Dolichovespula norwegica*

187 *Dolichovespula sylvestris*

188 *Vespula germanica*
189 *Vespula vulgaris*

APOIDEA

SPHECIDAE

Pemphredoninae

190 *Diodontus insidiosus*
191 *Diodontus luperus*
192 *Diodontus minutus*
193 *Diodontus tristis*
194 *Passaloecus clypealis*
195 *Passaloecus corniger*
196 *Passaloecus eremita*
197 *Passaloecus gracilis*
198 *Passaloecus insignis*
199 *Passaloecus monilicornis*
200 *Passaloecus singularis*
201 *Passaloecus turionum*

APIDAE

Colletinae

202 *Colletes daviesanus*
203 *Colletes fodiens*
204 *Colletes similis*

Andreninae

205 *Andrena apicata*
206 *Andrena cineraria*
207 *Andrena ferox*
208 *Andrena flavipes*
209 *Andrena gravida*
210 *Andrena lathyri*
211 *Andrena nitidiuscula*
212 *Andrena praecox*

Halictinae

213 *Lasioglossum angusticeps*
214 *Lasioglossum brevicorne*
215 *Lasioglossum laevigatum*
216 *Lasioglossum prasinum*

Megachilinae

217 *Osmia parietina*

Anthophorinae

218 *Nomada errans*
219 *Nomada ferruginata*

220 *Nomada fucata*
221 *Nomada lathburiana*
222 *Epeolus cruciger*
223 *Epeolus variegatus*

Apinae

224 *Bombus humilis*
225 *Bombus subterraneus*

DISTRIBUTION MAPS AND SPECIES PROFILES

Maps 171 to 225 show the recorded distributions of the individual species. Records are presented for three periods:

+ before 1900
○ 1900 - 1969
● 1970 - March 2002

It should be mentioned here that plus signs and open circles do not necessarily mean that the species has ceased to occur in that 10-km square since 1900 or 1969. It may only be that the locality has not been visited, or that the species has not been looked for. Where a species is thought to have genuinely declined, this is mentioned in the accompanying text.

SPECIES PROFILES

Threat statuses (for Britain only) were identified for some species in the *British Red Data Book* (RDB) (Shirt 1987), in which the data sheets for aculeate Hymenoptera were compiled by G R Else and the late G M Spooner. Some of these RDB statuses were proposed for revision by Falk (1991) in a national review of scarce and threatened aculeates; such proposed changes being prefixed with a p - thus pRDB. Species with restricted distributions, that failed to meet the RDB threat criteria, were also listed by Falk (1991) as Notable (now referred to as Scarce). Two degrees of Notable status were recognised - Na (thought to occur in 30 or fewer 10-km squares) and Nb (thought to occur in between 31 and 100 10-km squares). For a full explanation of all the RDB and Notable statuses see Ball (1994).

In the text of this atlas, county names are those of the Watson-Praeger Vice-county system.

Plant names are given only in the vernacular form in the species profiles. Readers requiring scientific names should turn to page 130. All botanical names are as given in Stace (1997).

Map 171 *Hedychrum niemelai* Linsenmaier, 1959

[Chrysididae: Elampinae]

Previously known as *Hedychrum nobile*, a misidentification, and *H. aureicolle* Mocsary. Identification keys and general biology are given in Morgan (1984), Falk (1991) and Kunz (1994).

Distribution

Recorded from Cornwall to Kent and north to Oxfordshire, Norfolk and Lincolnshire. Also found in Jersey.

Overseas found in Europe (including Norway, Sweden, Finland, The Netherlands, France including Corsica, Spain, Portugal, Germany, Switzerland, Italy including Sicily, Poland, Austria, Hungary and the former Yugoslavia), Asia (Turkey across to Siberia and Manchuria) and north Africa (Morocco).

Status (in Britain only)

Not listed in Shirt (1987). Falk (1991) lists it as Rare (pRDB3). Work for this atlas suggests that its status requires review.

Habitat

Open sandy localities: lowland heaths, coastal dunes, cliffs with sandy deposits, and other disturbed locations, for example sandpits, footpaths and railway cuttings. Adults fly in bright sunshine around nesting sites of the hosts and feed at the nectaries and extra-floral nectaries of flowering plants.

Flight period

Probably univoltine; mainly during July and August, but also during June and September and rarely during May.

Parasitic behaviour

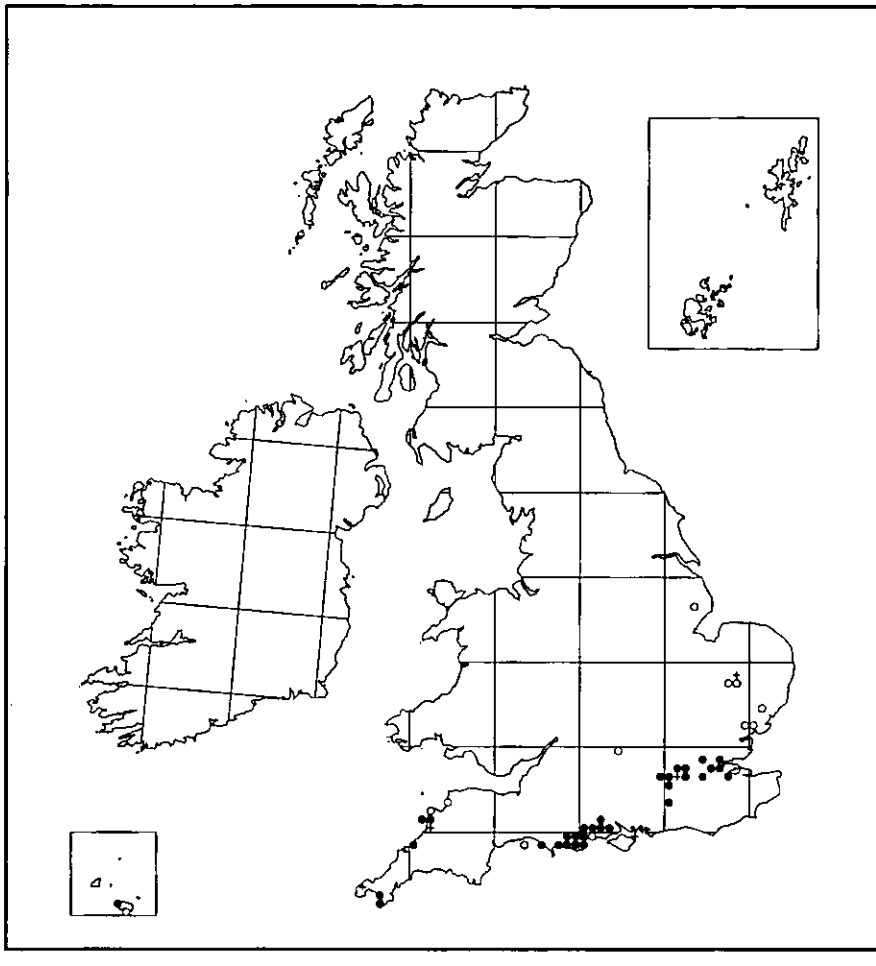
The hosts of this species are *Cerceris rufícornis*, *C. arenaria*, *C. rybyensis* and *C. quinquefasciata* (Edwards 1997). All the host species nest in sandy places. On detecting a host's nest the female enters and lays an egg in a cell. On hatching, the chrysidid larva acts as a parasitoid consuming either the mature larva or prepupa of the host.

Flowers visited

Claries, goldenrod, woundworts and yarrow.

Parasites

No information available.



Map compiled by: M E Archer and S P M Roberts.
Author of profile: M E Archer.

Map 172 *Hedychrum rutilans* Dahlbom, 1854

[Chrysididae: Elampinae]

Previously known as *Hedychrum intermedium*, a misidentification. Identification keys and general biology are given in Morgan (1984), Falk (1991) and Kunz (1994).

Distribution

There are two records from England: from Lyndhurst, Hampshire (Morice 1901b) and from Wandsworth, Surrey (Morice 1902). The Lyndhurst specimen has been found at Oxford University Museum. Now regarded as extinct in England, but still found on Jersey and Guernsey.

Overseas found throughout Europe except the extreme north (including Finland, Denmark, The Netherlands, France including Corsica, Spain, Portugal, Germany, Switzerland, Poland, Austria, Hungary, Albania and Greece), and in Turkey, Armenia, Iran, Siberia and north Africa.

Status (in Britain only)

An appendix species in Shirt (1987) and Falk (1991).

Habitat

Found in the habitats of its hosts which are usually open sandy places such as lowland heaths, coastal dunes and other disturbed sandy places. Adults can be found feeding on nectar in flowers and at extra-floral nectaries.

Flight period

Probably univoltine: from a small sample found from June to August.

Parasitic behaviour

Host(s) unknown in England, but on mainland Europe its hosts are *Philanthus triangulum* (Edwards 1997) and *P. coronatus*. For details of parasitic behaviour see *H. niemelai* (p. 14).

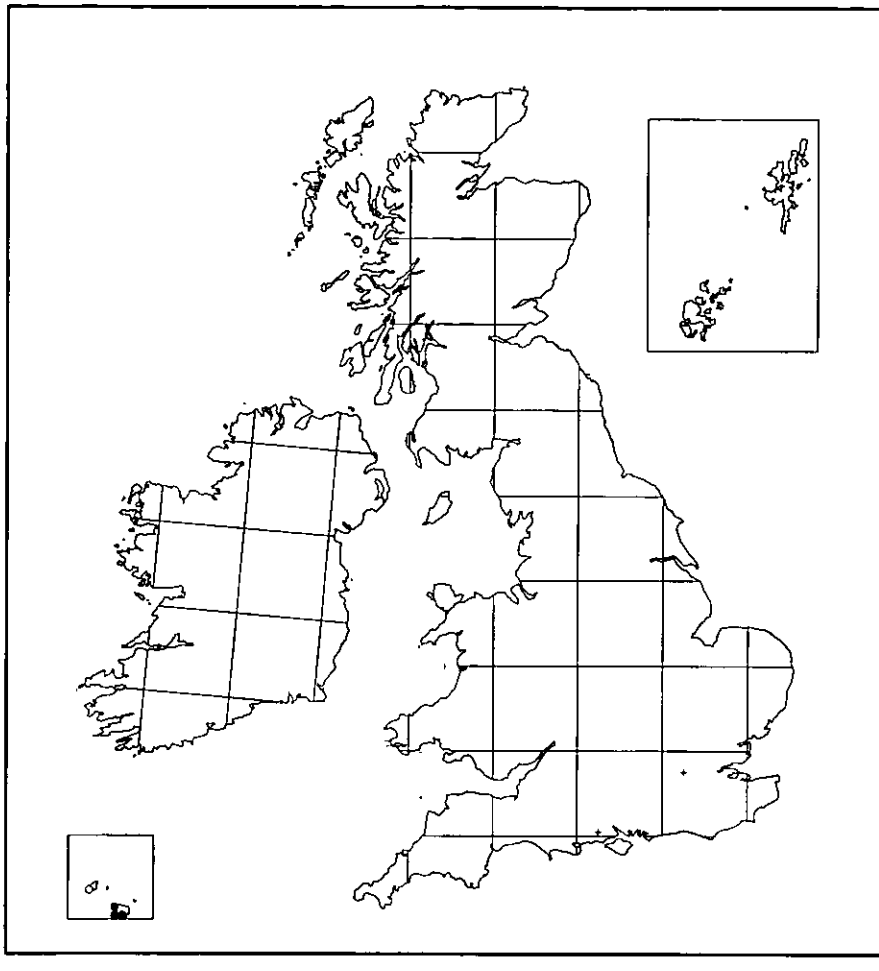
Flowers visited

Mayweed, sea-holly, sheep's-bit and yarrow.

Parasites

No information available.

Map compiled by: M E Archer and S P M Roberts.
Author of profile: M E Archer.



Map 173 *Chrysis fulgida* Linnaeus, 1761

[Chrysididae: Chrysidinae]

Distinguished from other *Chrysis* species in having four distinct acute teeth on the posterior margin of the third gastral tergite, and by having the first gastral tergite blue-black. Identification keys are given in Morgan (1984). Information concerning general biology is given in Kunz (1994).

Distribution

South Devon to east Kent, north to Worcestershire and Cambridgeshire. Records from 1970 onwards are from several localities in west and north-west Surrey, and north-east Hampshire.

Overseas found in Europe, and eastwards to central Asia.

Status (in Britain only)

Shirt (1987) and Falk (1991) list this species as endangered (RDB1). Recent survey work would suggest that its status should be reviewed.

Habitat

This wasp is associated with scrubby heathland and open woodland where its hosts are found in the vicinity of aspen and creeping willow.

Flight period

British records agree with the flight period June to mid-August stated by Kunz (1994).

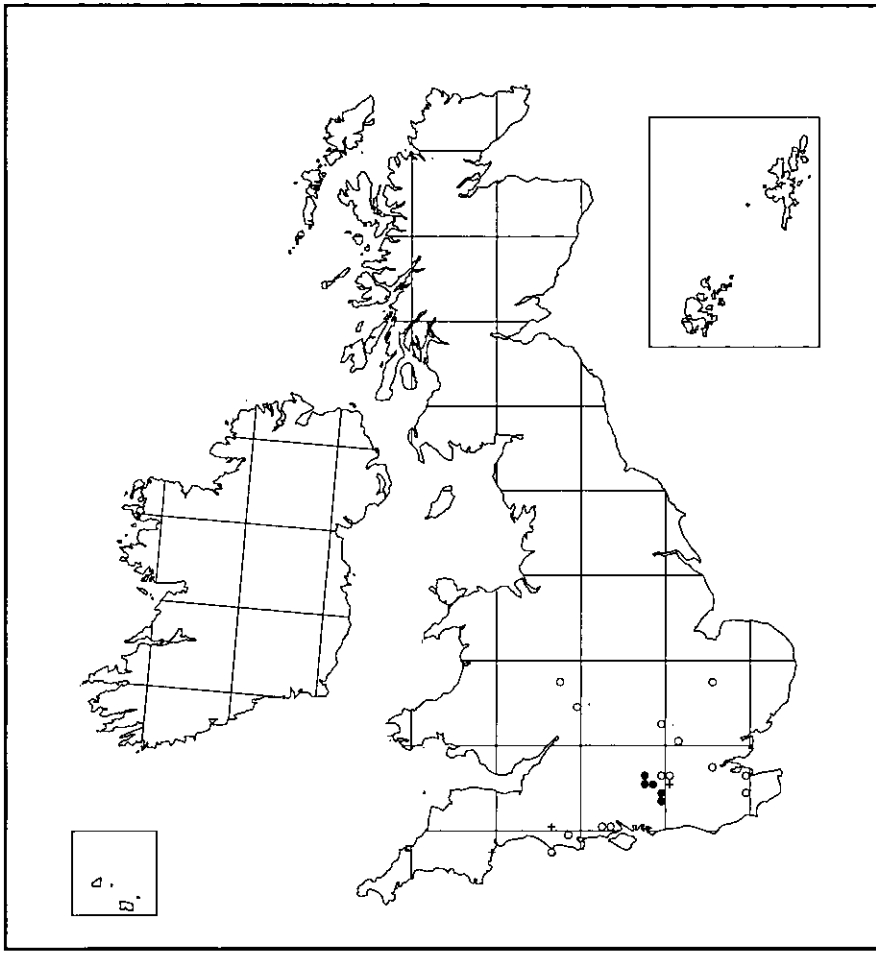
Parasitic behaviour

Recent research for the UK Biodiversity Action Plan indicates that the host of *Chrysis fulgida* is the eumenid wasp *Symmorphus crassicornis*, in agreement with the information given by Kunz (1994) (D Baldock and M Edwards pers. comm., 2000). *S. crassicornis* (see Edwards 1997) is a predator of larvae and adults of the leaf beetle *Chrysomela populi* and is a cavity nesting species, utilising cavities in both dead wood and banks (Archer 2000). The *Chrysomela* larvae feed on aspen and creeping willow: young suckers of the latter are particularly favoured.

Overseas, recorded from other mason wasps, *Ancistrocerus* and *Odynerus* for example.

Flowers visited

No information available.



Parasites
No information available.

Map compiled by: M E Archer and S P M Roberts.
Authors of profile: M E Archer and M Edwards.

Map 174 *Chrysura hirsuta* Gerstäcker, 1869

[Chrysididae: Chrysidinae]

In older literature this species has been referred to as *Chrysis osmiae* Thomson. Identification keys and general biology are given in Morgan (1984), Falk (1991) and Kunz (1994).

Distribution

Scotland only: Morayshire (Aviemore, Loch Garten), East Perth (Blair Atholl) and Wigtownshire (Whithorn). Very rarely seen.

Overseas: Fennoscandia, central Europe and the Pyrenees, Poland, north China, Korea, Japan.

Status (in Britain only)

Listed as Vulnerable (RDB2) by Shirt (1987) and provisionally downgraded to Rare (RDB3) by Falk (1991).

Habitat

Occurs in three habitats related to its three possible hosts. Blair Atholl (*Osmia inermis*) - upland, base-rich grassland. Loch Garten (*O. uncinata*) - mature Caledonian pine woodlands. Whithorn (*O. parietina*) - probably traditionally-managed upland pasture with old stone walls and rocky outcrops (Else & Edwards 1996).

Flight period

Probably a minimum two-year life-cycle. From the few available records, adults fly from May to July.

Parasitic behaviour

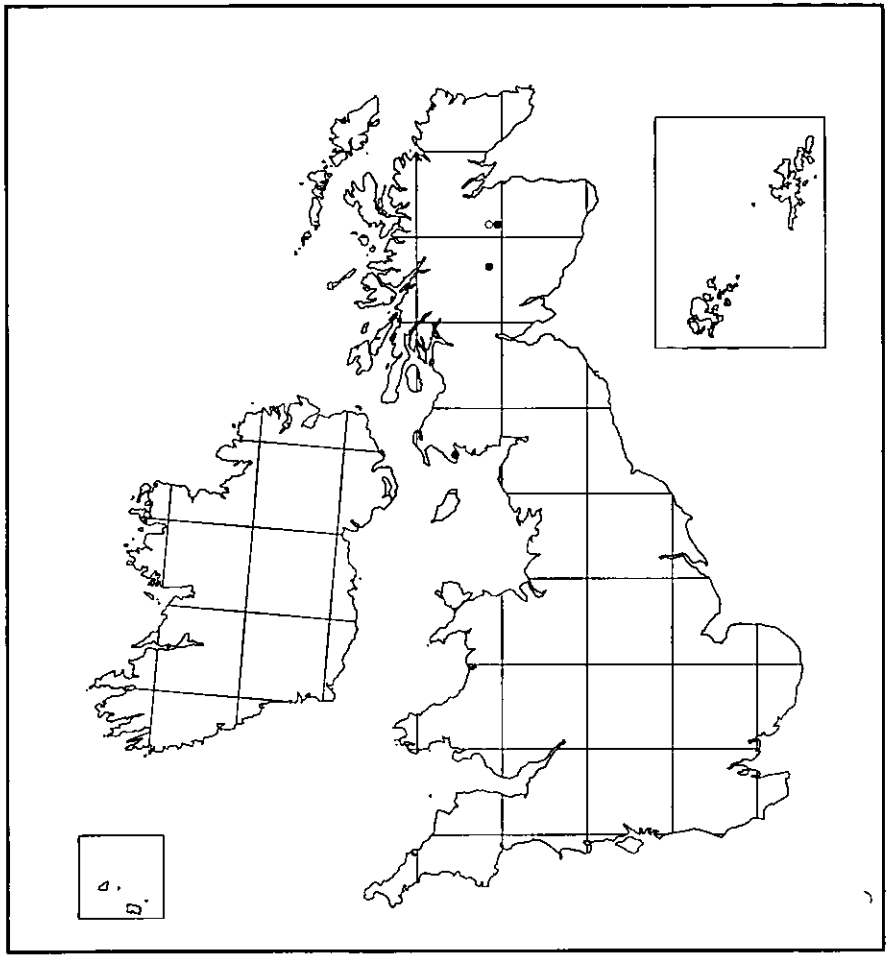
Krombein (1967) *in* Morgan (1984) describes the chrysidid larva as usually hatching a day before the egg of its host bee. From three to seven days after hatching, the *Chrysura* larva attaches itself to the feeding bee larva and slowly begins to eat it. The host bee spins its cocoon 17-31 days after hatching. After the host completes its cocoon and becomes quiescent, the *Chrysura* larva moults to its second instar and then completely devours the bee larva. Finally, the *Chrysura* larva spins a cocoon inside the cocoon of the bee. It is therefore a parasitoid.

Flowers visited

No information available.

Parasites

No specific information found.



Map compiled by: M E Archer and S P M Roberts.
Author of profile: M E Archer.

Map 175 *Chrysura radians* (Harris, 1781)

[Chrysididae: Chrysidinae]

In older literature this species is referred to as *Chrysis pustulosa* Abeille de Perrin. Identification keys and general biology are given in Morgan (1984), Falk (1991) and Kunz (1994).

Distribution

Cornwall to Kent, and north to South Yorkshire. The species is widespread but rarely found (M Edwards, pers. comm.).

Overseas: Europe, Turkey, Syria, Arabia, Caucasus, Siberia, north Africa.

Status (in Britain only)

Listed in Falk (1991) as Notable A.

Habitat

This species occurs in a variety of open, sunny habitats. It is usually seen around old wooden posts, stumps and dead trees where its host nests.

Flight period

Probably univoltine. Adults mainly fly from May until July, rarely in August and September.

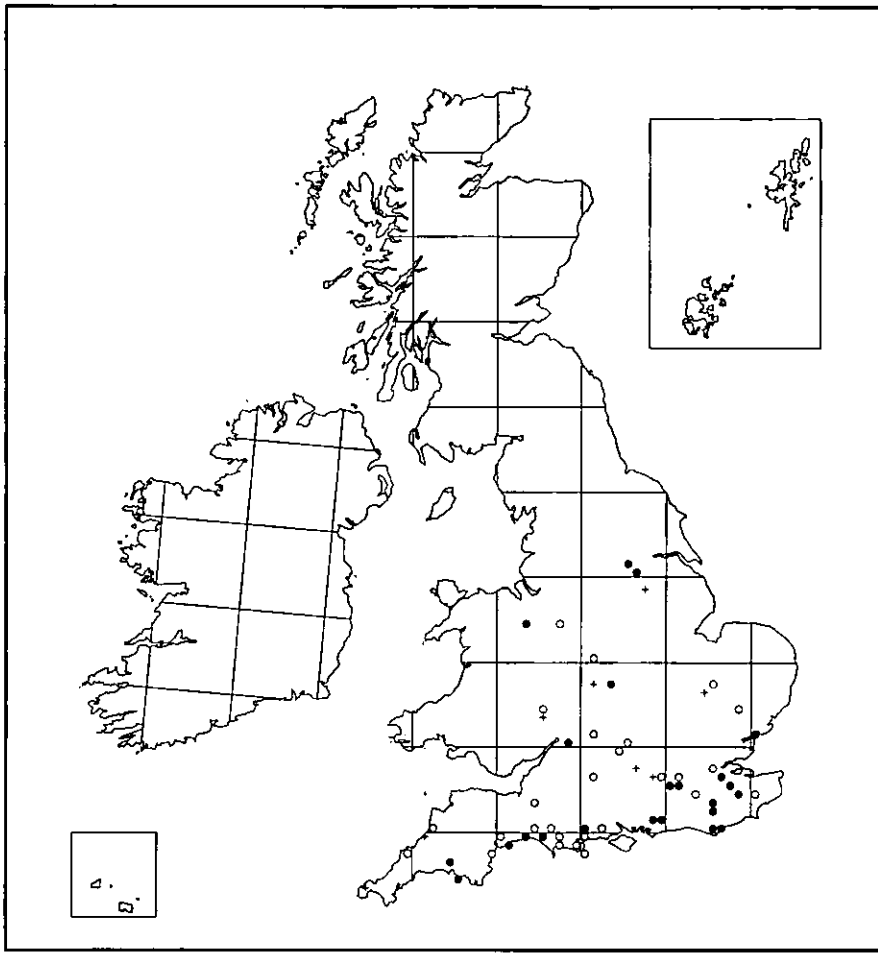
Parasitic behaviour

A parasitoid on wood-nesting species of *Osmia*, possibly *O. leaiana*. See *Chrysura hirsuta* for further details.

Parasites

No information available.

Map compiled by: M E Archer and S P M Roberts.
Author of profile: M E Archer.



Map 176 *Anergates atratulus* (Schenk, 1852)

[Formicidae: Myrmicinae]

Anergates atratulus is an obligate workerless social parasite (inquiline) in the colonies of another ant, *Tetramorium caespitum*. As with many socially parasitic ants, *Anergates* appears to be related to its host genus and the female morphology is superficially similar. Gynes are about 2.5 mm long, blackish-brown with yellow legs.

Distribution

The distribution and status of *A. atratulus* is, not surprisingly, closely linked to that of its host species, which is itself only locally common. *A. atratulus* has been recorded from the cliffs at Bolt Head and Bolberry Down in S. Devon, the heathlands of Purbeck and around Wareham and Hurn in Dorset, near Burley and Beaulieu Road Station in the New Forest and the heaths at Longmoor in Hants, Pirbright Common in Surrey and the shingle beds around Dungeness. It has also been recorded from Jersey. This parasite is possibly under-recorded. It is present in only a small proportion of host colonies, it is easily overlooked, and the *Tetramorium* nests are difficult to excavate. *Anergates atratulus* is found across the Palaearctic and, along with its host, it has become well established in the eastern United States.

Status (in Britain only)

Listed as Rare (RDB3) in Shirt (1987); revised to Insufficiently Known (RDBK) by Falk (1991).

Habitat

Anergates atratulus requires a large stable population of its host species to survive. *T. caespitum* itself is a thermophilous species requiring high levels of insolation at the ground surface. The largest populations of *T. caespitum* are found in sun-exposed, rocky or shingle coastal sites with short, sparse maritime vegetation. Some lowland heaths also support strong populations of the host but only where the vegetation is short or sparse and there are patches of bare free-draining ground.

Flight period

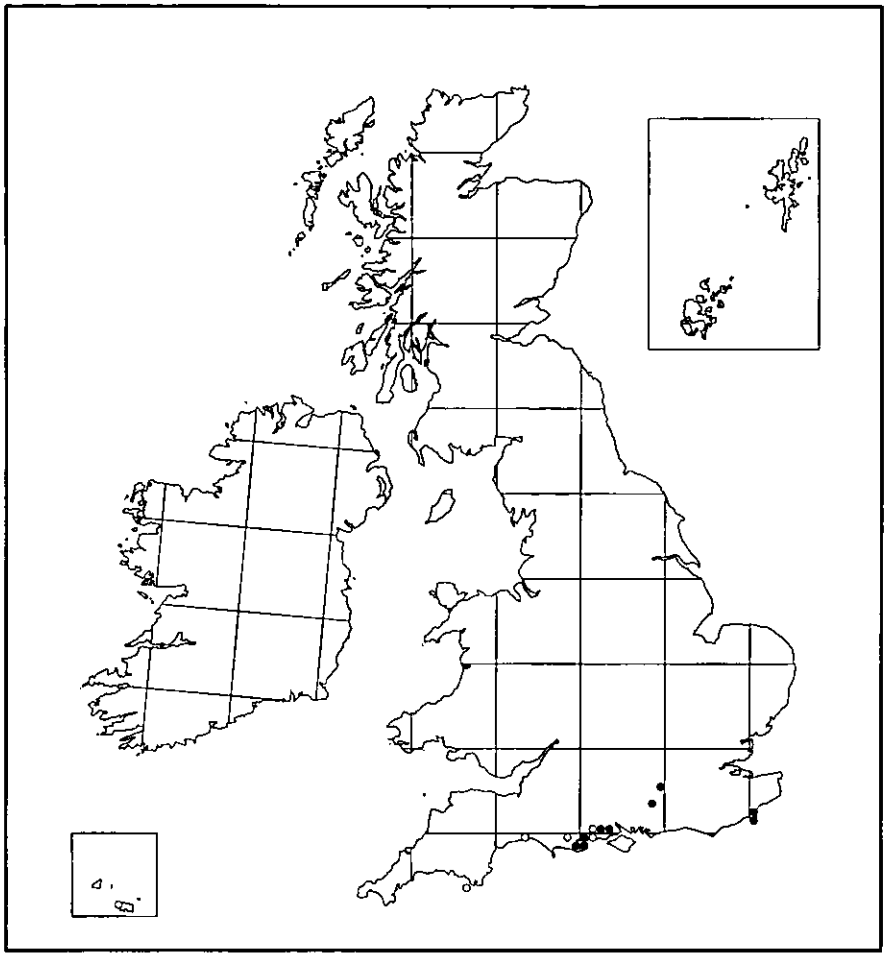
Males of *A. atratulus* are degenerate and wingless, therefore mating occurs within the host nest. The mated gynes then fly out from May to August to find new host colonies.

Foraging behaviour

A. atratulus has no worker caste, the queen, brood and young sexuals are therefore totally dependent on the host *Tetramorium* workers for food. *T. caespitum* workers are predators and scavengers of animal and plant material (notably including seeds).

Nesting biology

This is poorly understood but newly mated queens appear to either secure adoption



in an old queenless colony of *T. caespitum*, or they lead to the host queen being killed or starved by her own workers. The parasite seems to predominate in mature *T. caespitum* colonies where the host workers are notably large and dark.
A. atratulus does not have workers of its own and so the entire resources of the host colony are diverted to producing large numbers of new *A. atratulus* gynes and males. Since no new host workers are generated, *A. atratulus* queens must produce new generations before the colony dies out in 2-5 years. The queens therefore become massively swollen with eggs (physogastric) and are themselves rarely found in nests. The yellowish larvae (contrasting with the white *Tetramorium* larvae), and the winged gynes or the pale pupoidal males are more often seen.

Map compiled by: S P M Roberts and S P Hoy.
Author of profile: S P Hoy.

Map 177 *Formicoxenus nitidulus* (Nylander, 1846)

[Formicidae: Myrmicinae]

This small, shining, reddish-yellow to brown ant is the only known European representative of its genus. It resembles *Leptothorax* species, to which it is closely related. Females, and the wingless males, are worker-like in appearance, whilst individuals morphologically intermediate between females and workers also occur.

Formicoxenus nitidulus is a 'guest ant', living only within the nest mounds of its ant hosts. These are usually 'wood ants' (*Formica* subgenus *Formica*). Known hosts in Britain are *F. aquilonia*, *F. lugubris* and *F. rufa*. Although it obtains food from its hosts, *F. nitidulus* establishes discrete nests and rears its own brood. Whether or not it should be considered a true social parasite is therefore a matter of some debate. (See Dumpert (1981) and Hölldobler & Wilson (1990) for differing views, and (together with Donisthorpe (1927), Collingwood (1979), and studies cited therein) for more extensive accounts and discussion of information included in this profile.)

Distribution

The scattered British records of *F. nitidulus* cover much of the areas of England and Scotland from which its hosts are recorded, but as yet it is unknown from Wales, Ireland and the Channel Islands. Elsewhere, *F. nitidulus* ranges from latitude 70°N to north Italy and from Spain to eastern Siberia.

Status (in Britain only)

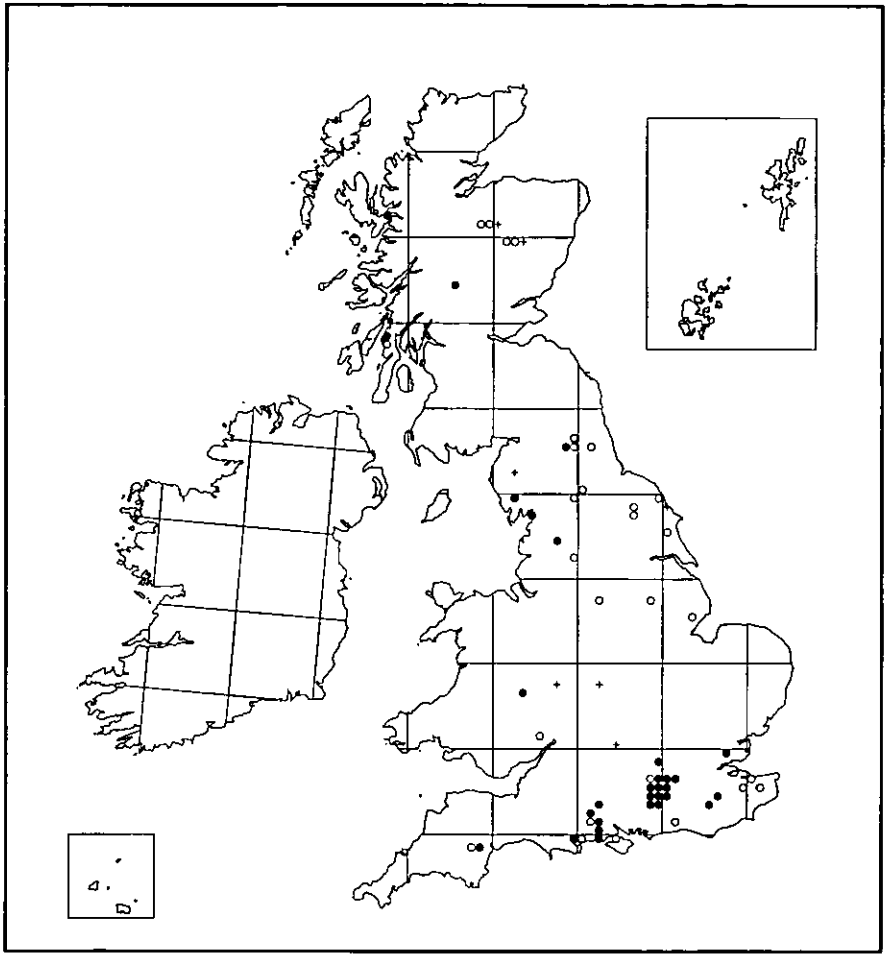
Neither Shirt (1987) nor Falk (1991) list *F. nitidulus* as scarce or threatened in Britain. Apparently uncommon, it can be difficult to find, and its true status is therefore unclear. Several new localities have been found during the 1990s, suggesting that the persistently small number of records reflects some under-recording.

Flight period

Although *F. nitidulus* seldom leaves the host mound interior, individuals may be seen on the mound surface on warm, dull, humid days. Males and winged females are present during July and August, with males persisting, perhaps exceptionally, into November (Robinson 1998). Since the males are wingless, there is no nuptial flight. Females release a male-attracting pheromone and mating takes place on the surface of a *Formica* mound.

Nesting biology

Within the host nest mound, *F. nitidulus* nests in hollow twigs and stems, wood fragments or the earth floor. A single *Formica* mound may have several of these



nests, each, typically, with less than 100 workers and perhaps several females, but only one egg-laying queen.

Foraging behaviour

Workers forage singly, leaving their nest via narrow galleries connecting with the interior of the host mound. They obtain food from host workers, either by intercepting regurgitated food being passed between them, or by direct soliciting. Captive *F. nitidulus* will take *Leptothorax* larvae, but there is no evidence that they feed on host brood.

Map compiled by: G M Orledge and S P M Roberts.
Author of profile: G M Orledge.

Map 178 *Formica lugubris* Zetterstedt, 1838

[Formicidae: Formicinae]

Formica lugubris, F. aquilonia, F. rufa and *F. pratensis* comprise a group of morphologically similar British species which are commonly referred to as 'wood ants'. Only *F. lugubris* and *F. aquilonia* are recorded from both Britain and Ireland, whilst *F. pratensis* is now presumed to be extinct on the mainland, but remains in the Channel Islands. The nomenclature of these species, and the morphological distinctions between them, have been considered by Yarrow (1955).

Distribution

In Britain, *F. lugubris* is found as far south as Derbyshire and Radnorshire. Its range therefore overlaps with that of *F. rufa* in northern Britain and north Wales, and with that of *F. aquilonia* in Scotland (Edwards 1997; Edwards & Telfer 2001). Also occurs in southern Ireland. Elsewhere, *F. lugubris* is recorded from European mountains and Eurosiberia. It occurs from northern Norway to Italy and from the Pyrenees to Kamchatka and Japan (Collingwood 1979).

Status (in Britain only)

Neither Shirt (1987) nor Falk (1991) list *F. lugubris* as scarce or threatened in Britain. The paucity of recent records from northern England and Wales no doubt reflects under-recording, although some Yorkshire and Derbyshire sites have been lost through over-shading, woodland clearance and urban growth (Collingwood & Hughes 1987; E. Langner, pers. comm.). The ant has also disappeared from some Irish sites (Collingwood 1958; Breen 1977).

Habitat

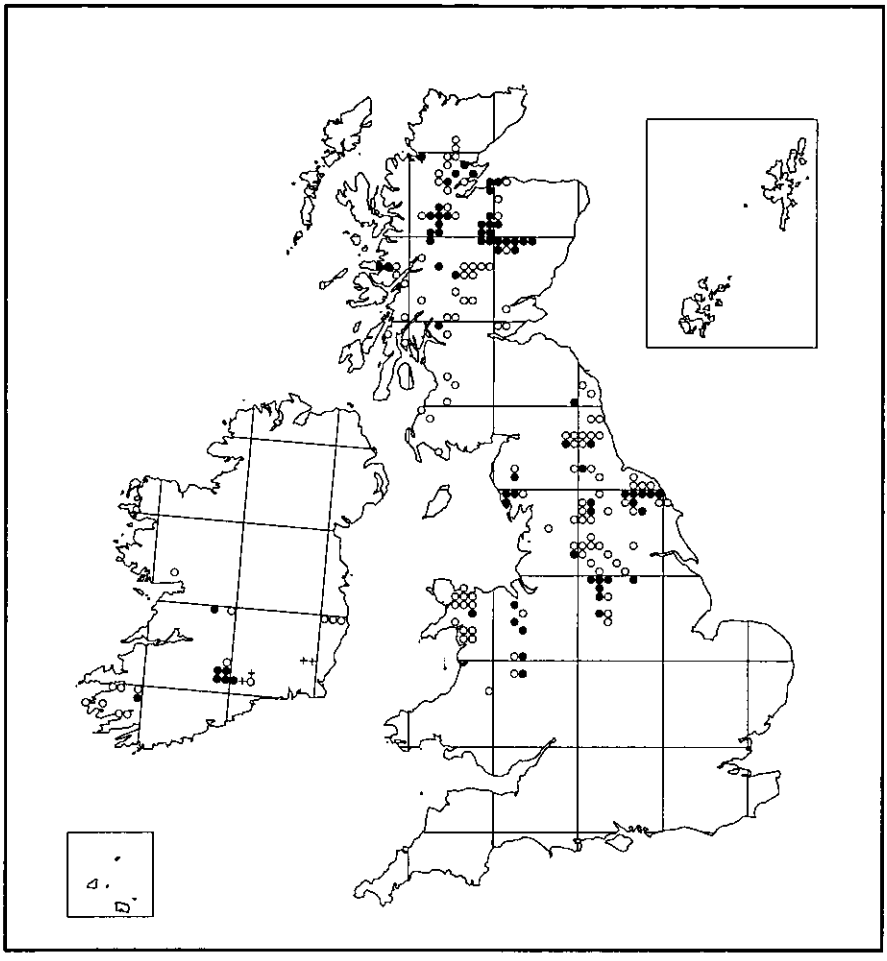
Formica lugubris colonises deciduous and coniferous woodland, and can extend into open areas away from trees which may be quite wet. It spreads more readily into new plantation areas than other British wood ants, and its upland occurrence on broken, rocky ground which supports only a sparse tree or shrub layer, demonstrates its tolerance of exposed conditions (Bolton & Collingwood 1975 ; Hughes 1975).

Flight period

Mating flights occur in June and July.

Nesting biology

The mound nests are composed of vegetable litter. Some exist in isolation, but large groups of inter-connecting nests often occur, and may contain many hundreds of queens. *Formica lugubris* spreads by colony budding, and less frequently, by temporary social parasitism. In the second case, a fertile *F. lugubris* queen is adopted into a nest of *F. lemani* and, after elimination of the *F. lemani* queen, becomes the exclusive egg-layer. Finally the host workers die off, leaving only the



F. lugubris queen and her progeny. In common with other wood ants, *F. lugubris* nests support many myrmecophilous arthropods, especially beetles, and including the ant *Formicoxenus nitidulus*.

Foraging behaviour

Foraging workers follow pheromone trails from the nest mound which can persist for months and may lead to good nectar sites or to groups of aphids from which the ants collect honeydew and the aphids themselves. Workers are also effective predators of other arthropods, including the larvae of forest insect pests living in the tree canopy, and can have a considerable impact on their populations.

Map compiled by: G M Orledge and S P M Roberts.
Author of profile: G M Orledge.

Map 179 *Formica rufibarbis* Fabricius, 1793

[Formicidae: Formicinae]

This species is easily confused with *Formica cunicularia*, especially in the worker caste. The queen's red and black patched trunk provides a guide (see Donisthorpe (1927), for a black and white illustration giving a good impression of this feature). Live workers appear distinctive with legs darker than the trunk and with a matt black gaster; they swarm rapidly out of the nest in large numbers to attack a disturber.

Distribution

Very rare in the British Isles: all well-substantiated records are from Surrey and the Isles of Scilly; other records probably refer to *F. cunicularia*.

Its range abroad extends across Asia to western Siberia.

Status (in Britain only)

Listed as Vulnerable (RDB2) in Shirt (1987) but revised to Endangered (RDB1) by Falk (1991). It is the subject of a Species Recovery Programme funded by English Nature.

Habitat

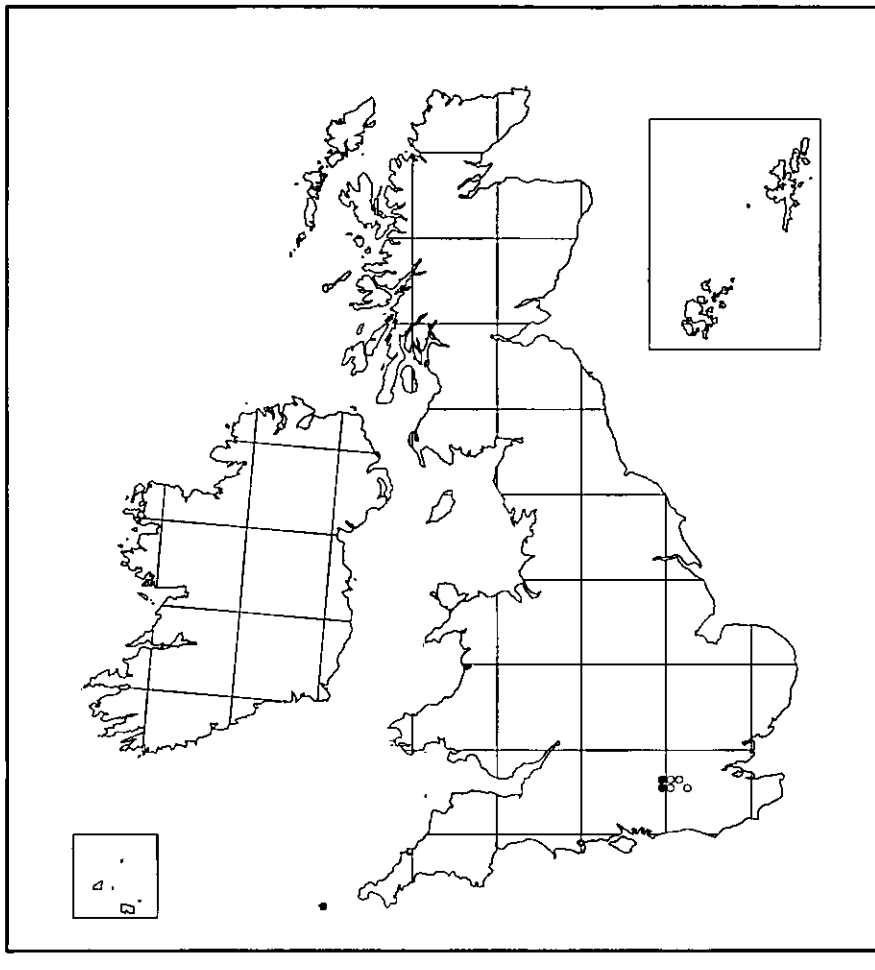
The nest habitat, as usually described, is a south-facing bank with sparse vegetation on dry heathland; but some of the nests surviving now are in purple moor grass/bristle bent grassland with grass fragments built up to make a mound in a tussock. Certainly a hot spot is needed for success and, in the laboratory, *F. rufibarbis* survives desiccation better than most British species.

Flight period

Mainly in July.

Nesting biology

Mating behaviour resembles a moth rather than that of the familiar *Lasius* species. Alate females 'call' at 0930-1100 hrs from high up on grass stems or other plants of similar height, and males fly in to mate. Synchrony is poor and mating can occur over a period of two weeks, whenever conditions are sunny with a light breeze. As in other *Formica* species a majority of nests produce either male or female alates only, and this must put at risk the very small populations which are known still to exist in Surrey. The other main risks are predation in conjunction with slave-making by *F. sanguinea* and mismanagement of the habitat. Workers of other ant species are avoided or ignored, unless near the nest, and competitive interactions may well be unimportant in the Surrey sites.



Foraging behaviour

Foraging is above ground; aphids are tended and dead arthropods are carried into the nest - many of these are found already dead, but small insects are attacked as prey.

Parasites and Predators

Predation by Green Woodpeckers and spiders occurs, but is likely to be of minor importance. No information is available on parasites.

Map compiled by: J Pontin and S P M Roberts.
Author of profile: J Pontin.

Map 180 *Priocnemis coriacea* (Dahlbom, 1843)

[Pompilidae: Pepsinae]

One of three large species of *Priocnemis* with plentiful erect hair on the face and propodeum (subgenus *Umbripennis*). *P. coriacea* is unpredictable in its occurrence. Identification characters are given in Day (1988).

Distribution

Widely distributed through southern and central England.

Scarce in central Europe, rare in northern and southern Europe (Wolf 1972).

Status (in Britain only)

Listed in Falk (1991) as Notable A.

Habitat

Associated with lighter soils, on downland and thinly wooded heathland.

Flight period

Univoltine; April to August, although Day (1988) records June as the latest date.

Prey collected

No prey recorded. However, it is probable that the wasps take larger species in the families Lycosidae and Gnaphosidae.

Nesting biology

Little is known about this but *Priocnemis* in general use existing cavities within which they may excavate several cells (Day 1988).

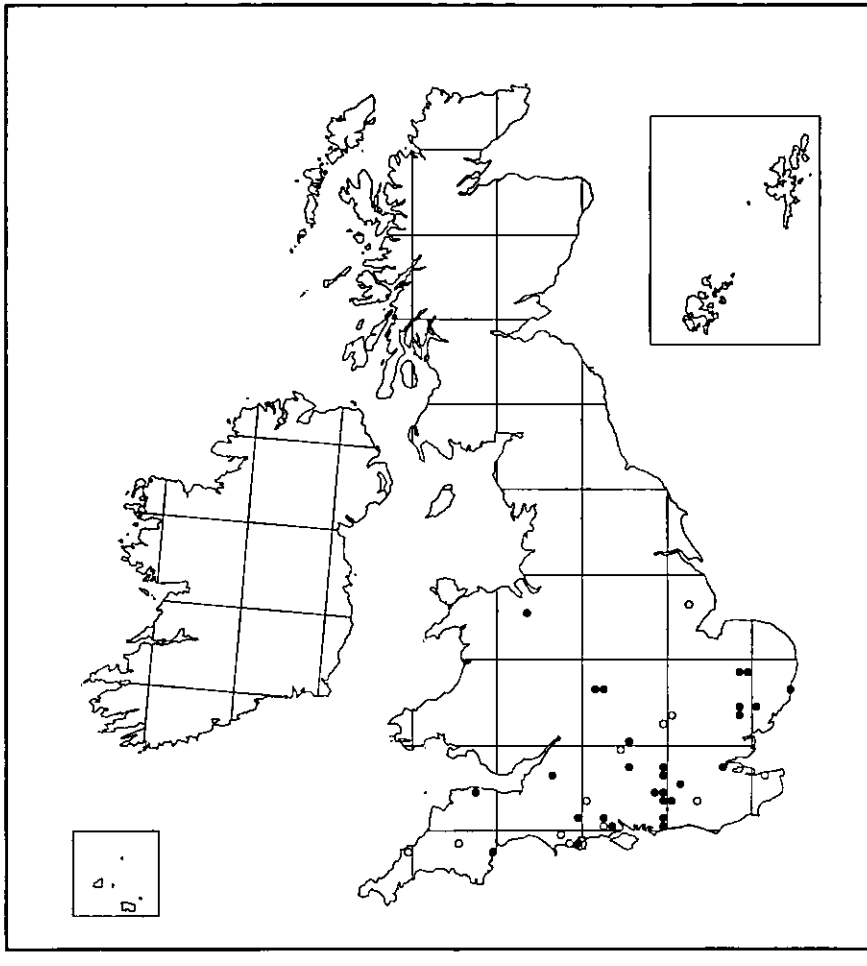
Flowers visited

Has been recorded at wood spurge, but may visit a wide range of plant species, as long as they have short corollae.

Parasites

No information available.

Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.



Map 181 *Priocnemis perturbator* (Harris, 1780)

[Pompilidae: Pepsinae]

One of three large species of *Priocnemis* with plentiful erect hair on the face and propodeum (subgenus *Umbripennis*). *P. perturbator* is often found at the flowers of wood spurge in woodlands during May. Identification is given in Day (1988). Many early records for this species may be confused with those for its close relative *P. susterai* Haupt.

Distribution

Widely distributed throughout Britain and Ireland.

Widespread in central and northern Europe and Asia eastwards to Japan (Wolf 1972).

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Most frequently associated with open woodland, but may be found in a variety of habitats, as long as they are not waterlogged.

Flight period

Univoltine; April to July.

Prey collected

Early records for the spider prey of this species are attributed to *P. fuscus* and may not be correctly assigned to species; however, the general comment that prey are larger species in the families Lycosidae and Gnaphosidae is likely to be correct. Females are sometimes seen on the ground, apparently searching for prey. The spider *Trochosa terricola* is known as a prey item (pers. obs., 2000).

Nesting biology

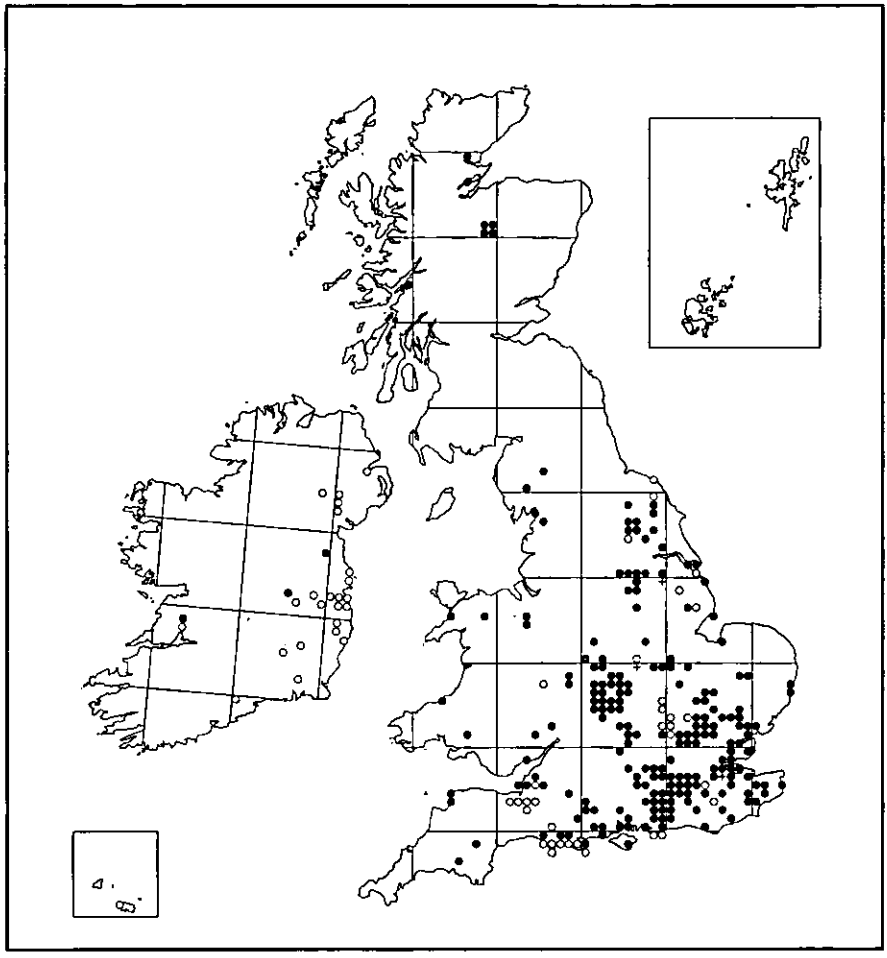
Little is known about this, but *Priocnemis* species generally use existing cavities within which they may excavate several cells (Day 1988).

Flowers visited

Most often found at wood spurge, but also known to visit blackthorn, dandelion, hawthorn and willow.

Parasites

No information available.



Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.

Map 182 *Priocnemis schioedtei* Haupt, 1927

[Pompilidae: Pepsinae]

Females of this species are easily confused with *Priocnemis pusillus*, *P. cordivalvata* and *P. gracilis*, although the males are readily distinguishable. Keys to species and general biology are given in Richards & Hamm (1939), Wolf (1972), Day (1988) and Falk (1991).

Distribution

South Devon to east Kent and north to east Inverness-shire and Moray. Also occurs on the Channel Islands. A scarce species, although in northern England it can be abundant flying low over dry sandy soils (M E Archer, pers. obs.).

Overseas, found in northern and central Europe. A melanic form occurs in southern Europe.

Status (in Britain only)

Listed by Falk (1991) as a Nationally Scarce (Nb) species.

Habitat

Usually in open situations on sandy soils, but also limestone grassland, along old hedges and earth exposures on road verges, and open areas in woodland on sandy soils.

Flight period

Probably univoltine. Females fly mainly during July and August, but also during June and September and rarely during October. Males mainly fly during July but also during June and August.

Prey collected

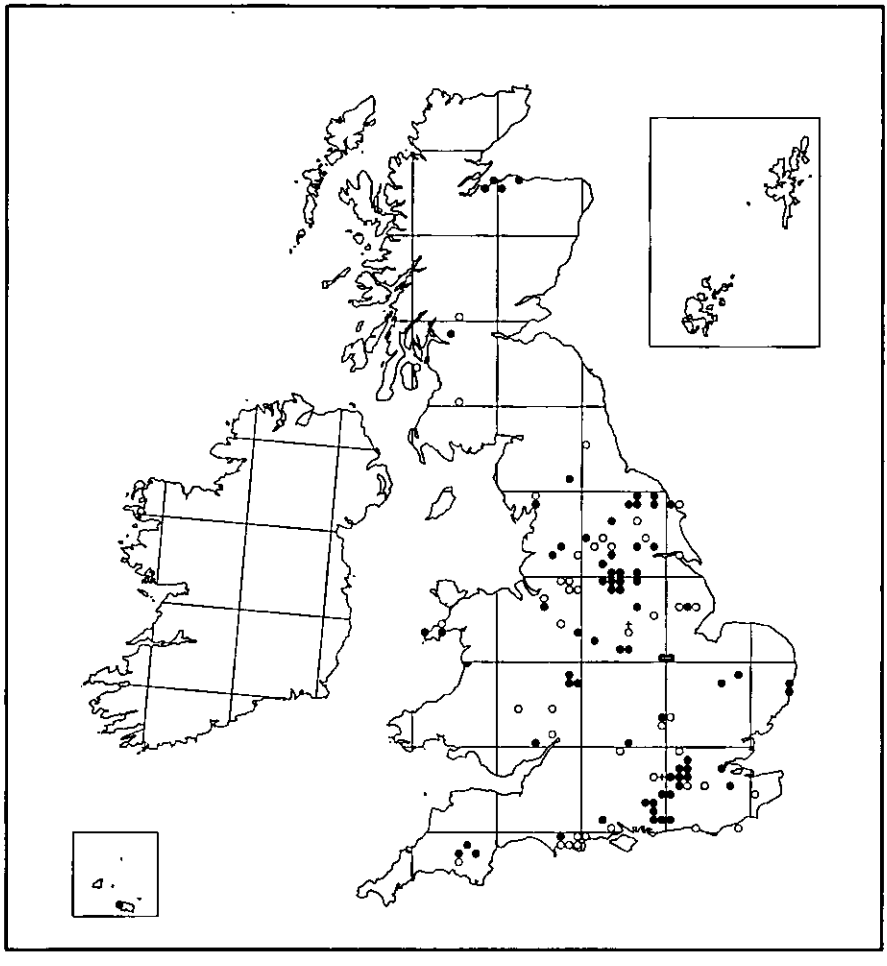
Spiders, probably of the family Clubionidae, but also Gnaphosidae, Salticidae and Lycosidae.

Nesting biology

After mating the female starts hunting for a spider. The captured spider is paralysed and then hidden. The female then digs a burrow, although she often takes advantage of natural cavities and abandoned burrows. The spider-prey is stored in a cell and an egg is laid, usually on its abdomen. The entrance tunnel, which is probably short, leads to several cells. The same female may prepare and provision several such nests. The young probably overwinter as mature larvae.

Parasites

No information available.



Map compiled by: M E Archer and S P M Roberts.
Author of profile: M E Archer.

Map 183 *Priocnemis susterai* Haupt, 1927

[Pompilidae: Pepsinae]

Another of the three large species of *Priocnemis* with plentiful erect hair on the face and propodeum (subgenus *Umbripennis*). *P. susterai* may occur anywhere among the much more frequently found *P. perturbator*. Identification is given by Day (1988).

Distribution

Widely distributed through southern and central England, and north to north-east Yorkshire. Also occurs in two areas of Wales.

Widespread in central and western Europe (Wolf 1972).

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Most often associated with open woodland, as long as the soil is not waterlogged.

Flight period

Univoltine; April to August.

Prey collected

None known, but it is probable that prey are large spiders in the families Lycosidae and Gnaphosidae. Confusion with *P. perturbator* (both species were known as *P. fuscus* in the earlier literature) means that historic prey records cannot be assigned with certainty.

Nesting biology

Little is known about this, but *Priocnemis* in general use existing cavities within which they may excavate several cells (Day 1988).

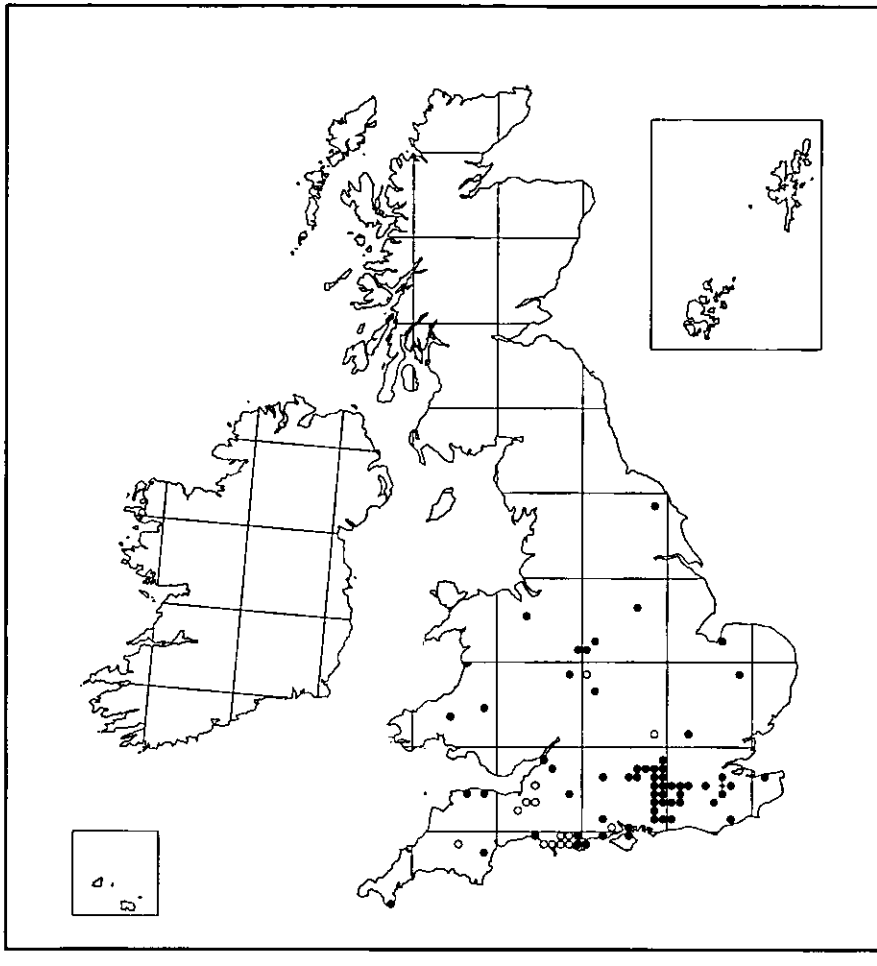
Flowers visited

Has been recorded at wood spurge, but may visit a wide range of plant species, as long as they have open corollae.

Parasites

No information available.

Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.



Map 184 *Evagetes crassicornis* (Shuckard, 1837)

[Pompilidae: Pompilinae]

One of our most frequently encountered red and black spider-hunting wasps, perhaps because it spends a lot of time searching open sunny ground for nesting host species.

Distribution

This species is widely distributed throughout the British Isles, with only a few records north of Yorkshire. There are several records from Ireland (Wexford and Wicklow).

Widespread in northern and central Europe, and in south European mountains. Also occurs in central Asia and the Nearctic (Wolf 1972).

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Although most often encountered in sandy habitats (Day 1988), this species may be found on areas of open ground within many different habitats.

Flight period

May to September (Day 1988).

Nesting biology

This is a cleptoparasitic species probably preying on various species of *Arachnospila*, although specific hosts have not yet been identified. Day suggests *Arachnospila anceps* and *Anoplius nigerrimus* as hosts in the British Isles. There is a continental record of *Arachnospila trivialis* being parasitised (Day 1988).

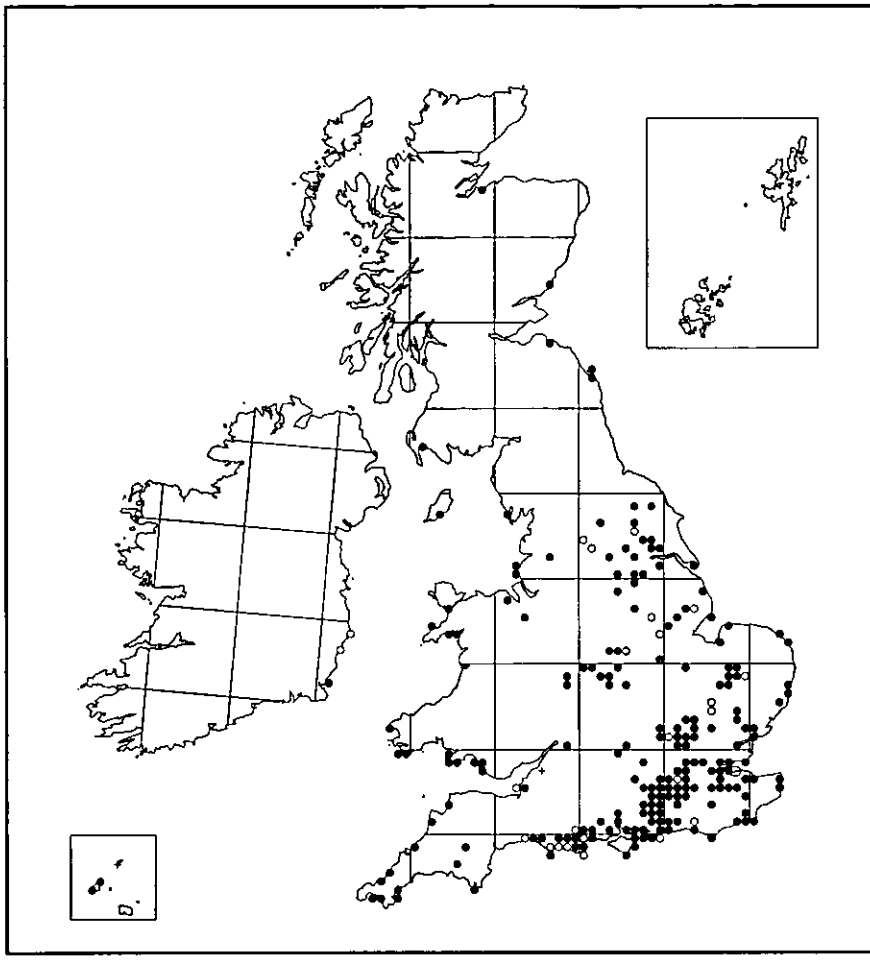
Flowers visited

Visits a wide variety of open flowers with short corollae, especially those of the families Apiaceae and Asteraceae.

Parasites

No information available.

Map compiled by: A S Davidson and S P M Roberts.
Author of profile: A S Davidson.



Map 185 *Evagetes siculus* (Lepeletier, 1845)

[Pompilidae: Pompilinae]

Distribution
Channel Islands only. Distribution elsewhere is unknown.

Status (in Britain only)
This species is not regarded as scarce or threatened.

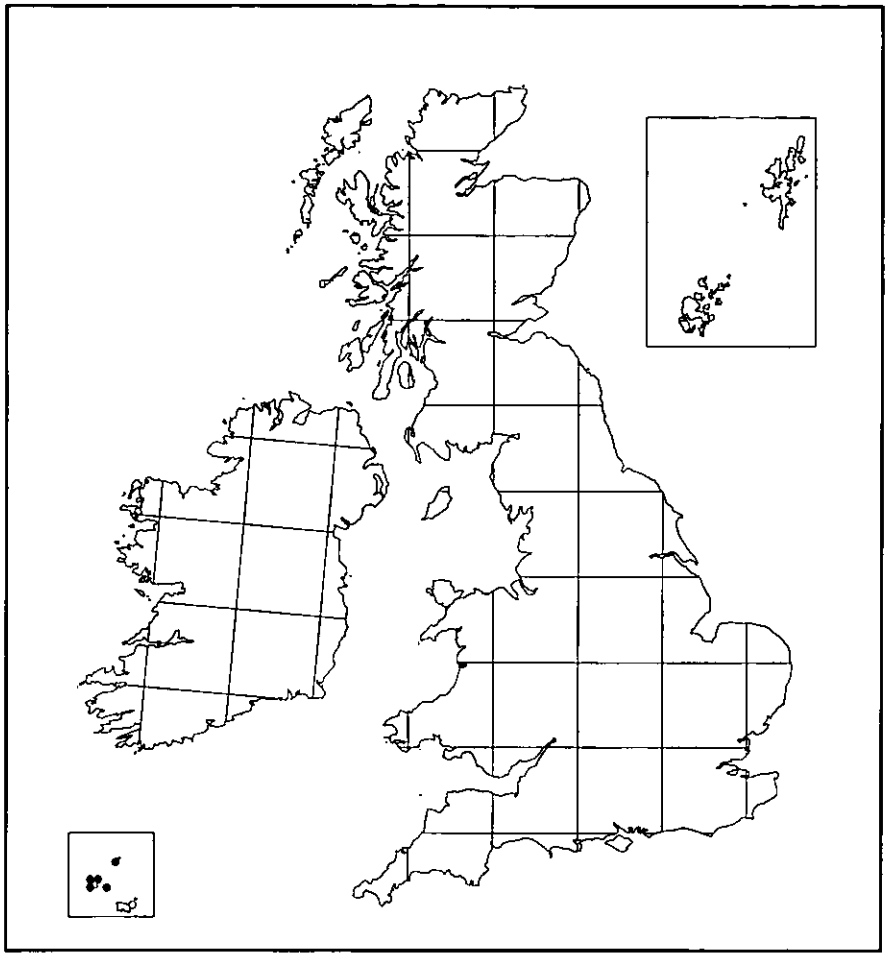
Habitat
No information available.

Flight period
July to August (Day 1988).

Nesting biology
Whilst this species is assumed to be cleptoparasitic there are no records of its behaviour.

Parasites
No information available.

Map compiled by: A S Davidson and S P M Roberts.
Author of profile: A S Davidson.



Map 186 *Dolichovespula norwegica* (Fabricius, 1781)

[Vespidae: Vespinae]

This is one of the three British 'long-cheeked' social wasps. Identification keys and details of biology are given in Archer (1996), Else (1994), Edwards (1980) and Spradbery (1973).

Distribution

Widely distributed throughout Britain and Ireland including Orkney and Shetland (Fair Isle). Overseas, occurs across most of northern Europe and Asia where it may be found as far north as 70°N. However, it is rare in southern Europe, where it tends to be an alpine species (in the Pyrenees, for example).

Status (in Britain only)

The species is not regarded as being threatened, although in common with other social wasps, it appears to have declined markedly in the late 1990s and early 2000s.

Habitat

Can be found in most areas, but tends to prefer nesting adjacent to heathland and moorland in Britain (pers. obs.).

Flight period

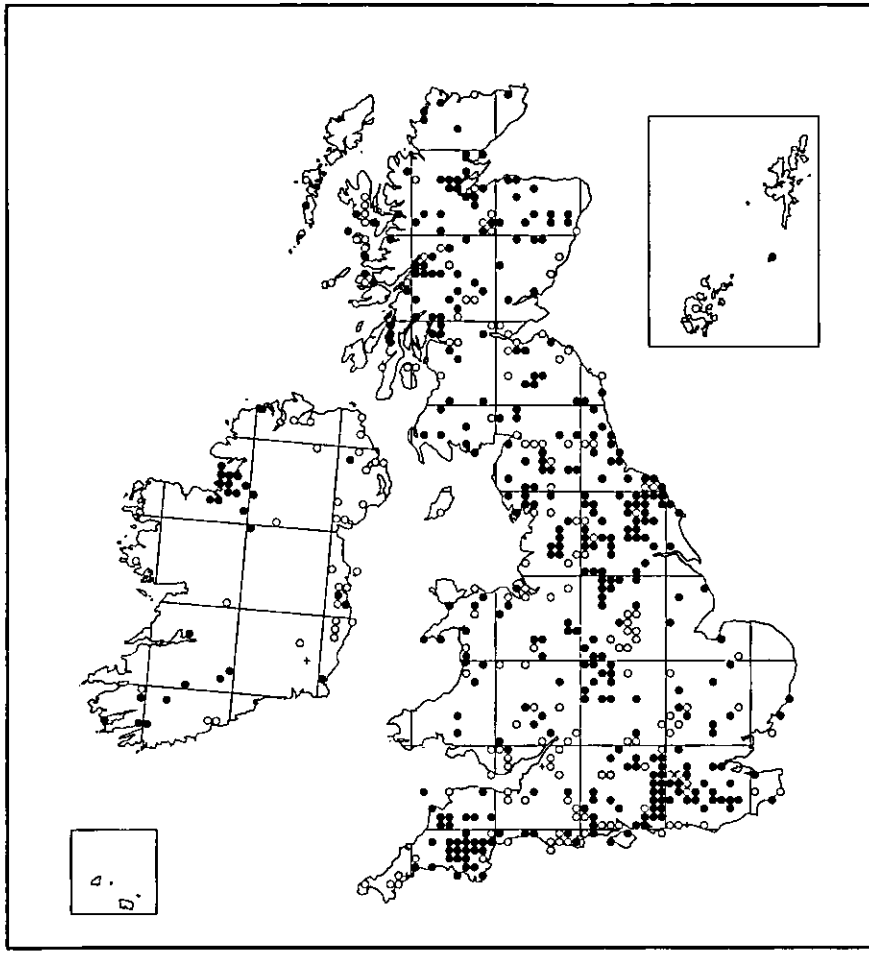
Spring queens are on the wing from mid-April to early June; workers from July to mid-October, and the newly emerged sexuals from September to October (Edwards 1980).

Nesting biology

As with all social wasps, queens which have overwintered build nests in the spring. This species hangs its nests from the branches of low bushes, often quite close to the ground. The queen tends her brood until the first new adults emerge in June: these are the 'workers' who then enlarge the nest and forage for food. At the end of the season, in August, new males and females (queens) are produced. Mating takes place outside the nest, and the fertilised queens then spend some time feeding on nectar from the umbels of hogweed and other Apiaceae, before seeking suitable over-wintering sites. The males spend most of their time feeding on the same umbels, and on bramble and other late fruits. Nests are abandoned and soon break up and rot away. Only the new queens hibernate over the winter, ready to start new colonies in the following spring.

Flowers visited

Spring queens visit the early flowers of *Cotoneaster* and *Berberis* for their nectar. Workers may visit figwort which has shallow flowers enabling the wasps to reach



the nectaries. There are no records of other flowers being visited by this species, except for the Apiaceae mentioned above.

Parasites

There are no records of parasites of British *D. norwegica*, but on the Continent, *Chrysis austriaca* is listed by Guiglia (1972). In addition, there is one social parasite, *Dolichovespula adulterina* whose queens take over established nests of *D. norwegica* in much the same way as *Vespula austriaca* takes over nests of *Vespula rufa* in Britain (see Edwards (1998) p. 64).

Map compiled by: T Ings and S P M Roberts.
Author of profile: R Edwards.

Map 187 *Dolichovespula sylvestris* (Scopoli, 1763)

[Vespidae: Vespinae]

A medium-sized, long-cheeked social wasp which is the most common species of the genus *Dolichovespula* in Britain.

Distribution

The species is widespread throughout the British Isles including many of the islands such as the Outer Hebrides, Isle of Man, Isles of Scilly and the Channel Islands. Overseas, the species occurs throughout most of Europe, Morocco, and across central Asia to eastern China; it is not found in Japan (Archer 1999).

Status (in Britain only)

This species is not regarded as being scarce or threatened, but has declined recently, as with other social wasps.

Habitat

Will utilise the majority of habitats and can often be very common in urban areas, particularly in domestic gardens.

Flight period

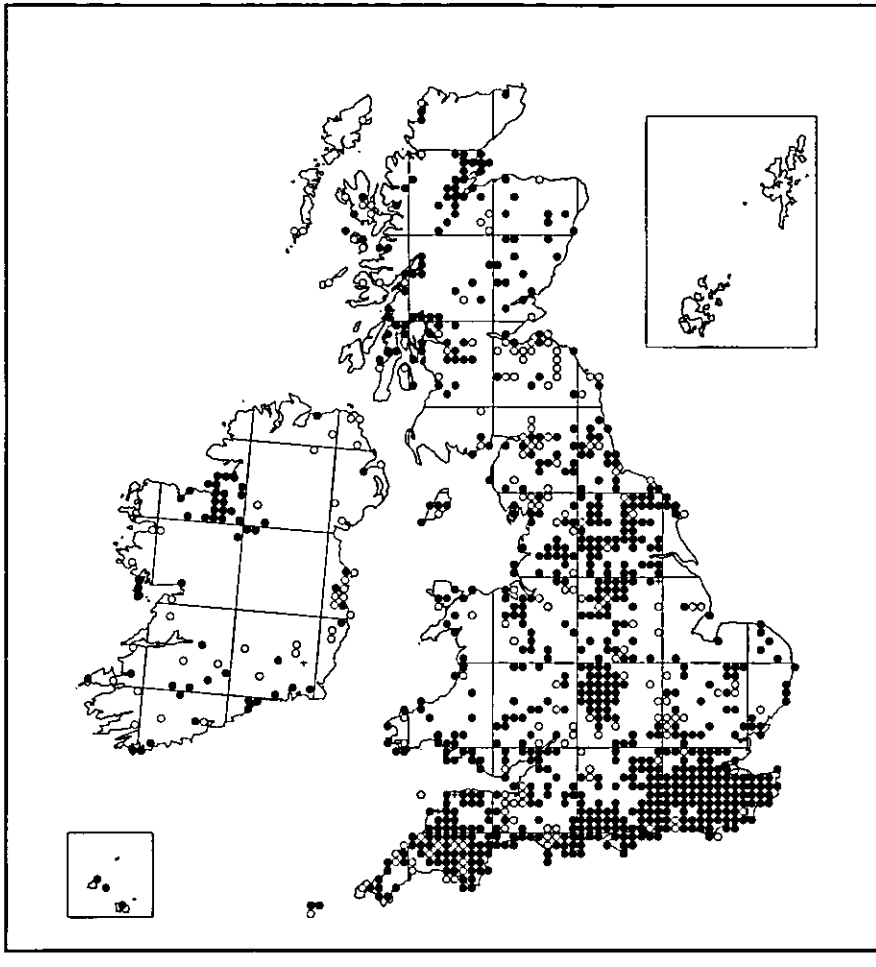
In common with all species of *Dolichovespula*, *D. sylvestris* has a relatively short life-cycle with typical flight periods as follows: spring queens from early May to mid-June; workers from the end of May/beginning of June to the end of September; autumn queens end of July to the end of September; and males mid-July to the beginning of September (Edwards 1980).

Nesting biology

Contrary to its common name, the Tree Wasp, nests are not always situated in trees, but tend to require at least partial cover. Many are found at ground level or even in cavities in the ground. Other typical situations are in the eaves, roof spaces and cavity walls of buildings, and small bird nest boxes. The short life-cycle means that the maximum colony size achieved during peak activity is only a few hundred individuals: nests are therefore quite small. Due to the paper being made from mostly well-seasoned wood, nests are grey with some fine white and pale brown transverse bands.

Flowers visited

Typical of most social wasp species, individuals can often be seen in late summer at the flowers of wild parsnip, hogweed, wild carrot and fennel. In addition they also visit so-called 'wasp-flowers' such as figworts, cotoneaster, snowberry, etc. and are important pollinators of common figwort (Edwards 1980; Proctor et al. 1996 and references therein).



Parasites

The social parasite *Dolichovespula omissa* attacks *D. sylvestris* in Continental Europe (Weyrauch 1937), but has not yet been recorded in Britain. Other parasites are the roundworm, *Pheromermis pachysoma* in Britain (Welch 1958) and in Germany, the ichneumonid *Sphecophaga vesparum* (Schummel 1829).

Map compiled by: T Ings and S P M Roberts.
Authors of profile: T Ings and R Edwards.

Map 188 *Vespula germanica* (Fabricius, 1793)

[Vespidae: Vespinae]

This and the next species are our most common social wasps, having a short oculomalar space. Due to their scavenging habits and choice of nesting sites, they are frequently attracted to homes, gardens and picnic areas, where they may become serious pests. Identification keys and biology are given in Spradbery (1973), Edwards (1980), Else (1994) and Archer (1996).

Distribution

Widespread in England, Wales, Scotland (recently also including Shetland) and Ireland. Also found on the Isles of Scilly and the Channel Islands. Overseas, it occurs from about 65°N to north Africa and the Canaries, and eastwards to Sakhalin Island, Korea and China; it is not found in Japan (cf. *V. vulgaris*). Also found in Canada and the United States south to California. The species has become widely established in the southern hemisphere (Archer 1998; Edwards 1976).

Status (in Britain only)

This species is not regarded as being scarce or threatened. However, in common with the next species, there has been a serious decline in numbers since the late 1970s (Archer 2001).

Habitat

Found in many types of temperate habitats.

Flight period

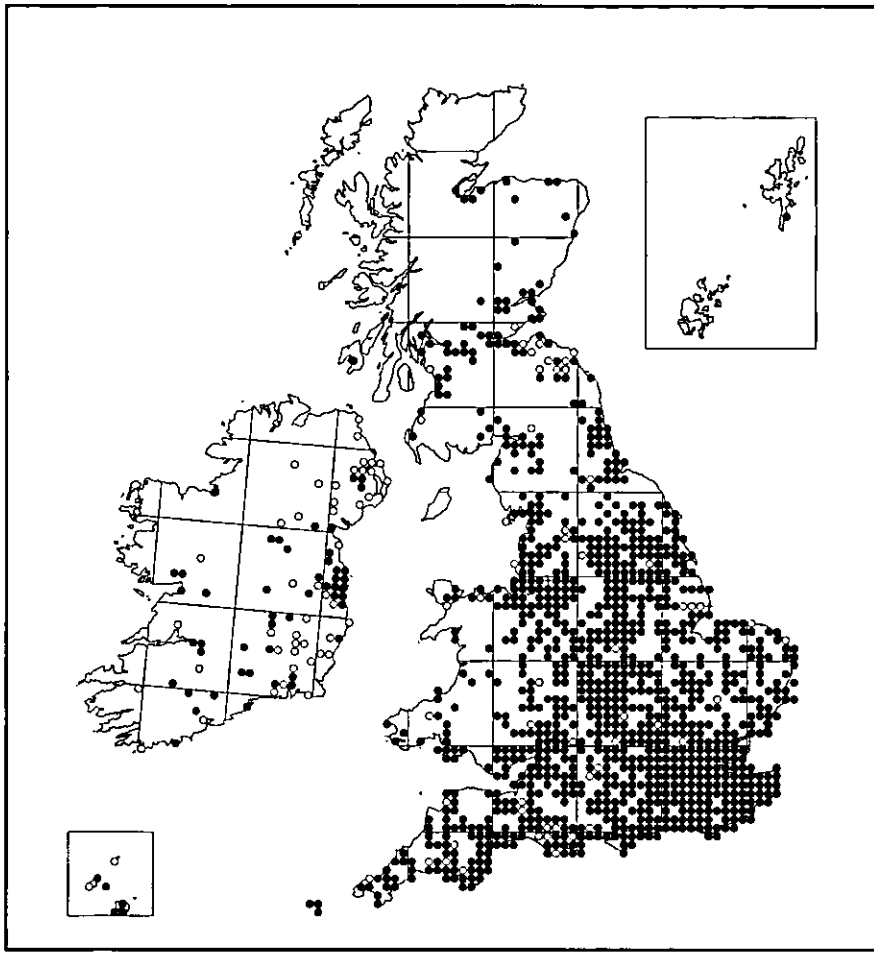
This species and the next have a much longer life-cycle than species of *Dolichovespula*. Overwintered queens start searching for nest sites in mid-March. Workers are present from early May to mid-November, and new 'Autumn' queens leave the nest in September and October. Males are on the wing from mid-August to mid-November (Edwards 1980). A few colonies overwinter, persisting to early spring.

Prey collected

In common with all other social wasps, the workers catch various insects and spiders which are malaxated (chewed up) and fed to the larvae.

Nesting biology

Nest sites are mostly underground with entrance tunnels some 3-20 cm in length. Open sites are preferred, often in heathland or grassland. Aerial sites are used less commonly than *V. vulgaris*. The long life-cycle allows nests to grow to a larger size than those of *Dolichovespula* species: in the soil, nests may reach 25 cm in diameter. Nest paper is grey, due to workers collecting well-weathered wood fibres (cf. *V. vulgaris*, p. 50).



Flowers visited

In spring, queens visit cotoneaster and other early flowering shrubs for nectar. Males and the last workers are often found taking nectar from ivy flowers and the last remaining umbellifer flowers in October and November.

Parasites

The roundworm *Pheromermis pachysoma*, the conopid fly *Leopoldius coronatus* and the ichneumonid wasp *Sphecophaga vesparum* are the only parasites of *V. germanica* known in Britain (Edwards 1980; Smith 1969).

Map compiled by: T Ings and S P M Roberts.
Author of profile: R Edwards.

Map 189 *Vespula vulgaris* (Linnaeus, 1758)

[Vespidae: Vespinae]

Our second very common social wasp with a short oculo-malar space (see *V. germanica*) which is also a frequent pest. For keys and biology, see *V. germanica* profile.

Distribution

Similar to *V. germanica* in England, but more widely distributed in Wales, Scotland and Ireland. Recently recorded from Orkney and Shetland.

Common in Europe and Palaearctic Asia as far north as the Arctic Circle, and east to Japan. In North America, it is found from about 69°N in Canada, south to New Mexico and northern Georgia. It was introduced into south-eastern Australia and New Zealand, where it has become an important pest. This wasp also occurs in Hawaii (Maui island, above 1200 m) (Archer 1998; Edwards 1980).

Status (in Britain only)

This species is not regarded as being scarce or threatened. As with *V. germanica*, this species has also declined (Archer 2001), but not so markedly until the late 1990s.

Habitat

Found in many types of temperate habitats.

Flight period

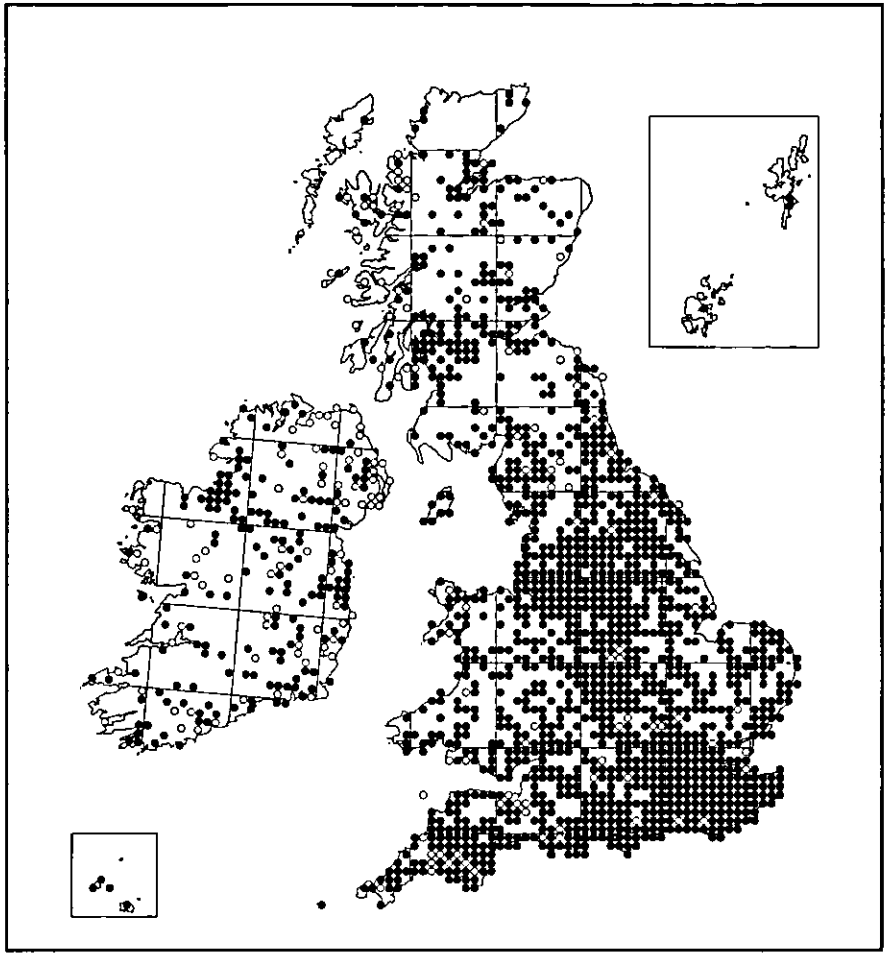
Similar to *V. germanica*, although workers are usually about a month later in making their appearance (Edwards 1980). Some colonies overwinter, dying out in early spring.

Prey collected

In common with all other social wasps, the workers catch various insects and spiders which are malaxated and fed to the larvae.

Nesting biology

Nest sites are mostly underground with entrance tunnels often much longer than those of *V. germanica*, sometimes reaching 45 cm in length. Much more common than *V. germanica* in roof spaces, where the nests can be up to 1.2 m across. The nest envelope is variously coloured yellowish to brown due to the workers collecting both rotted and fairly sound wood fibres (cf. *V. germanica*). Average sized mature colonies of *V. vulgaris* have about 7500 small cells and 2300 large cells. They rear about 10000 workers, 1000 queens and 1000 males. By comparison, *V. germanica* colonies are smaller, with about 6500 small cells



and 1500 large cells, from which are reared about 8000 workers, 1300 queens and 3200 males (M Archer, pers. comm.).

Flowers visited
Similar to *V. germanica.*

Parasites
The roundworm *Pheromermis pachysoma*, the fly-like beetle *Metoecus paradoxus*, the conopid fly *Leopoldius coronatus* and the ichneumonid wasp *Sphecophaga vesparum* are recorded as parasites of this species (Edwards 1980; Smith 1969).

Map compiled by: T Ings and S P M Roberts.
Author of profile: R Edwards.

Map 190 *Diodontus insidiosus* Spooner, 1938

[Sphecidae: Pemphredoninae]

Distribution

Heathland districts, largely from Dorset to Essex. There are also a few recent records from Staffordshire (Archer 2000; S. Falk, pers. comm.). Also occurs on the Channel Islands.

Overseas, a poorly known species; scattered widely in northern and central Europe (Lomholdt 1975-76).

Status (in Britain only)

Listed as Rare (RBD3) in both Shirt (1987) and Falk (1991).

Habitat

Open sandy situations, especially heathland and sandpits on Tertiary deposits (Falk 1991).

Flight period

June to September (based on only a few captures).

Prey collected

The prey is not known but is likely to be aphids, as in other species of the genus.

Nesting biology

Nests have been found in bare, sandy ground, both level and sloping, such as banks (Falk 1991). No more is known of the nesting biology.

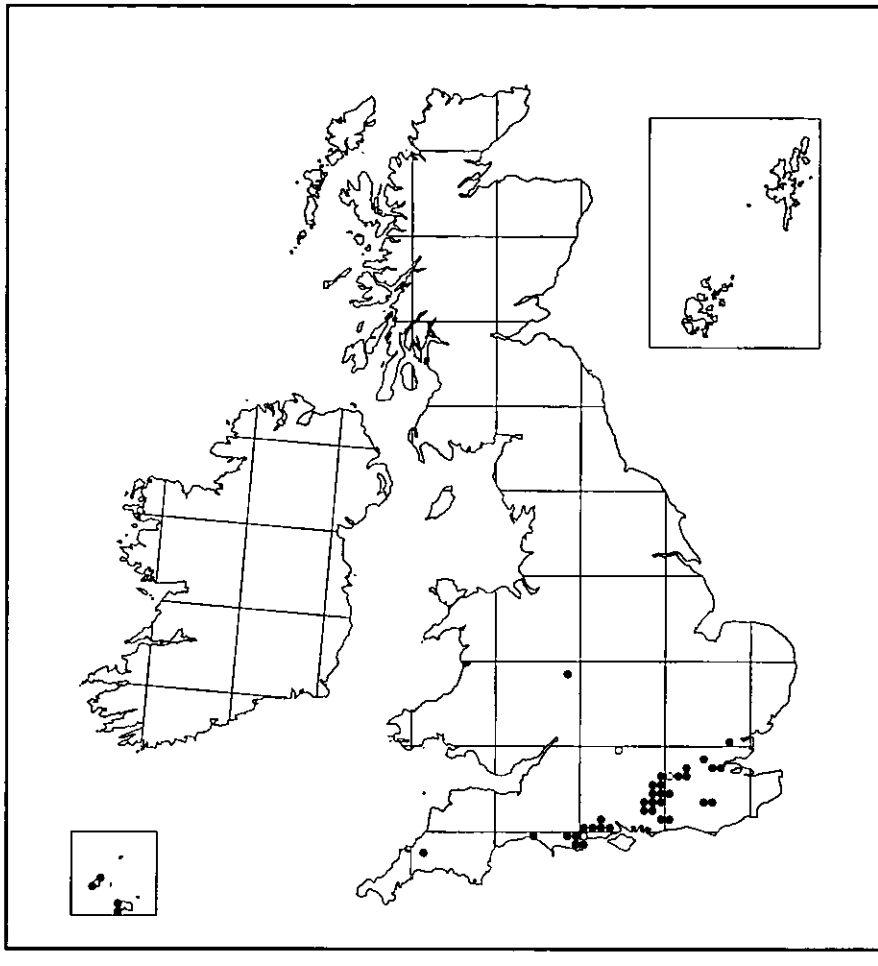
Flowers visited

No information available.

Parasites

No information available.

Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.



Map 191 *Diodontus luperus* Shuckard, 1837

[Sphecidae: Pemphredoninae]

Distribution

Widely distributed in England and eastern Wales.

Rather common in central Europe and also distributed over large parts of Asia, eastwards to Kazakhstan and Mongolia (Lomholdt 1975-76).

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Found in sandy places, including coastal areas and sandpits. Rarely found on calcareous grassland.

Flight period

Early June to early October but most commonly late June to early August.

Prey collected

The prey is invariably aphids, including *Myzus* and *Macrosiphum* (Lomholdt 1975-76).

Nesting biology

Little has been observed of nesting behaviour, but in common with other species of the genus, females nest in sandy soil, digging burrows terminating in one or more cells. A single cell may contain 22 prey (Lomholdt 1975-76).

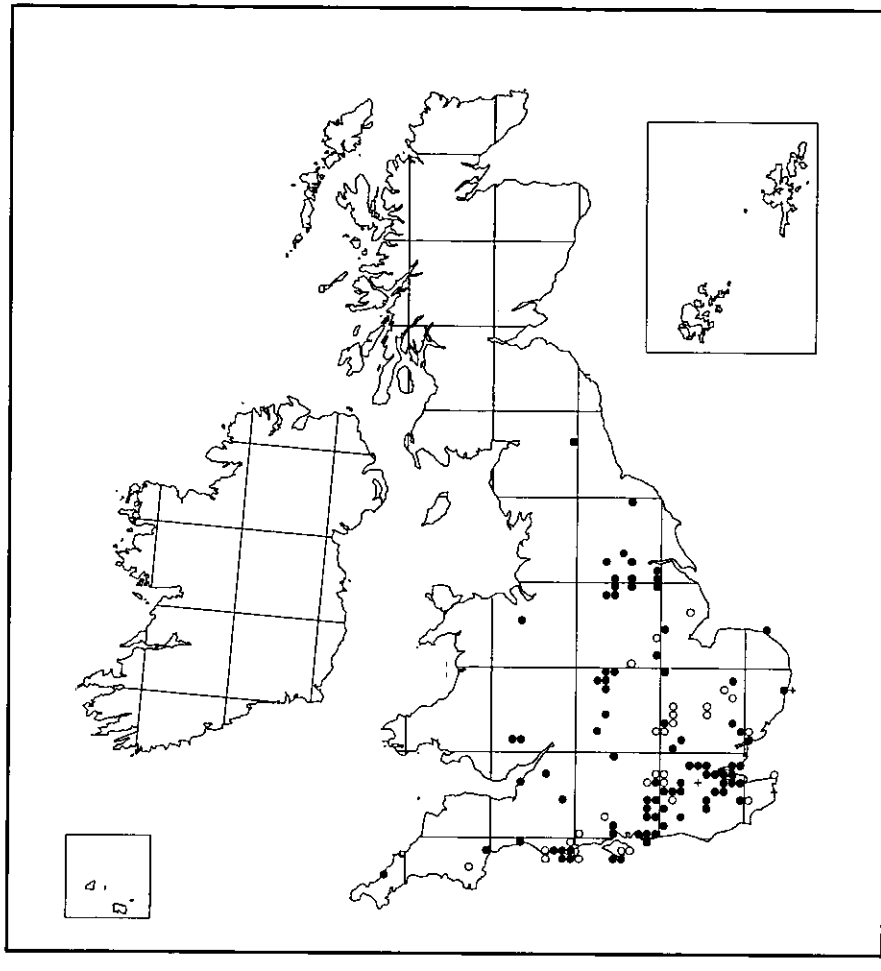
Flowers visited

Only wild parsnip, wild carrot and yarrow have been recorded for this wasp.

Parasites

No information available.

Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.



Map 192 *Diodontus minutus* (Fabricius, 1793)

[Sphecidae: Pemphredoninae]

The most common British *Diodontus*.

Distribution

Occurs from Cornwall to Kent and north through Wales to Yorkshire and the Isle of Man. Also occurs on the Channel Islands.

Common in central and southern Europe, and eastwards to Mongolia. Less common in the north (Lomholdt 1975-76).

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Found in sandy areas, both on the coast and inland.

Flight period

Late May to mid September, particularly June to July, and exceptionally found in flight as late as early October.

Prey collected

The prey are winged aphids (Lomholdt 1975-76).

Nesting biology

The nests are excavated in sandy banks and slopes, with a main burrow about 10 cm long ending in a cell. Along this burrow, subsequent cells are constructed in side branches, which may themselves be branched. Altogether, up to 10-15 cells may be excavated, and each is provisioned with about 30 prey items (Lomholdt 1975-76).

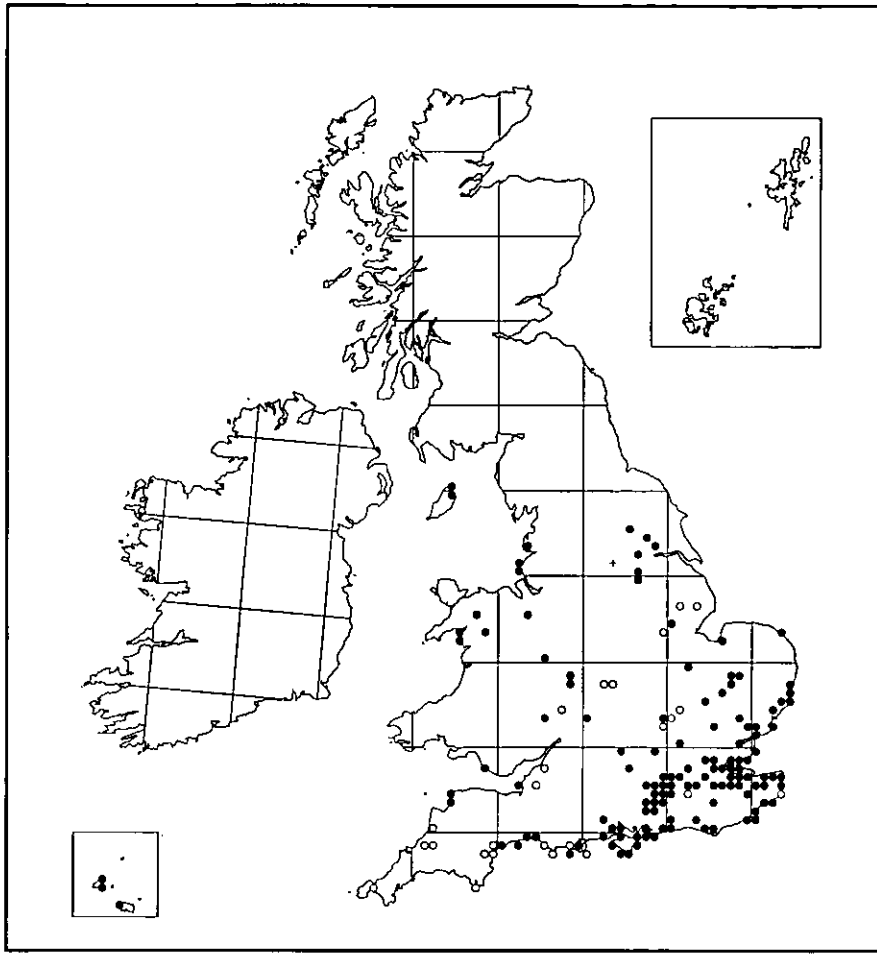
Flowers visited

No information available

Parasites

None recorded from Britain, but in continental Europe, the wasps *Chrysis leachii* (Chrysididae) and *Myrmosa atra* (Mutillidae) have been recorded as parasitoids by Lomholdt (1975-76).

Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.



Map 193 *Diodontus tristis* (Vander Linden, 1829)

[Sphecidae: Pemphredoninae]

Distribution

Widespread in England, north to north-east Yorkshire; sporadic in Wales and very restricted in Scotland, from where there is only a single record. The species is absent from Ireland, but present on Guernsey and Sark in the Channel Islands.

Common throughout Europe, and also found in Asia: Kazakhstan and Mongolia (Lomholdt 1975-76).

Status (in Britain only)

Not regarded as threatened, although Richards (1980) considered it not very common.

Habitat

Occurs in sandy places, including heathland, sand/gravel pits and hedge-banks.

Flight period

Late May to mid October, but particularly July and August. There may be more than one generation per year.

Prey collected

Wingless aphids, such as *Hyalopterus pruni* (Lomholdt 1975-76). The prey is not stung but malaxated (the body is chewed to release fluids which are then imbibed) in the thoracic region.

Nesting biology

The nest is constructed in dry, sandy soil, often in sloping or vertical faces. The burrow may be multi-branched and have more than 20 cells. Each cell contains 20-40 prey and when the larva has consumed these, it spins a firm cocoon which is covered outside with attached sand grains (Lomholdt 1975-76).

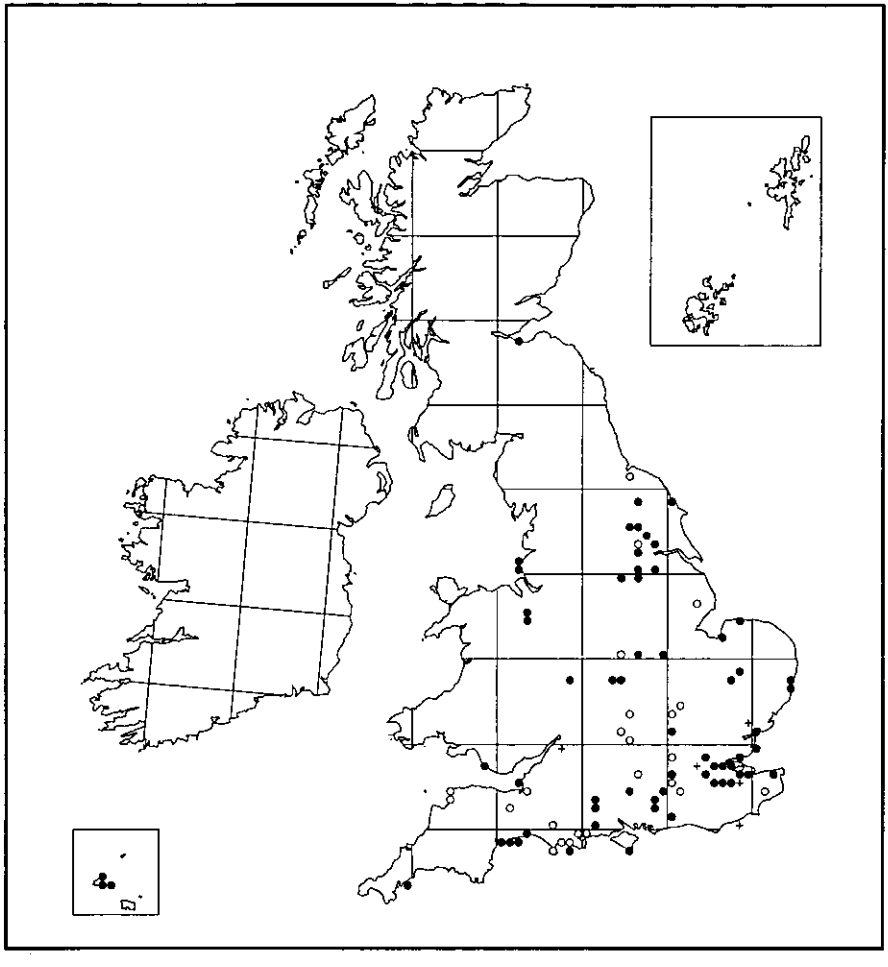
Flowers visited

Visits to flowers are not known for this species, but it may visit honeydew.

Parasites

The mutillid wasp *Myrmosa atra* is recorded as a parasitoid (Lomholdt 1975-76). (See also Edwards 1998.)

Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.



Map 194 *Passaloecus clypealis* Faester, 1947

[Sphecidae: Pemphredoninae]

Passaloecus species are small to very small, elongate, black wasps which nest particularly in beetle borings in posts and other cavities, and prey on aphids. The biology of this species is described by Merisuo (1973), and keys to the European species groups of the genus *Passaloecus* are in Merisuo (1974).

Distribution

Entirely restricted to south-eastern England, with most modern records from East Norfolk, the Thames corridor and Dungeness.

Abroad, this species is widely distributed throughout central and northern Europe, but found only rarely. Also occurs in western Russia, eastwards to Uzbekistan (Lomholdt 1975-76).

Status (in Britain only)

Listed in Shirt (1987) as Vulnerable (RDB2), and in Falk (1991) as Rare (pRDB3).

Habitat

Found around reed beds in brackish and fresh water.

Flight period

June to August.

Prey collected

The prey is unknown but may be aphids, in common with other species of its genus.

Nesting biology

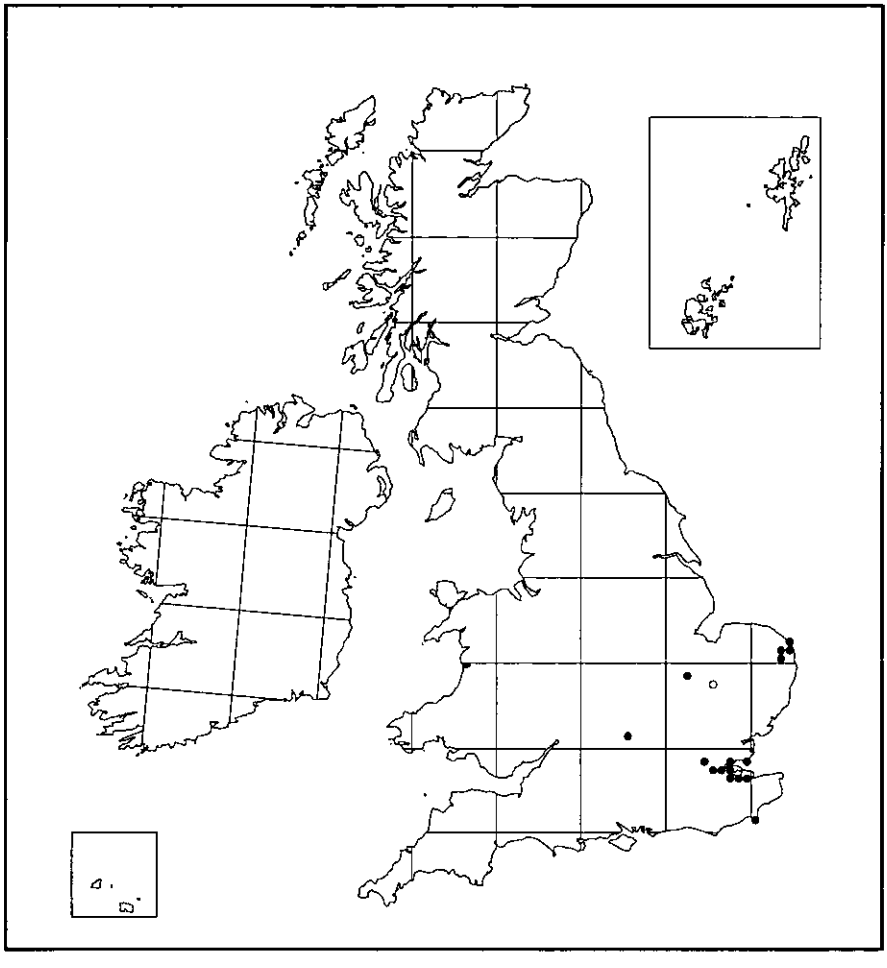
The species has been reared by G H L Dicker from *Lipara lucens* (Diptera, Chloropidae) galls in common reed and also from the cut, hollow stems of the reed itself (Dicker 1978). Abroad, honeysuckle stems are also used as nesting sites (Lomholdt 1975-76). Nest construction has not been observed, but as in all other *Passaloecus*, the cell partitions and nest closure are probably made from a mixture of resin and small pebbles.

Flowers visited

Not known to visit flowers; adults of the wasp are seldom encountered in the field.

Parasites

Abroad, *Trichrysis cyanea* is recorded as a parasitoid (Lomholdt 1975-76).



Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.

Map 195 *Passaloecus corniger* Shuckard, 1837

[Sphecidae: Pemphredoninae]

Distribution

Widely distributed through England and Wales.

Similarly in Europe and Asia, east to Japan (Lomholdt 1975-76).

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Rather a generalist: habitat includes suburban gardens, where there are wooden posts or old timber containing nests of other *Passaloecus* species. Also found in reed beds.

Flight period

Late May to late September; particularly June to July.

Prey collected

The prey collected are aphids (such as *Aphis* and *Anuraphis*), sometimes stolen from the nests of other species of *Passaloecus* (Corbet & Backhouse 1975; Yeo & Corbet 1995) and from *Psenulus pallipes* according to Chevalier, cited by Richards (1980). The females may even rob from conspecific nests (Lomholdt 1975-76).

Nesting biology

Similar in nesting biology to *P. eremita* (see p. 64 and Lomholdt (1975-76)). Nests have been found in wooden posts, old timber and occasionally in *Lipara lucens* (Diptera: Chloropidae) galls on common reed. Both sexes and an occupied nest are illustrated by Blösch (2000).

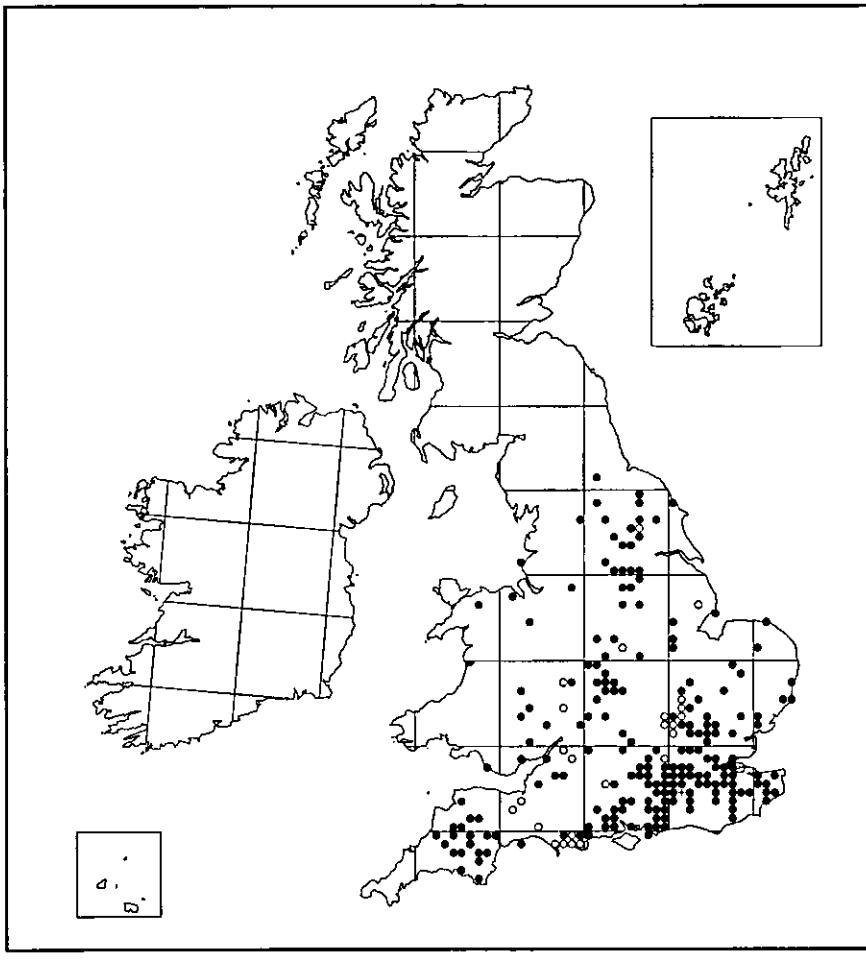
Flowers visited

No information available.

Parasites

Hymenopterous parasitoids have been recorded in continental Europe: *Eurytoma nodularis* (Chalcidoidea) and *Trichrysis cyanea* (Chrysididae) (Lomholdt 1975-76).

Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.



Map 196 *Passaloecus eremita* Kohl, 1893

[Sphecidae: Pemphredoninae]

First found in Britain in 1978 by M Edwards. An important paper on this species is that by Else (1997). See also Dicker (1982). A key to European species groups of the genus *Passaloecus* is given by Merisuo (1974).

Distribution

Southern England; from Dorset to Kent and, more locally, northwards to the east Midlands and Norfolk.

Widely distributed in Europe, but rare (Lomholdt 1975-76).

Status (in Britain only)

Listed by Shirt (1987) as Rare (RDB3), but revised by Falk (1991) to "not thought to be native".

Habitat

This species is found in various habitats but needs the presence of pine trees as a source of resin and aphid prey.

Flight period

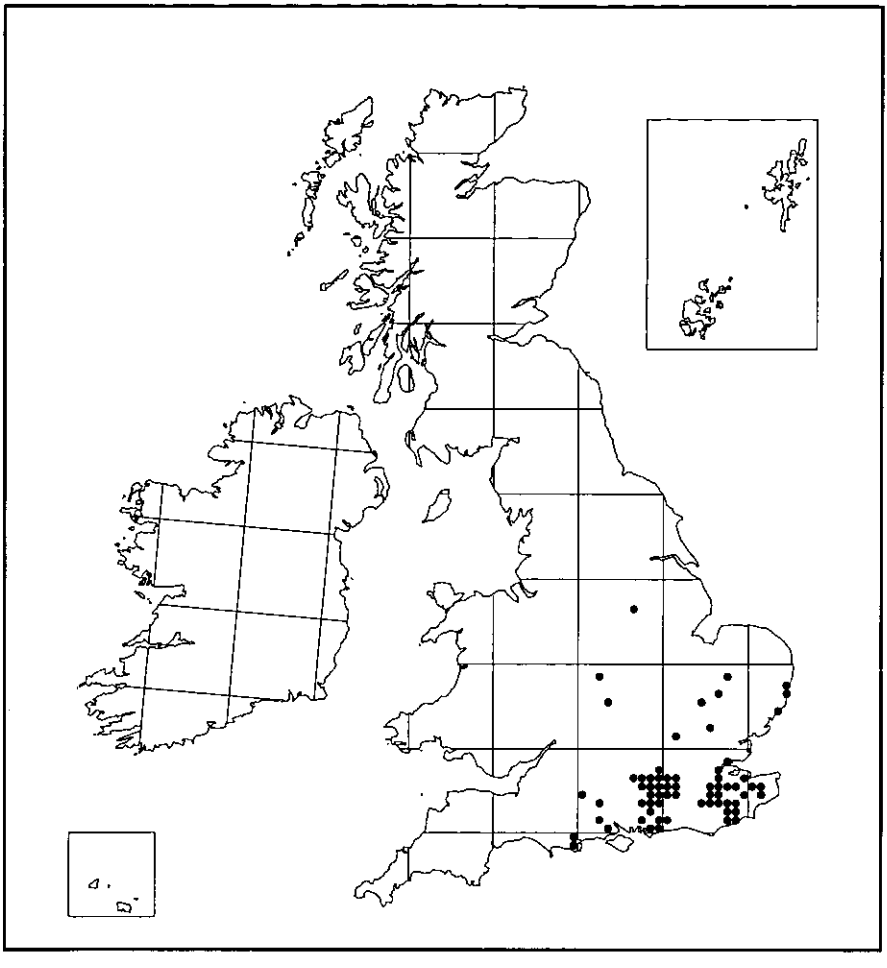
Late May to late September, but particularly June to July.

Prey collected

The prey is Homoptera of the family Lachnidae, including *Cinara pinea*, a species living on pine (Lomholdt 1975-76).

Nesting biology

In Britain, *P. eremita* nests in pine bark, in burrows in the bark and dead sapwood of pine and deciduous trees, and in abandoned beetle borings in posts, the nest entrances frequently being surrounded by a ring of small drops of white resin (a feature which is possibly unique to this species (G R Else, pers. comm.)). The nests are also sealed with resin, which hardens to a characteristic white or off-white plug (Else 1997). In Denmark, the species has been found nesting in the hollow stems of common reed used in thatching roofs, sometimes in very large numbers. There are usually 4 or 5 cells per reed stem, terminating in a vestibular cell. The last constructed cells usually contain males, which are the first to emerge. Burrows in bark or old timbers frequently have one or two cells only (M Edwards, pers. comm.). A previously occupied stem or beetle boring may be re-used (Lomholdt 1975-76).



Flowers visited
Flower visits are not known for this species.

Parasites
Else (1997) reported the ichneumonid *Poemenia notata* as a parasitoid, reared from a nest of *Passaloecus eremita*. Abroad, the chrysidid wasps *Omalus aeneus* and *Trichrysis cyanea* are recorded as cleptoparasites or parasitoids, as are the ichneumonid *Perithous scurra* (= *mediator*) and the dermestid beetle *Megatoma undata* (Lomholdt 1975-76).

Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.

Map 197 *Passaloecus gracilis* (Curtis, 1934)

[Sphecidae: Pemphredoninae]

An Holarctic species, although probably introduced to North America. It is widely distributed in Europe, but scarcer in the north (Lomholdt 1975-76). A key to European species groups of the genus *Passaloecus* is given by Merisuo (1974).

Distribution

Cornwall to Kent, and north to southern Cumberland and Yorkshire. Also recorded from Jersey.

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Occurs in a variety of habitats, including suburban gardens.

Flight period

Late May to late September, but particularly June to July.

Prey collected

Lachnidae and Aphididae (Homoptera) (Lomholdt 1975-76).

Nesting biology

The females nest in dry, hollow plant stems and abandoned beetle burrows in old timber; also in the galls of *Andricus kollari* on oak (Lomholdt 1975-76) but little more is known of the nesting biology.

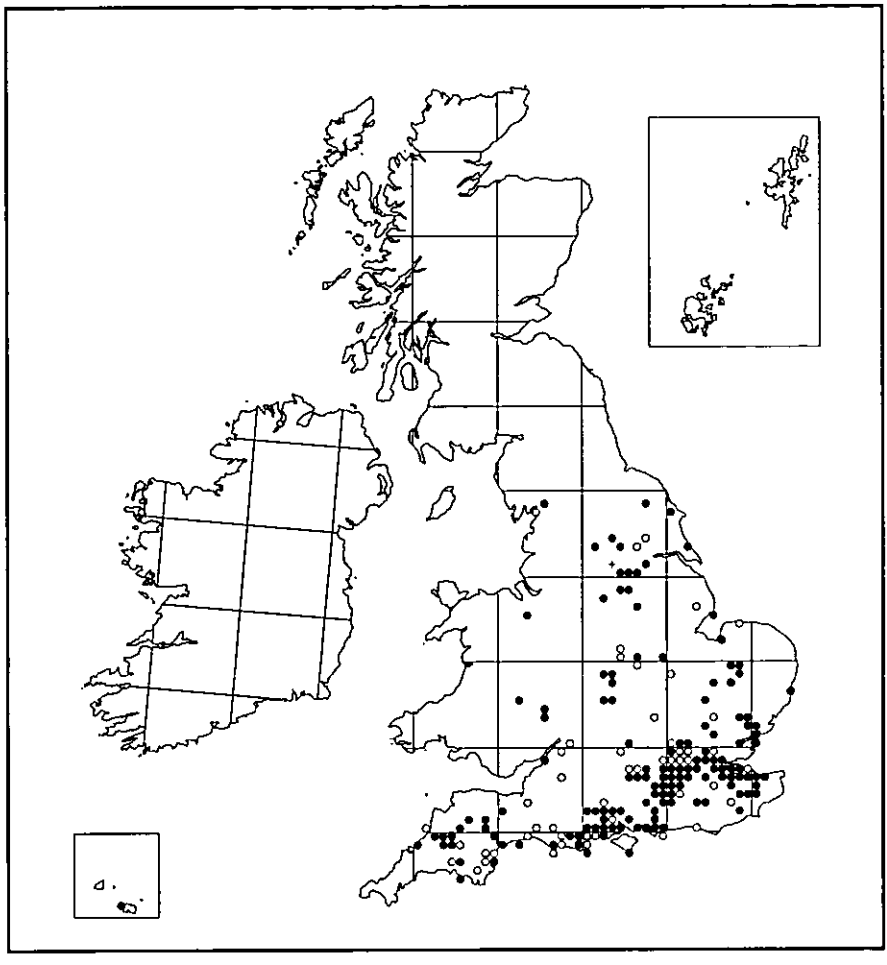
Flowers visited

None known for this species, although it may take honeydew.

Parasites

On mainland Europe, the chrysidid wasps *Omalus aeneus* and *Trichrysis cyanea* are recorded as cleptoparasites or parasitoids. *Eurytoma nodularis* (Hymenoptera, Chalcidoidea) is a parasitoid (Lomholdt 1975-76).

Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.



Map 198 *Passaloecus insignis* (Vander Linden, 1829)

[Sphecidae: Pemphredoninae]

Distribution

Devon to Kent, Wales and north to Mid-west Yorkshire and Morecombe Bay.

A widely distributed central and southern European species, also found eastwards through Asia to Japan (Lomholdt 1975-76). The species may be Holarctic, as Vincent (in Bohart & Menke 1976), synonymised the nearctic *P. ithacae* Krombein, 1938, with *P. insignis*. Thus enlarged, *P. insignis* is also found in Canada (Alberta) and the north-east United States to Virginia. (It is also possible that the taxon '*P. ithacae*' includes both *P. insignis* and *P. monilicornis*).

Status (in Britain only)

This species is not regarded as being scarce or threatened. Richards (1980) commented that it is not common.

Habitat

Found in a variety of open, ruderal habitats.

Flight period

Late May to mid September, but most frequently June to July.

Prey collected

The prey is Homoptera of the families Aphididae and Lachnidae (Lomholdt 1975-76).

Nesting biology

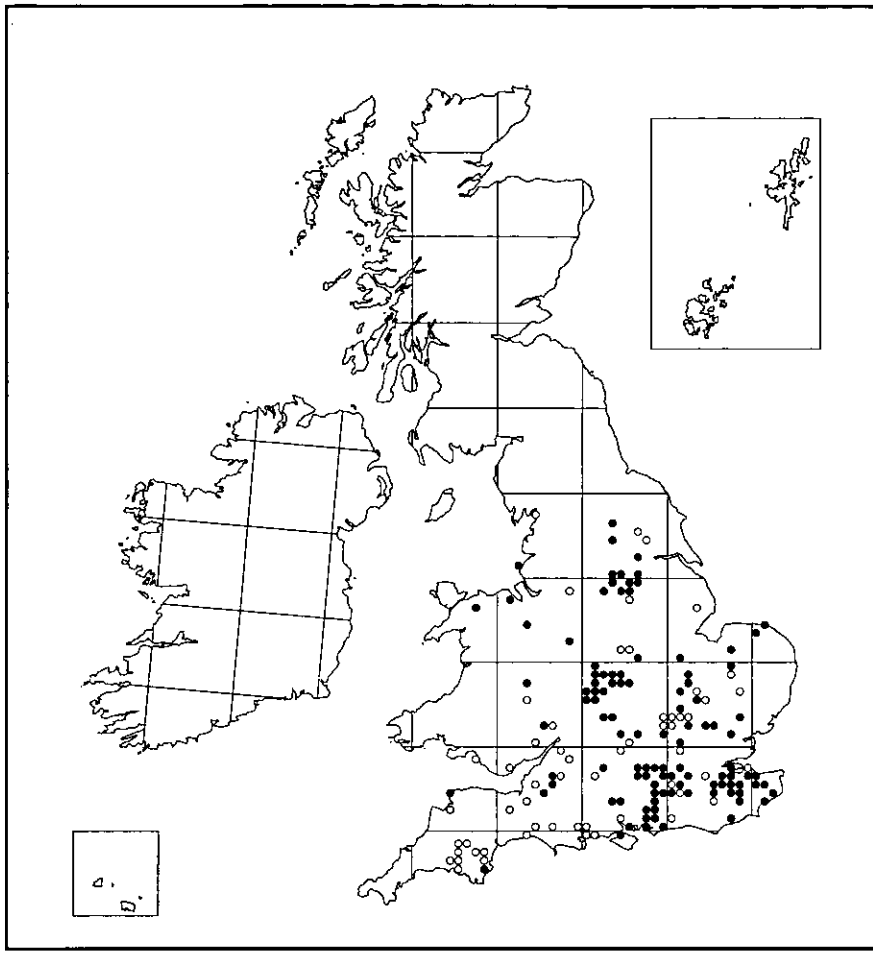
The nests are constructed in abandoned beetle burrows in decayed wood or in stems with the pith excavated. *P. insignis* is reported to supersede other species of Sphecidae in nest burrows and, possibly, compete for such nests (Lomholdt 1975-76). In a stem nest there may be as many as 15-18 cells. The larva has been described by Janvier (1961), and a female and an occupied nest are illustrated by Blösch (2000). Krombein (1967) described in detail the nest structure of '*P. ithacae*' in wooden trap nests.

Flowers visited

No information available.

Parasites

A captured female *P. insignis* was found to be bearing several specimens of an unidentified (?)acarid mite (G W Allen, pers. obs.). It is assumed that these were



reared in the nest. In North America, Fye (cited by Krombein 1967) reported the ichneumonid wasps *Poemenia albipes* and *P.* sp. near *americana*, and the chrysidid wasps *Omalus aeneus* and *O.* sp. near *iridescens*, as parasitoids/ cleptoparasites of '*P. ithacae*'.

Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.

Map 199 *Passaloecus monilicornis* Dahlbom, 1842

[Sphecidae: Pemphredoninae]

A species closely related to *Passaloecus insignis*, from which it is separable only with difficulty.

Distribution

Sparsely distributed from South Wales to Scotland, and in Ireland.

A northern species in Europe, but not recorded from the Alps or Pyrenees. It is distributed eastwards through Asia to Mongolia, China, Korea, Kamchatka and Japan (Lomholdt 1975-76).

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Found in the vicinity of dead wood.

Flight period

June to July (based on a few specimens in collections).

Prey collected

The prey is Aphididae (Homoptera).

Nesting biology

The females nest in abandoned beetle burrows in dead wood, which are cleaned of wood dust and frass. Lomholdt (1975-76) stated the species is able to gnaw its own burrow in not too hard wood, and abandoned beetle burrows are often elaborated in the same way. The burrows are often branched and the cells are placed sequentially in rows. Cells may number over 20 in a nest.

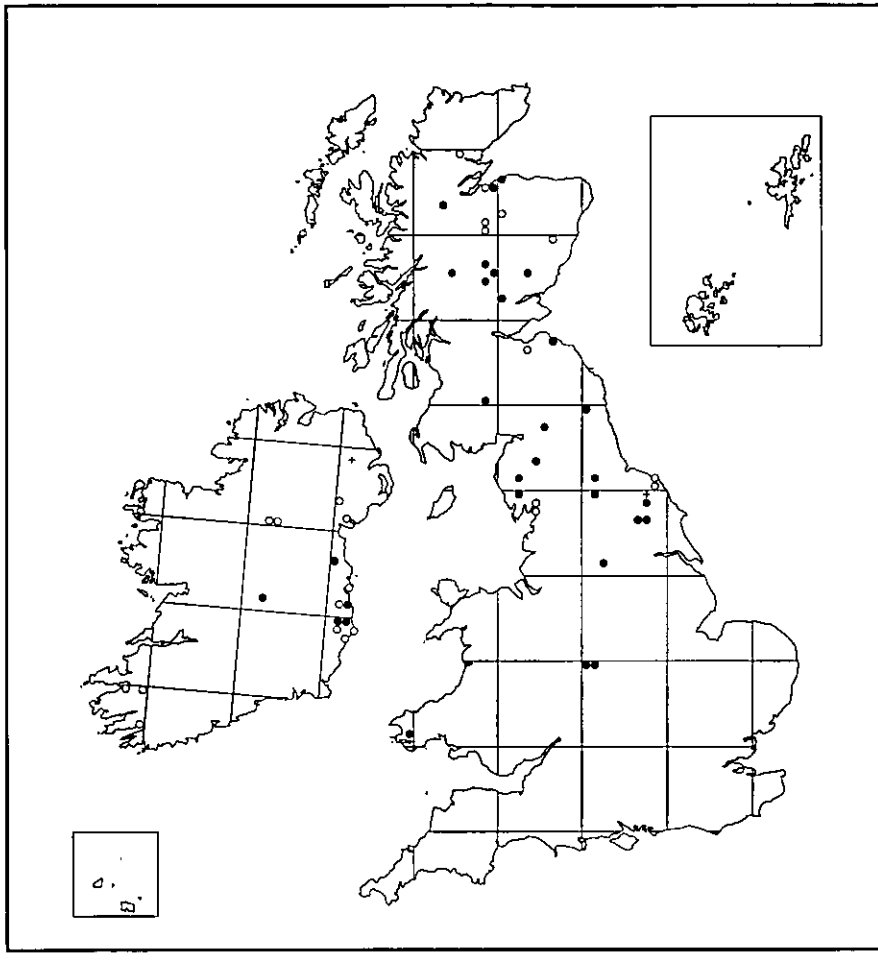
Flowers visited

No information is available on flower visits but honeydew may be visited.

Parasites

No information available.

Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.



Map 200 *Passaloecus singularis* Dahlbom, 1844

[Sphecidae: Pemphredoninae]

Probably the most common British species of *Passaloecus*, at least in the south.

Distribution

Mainly an English species, with a few records from east Wales.

A common species throughout Europe, and found eastwards through Asia to Japan (Lomholdt 1975-76).

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

A generalist, found in many habitats including gardens.

Flight period

May be reared from stems as early as April; has been captured on the wing from mid-May to early September, and particularly during June. Richards (1980) commented that the species is less common from July onwards.

Prey collected

The prey are wingless aphids (Homoptera, Aphididae) (Lomholdt 1975-76).

Nesting biology

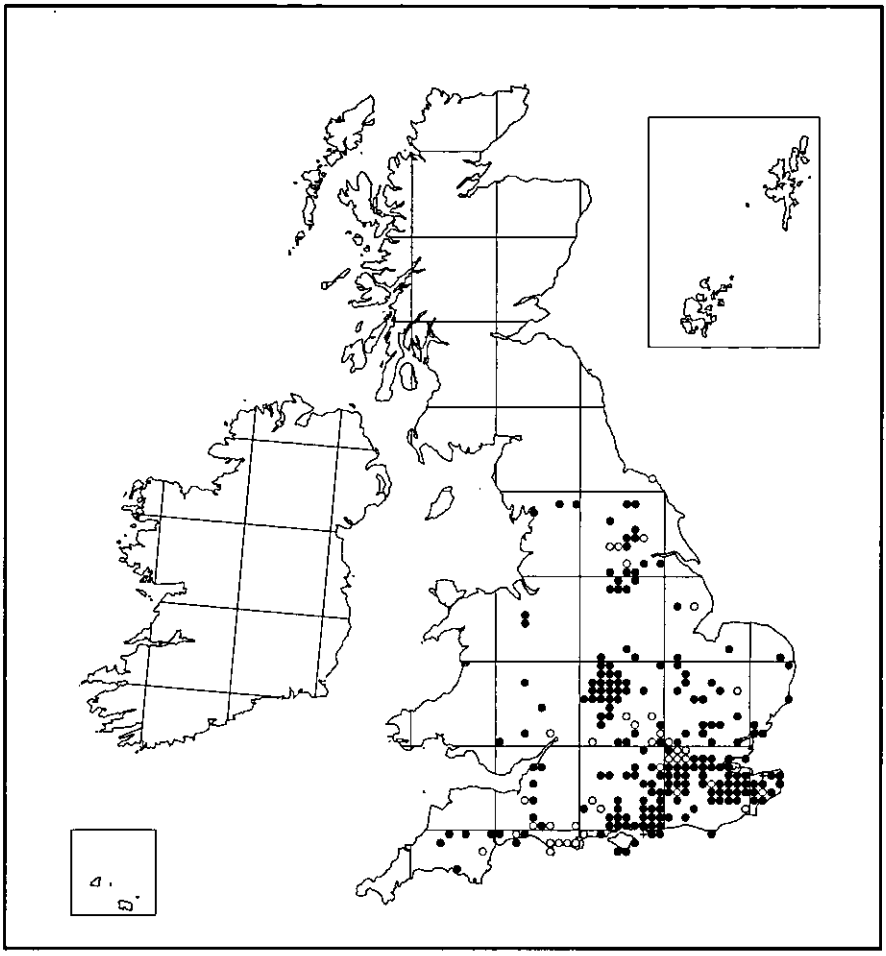
Nests are prepared by females in pithy stems or abandoned beetle borings in wood, such as fence posts. Also used are old *Lipara lucens* galls on common reed stems. The cells are separated by partitions of resin and a final closure is effected with a mixture of resin and small stones, 0.5 to 1 mm diameter (Lomholdt 1975-76), which is distinctive of the species.

Flowers visited

No information is available on flower visits but the species may preferentially visit honeydew.

Parasites

A variety of hymenopterous parasitoids/cleptoparasites have been recorded on the continent, including Ichneumonidae (*Perithous mediator* and *P. divinator*), Eurytomidae (*Eurytoma* sp.) and Chrysididae (*Pseudomalus auratus* and *Trichrysis cyanea*) (Lomholdt 1975-76).



Map compiled by: G W Allen and S P M Roberts.
Author of profile: G W Allen.

Map 201 *Passaloecus turionum* Dahlbom, 1845

[Sphecidae: Pemphredoninae]

A scarce and little known species in Britain, only recently added to the British list (Guichard 2002). It is very similar to the common *P. gracilis* and great care must be taken with determination as the characters are subtle. Ecological differences between the two species have been reported by Westrich & Schmidt (1983), who found that *P. gracilis* was foraging for aphids on herbaceous plants, whilst *P. turionum* was foraging for aphids associated with trees.

Distribution

South-east England, including Surrey, Berkshire, North Hants, West Sussex, East Sussex, West Kent and East Kent.

Probably a boreo-alpine species in Europe; it is common in Finland, for example (Lomholdt 1975-76). The species is adventive in North America, being found from Pennsylvania and New Jersey to Texas along the coast, and inland in Michigan, Indiana and Ohio. It was first collected in the 1940s but not identified until 1961 (Krombein 1961).

Status (in Britain only)

Not listed in Shirt (1987) or by Falk (1991) but its status clearly needs to be assessed.

Habitat

The few known British localities are mainly sandy heaths or mixed woodlands. The species is sparsely distributed in coniferous plantations in Denmark (Lomholdt 1975-76).

Flight period

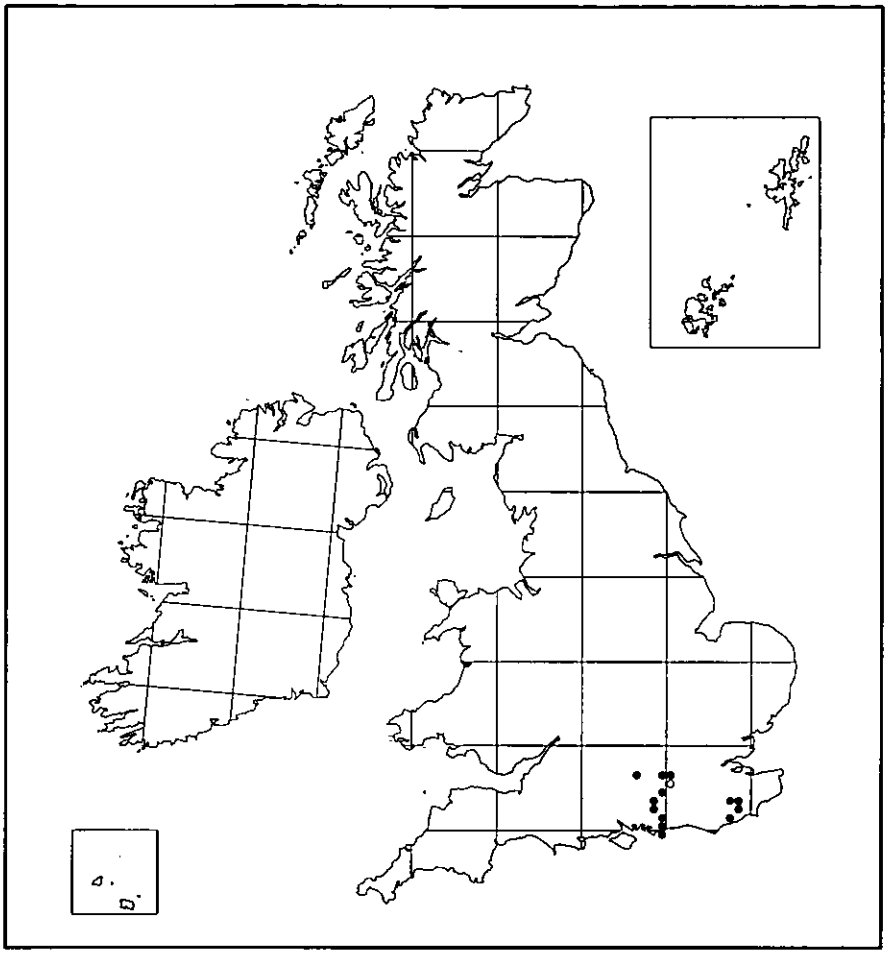
Late May to early September.

Prey collected

Arboreal aphids are reported as prey by Westrich & Schmidt (1983).

Nesting biology

Falk has reared this wasp from beetle burrows in old Scots pine bark from Ambersham Common in West Sussex, and M Edwards collected one entering old beetle burrows in Scots pine bark in Rewell Wood, West Sussex (pers. comm.). Abroad, nests have been found in the galls of the moth *Petrova resinella* (Lepidoptera, Tortricidae) on *Pinus* species, including *P. contorta* and *P. silvestris* (Lomholdt 1975-76). This moth also occurs in Britain and its galls



may harbour *P. turionum*. Nest closures and an adult female are illustrated by Blösch (2000).

Flowers visited

No information available.

Parasites

The chrysidid wasps, *Omalus biaccinctus* (not British) and *O. aeneus* have been found as parasites/parasitoids in Europe (Lomholdt 1975-76).

Map compiled by: G W Allen and S P M Roberts.
Authors of profile: G W Allen and M Edwards.

Map 202 *Colletes daviesanus* Smith, 1846

[Apidae: Colletinae]

Bees of the genus *Colletes*, in common with those of the genus *Hylaeus*, are readily identified by their short, bifid tongues. They look superficially similar to many of the *Andrena* bees. Some species specialise on pollen from a specific plant or closely related group of plants (oligolectic). Identification keys and general information are given in Guichard (1974).

Distribution

Widely distributed throughout England, Wales and the Channel Islands, but scarce in Scotland, where it is known only from scattered coastal sites as far north as Fife. Published records from the Outer and Inner Hebrides (Heslop Harrison 1952) are almost certainly misidentifications of *Colletes floralis*. It is also scarce in Ireland, with records from Wexford and Down. Widely distributed in Europe, occurring from Fennoscandia south to Austria and northern Italy, and east to Iran. Also reported from Mongolia and the Gobi.

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Virtually ubiquitous in lowland Britain and it is the only *Colletes* regularly observed in urban localities, including private gardens.

Flight period

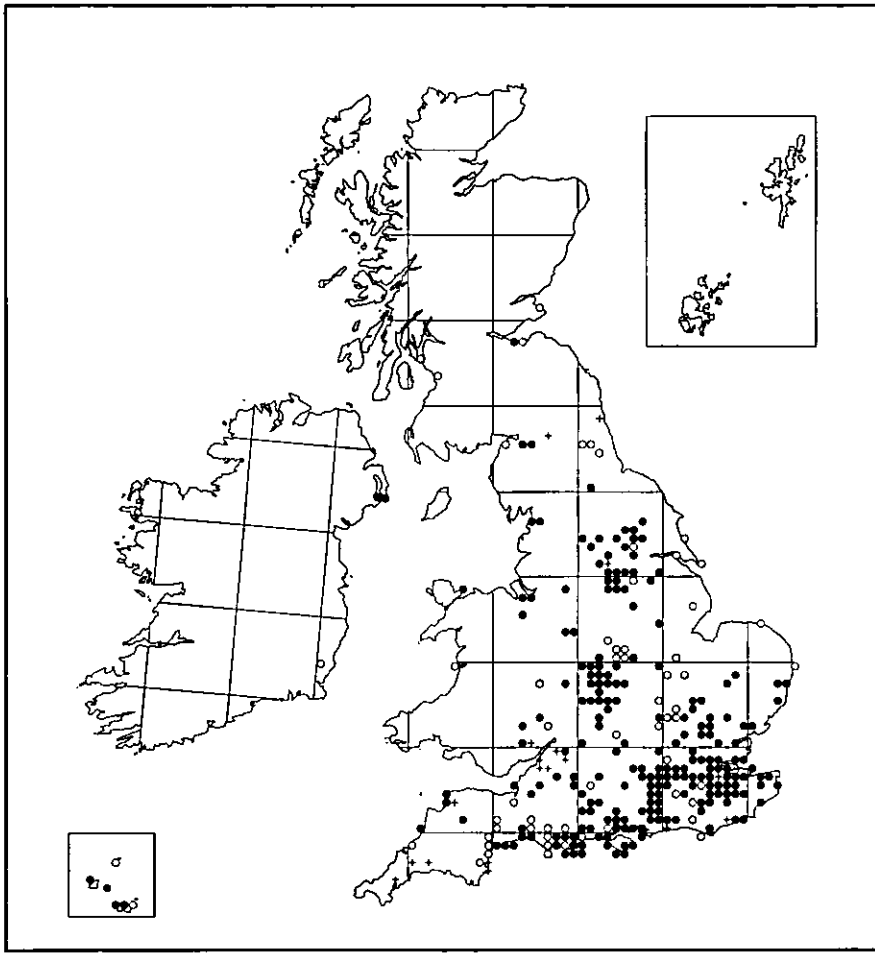
Univoltine; mid June to mid September.

Pollen collected

Surprisingly there are no records for the British Isles but it is almost certainly oligolectic on Asteraceae (Westrich 1989).

Nesting biology

Most commonly nests in dense aggregations in sunlit, vertical surfaces such as coastal sandstone cliffs, sand pits, roadside cuttings, cob walls and in soft mortar joints of brickwork. The bee has gained some notoriety in undermining mortar joints, in extreme examples leading to serious weakening of masonry, with piles of excavated sand collecting at the bases of affected walls. Mader (1999) provides an exhaustive review of the nesting habits of this species in Germany. Individual nest burrows generally terminate either in a single cell or in a series of 4-10 consecutive cells (eg Blair 1920; O'Toole & Raw 1991), the convex base of each fitting into the concave lid of the previous cell. The winter is passed as a diapausing prepupa and perhaps occasionally as a young larva (Friese 1912). The



nesting behaviour of this species has been described in detail by Malyshev (1923).

Flowers visited

Creeping thistle, daisy, dropwort, feverfew, hogweed, ragwort, tansy and yarrow.

Parasites

Epeolus variegatus (Carr 1916; Blair 1920; Richards 1937) (see p. 118). The sarcophagid fly *Miltogramma punctatum* is a well known parasitoid of the bee (eg Blair 1920; O'Toole 1986; G M Spooner and M Edwards pers. comm.). The bee-fly *Bombylius minor* has been reared from *Colletes daviesanus* cells (Blair 1920).

Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.

Map 203 *Colletes fodiens* (Geoffroy *in* Fourcroy, 1785)

[Apidae: Colletinae]

Identification keys and general information are given in Guichard (1974).

Distribution

Widespread in sandy districts in England and Wales, scarcer towards the north. There is only one record in Scotland. The species is absent from Ireland, but does occur in the Channel Islands (Alderney, Guernsey, Jersey and Sark).

Widespread in Europe and Asia: Fennoscandia south to Spain, and east to Siberia.

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Associated with meadows and edge habitats in sandy districts, including coastal dunes.

Flight period

Univoltine; late July to early September.

Pollen collected

Oligolectic on the pollen of flowers in the family Asteraceae. Especially found at ragwort.

Nesting biology

Nothing is known about the nesting biology of this species, except that it nests in the ground.

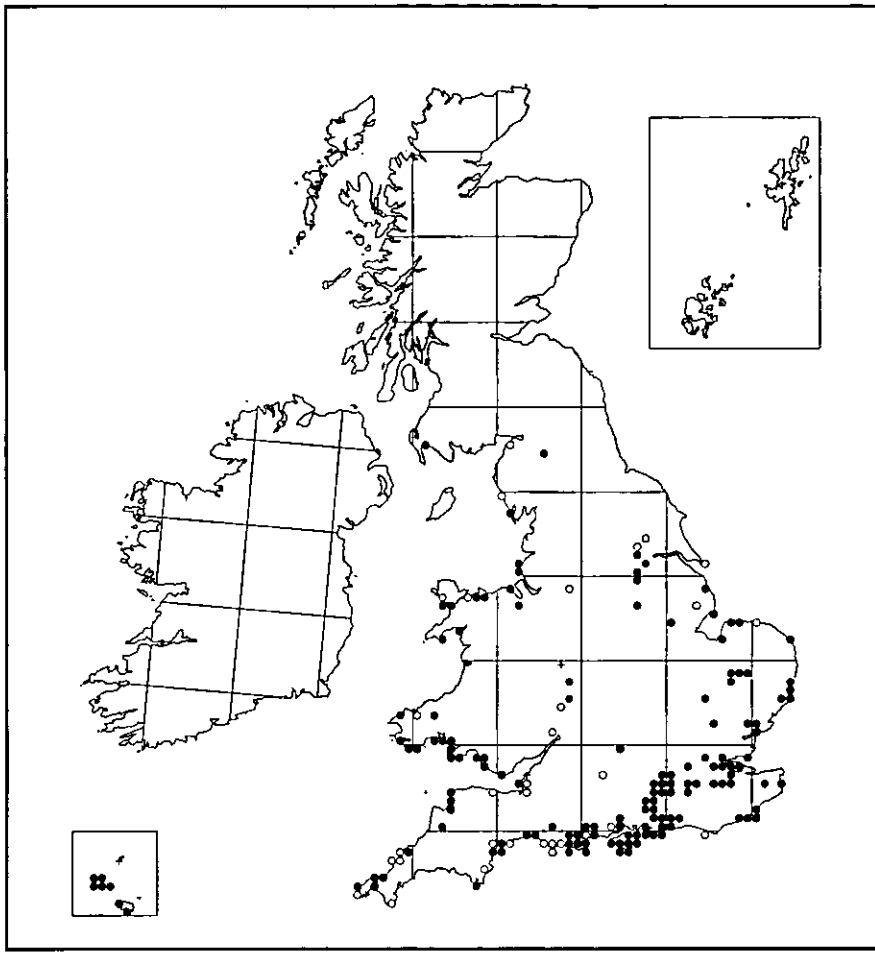
Flowers visited

Bell heather, bog pimpernel, bramble, creeping thistle, English stonecrop, fleabane, hawk's-beard, mayweed, ragwort, sea spurge, sheep's-bit, tansy and yarrow.

Parasites

Epeolus variegatus (see p. 118) is recorded as a cleptoparasite (Perkins 1920; Richards 1937). *Epeolus cruciger* (see p. 116) may also be cleptoparasitic on this species (Richards 1937).

Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.



Map 204 *Colletes similis* Schenck, 1853

[Apidae: Colletinae]

Distribution

Occurs throughout much of southern Britain, from the Isles of Scilly to Kent, and northwards to Lancashire, South-east Yorkshire and the Isle of Man. There are no records from Scotland. Widely distributed in the Channel Islands (except Jersey). In Ireland it is widespread, though mainly coastal, from Louth to Waterford; and in the west, from the Arran Islands. Usually found only in small numbers in most localities, though it is often very common on the sand dune systems of south-east Ireland (pers. obs.).

Widespread in the Palaearctic, ranging from southern Sweden to north Africa (Morocco and Algeria), and eastwards to Siberia, the Middle East and Asia Minor.

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Whereas most British *Colletes* have a distinct preference for light sandy soils, this bee is more catholic in its choice, being found on chalk grassland, heaths, moors, sand pits, open woodland as well as on coastal cliffs and dunes. On the south-east coast of Ireland, the species flies with *Colletes floralis*, the two often visiting the same flowers (pers. obs).

Flight period

Univoltine; mid June to mid September.

Pollen collected

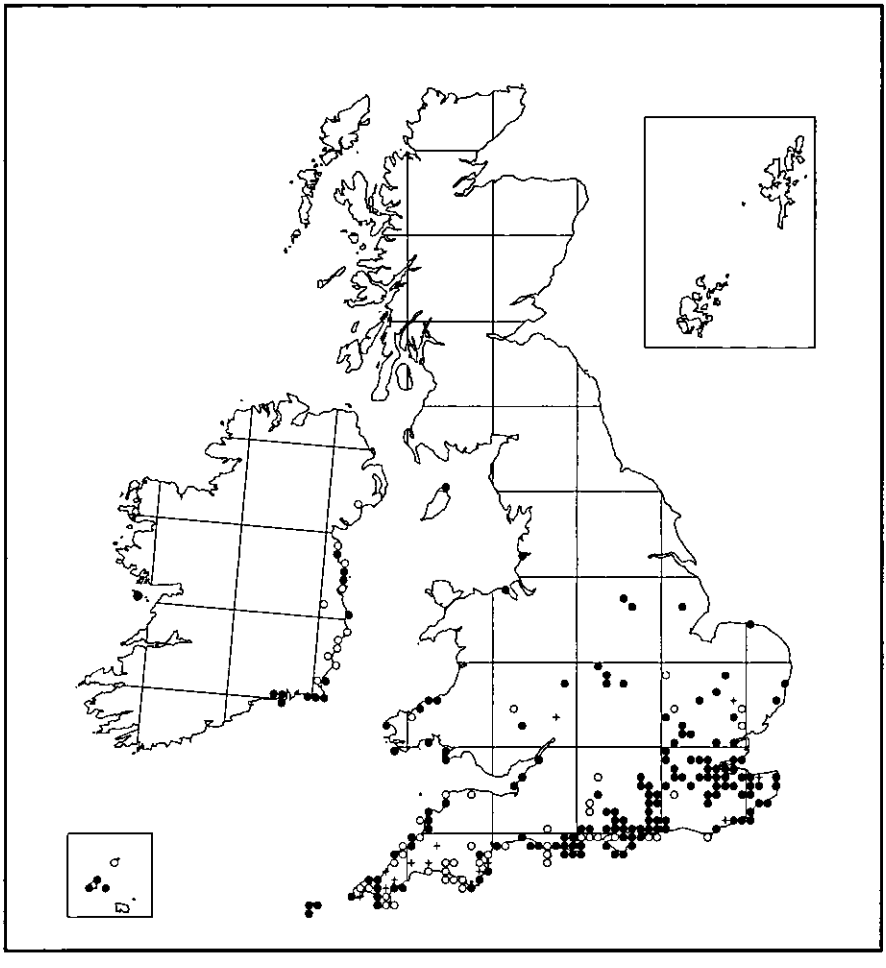
Not known for the British Isles, though females are oligolectic on Asteraceae (Westrich 1989). On the Dorset coast, several females of this bee were apparently collecting pollen from wild carrot blossom (pers. obs.).

Nesting biology

Often occurs in small nesting aggregations consisting of only a few closely scattered burrows, generally in level soil. A nest has been illustrated by Westrich (1989).

Flowers visited

Autumn hawkbit, cat's-ear, creeping thistle, dropwort, fleabane, hogweed, milk thistle, ragwort, sheep's-bit, sow-thistle, spurge, tansy, white bryony, wild angelica, wild carrot, wild mignonette, yarrow.



Parasites

Epeolus variegatus (see p. 118) according to Perkins (1924) and Richards (1937).

Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.

Map 205 *Andrena apicata* Smith, F., 1847

[Apidae: Andreninae]

This species is one of the first bees to appear in the spring, with individuals regularly found in early March in southern England. *A. praecox* frequently flies with this species (see p. 96). As with most of these early species, foraging flights are made almost exclusively to willow catkins.

Distribution

Local in southern Britain, the range extending northwards to Lancashire. There is an old record from Herm, Channel Islands (Luff 1905). In Ireland, known from Carlow, Kilkenny, Wicklow and Dublin (Stelfox 1927).

Widely distributed in the Palaearctic, occurring from Fennoscandia south to Spain and east to Kamchatka and Japan.

Status (in Britain only)

A Notable B species (Falk 1991).

Habitat

Open deciduous woodland and abandoned sand and chalk quarries.

Flight period

Univoltine; early March to late April, rarely May.

Pollen collected

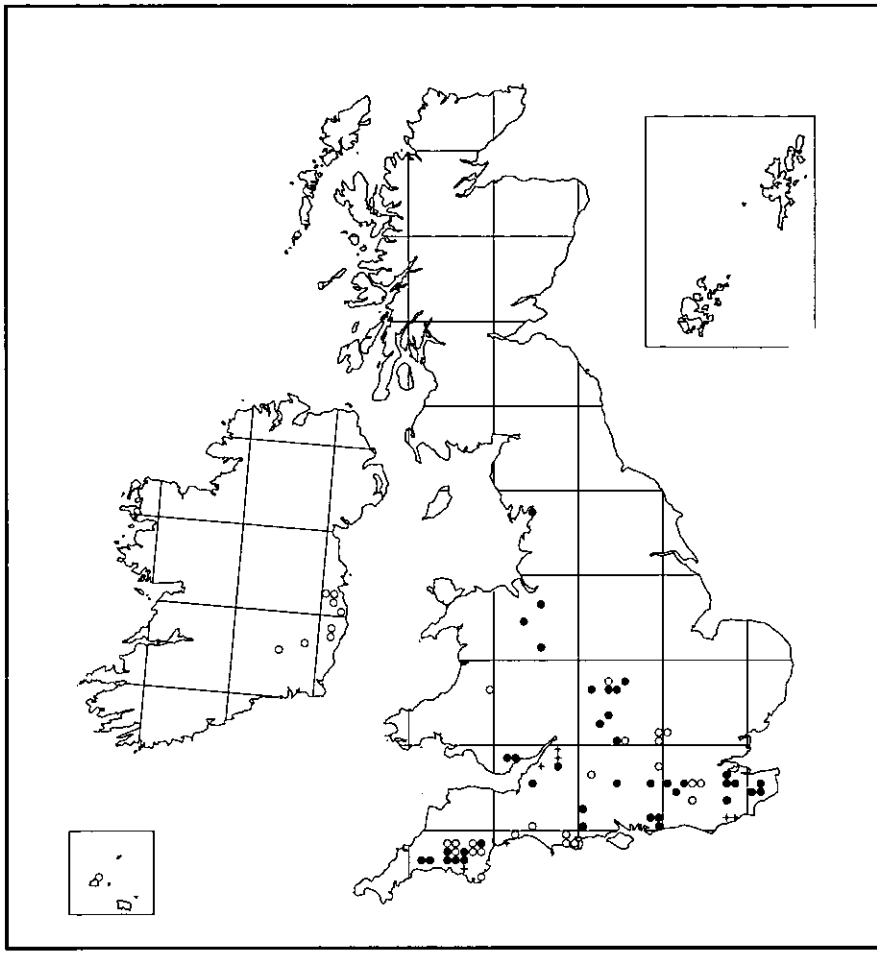
Mainly associated with sallows. In Sussex, the bee has been observed foraging for pollen from gorse (M Edwards, pers. comm.). Chambers (1968) analysed pollen loads of *A. apicata* and found that although most had been collected from willow, a low percentage had originated from plum.

Nesting biology

The nest burrows are generally excavated in level soil. Nests occur either singly or in small, open aggregations, the burrow entrances being rather widely scattered (pers. obs.). Large compact aggregations, however, have been recorded (Perkins 1919). Males are either seen flying low and fast over open ground, or zig-zagging up tree trunks and telegraph posts, presumably in their search for receptive females. Both sexes occasionally alight on such surfaces.

Flowers visited

Gorse, plum and willow. On mainland Europe, the species has been noted visiting alder, colt's-foot and dandelion flowers (Dylewska 1987). Males rarely



seem to visit flowers, though specimens are commonly dusted with pollen grains, suggesting they do so.

Parasites

The bee *Nomada leucophthalma* is a well known cleptoparasite of this species (Edwards & Telfer 2001; Perkins 1919; Westrich 1989). Stylopised individuals of the *Andrena* have been reported from Sussex (Perkins 1919).

Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.

Map 206 *Andrena cineraria* (Linnaeus, 1758)

[Apidae: Andreninae]

A distinctive *Andrena* species with a bluish-black cuticle and ash-grey hairs on the thorax and propodeum. Identification keys and general biology are given in Perkins (1919), Dylewska (1987), Schmid-Egger & Scheuchl (1997) and Else (in prep.).

Distribution

Recently recorded from Cornwall to east Kent, and north to Durham, with older records into Scotland reaching mid-Perthshire, Argyll and South Aberdeenshire. Also occurs in Ireland and the Channel Islands. This bee seems to be increasing its range, at least in southern England. A widely distributed Palaearctic species, the range extending from Fennoscandia, south to Iberia, and east to northern China.

Status (in Britain only)

This bee is not regarded as being scarce or threatened.

Habitat

Open sunny areas usually on sandy sites (open woodland, moorland, coastal sites, river banks, old quarries). Also on friable chalk, silt and clay sites, and urban areas (garden lawns, golf courses). In southern England mainly on calcareous grasslands.

Flight period

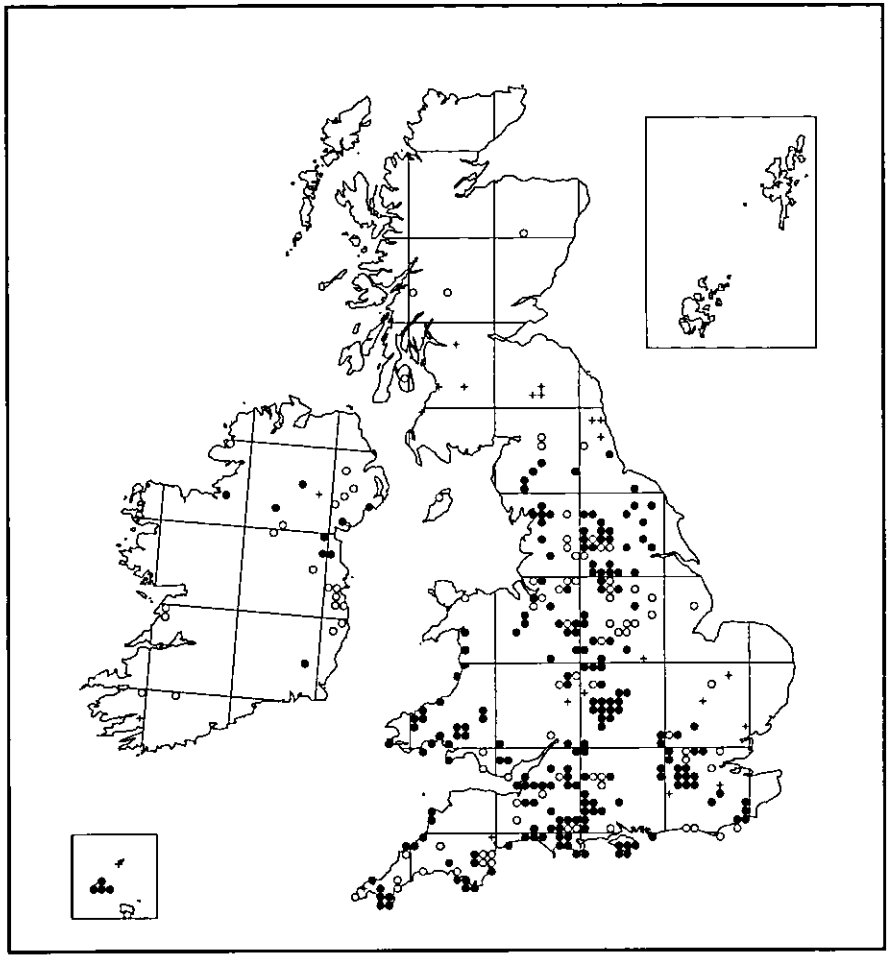
Usually univoltine. In southern England males fly from March until May but mainly during April, and females from April until June but mainly during April and May. In northern England the flight period is later, with males from April until June but mainly during May, and females from April until July but mainly during May and June. Rare records of males from July and August and females from August may represent a second brood.

Pollen collected

Polylectic, including buttercups, grasses, mustards, roses and rough chervil. In Cumbria females have been seen foraging from silverweed (N A Robinson, pers. comm.).

Nesting biology

A subterranean nester, sometimes in large compact aggregations in bare or poorly vegetated soil; in small aggregations scattered over a larger area, or found singly. The burrow is excavated to a depth of 10-20 cm with two to three cells per nest (Westrich 1989). The burrow entrance is left open during foraging trips, but at the end of these flights, during rain or when disturbed, the burrows are closed. The species overwinters as adults within the natal cells.



Flowers visited
In addition to those listed above, brambles, cabbages, cherries (including blackthorn and wild cherry), dandelions, daisies, gorse, hogweed, pears, plum, thrift, willows, wood spurge.

Parasites
Nomada lathburiana is a cleptoparasite of this bee (see p. 114). G M Spooner (pers. comm.) observed specimens of *N. goodeniana* flying about and entering the nesting burrows of this species at a Dartmoor, Devon, site. This latter *Nomada* is also stated to attack *A. cineraria* in Germany (Westrich 1989).

Map compiled by: M E Archer and S P M Roberts.
Authors of profile: M E Archer and G R Else.

Map 207 *Andrena ferox* Smith, F., 1847

[Apidae: Andreninae]

Distribution

Very rarely encountered and confined to scattered sites in southern England. Females are often locally abundant if a nest has been located. The apparent rarity of this species may be partly explained by the habits of both sexes. Females have very localised nest sites and, on leaving them, they seem to fly high up to forage in the canopy of oaks (the flowering period of these trees is also very short). Males too visit the flowers of trees and shrubs for nectar. The species is similarly rare on the continent (eg Westrich 1989), with records from The Netherlands, Belgium, France, Spain, Germany, Switzerland, northern Italy, the Czech Republic, Bosnia, Crimea and the Carpathian Basin (see Leys 1978).

Status (in Britain only)

Classified as Endangered (RDB1) in the Red Data Book (Shirt 1987) and by Falk (1991).

Habitat

Mainly known from open, deciduous woodland. In eastern Europe, males have been reported flying around oaks and copulating with females on the leaves, often at a height of 4-5 m (Kocourek 1966). With a sudden change of weather both sexes shelter under the flowers of shrubs, mainly hawthorn, where they may also spend the night (Kocourek 1966).

Flight period

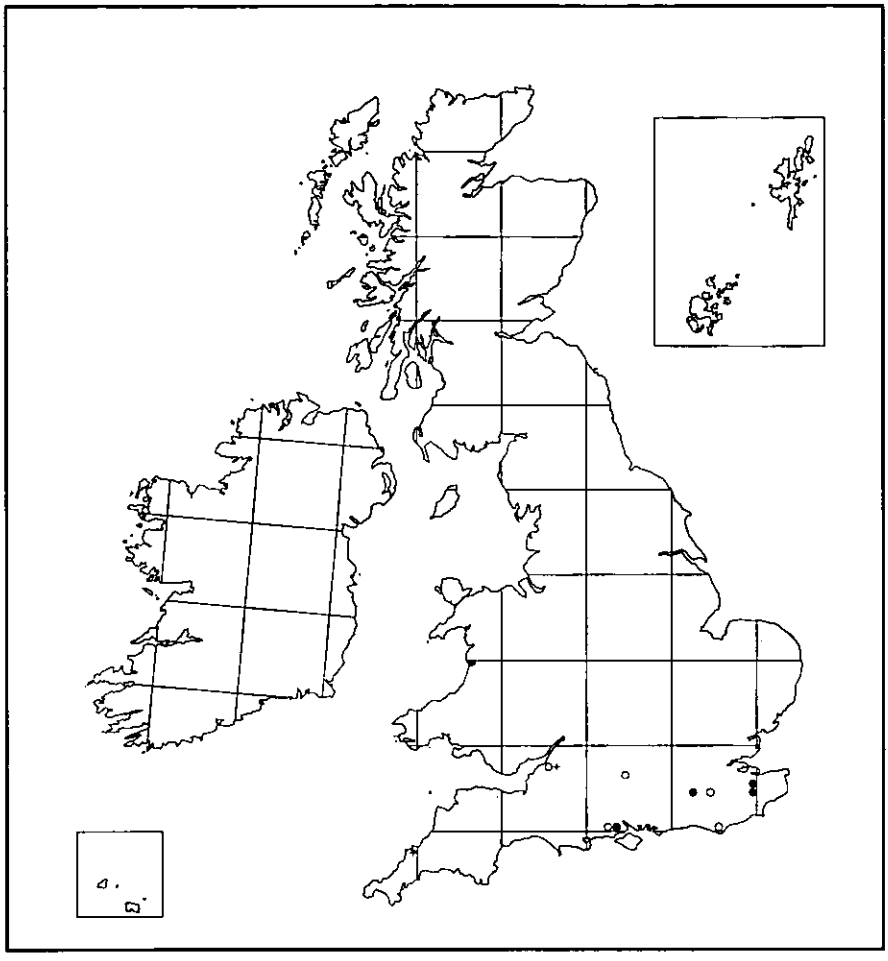
Univoltine; late April to early June.

Pollen collected

Pollen analysis from females collected in the New Forest, Hampshire, indicated that they had foraged exclusively from oak blossom (S P M Roberts and P Westrich, pers. comm.). Also, from pollen analysis, females were found to only visit oak blossom in The Netherlands (Leys 1978). In Germany, the bee is reported to be polylectic, foraging from hawthorn, oak and sycamore (Westrich 1989).

Nesting biology

This species nests communally in burrows excavated in the soil, many females sharing a common nest entrance. In The Netherlands, each communal nest is inhabited by up to 80 females. Investigations in a meadow in the same country revealed an aggregation of about 200 such nests. It was estimated that the total female population in this site was about 15,000 (Leys 1978).



Flowers visited
Hawthorn, oak and sycamore. Also a white-flowered crucifer, possibly a species of mustard (G W Allen, pers. comm.).

Parasites
In Britain, the cleptoparasitic bees *Nomada flava* and *N. marshamella* have been seen flying around the nest burrows of this *Andrena* (G R Else and S P M Roberts, pers. obs.; Yarrow & Guichard 1941, respectively), the former species entering a nest burrow.

Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.

Map 208 *Andrena flavipes* Panzer, 1798

[Apidae: Andreninae]

Distribution

Widely distributed throughout southern England and the south coast of Wales. Most of the Welsh records are recent; Hallett apparently did not find it in places where it is now common (M Pavett, pers. comm.). Also recorded by Beavis (2000) on St Mary's and Tresco (Isles of Scilly). Channel Islands.

Widespread and common in central and southern Europe, central Asia eastwards to India. North Africa.

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

May be found in a variety of open habitats with a slight preference for clay-based or sandy soils, although these need not be acidic. This species has undergone an expansion of range during the past decade or so.

Flight period

Bivoltine; March to June, July to September, with some overlap, particularly of first generation females with second generation males.

Pollen collected

Very widely polylectic.

Nesting biology

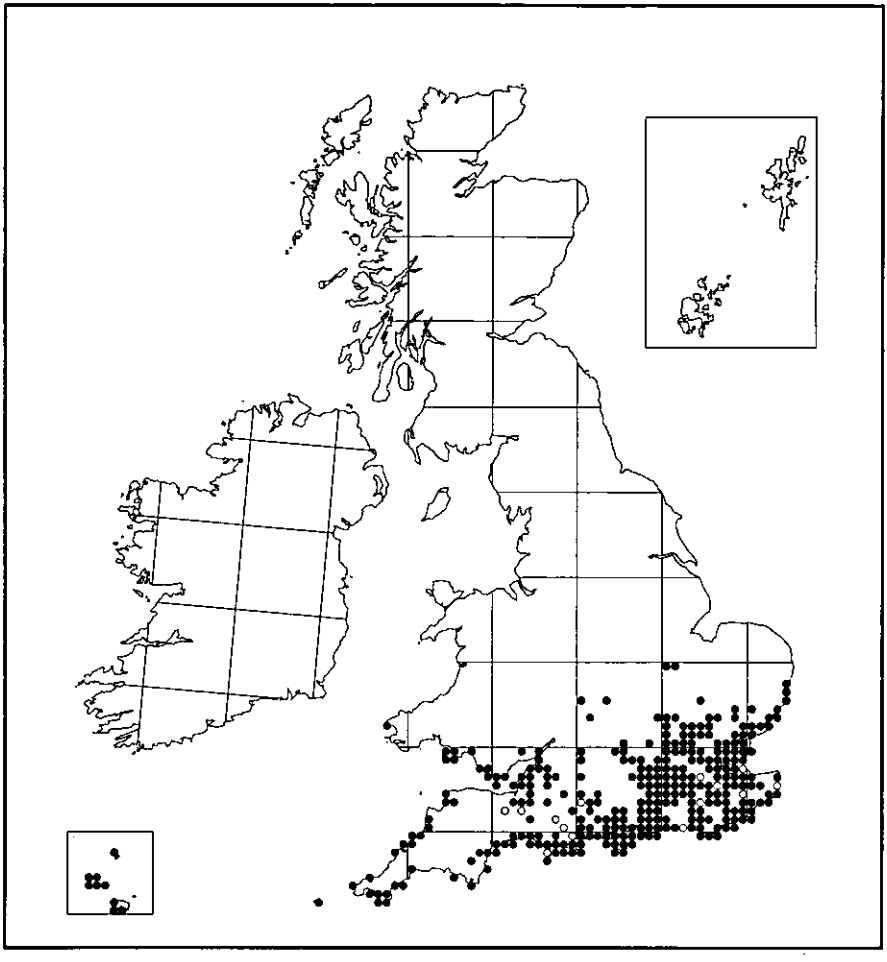
May nest singly or in aggregations (sometimes very large) in patches of bare, or sparsely vegetated soil exposed to the sun.

Flowers visited

Those of a wide range of plants, as long as the corollae are short.

Parasites and nest associates

The bee *Nomada fucata* (see p. 112) is a cleptoparasite of this bee. In the New Forest, G R Else and the author once watched large numbers of the carabid beetle *Pterostichus kugelanni* going in and out of the nesting burrows of *A. flavipes*. The beetles appeared to have pollen on their mouthparts and were clearly closely associated with the bee nesting aggregations. Bees are sometimes stylopised, probably by *Stylops flavipedis* (Kinzelbach 1971).



Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.

Map 209 *Andrena gravida* Imhoff, 1832

[Apidae: Andreninae]

Distribution

Restricted to the south-eastern corner of England (East Sussex, Kent and Essex), where records have always been sporadic. Unconfirmed records exist for Hampshire and West Sussex.

Widespread and common in central and southern Europe.

Status (in Britain only)

Listed in Shirt (1987) and Falk (1991) as Endangered (RDB1). It has been included in the UK Biodiversity Action Plan Priority Species List.

Habitat

May be found in a variety of open habitats with a slight preference for clay-based or sandy soils, although these need not be acidic.

Flight period

Univoltine; April to May, although two males collected in Kent by J C Felton during July and August may represent a partial second generation.

Pollen collected

Widely polylectic, considered to be an important pollinator of apple crops in central Europe.

Nesting biology

May nest singly or in small aggregations in patches of bare, or sparsely vegetated soil exposed to the sun (M Edwards, pers. obs. in the Netherlands; Westrich 1989).

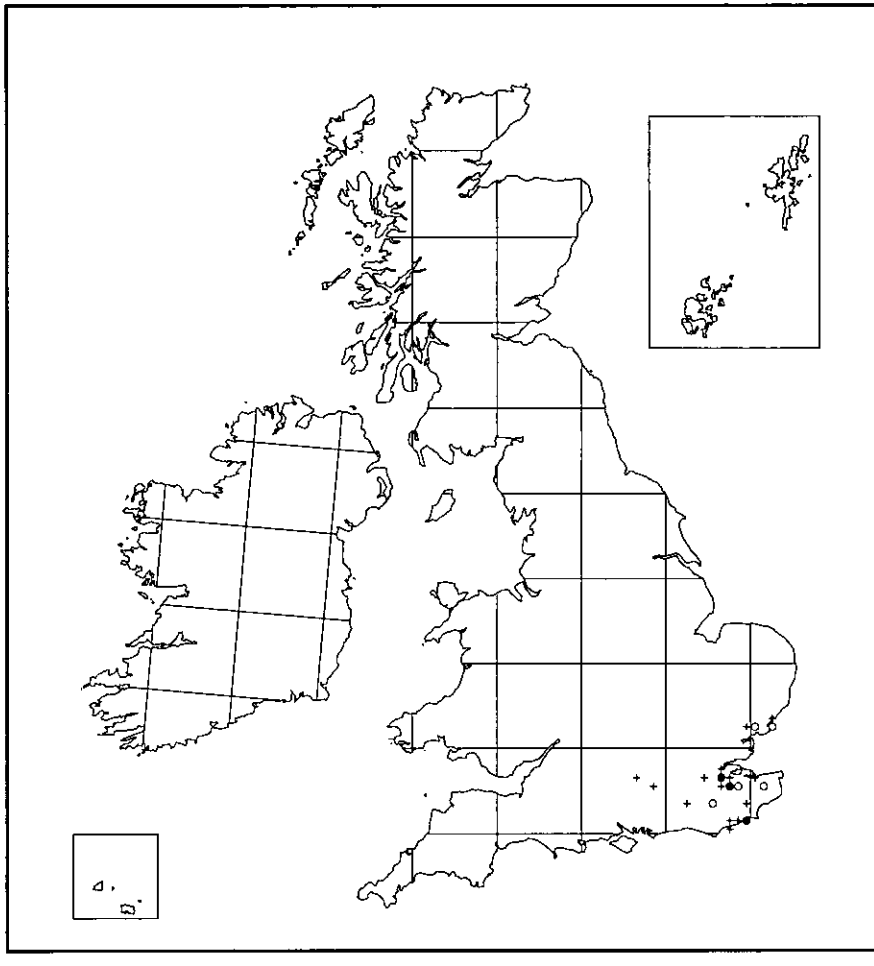
Flowers visited

Those of a wide range of plants, as long as the corollae are short.

Parasites

No parasites are known in Britain.

Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.



Map 210 *Andrena lathyri* Alfken, 1899

[Apidae: Andreninae]

The largest of the four British species in the *Andrena wilkella* group. Guichard (1971) provides characters distinguishing both sexes of *A. lathyri* from those of its three relatives, but he was not aware at that time that the best character for separating the females is the deeply emarginate pygidium, a character unique amongst British *Andrena*.

Distribution

A very rare mining bee, having been recorded from only two sites. K M Guichard and S Thewes collected four males and a female along a grassy bank beside an abandoned railway track bed near Burbage, Wiltshire, on 16th May 1970 (Guichard 1971). Many further specimens of both sexes were also collected by Guichard on 19th May 1970 and 15th May 1971. An abraded female was finally collected by him there on 4th July 1971. A subsequent search by him of the collections in The Natural History Museum, London, produced an unidentified (or misidentified) female *A. lathyri*, collected at Moorlinch, Somerset, on 22nd May 1950, by J Cowley. Though common at Burbage in 1970-71, since that time, despite many visits to the site by several hymenopterists, the species has remained exceedingly elusive, with only a single female being encountered on 10th May 1990 by S P M Roberts, suggesting that the bee may still be established in the area. Unfortunately, the site is now becoming unattractive to bees generally, owing to the development of dense scrub, which is shading out nectar and pollen sources. The range extends from southern Fennoscandia to Switzerland, Austria and Turkey. It has also been reported from Ukraine and Moldova.

Status (in Britain only)

This species is listed as Endangered (RDB1) in both Shirt (1987) and Falk (1991).

Habitat

Open grassland supporting vetches.

Flight period

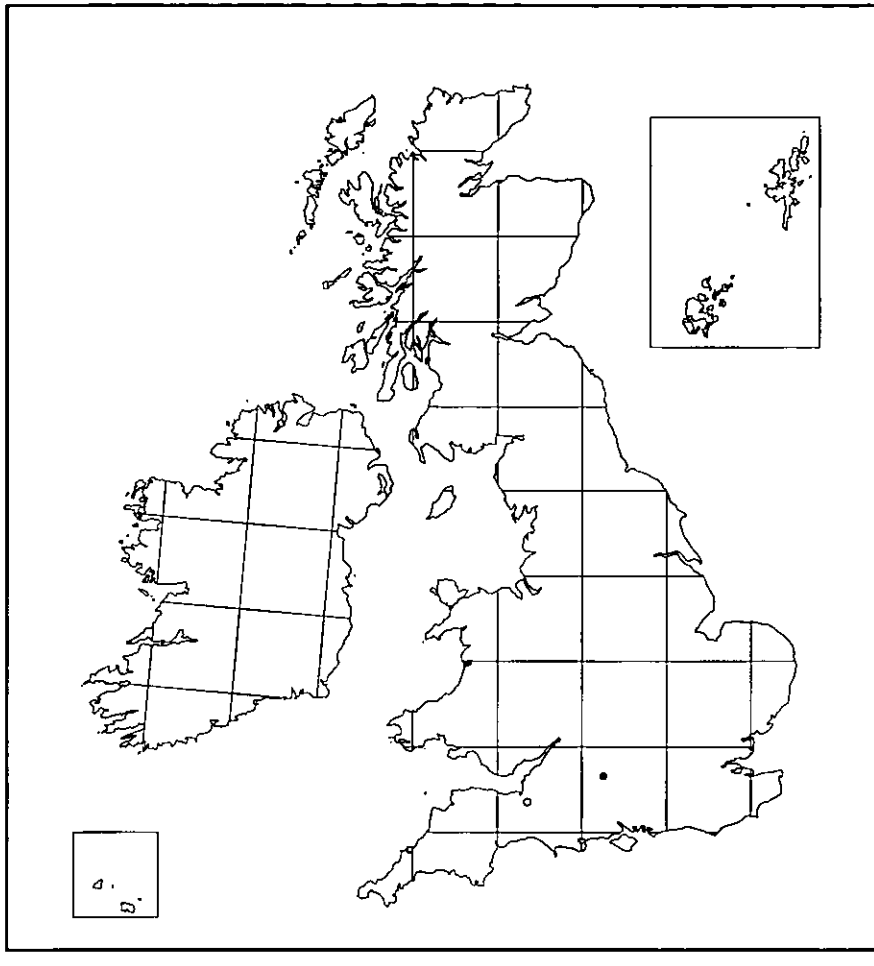
Univoltine, about mid-May to June; exceptionally early July.

Pollen collected

Not known, but presumed to be an oligolege of Fabaceae. In south-west Germany the main pollen source is reported to be bush vetch, with tufted vetch being of secondary importance (Westrich 1989). In Europe, it also forages from other vetches in the genus *Lathyrus* (Stöckhert 1933; Guichard 1971; Westrich 1989).

Nesting biology

No nests have been found in Britain. In Europe, the species apparently nests



solitarily in loamy soil, often along woodland rides and at the edge of broad-leaved woodland (Kocourek 1966; Dylewska 1987; Westrich 1989).

Flowers visited

In Wiltshire, it was seen visiting bush vetch and common vetch (Guichard 1971). Probable nectar sources in Germany are bugle, dandelion and willows (Stöckhert 1933).

Parasites

None known in Britain.

Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.

Map 211 *Andrena nitidiuscula* Schenck, 1853

[Apidae: Andreninae]

A small, shining black bee with narrow apical bands of white hairs on the abdominal tergites. Identification characters are in Perkins (1919).

Distribution

Restricted to some southern counties of England, where it is very local.

Widespread in central and southern Europe, central Asia eastwards to Japan and western north Africa.

Status (in Britain only)

This species is listed as RDB3 Rare in both Shirt (1987) and Falk (1991). Work for this atlas suggests the status should be reviewed.

Habitat

May be found in a variety of open habitats with a preference for clay-based soils, although these need not be acidic.

Flight period

Univoltine; June to September.

Pollen collected

Oligolectic on flowers of plants in the family Apiaceae, apparently preferring those with white flowers, such as wild carrot, although it has been found collecting pollen on wild parsnip (G R Else, pers. comm. 2000).

Nesting biology

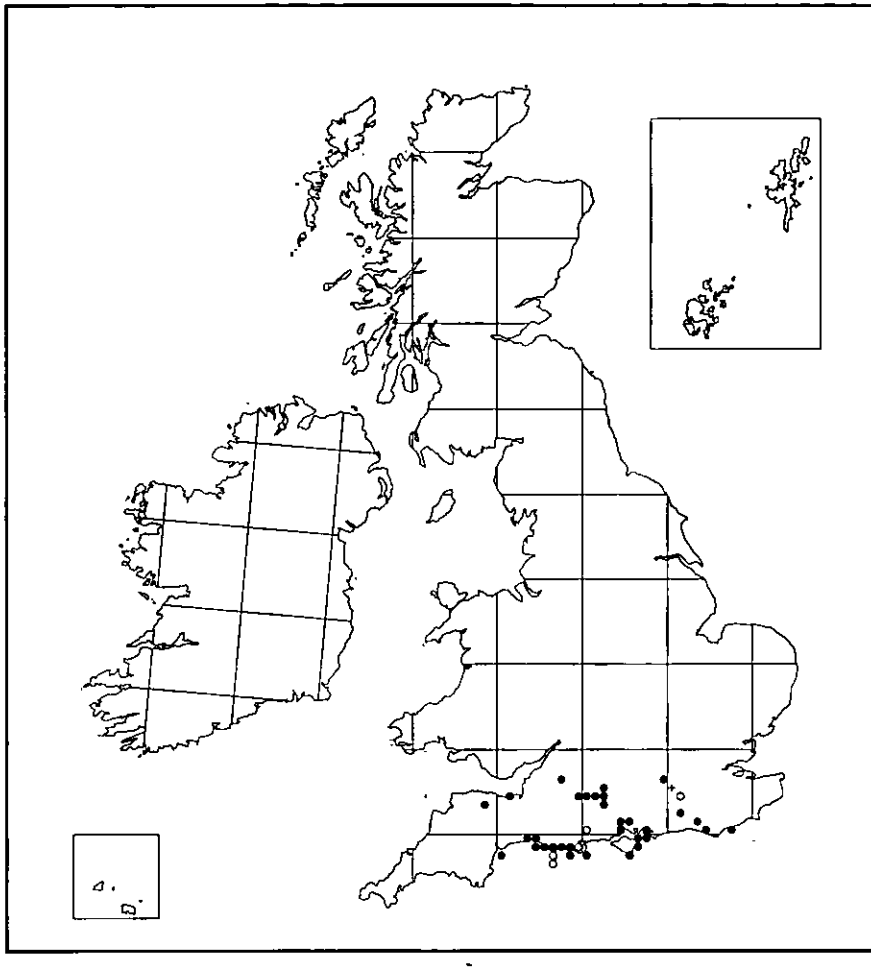
May nest singly or in aggregations in patches of bare clay soil exposed to the sun.

Flowers visited

Those of a wide range of plants in the family Apiaceae.

Parasites

The very rare (RDB1 Endangered) bee *Nomada errans* (see p. 108) is cleptoparasitic on *A. nitidiuscula*. However, in Britain there appear to be large populations of the *Andrena* where the *Nomada* is absent. Numerous *Nomada rufipes*, which may also be a parasite, have been observed flying over a large nesting aggregation of this *Andrena* on Salisbury Plain, Wiltshire (G R Else & S P M Roberts, pers. comm. 1999).



Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.

Map 212 *Andrena praecox* (Scopoli, 1763)

[Apidae: Andreninae]

Andrena praecox and *A. apicata* (see p. 82) are a closely related species-pair, and individuals can be difficult to identify (especially females). In some sites, both species fly together.

Distribution

Rather local, but often common where it does occur, throughout much of southern Britain, as far north as north Yorkshire. Perkins (1919) records the species from Scotland, though no locality is listed. There are no records of it from the Channel Islands. In Ireland, the species has been reported from Wexford, Kilkenny, Carlow, Wicklow and Dublin (Stelfox 1927), and more recently from further north.

In Europe, the species is broadly boreo-alpine, ranging from Fennoscandia and Germany south to Spain, Austria and northern Italy. In Asia, found in the Caucasus.

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Heathland and open woodland where there is sufficient willow to support populations of this bee.

Flight period

Univoltine; early March to the end of April or early May.

Pollen collected

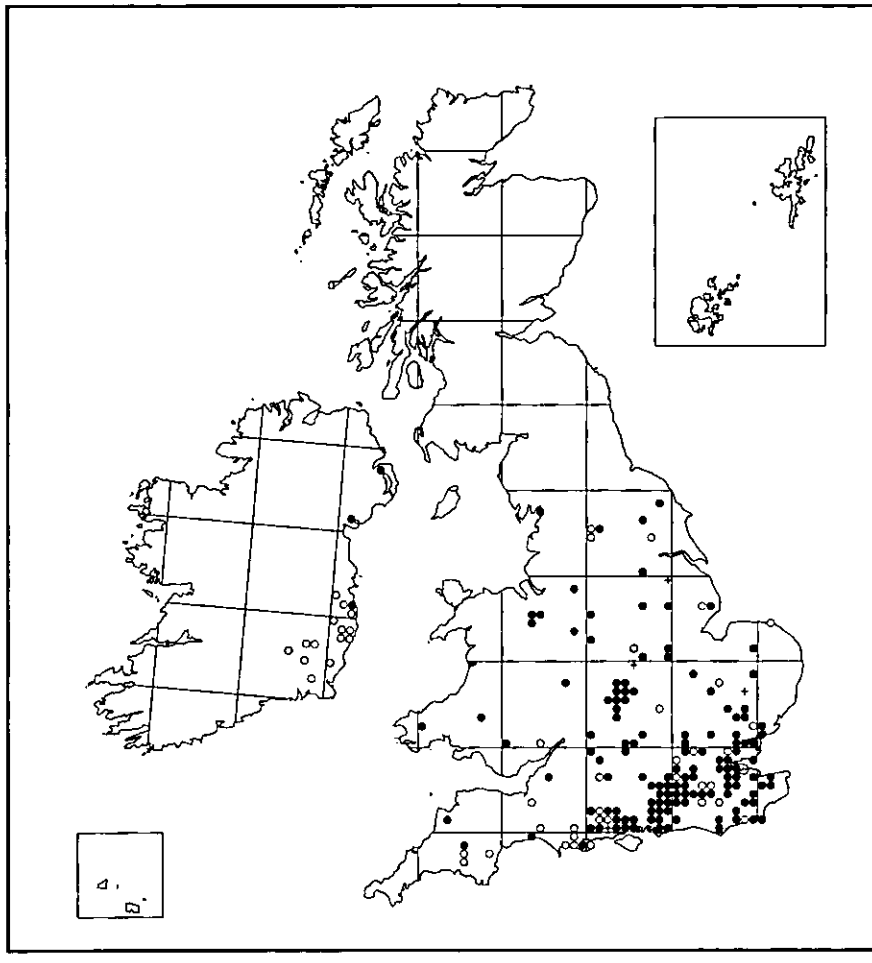
Strongly oligolectic on willows, although Chambers (1968) also found bulbous buttercup and pear pollens in the pollen load samples he analysed.

Nesting biology

Small nesting aggregations have been encountered in sparsely vegetated deciduous woodland (M Edwards, pers. comm.; G R Else, pers. obs.). Perkins (1919) mentions large nesting aggregations, though on mainland Europe the species is reported to nest solitarily (Dylewska 1987; Westrich 1989).

Flowers visited

Females have only been seen visiting willow catkins (but see other records listed above). Although males often fly about these blossoms, they rarely seem to visit the flowers for nectar.



Parasites

The rare cleptoparasitic bee *Nomada ferruginata* (see p. 110) attacks the nests of this species (Perkins 1919; Westrich 1989). Specimens are rarely stylopised.

Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.

Map 213 *Lasioglossum angusticeps* (Perkins, 1895)

[Apidae: Halictinae]

Distribution

Coastal localities in east Devon, Dorset and the Isle of Wight. The type locality of the species is Sidmouth, Devon (Perkins 1895). Records are best based on males, as females are generally very difficult to distinguish from those of *L. punctulatissimum.*

Rare and sporadic in the south-west Palaearctic, where the species is distributed from Britain to Romania, and from Morocco to Turkey. Warncke (1981) has prepared a distribution map for the species.

Status (in Britain only)

Listed as RDB3 Rare in Shirt (1987) and by Falk (1991).

Habitat

Mainly rough coastal landslips.

Flight period

Females from late May to at least August; males from the end of July to late September.

Pollen collected

None reported.

Nesting biology

Females usually nest gregariously in burrows excavated in clay exposures at the base of cliffs and slopes above the beach (Spooner 1929).

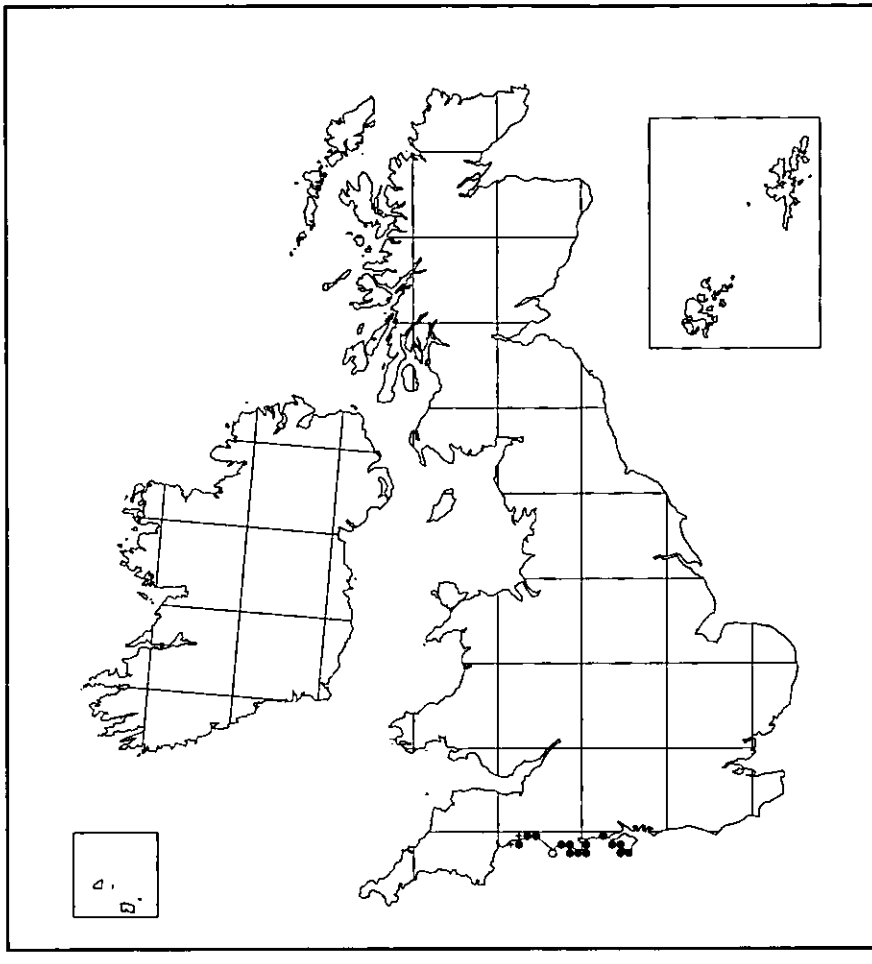
Flowers visited

Males visit wild carrot blossom and yellow-flowered Asteraceae. Female *Lasioglossum*, provisionally identified as *angusticeps*, have been observed on several occasions visiting common bird's-foot-trefoil flowers (pers. obs.).

Parasites

Stylopised males have been collected in two Dorset sites (personal records), probably affected by a *Halictoxenos* species, perhaps the same as that affecting *L. punctulatissimum.*

Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.



Map 214 *Lasioglossum brevicorne* (Schenck, 1870)

[Apidae: Halictinae]

Distribution

Restricted to light sandy soils principally in south-east England. Also occurs in the Channel Islands.

Widespread in central and southern Europe, central Asia eastwards to Afghanistan, and in north Africa.

Status (in Britain only)

Listed as Rare (RDB3) in Shirt (1987) and in Falk (1991).

Habitat

May be found in a variety of open habitats with a slight preference for clay-based or sandy soils, although these need not be acidic. This species has undergone an expansion of range during the past decade or so.

Flight period

Univoltine; May to August, with males present from late July.

Pollen collected

Only found collecting pollen from the flowers of plants of the family Asteraceae (M Edwards and P Westrich, pers. obs.). It is not known whether this is true throughout its entire range.

Nesting biology

Nests in the ground. It is not known whether this is a eusocial species.

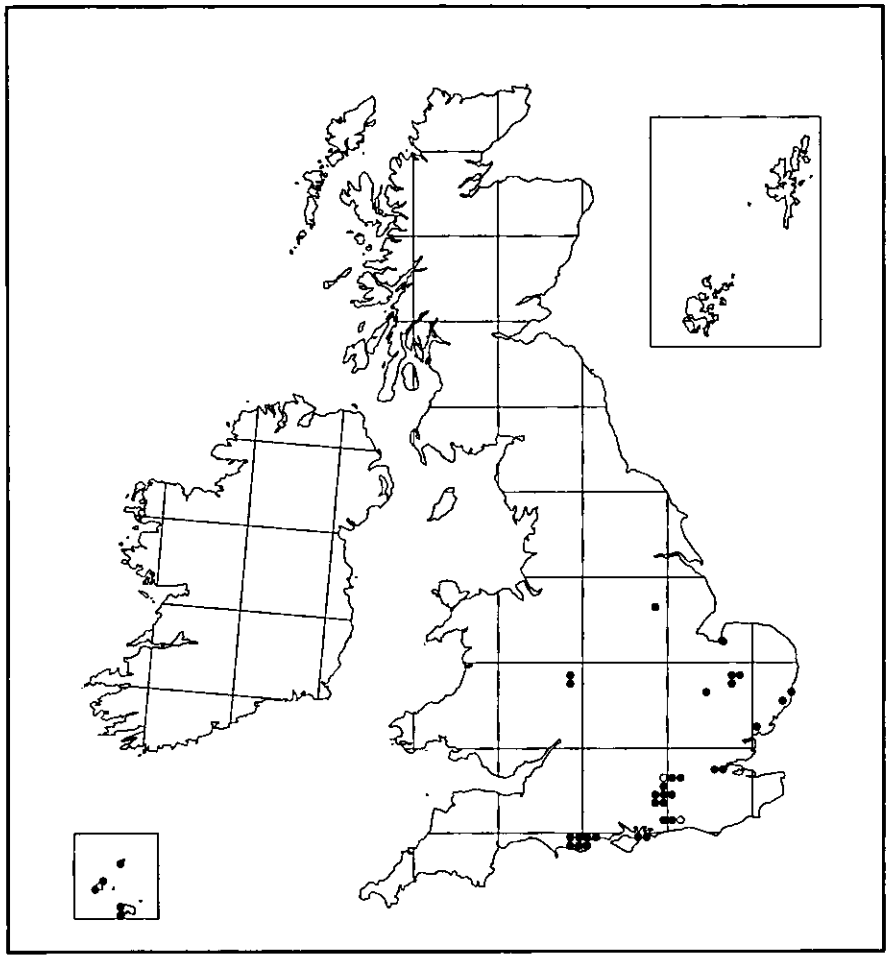
Flowers visited

Yellow-flowered Asteraceae.

Parasites

None known in Britain, although *Sphecodes puncticeps* has been suggested as a cleptoparasite on the continent (Westrich 1989).

Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.



Map 215 *Lasioglossum laevigatum* (Kirby, 1802)

[Apidae: Halictinae]

Distribution

Mainly confined to southern England, with a few records from further north. Not known from Scotland, Ireland or the Channel Islands. A local mining bee but sometimes abundant where found.

A western Palaearctic species, the range extending from Britain to the Urals, and central Iberia to Iran.

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Particularly associated with calcareous grassland; occasionally open woodland on chalk, wooded heathland and fenland.

Flight period

Females from mid April to late September; males early July to September.

Pollen collected

Polylectic, foraging from species in the families Apiaceae, Asteraceae, Brassicaceae, Caryophyllaceae, Cornaceae, Ranunculaceae, Rosaceae and Salicaceae (Westrich 1989).

In Britain, the bee has been observed collecting dandelion pollen (pers. obs.), but other flowers are doubtless utilised.

Nesting biology

Nesting habits are apparently largely unknown. In Germany, the species is stated to be 'solitary' (ie non-social) (Westrich 1989).

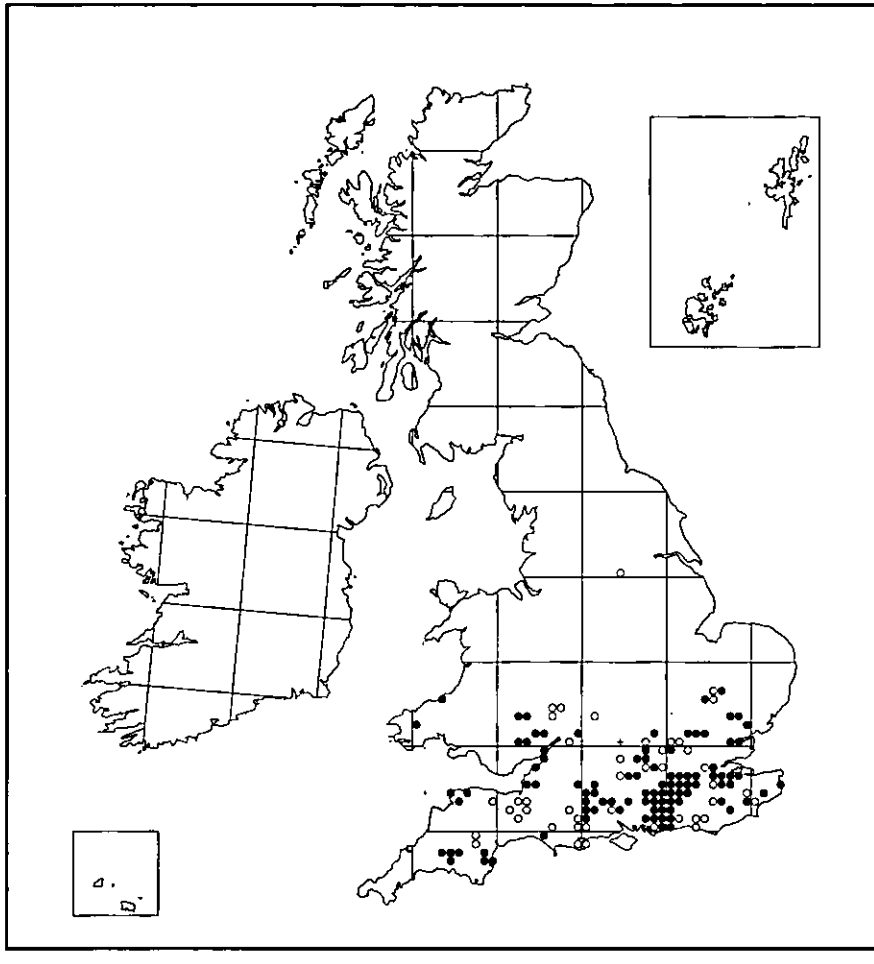
Flowers visited

Broom, dandelion, guelder-rose, lesser celandine, plum, ragwort, speedwell, tormentil, wild carrot, wild parsnip and willow.

Parasites

No information available.

Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.



Map 216 *Lasioglossum prasinum* (Smith, F., 1848)

[Apidae: Halictinae]

One of the larger halictine bees of the British Isles, the male has a distinctive blood-red tip to the abdomen. Identification keys and general information are given in Perkins (1922).

Distribution

Known from southern England and Wales. It is associated with sandy soils, especially if these support heaths and heathers, although females are far too long-lived to be oligolectic on these plants. Also found in the Channel Islands (Jersey). There are a number of very old (and doubtful) records from the Scottish border region, from where it has not been reported for over a century.

Widespread in southern and central Europe: north-western Netherlands and Germany, south to Iberia and Corsica, east to Greece.

Status (in Britain only)

This species is not regarded as being threatened. However, the current map shows a highly restricted range which suggests its status should be reviewed.

Habitat

Associated with heathy vegetation on sandy soils.

Flight period

Females initiate nests during May, new males and females are produced during August and September. As this is a solitary species, the flight period of females is extraordinarily long.

Pollen collected

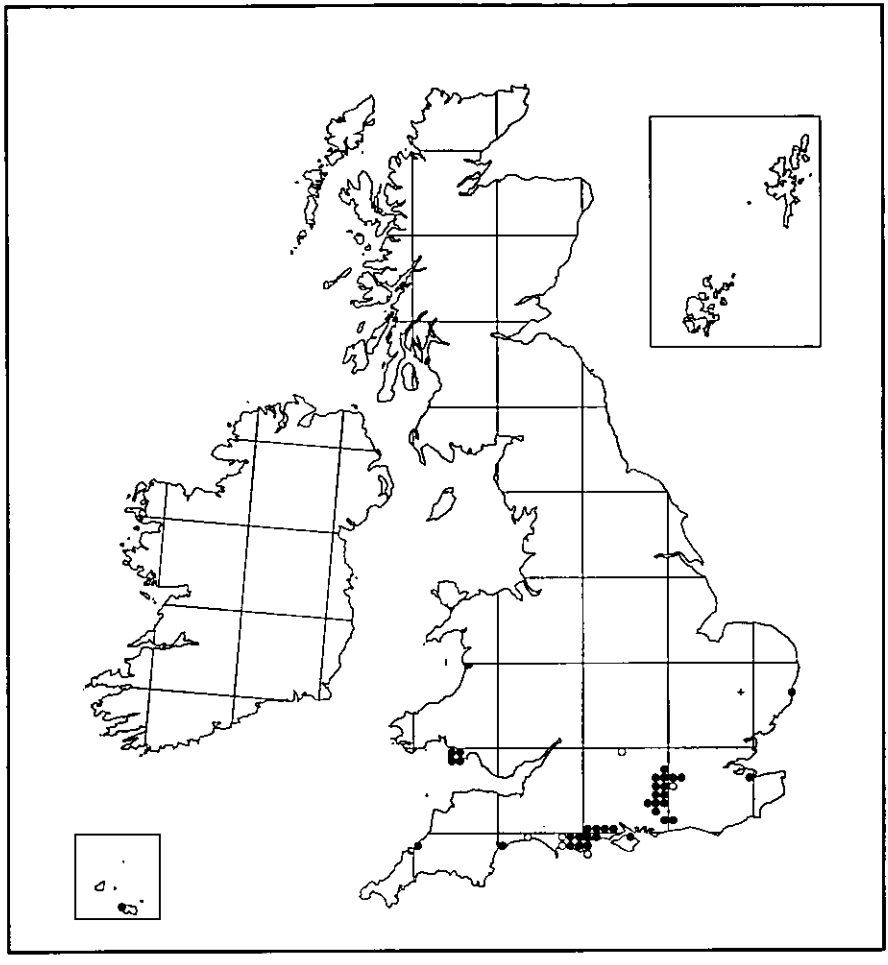
Polylectic, but with a strong preference for heath and heather flowers during the mid and late summer. It has been recorded as collecting pine pollen on Studland Heath (G H Spooner, pers. comm.). Pollen taken from a British female had been gathered entirely from a plant of the family Caryophyllaceae (G R Else, pers. comm.).

Nesting biology

A solitary species but may nest in dense aggregations in quite loose, but not continually disturbed, sandy soil which is exposed to the sun.

Flowers visited

Bell heather, cross-leaved heath, dandelion, forget-me-not, hawk's beard, heather and pine.



Parasites

It is reported that this species is cleptoparasitised by *Sphecodes reticulatus* (Morice 1901a) but this requires confirmation. It is possible that *Sphecodes pellucidus* also attacks this bee (Vegter 1993).

Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.

Map 217 *Osmia parietina* Curtis, 1828

[Apidae: Megachilinae]

One of three brown and black-haired *Osmia* bees (*O. inermis, O. parietina* and *O. uncinata*) with an arctic-alpine distribution. Saunders (1896) does not distinguish between these three species.

Distribution

Restricted to the north and west of Britain, this is the most widely distributed of the three species. Modern records are known from western and northern Wales, north-western England and southern and northern Scotland.

It is widely distributed in northern Eurasia, from Fennoscandia south to central Spain and east to Greece and eastern Russia.

Status (in Britain only)

Listed as a Rare species (RDB3) in Shirt (1987) and by Falk (1991); it has also been listed as a priority species under the UK Biodiversity Action Plan.

Habitat

Associated with areas of unimproved grassland where its only known pollen source in Britain, common bird's-foot-trefoil, grows. In Cumbria it seems to prefer areas with the shelter of scrub (N Robinson, pers. comm.).

Flight period

The species is single-brooded. Both sexes fly between May and July.

Pollen collected

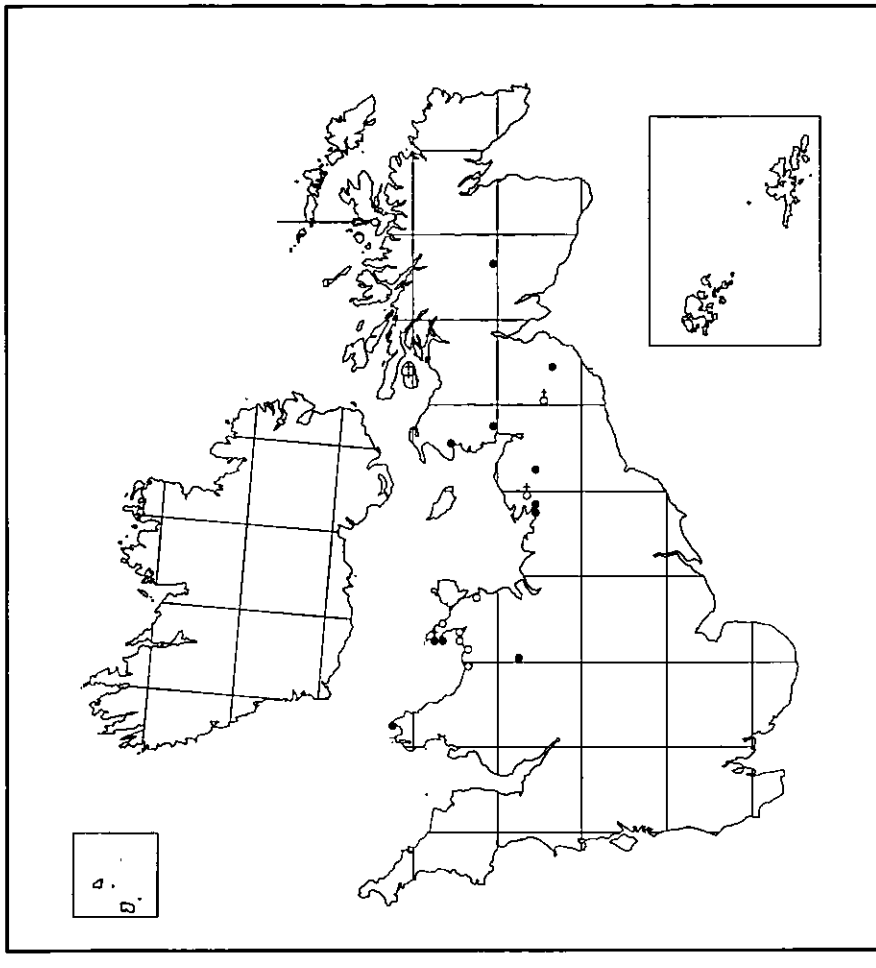
In Britain it has only been observed collecting pollen from common bird's-foot-trefoil, although it is likely that pollens from other plants in the family Fabaceae are also utilised. Westrich (1989) states that it is polylectic in Germany, although many of the confirmed plant species he lists are also members of the Fabaceae.

Nesting biology

Females make their nests in a variety of cavities, including dry stone walls and dead wood. The nest walls are probably made of chewed plant material.

Flowers visited

In Britain, bramble, bugle and common bird's-foot-trefoil. In Germany, Westrich (1989) also lists germander speedwell, horseshoe vetch, red clover, reflexed stonecrop and strawberry.



Parasites

Known to be attacked by the chrysidid *Chrysura hirsuta* on the mainland of continental Europe (Stöckhert 1933). The same relationship is likely to occur in Britain. *Sapyga quinquepunctata* (see Part 3, p. 22) has also been found flying round nest sites of *Osmia parietina* at Criccieth (NHML collection).

Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.

Map 218 *Nomada errans* Lepeletier, 1841

[Apidae: Anthophorinae]

This small *Nomada* was only recognised as British in 1944 (Spooner 1946) but had been found much earlier, in 1878, by C W Dale, although he failed to recognise the species. It is our most localised bee species, but has not been seen since 1982, despite several recent searches.

Distribution

Restricted to a small area of coast on the Isle of Purbeck, Dorset.

Widespread in southern Europe, but nowhere frequent.

Status (in Britain only)

This species is listed as RDB1 Endangered in both Shirt (1987) and Falk (1991).

Habitat

The known area is basic grassland with local areas of open clay soil where the host bee, *Andrena nitidiuscula*, nests (see p. 94).

Flight period

Univoltine, July and August.

Pollen collected

This is a cleptoparasitic species, so no pollen is gathered.

Nesting biology

In England it parasitises the nests of *Andrena nitidiuscula*.

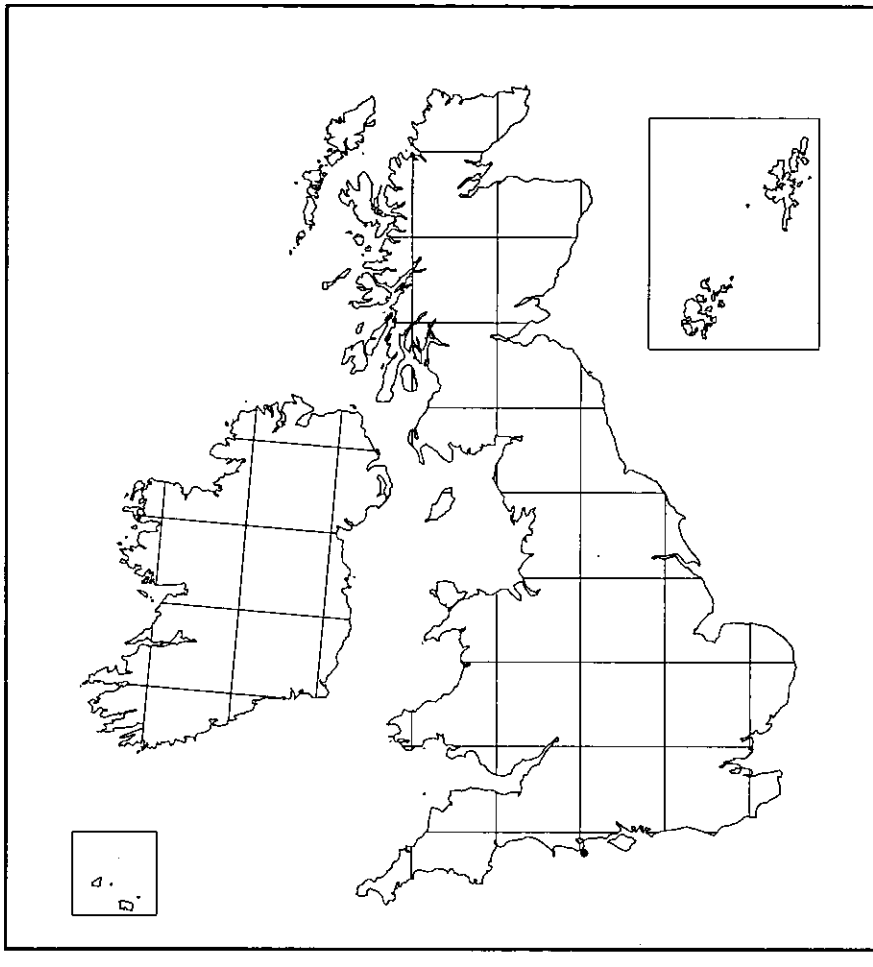
Flowers visited

The species has been found at wild carrot, ragwort and yarrow. It has also been found on wild parsnip in Germany (Westrich 1989).

Parasites

No information available.

Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.



Map 219 *Nomada ferruginata* (Linnaeus, 1767)

[Apidae: Anthophorinae]

This species is commonly listed under the name *Nomada xanthosticta* (Kirby, 1802) in the British literature (the species name is now treated as a junior synonym of *Nomada ferruginata* (Linnaeus, 1767)).

Distribution

A rare species, but formerly widely distributed in southern Britain. There were no records between 1949 and 1987. However, in recent years the species has undergone a resurgence, with confirmed records from Hampshire, Kent, Wiltshire, Berkshire, Middlesex, Gloucestershire, Warwickshire, Essex and Suffolk.

This is a northern and central European species, becoming more sparsely distributed in the south.

Status (in Britain only)

Listed as Endangered (RDB1) in the British Red Data Book (Shirt 1987) and by Falk (1991). This status needs to be reviewed.

Habitat

Sites include open deciduous woodland, the coast (as at Dungeness, East Kent) and open sites where the host species occurs.

Flight period

Univoltine; mid April (exceptionally March) to mid May.

Pollen collected

This is a cleptoparasitic species, so no pollen is gathered.

Nesting biology

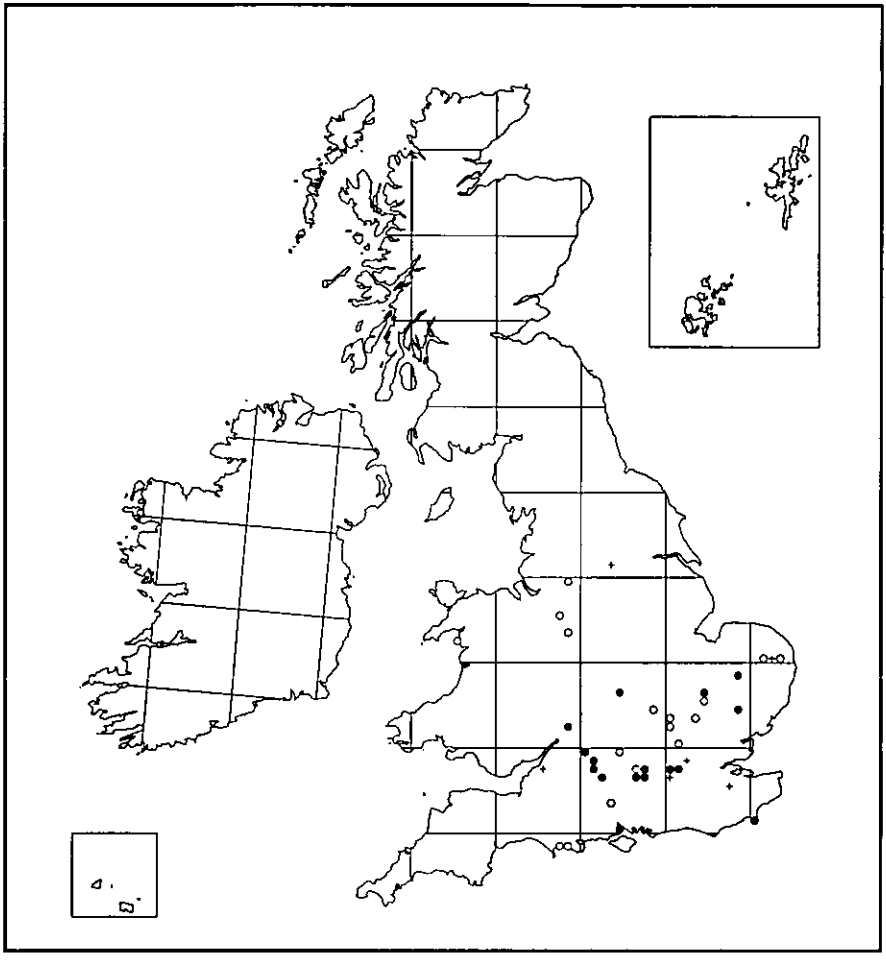
A cleptoparasite of the mining bee *Andrena praecox* (Perkins 1919; Chambers 1949; Westrich 1989) (see p. 96). It is only found with a small number of populations of this host species. Chambers (1949) also lists *A. varians* as a possible host.

Flowers visited

Black currant, dandelion, lesser celandine and willow.

Parasites

No information available.



Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.

Map 220 *Nomada fucata* Panzer, 1798

[Apidae: Anthophorinae]

This medium-sized *Nomada* has an overall pattern of yellow and dark brown stripes on the abdomen, with the first tergite a clear reddish brown. It can be most easily found flying over large nesting aggregations of its host bee, *Andrena flavipes* (see p. 88).

Distribution

Although considered rare by Saunders (1896), during the 1930s and 1940s it was clearly widespread and abundant in some widely dispersed localities (The Natural History Museum, London, collection and Chambers (1949)). During the 1970s the species was decidedly local, with most known sites being on the south coast of Dorset and this *Nomada* was absent from many large nesting aggregations of *Andrena flavipes*. It has since spread to become an almost certain companion of the *Andrena* throughout much of its range. *Nomada fucata* is now widely distributed throughout southern England, and the south Wales coast. Also occurs on the Channel Islands.

Widespread in Europe, from France to the Middle East, and north Africa.

Status (in Britain only)

This species is listed as Notable A in Falk (1991). However, its current abundance suggests that this status should be revised.

Habitat

Open countryside where its host, *Andrena flavipes*, is present.

Flight period

Bivoltine; April to June, July and August.

Pollen collected

This is a cleptoparasitic species, so no pollen is gathered.

Nesting biology

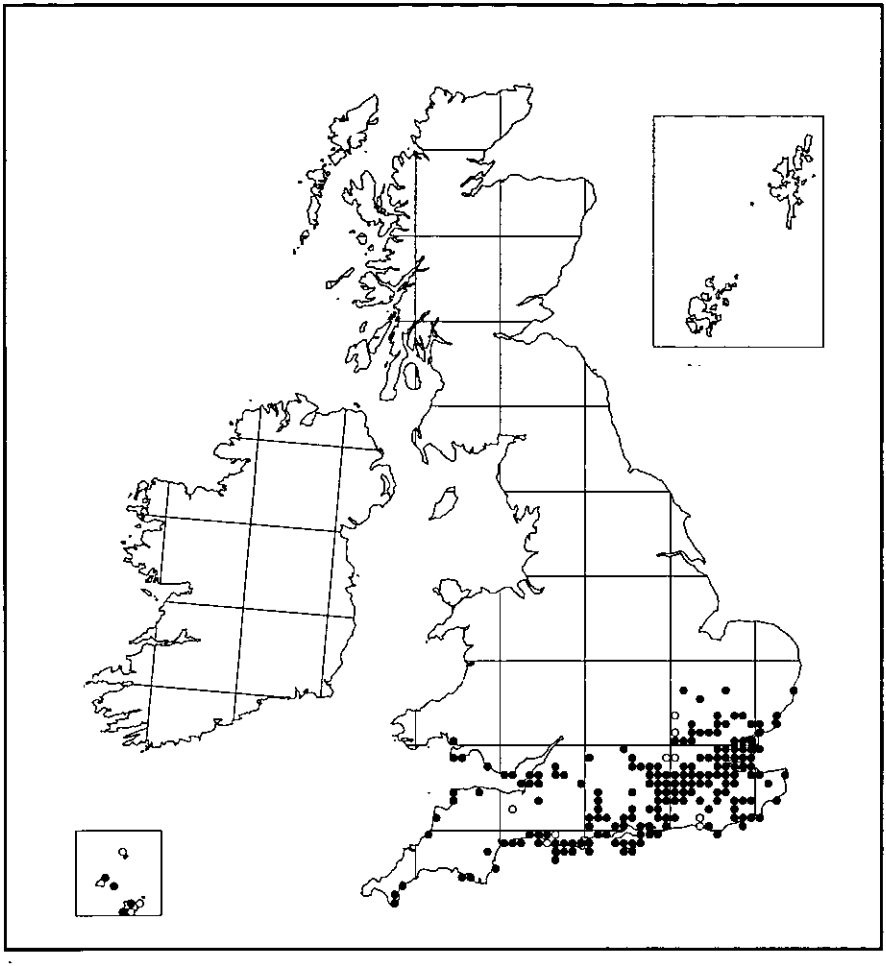
In England it parasitises the nests of *Andrena flavipes*.

Flowers visited

The species has been found at a wide variety of flowers with short corollae.

Parasites

No information available.



Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.

Map 221 *Nomada lathburiana* (Kirby, 1802)

[Apidae: Anthophorinae]

A *Nomada* species with a tricoloured gaster and reddish hair (particularly on newly emerged individuals) on the thorax, being more evident in the female. Identification keys and notes on the general biology of *Nomada* are given in Perkins (1919), Michener (2000) and Else (in prep.).

Distribution

East Cornwall to east Kent, and north to Durham (Shotley Bridge). Also recorded from Guernsey. Not recorded in Scotland or Ireland although its host is present in these countries.

Overseas the range extends from southern Fennoscandia southwards in Europe and east to Siberia.

Status (in Britain only)

Listed as RDB3 (Rare) in Shirt (1987) and by Falk (1991). Recent data indicate that the status of this species could be downgraded.

Habitat

Found in open sunny areas within the nesting sites of the host. Where the host is nesting in large compact aggregations, the *Nomada* males and females can be very numerous.

Flight period

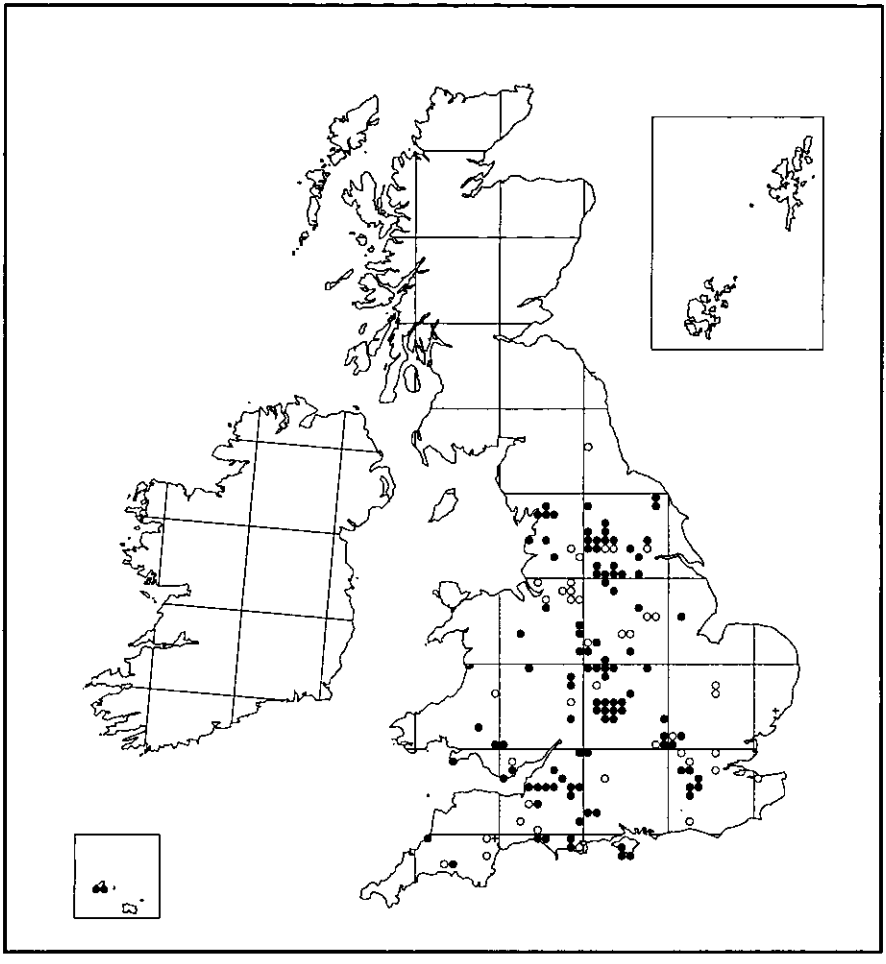
Usually univoltine. In northern England males fly from April until June but mainly during May, and females from April until July but mainly during May and June. These flight periods coincide, not surprisingly, with those of its host, *Andrena cineraria* (see p. 84). The rare records of females during August may represent a second brood. Fewer records are available from southern England but both males and females fly mainly during April and May, coinciding with the earlier flight period of its host.

Pollen collected

This is a cleptoparasitic species, so no pollen is gathered.

Parasitic behaviour

In Britain it is a cleptoparasite on *Andrena cineraria* (see p. 84). The *Nomada* female detects incomplete host cells which are still open and being provisioned. The *Nomada* lays an egg in the wall of the cell and departs. The host oviposits in the cell when provisioning is completed and seals the cell. The first stage larva of



the cleptoparasite has large mandibles which are used to kill the host's egg or young larva, before feeding on the provisions.

Flowers visited
Cherries, creeping willow, dandelions and gooseberry.

Parasites
No information available.

Map compiled by: M E Archer and S P M Roberts.
Authors of profile: M E Archer and G R Else.

Map 222 *Epeolus cruciger* (Panzer, 1799)

[Apidae: Anthophorinae]

Distribution

Widely distributed throughout much of southern and central Britain (becoming scarcer in the northern part of its range) and locally common, at least in many southern sites. It is also known from Jersey (Grosnez Point, 1989, M E Archer, pers. comm.). There is a specimen collected on 8th July, 1899 at Irvine Moor, Ayr, in The Natural History Museum, London, which may be this species, but it is in too poor a condition to be certain. The species has not been found in Ireland.

Widespread in Europe, occurring as far north as central Finland.

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Inland heaths (where it is often common) and moors; also coastal sand dunes and undercliffs.

Flight period

Univoltine; end of June to late September. A small form associating with *Colletes marginatus* flies earlier in the season, in June and July.

Pollen collected

This is a cleptoparasitic species, so no pollen is gathered.

Nesting biology

A cleptoparasite of *Colletes succinctus* and *C. marginatus*. The form attacking *C. marginatus* is generally smaller than that associating with *C. succinctus*. Richards (1937) additionally lists *C. fodiens* as a host, but this requires confirmation.

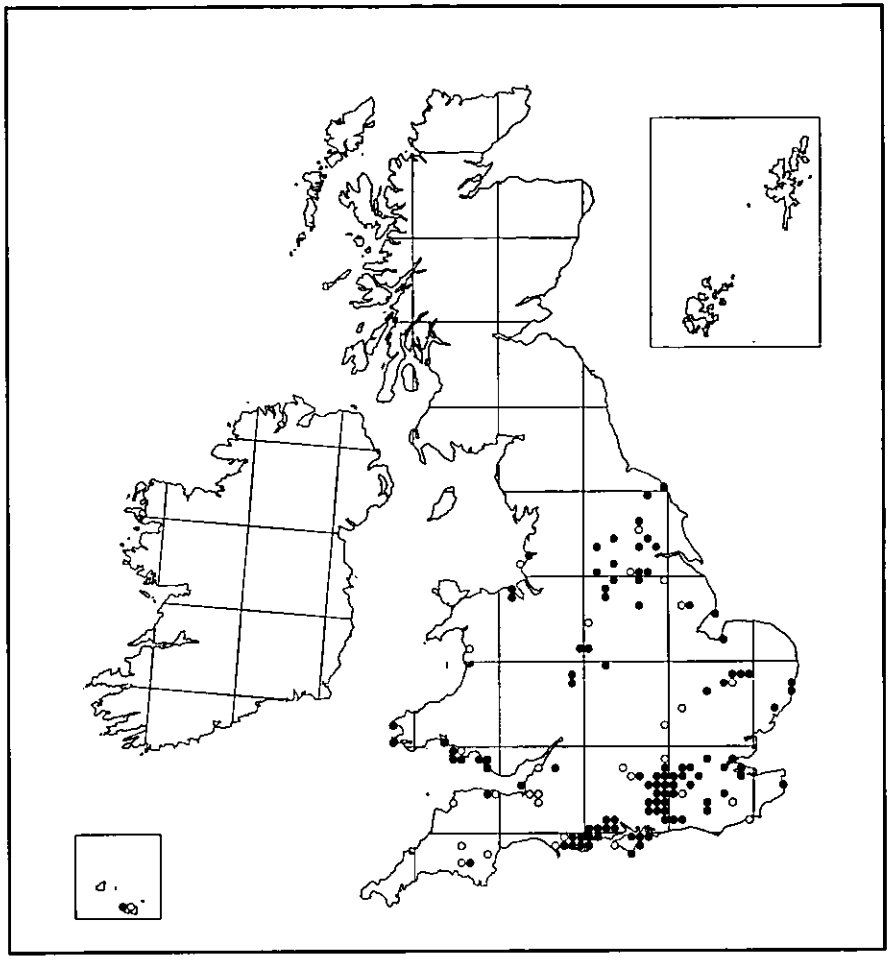
Flowers visited

Nectar sources include clover, a hawkbit, heather, a mint, ragwort and sheep's-bit.

Parasites

None reported.

Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.



Map 223 *Epeolus variegatus* (Linnaeus, 1758)

[Apidae: Anthophorinae]

Distribution

Throughout much of Britain and the Channel Islands, becoming scarce in northern England. There is a single confirmed record from the Isle of Man and one from south-west Scotland, but none from Ireland. Often locally common.

Status (in Britain only)

This species is not regarded as being scarce or threatened.

Habitat

Open woodland, heathland, coastal dunes, cliffs and salt marshes (see range of hosts below).

Flight period

Univoltine, June to late August, the form associating with *Colletes halophilus* flying from mid August to mid October.

Pollen collected

This is a cleptoparasitic species, so no pollen is gathered.

Nesting biology

A cleptoparasite of several *Colletes* species: *C. daviesanus* (Blair 1920; Carr 1916; Chambers 1949; Richards 1937, 1979), *C. fodiens* (Chambers 1949; Hallett 1928; Perkins 1920, 1924; Richards 1937, 1979), *C. halophilus* (Guichard 1974) and *C. succinctus* (Clark 1924; Butterfield & Fordham 1932; O'Toole & Raw 1991). However, there are very few rearing records and some of the above hosts have yet to be confirmed. The Scottish record from Torrs Warren, Wigtownshire (see map), was almost certainly attacking *C. fodiens*, though *C. floralis* was also present and in, apparently, greater numbers.

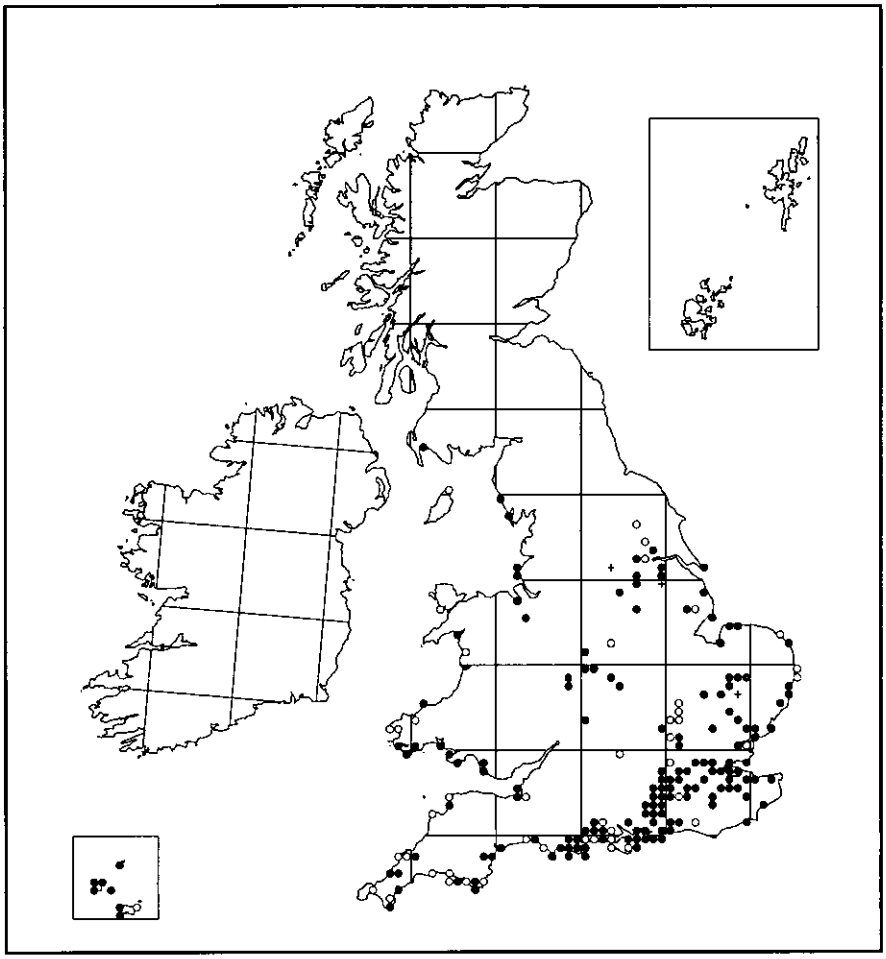
Flowers visited

Bog pimpernel, bramble, clover, common fleabane, common ragwort, creeping buttercup, creeping thistle, hawkbit, oxtongue, thyme, viper's-bugloss, and wild carrot. It is most frequently seen on common ragwort.

Parasites

No information available.

Map compiled by: G R Else and S P M Roberts.
Author of profile: G R Else.



Map 224 *Bombus humilis* Illiger, 1806

[Apidae: Apinae]

Keys and general biology are found in Sladen (1912), Free & Butler (1959), Alford (1975) and Prŷs-Jones & Corbet (1991). This species is very closely related to *Bombus muscorum* but is more southerly in its distribution. *B. humilis* has undergone a major decline in its distribution, with most remaining populations being on extensive, although sometimes narrow, areas of coastal grasslands. This decline seems to be closely linked to the intensification of farming.

Distribution

Intermittently present along the southern and western coasts of England and Wales, reaching furthest north on the Lleyn Peninsula and Anglesey. There are a few inland populations, most notably on Salisbury Plain, Wiltshire. In common with other bumblebees, relatively large areas of suitable habitat, in the order of ten square kilometres, are required to maintain viable populations.

Widespread in Europe, as far north as southern Scandinavia, but declining in many places (von Hagen 1994; Westrich 1989). Also found throughout central Asia (Løken 1973).

Status (in Britain only)

This species is not listed in either Shirt (1987) or Falk (1991). However, current research shows that this status may be in need of revision.

Habitat

Strongly associated with areas of tall, but open, grasslands supporting a good proportion of perennial plants, especially those in the families Fabaceae, Lamiaceae and Scrophulariaceae.

Flight period

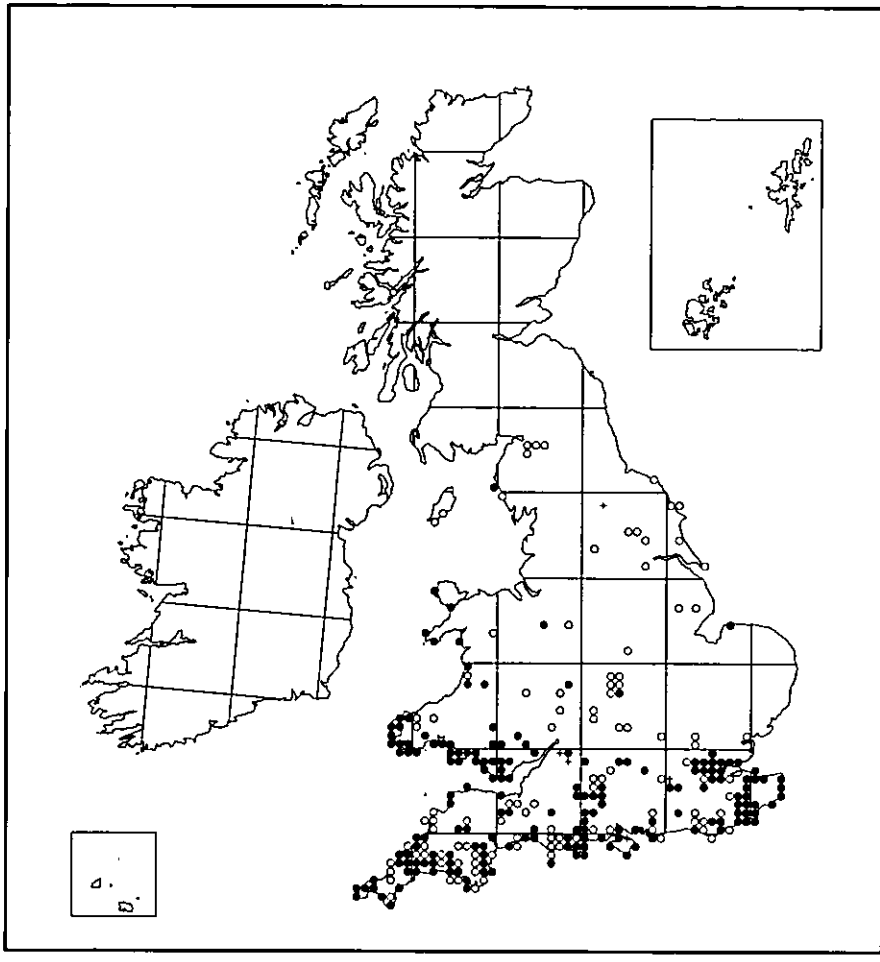
Overwintered queens search for nesting sites during May and early June. Workers fly between June and September; males during August and September.

Pollen collected

There is a strong preference for pollen from plants in the families Fabaceae, Lamiaceae and Scrophulariaceae.

Nesting biology

B. humilis queens found nests on the surface of the ground in moderately tall, open grassland. They may well use an old mouse nest as a base. The nest is covered with fragments of dead grass and moss which are gathered, initially by



the queen and later by the workers.

Flowers visited
The species will forage for nectar from a variety of plants, including yellow-flowered Asteraceae.

Parasites
Bombus (*Psithyrus*) *campestris* has been recorded as a social parasite of this species in Europe (Løken 1984).

Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.

Map 225 *Bombus subterraneus* (Linnaeus, 1761)

[Apidae: Apinae]

Keys and general biology are found in Sladen (1912), Free & Butler (1959), Alford (1975) and Prŷs-Jones & Corbet (1991). This species is very closely related to the more northerly distributed *B. distinguendus* and males of the two species can be extremely hard to separate. In Scandinavia it is strongly associated with red clover (Løken 1973). Sladen (1912) also comments upon its close association with this plant.

Distribution

Although formerly widespread and locally common in southern England, this species has experienced a catastrophic decline during the last fifty years and is now considered likely to have become extinct in Britain. The last confirmed specimens were found at Dungeness during 1988.

The species ranges from western Europe eastwards to northern Mongolia. It is known to be declining throughout Europe. It has been introduced to New Zealand as a pollinator of red clover.

Status (in Britain only)

Falk (1991) listed this species as Notable A. Survey work conducted by the Bumblebee working group indicates that its status should be reviewed.

Habitat

A species of herb-rich grassland, having a strong association with the pre-intensification farming systems of lowland Britain.

Flight period

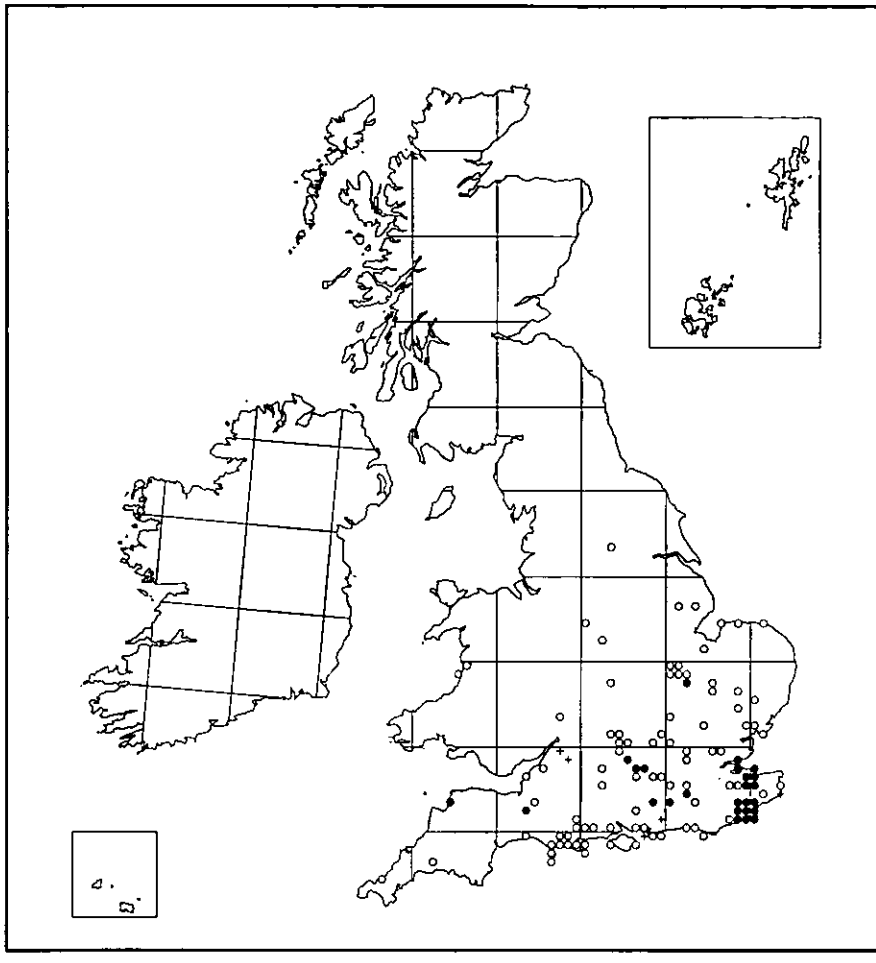
Queens search for nest sites during May. Nests mature during late August or early September (Sladen 1912; Løken 1973; von Hagen 1994).

Pollen collected

No detailed analysis of pollen collected is known, but it is likely that red clover pollen is of particular importance to this species.

Nesting biology

In spring, fertile queens seek out old mouse nests as the foundation for their nests. As this species is closely related to *B. distinguendus*, it is likely that nests situated a short distance underground are preferred. The population size of nests is unknown, but Sladen (1912) comments on the large number of first-brood workers produced by queens. Males and females are produced during August and September. Once the new sexual forms have emerged, the nest disintegrates, the



mated queens go into hibernation whilst the workers and males can be found on flowers before eventually dying. Hibernation sites for queens are unknown.

Flowers visited
Honeysuckle, red clover, viper's-bugloss and white dead-nettle.

Parasites
No cuckoo bumblebees are known to attack this species.

Map compiled by: M Edwards and S P M Roberts.
Author of profile: M Edwards.

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LIST OF PLANT NAMES

The names of plants have been standardised on the *New flora of the British Isles*, second edition (Stace 1997).

Note that in this list, vernacular names of individual species are treated as proper nouns. Collective nouns for genera or other groups of species start with a lower case letter. The old collective term 'umbellifers' is often still used for members of the family now known as the Apiaceae

alder	*Alnus* species
Angelica, Wild	*Angelica sylvestris*
Apple	*Malus domestica*
Aspen	*Populus tremula*
Bent, Bristle	*Agrostis curtisii*
Bird's-foot-trefoil, Common	*Lotus corniculatus*
Blackthorn	*Prunus spinosa*
bramble	*Rubus fruticosus* agg.
Broom	*Cytisus scoparius*
Bryony, White	*Bryonia dioica*
Bugle	*Ajuga reptans*
buttercup	*Ranunculus* subgenus *Ranunculus* species
Buttercup, Bulbous	*Ranunculus bulbosus*
Buttercup, Creeping	*Ranunculus repens*
cabbages	*Brassica* species
Carrot, Wild	*Daucus carota*
cat's-ear	*Hypochaeris* species
Celandine, Lesser	*Ranunculus ficaria*
cherry	*Prunus* species
Cherry, Wild	*Prunus avium*
Chervil, Rough	*Chaerophyllum temulum*
claries	*Salvia* species
clover	*Trifolium* species
Clover, Red	*Trifolium pratense*
Colt's-foot	*Tussilago farfara*
cotoneaster	*Cotoneaster* species
Currant, Black	*Ribes nigrum*
daisies	various genera and species
dandelion	*Taraxacum* species
Dead-nettle, White	*Lamium album*
Dropwort	*Filipendula vulgaris*
Fennel	*Foeniculum vulgare*

Feverfew	*Tanacetum parthenium*
figwort	*Scrophularia* species
fleabane	*Inula* and *Pulicaria* species
Fleabane, Common	*Pulicaria dysenterica*
forget-me-not	*Myosotis* species
Goldenrod	*Solidago virgaurea*
Gooseberry	*Ribes uva-crispa*
gorse	*Ulex* species
Guelder-rose	*Viburnum opulus*
hawkbit	*Leontodon* species
Hawkbit, Autumn	*Leontodon autumnalis*
hawk's-beard	*Crepis* species
hawthorn	*Crataegus* species
Heath, Cross-leaved	*Erica tetralix*
Heather	*Calluna vulgaris*
Heather, Bell	*Erica cinerea*
Hogweed	*Heracleum sphondylium*
honeysuckle	*Lonicera* species
Ivy	*Hedera helix*
mayweed	*Matricaria* and *Tripleurospermum* species
Moor grass, Purple	*Molinia caerulea*
Mignonette, Wild	*Reseda lutea*
mint	*Mentha* species
mustards	Brassicaceae (various genera and species)
oak	*Quercus* species
oxtongue	*Picris* species
Parsnip, Wild	*Pastinaca sativa*
pear	*Pyrus* species
Pimpernel, Bog	*Anagallis tenella*
pine	*Pinus* species
Plum	*Prunus domestica*
ragwort	*Senecio* species
Ragwort, Common	*Senecio jacobaea*
Reed, Common	*Phragmites australis*
roses	*Rosa* species
Sea-holly	*Eryngium maritimum*
Sheep's-bit	*Jasione montana*
Silverweed	*Potentilla anserina*
snowberry	*Symphoricarpos* species
sow-thistle	*Sonchus* species
speedwell	*Veronica* species
Speedwell, Germander	*Veronica chamaedrys*
spurge	*Euphorbia* species

Spurge, Sea	*Euphorbia paralias*
Spurge, Wood	*Euphorbia amygdaloides*
Stonecrop, English	*Sedum anglicum*
Stonecrop, Reflexed	*Sedum rupestre*
strawberry	*Fragaria* species
Sycamore	*Acer pseudoplatanus*
Tansy	*Tanacetum vulgare*
Thistle, Creeping	*Cirsium arvense*
Thistle, Milk	*Silybum marianum*
Thrift	*Armeria maritima*
thyme	*Thymus* species
Tormentil	*Potentilla erecta*
Vetch, Bush	*Vicia sepium*
Vetch, Common	*Vicia sativa*
Vetch, Horseshoe	*Hippocrepis comosa*
Vetch, Tufted	*Vicia cracca*
Viper's-bugloss	*Echium vulgare*
willow	*Salix* species
Willow, Creeping	*Salix repens*
woundwort	*Stachys* species
yarrow	*Achillea millefolium*

CUMULATIVE INDEX TO SPECIES IN PARTS 1 TO 4

Synonyms and misidentification names referred to in the text are listed in italics. Valid names are listed in normal typeface. Species in this part are in bold.

Anoplius infuscatus	3	40
Anoplius nigerrimus	2	44
Anoplius viaticus	3	42
Anthidium manicatum	1	110
Aporus unicolor	1	34
Arachnospila rufa	3	38
Argogorytes fargei	3	90
Argogorytes mystaceus	3	92
Astata boops	2	66
Astata pinguis	2	68
Auplopus carbonarius	1	24
Blepharipus dimidiatus	3	62
Bombus distinguendus	3	124
Bombus humilis	**4**	**120**
Bombus ruderarius	3	126
Bombus rupestris	3	128
Bombus subterraneus	**4**	**122**
Bombus sylvarum	3	130
Caliadurgus fasciatellus	3	32
Ceratina cyanea	1	122
Cerceris arenaria	1	86
Cerceris quadricincta	1	88
Cerceris quinquefasciata	1	90
Cerceris ruficornis	1	92
Cerceris rybyensis	1	94
Cerceris sabulosa	1	96
Ceropales maculata	2	48
Ceropales variegata	1	38
Chrysis fulgida	**4**	**18**
Chrysis osmiae	**4**	**20**
Chrysis pustulosa	**4**	**22**
Chrysis viridula	2	22
Chrysura hirsuta	**4**	**20**
Chrysura radians	**4**	**22**
Coelioxys conoidea	3	116
Colletes cunicularius	1	100
Colletes daviesanus	**4**	**76**
Colletes floralis	1	102
Colletes fodiens	**4**	**78**
Colletes halophilus	1	104
Colletes halophilus	3	94
Colletes hederae	3	94
Colletes marginatus	1	106

Colletes similis	**4**	**80**
Colletes succinctus	3	94
Colletes succinctus	3	96
Crabro binotatus	3	60
Crabro cribrarius	1	62
Crabro dimidiatus	3	62
Crabro peltarius	1	64
Crabro scutellatus	1	66
Crossocerus binotatus	3	60
Crossocerus dimidiatus	3	62
Crossocerus quadrimaculatus	3	64
Crossocerus vagabundus	3	66
Cryptocheilus notatus	1	26
Cuphopterus binotatus	3	60
Cuphopterus dimidiatus	3	62
Dasypoda altercator	2	106
Didineis lunicornis	3	78
Dienoplus tumidus	3	86
Diodontus insidiosus	**4**	**52**
Diodontus luperus	**4**	**54**
Diodontus minutus	**4**	**56**
Diodontus tristis	**4**	**58**
Dolichovespula media	1	58
Dolichovespula norwegica	**4**	**44**
Dolichovespula saxonica	1	60
Dolichovespula sylvestris	**4**	**46**
Dryudella pinguis	2	68
Ectemnius borealis	1	68
Ectemnius cavifrons	1	70
Ectemnius cephalotes	2	78
Ectemnius chrysostomus	2	84
Ectemnius continuus	2	80
Ectemnius dives	2	82
Ectemnius lapidarius	2	84
Ectemnius lituratus	2	86
Ectemnius nigrifrons	2	90
Ectemnius planifrons	2	90
Ectemnius quadricinctus	2	92
Ectemnius rubicola	2	88
Ectemnius ruficornis	2	90
Ectemnius saundersi	2	92
Ectemnius sexcinctus	2	92
Ectemnius zonatus	2	92

Embolemus ruddii	1	14
Entomognathus brevis	3	68
Epeolus cruciger	**4**	**116**
Epeolus variegatus	**4**	**118**
Episyron rufipes	2	46
Eumenes coarctatus	3	44
Euodynerus quadrifasciatus	3	46
Evagetes crassicornis	**4**	**40**
Evagetes dubius	1	28
Evagetes pectinipes	1	30
Evagetes siculus	**4**	**42**
Formica aquilonia	3	30
Formica candida	2	38
Formica exsecta	1	18
Formica lugubris	**4**	**28**
Formica picea	2	38
Formica rufa	1	20
Formica rufibarbis	**4**	**30**
Formica transkaucasica	2	38
Formicoxenus nitidulus	**4**	**26**
Goniozus claripennis	2	16
Gorytes bicinctus	3	84
Gorytes campestris	3	90
Gorytes laticinctus	3	80
Gorytes punctatus	3	88
Gorytes quadrifasciatus	3	82
Gymnomerus laevipes	3	50
Harpactus tumidus	3	86
Hedychridium ardens	2	18
Hedychridium coriaceum	3	14
Hedychridium cupreum	3	16
Hedychridium integrum	3	16
Hedychridium roseum	2	20
Hedychrum aureicolle	**4**	**14**
Hedychrum intermedium	**4**	**16**
Hedychrum niemelai	**4**	**14**
Hedychrum nobile	**4**	**14**
Hedychrum rutilans	**4**	**16**
Homonotus sanguinolentus	1	36
Hoplisoides punctatus	3	88
Hoplitis claviventris	2	122
Hoplitis leucomelana	2	122
Hylaeus brevicornis	3	98

Hylaeus cornutus	3	100
Hylaeus pectoralis	1	108
Lasioglossum angusticeps	**4**	**98**
Lasioglossum brevicorne	**4**	**100**
Lasioglossum laevigatum	**4**	**102**
Lasioglossum prasinum	**4**	**104**
Lasioglossum xanthopum	3	110
Lasioglossum xanthopus	3	110
Lasius brunneus	2	40
Lasius fuliginosus	1	22
Leptothorax acervorum	2	34
Leptothorax albipennis	2	36
Leptothorax tuberum	2	36
Lestiphorus bicinctus	3	84
Macropis europaea	2	108
Megachile maritima	3	114
Melitta dimidiata	2	98
Melitta haemorrhoidalis	2	100
Melitta leporina	2	102
Melitta tricincta	2	104
Mellinus arvensis	2	94
Mellinus crabroneus	2	96
Methocha ichneumonides	2	24
Microdynerus exilis	3	52
Monosapyga clavicornis	2	30
Mutilla europaea	1	16
Myrmica lobicornis	2	32
Myrmica sulcinodis	3	24
Myrmosa atra	2	26
Nomada argentata	3	118
Nomada armata	3	120
Nomada errans	**4**	**108**
Nomada ferruginata	**4**	**110**
Nomada fucata	**4**	**112**
Nomada lathburiana	**4**	**114**
Nomada leucophthalma	3	122
Nomada xanthosticta	**4**	**110**
Nysson dimidiatus	3	70
Nysson interruptus	3	72
Nysson spinosus	3	74
Nysson trimaculatus	3	76
Odynerus melanocephalus	1	40
Odynerus reniformis	1	42

Odynerus simillimus	-	44
Odynerus spinipes	1	46
Osmia aurulenta	2	116
Osmia bicolor	2	118
Osmia inermis	1	114
Osmia parietina	**4**	**106**
Osmia pilicornis	1	116
Osmia rufa	2	120
Osmia uncinata	1	118
Osmia xanthomelana	1	120
Oxybelus argentatus	1	72
Oxybelus mandibularis	1	74
Oxybelus uniglumis	1	76
Passaloecus clypealis	**4**	**60**
Passaloecus corniger	**4**	**62**
Passaloecus eremita	**4**	**64**
Passaloecus gracilis	**4**	**66**
Passaloecus insignis	**4**	**68**
Passaloecus monilicornis	**4**	**70**
Passaloecus singularis	**4**	**72**
Passaloecus turionum	**4**	**74**
Philanthus triangulum	1	98
Podalonia affinis	1	82
Podalonia hirsuta	1	84
Pompilus cinereus	3	34
Priocnemis coriacea	**4**	**32**
Priocnemis perturbator	**4**	**34**
Priocnemis schioedtei	**4**	**36**
Priocnemis susterai	**4**	**38**
Pseudepipona herrichii	3	48
Pseudepipona tomentosus	3	46
Pseudisobrachium subcyaneum	2	14
Pseudocilissa dimidiata	2	98
Sapyga clavicornis	2	30
Sapyga quinquepunctata	3	22
Smicromyrme rufipes	2	28
Sphecodes spinulosus	3	112
Stelis breviuscula	2	110
Stelis ornatula	2	112
Stelis phaeoptera	2	114
Stelis punctulatissima	1	112
Symmorphus bifasciatus	1	48
Symmorphus connexus	-	50

Symmorphus crassicornis		52
Symmorphus gracilis	1	54
Tachysphex nitidus	2	70
Tachysphex obscuripennis	2	72
Tachysphex pompiliformis	2	74
Tachysphex unicolor	2	70
Tachysphex unicolor	2	76
Tapinoma ambiguum	3	28
Tapinoma erraticum	3	28
Tetramorium caespitum	3	26
Tiphia femorata	3	18
Tiphia minuta	3	20
Vespa crabro	1	56
Vespula austriaca	2	64
Vespula germanica	**4**	**48**
Vespula rufa	3	58
Vespula vulgaris	**4**	**50**