The Bees of Lancashire.

Compiled by Michael Birt

A brief introduction

I have keep honey Bees since I was a very small lad. In those days just after World War 2 things were tough and the country was suffering severe hardships.

We used to have, with my grandfather, a small allotment where we use to grow most of our own food, keep chickens, ducks, pigs etc and in doing so had a few bee hive for the honey. After rationing restrictions were lifted my interest in bees continued, more so because they are, as most beekeepers will agree, fascinating insects to watch and work with, and if like me you are lucky , to be able to study them. Hence my long life pleasure in keeping bees. The bees that I have always kept and what all beekeepers keep are *Apis mellifera* or the Western honey bee. As time went by. I became interested in what bumblebees there were visiting our flowers.

All this time I did not realise that in this county of ours we have around 130 plus different species of Bee. Some are very rare to the county, and some have even become extinct . It makes the mind boddle to think that flying around us we have so many bees in this area, all doing a wonderful job of pollination, and just going about there business as nature intended them so to do.

A poem by a famous beekeeper E Warre, also to mind moments of pure joy playing around and studying these lovely little insects.

Before leaving, I would like, dear bees, to carve my name on these leaves, blessed shrub that has taken all its sap from around your dwelling place.
In its shade, I have rested from my weariness, have healed my wounds. Its horizon satisfies my desires for there I can see the heavens.
Its solitude is more gentle than deep. Your friends are visiting it. You enliven it with your singing.
And because you do not die, dear bees, you will sing again and for ever, in the surrounding foliage, where my spirit will rest.

Bearing all this in mind, I decided to look into what we have here in Lancashire and have a go at knocking up this little book in the hope that any reader will have a greater understanding of what we have flying around us and will also, I hope, get some of you out of the chair and see what you can spot.

Its not a scientific paper, I have never intended it to be so, just something that may take the people of this great county we call Lancashire away for the drudgery and into the world around us we call nature.

Hope you enjoy

Michael Birt

Index

Index

Dedication.

This book is dedicated to the following people.

To

Trevor Smith.

A wonderful naturalist and lover of all creatures. Passed away far to early.

To

Jean Fulton

The one who made me smile a lot. Again taken to early.

———————————————————————————————————————

With Thanks.

To Saipin my lovely wife. The one who as put up with me and helped me with her patience and understanding.

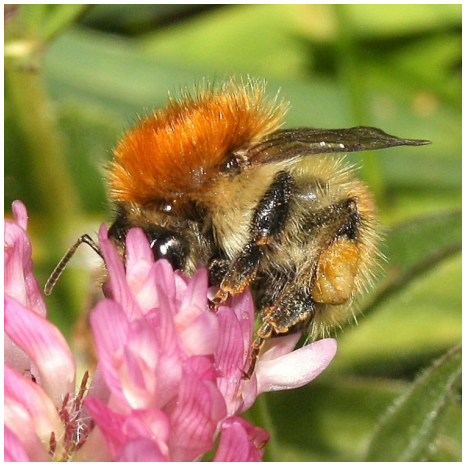
To.

Bill Ainsworth. Dedicated beekeeper, who I can honestly say as forgotten more about beekeeping than I will every know. A very lovely man, who is and always will be, happy to let anyone tap into his vast knowledge of bees.

There are other numerous people that I could mention both passed away and who are still with us, but they know who they are and that will do for me.

Khun Wu, Pui, Jinta, Khun Tee, Guy and Dr Prasert at Big Bee Farm, Banglamung, Thailand for the use of facilities and help.

And finally to Keith Winfield, who, got me, many years ago into beekeeping, and starting me off on this this path of understanding the beauty that is all around us, of which so many people tend to ignore.



A little about Lancashire

The highest point of the modern county council area is Gragareth, near Whernside, which reaches a height of 627 m (2,057 ft). Green Hill near Gragareth has also been cited as the "county" top. of the modern council area. However, the highest point in the historic County Palatine is Coniston Old Man in the Lake District at 803 m (2,634 ft)., which is regarded as the County Top by those who feel the Local Government Act 1972 (enacted 1974) did not abolish the historic county borders of Lancashire.

Lancashire rivers drain westwards from the Pennines into the Irish Sea. Rivers in Lancashire include the Ribble, Wyre and Lune. Their tributaries are the Calder, Darwen, Douglas, Hodder, and Yarrow. The Irwell has its source in Lancashire, high up on the moors of Cliviger.

To the west of the county are the West Lancashire Coastal Plain and the Fylde coastal plain north of the Ribble Estuary. Further north is Morecambe Bay. Apart from the coastal resorts, these areas are largely rural with the land devoted to vegetable crops. In the northwest corner of the county, straddling the border with Cumbria, is the Arnside and Silverdale Area of Outstanding Natural Beauty (AONB), characterised by its limestone pavements and home to the Leighton Moss nature reserve.

To the east of the county are upland areas leading to the Pennines. North of the Ribble is Beacon Fell Country Park and the Forest of Bowland, another AONB. Much of the lowland in this area is devoted to dairy farming and cheesemaking, whereas the higher ground is more suitable for sheep, and the highest ground is uncultivated moorland. The valleys of the River Ribble and its tributary the Calder form a large gap to the west of the Pennines, overlooked by Pendle Hill. Most of the larger Lancashire towns are in these valleys South of the Ribble are the West Pennine Moors and the Forest of Rossendale where former cotton mill towns are in deep valleys. The Lancashire Coalfield, largely in modern-day Greater Manchester, extended into Merseyside and to Ormskirk, Chorley, Burnley and Colne in Lancashire but is now finished.

As far as bees are concerned, Lancashire has a great variety of habitats for the them to flourish, not as many as years ago with the industrial revolution coming and going and then the demand for more and more houses taking away the many places which were once full of all kinds of flora for the bees to forage. Then with farming methods that have changed dramatically over the years taking away vital hedgerows and wildflower meadows only to be replaced by crops that are of little or no value at all to our native bees. What the future holds is uncertain but if it continues, I would say we are on a downwards road, as bees are one of the most important pollinators of all flora not just in Lancashire, but anywhere in the world, and to lose would not just be a crying shame, but also would damage the whole human population due to the loss of food production and our beautiful countryside which sadly most people take for granted. Lets hope something is done to reverse that now fast approaching scenario, and hope that governments both nationally and local can put their best efforts forwards to prevent this happening. As far as you and I and the general public are concerned, plant bee friendly plants in the garden, to some extent let your local MPs know your thoughts and maybe, just maybe, in years to come our children and grandchildren will be able to enjoy what we have today, and with pride know that it was their family members, who made this happen. Support your local Wildlife trust and In Lancashire we have a great one being The Lancashire Wildlife Trust. Get out and go for walks, see what you can spot and enjoy the fresh air, its wonderful and you will live longer too.

I do hope that this little book will give you all, some insight into what a wonderful county we live in, with nature and especially bees in abundance all around us. I get calls from people saying they have bumblebees in part of the house, leave them alone and they will leave you alone, and will be gone by summers end. All they are doing is raising a family and they are such gentle little creatures. Learn your children to respect what most of us take for granted and learn them that without nature and especially bees and other pollinators we will struggle to exist, in fact it will be us humans that will go extinct.

Colletidae Description

Colletidae are a family of bees, and are often referred to collectively as **plasterer bees** or **polyester bees**, due to the method of smoothing the walls of their nest cells with secretions applied with their mouthparts; these secretions dry into a cellophane-like lining. The cells are filled with semi liquid mixture of pollen and nectar with the egg attached to the upper cell wall.

The five subfamilies, 54 genera, and over 2000 species are all evidently solitary, though many nest in aggregations. Two of the subfamilies, Euryglossinae and Hylaeinae, lack the external pollen-carrying apparatus (the scopa) that otherwise characterizes most bees, and instead carry the pollen in their crops.

These groups, and most genera in this family, have liquid or semiliquid pollen masses on which the larvae develop.

A medium sized bee, hairy with short bilobed tongues. All but one of the British species have banded abdomens. Pollen is collected on the femora, tibiae and basitarsi and hind legs and also the sides of the propodeum in impressively large quantities. Most species nest in light soil with some species forming very large aggregations. Forage habitats vary from species to species with some being polylactic with others jus concentrating on a single family (especially Asteraceae) of even a single species of plant as with *C.halophilus* and *C. hederae*. The males usually appear and week so before the females.

They can be found all over the world, but the most species live in South America and Australia. Over 50% of all bee species living in Australia belong to this family. Only the genera *Colletes* and *Hylaeus* can be found in Europe, while in North America, in addition to these two, the genera *Caupolicana*, *Eulonchopria*, and *Ptiloglossa* are found.

There are about 60 species in Europe with 8 residing in the UK .

Here in Lancashire we have recorded 12 species which are as follows

Subfamily Colletidae

Colletes cunicularius ***Colletes daviesanus*** ***Colletes fodiens*** ***Colletes hederae*** ***Colletes marginatus*** ***Colletes succinctus***

Subfamily Hylaeus — yellow-faced bees

Hylaeus brevicornis ***Hylaeus communis*** ***Hylaeus confuses*** ***Hylaeus hyalinatus*** ***Hylaeus pictipes*** ***Hylaeus signatus***

Genus Colletes Description

The genus ***Colletes*** (**plasterer bees**) is a large group of ground-nesting bees of the family Colletidae. They occur primarily in the Northern Hemisphere. They tend to be solitary, but sometimes nest close together in aggregations. Species in the genus build cells in underground nests that are lined with a cellophane-like plastic secretion, a true polyester, earning them the nickname **polyester bees**.

As of 2012 there were about 469 described species, and an estimated total around 700. They occur throughout the world except in Antarctica, Australia, Madagascar, and Southeast Asia. There are about 60 species in Europe and about 100 in North America north of Mexico.

Here in Lancashire we only have recorded up to date 7 species.

These are
Colletes cunicularius
Colletes daviesanus
Colletes fodiens
Colletes hederae
Colletes marginatus
Colletes similis
Colletes succinctus

Colletes on Poppy heads

Colletes cunicularius Linnaeus 1761 (Early Colletes)

Male

Female

Colletes cunicularis, the **vernal colletes** or **Spring mining bee**, is a species of solitary bee from the family Colletidae which is widespread in the Palearctic from Britain to the Pacific Ocean which nests in areas of open, sandy soil.

Description.

With a forewing of 10-11mm in females and 9.5 to 10.5 mm in males making it our largest *Colletes* and the only one with an unbanded, furry abdomen, this being mostly black haired and contrasting with the brown haired thorax.

It can be easily confused with *Andrena scotica* and with the early flight period confuses the matter even more. But if looked at closely you will notice a much smaller antennae than Andrena and also no facial foveae are present.

The males are much smaller, slimmer and with paler hairs than the females and the abdomen can look like there are hair band if viewed from some angles. The abdomen does consist of long hairs but not the dense whitish hairs of other male *Colletes.*

You also get minor size and colour variations with age.

Female Abdomen

Male Abdomen

Habitat and ecology.

Colletes cunicularius is a species associated with sparsely vegetated sandy areas, in Britain it was associated with large, mature coastal sand dunes which were near to areas where creeping willow (*Salix repens*) grows. Bees from Europe tended to be associated with alluvial area where rivers in flood has removed most of the vegetation and in both Britain and Europe this species has colonised man-made habitats such as sand pits. The British population was restricted to areas of dunes where it nests in erosion hollows within old dunes. It is univoltine, i.e. there is one generation per year, and it has a flight period of March to May, sometimes into June, which is earlier than most other species of *Colletes*.
C. cunucularius forages from a wide variety of flowers but in Great Britain, the most important is creeping willow with other species of *Salix* being used if creeping willow is not present. Elsewhere it is much more catholic in the plants it forages from, although in Finland it has also been reported as mainly specialising on willows while in Italy at was recorded as specialising in pollinating species in the family Fabaceae. The male *C. cuniculiaris* are the only species which pollinate two species of sexually deceptive orchids which mimic females bees *Ophrys exaltata* and *Ophrys arachntiiformis*, although they have been recorded as attempting to pseudo copulating with other species in the genus *Ophrys*. To create the nest the female excavates a tunnel into the sand of around 45–55 centimetres (18–22 in) in length which is slightly sloping and has a number of side tunnels towards the deepest part of the tunnel each with a cell at the end. The adult males emerge from the upper cells *en masse* a day before the females, normally in the afternoon. The brood cells are lined with a cellophane-like membrane which is waterproof, has antifungal properties and is thought to aid in the maintenance of the appropriate level of humidity as the bee's larvae develop. The membrane is made from a liquid secreted by the Dufour's gland and the female bee uses her short, two-pronged tongue like a paint brush to smear the oily secretion around the walls of the cells, it then dries into the clear membrane. The females often nest together in large, and noisy, aggregations and when the females first emerge from their cells "mating balls" can be formed as many males try to mate with a single newly emerged female. In Britain this species has no known parasites but on continental Europe the cuckoo bee *Sphecodes albilabris* is a cleptoparasite of this species. And the blister beetle *Apalus bimaculatus* is also recorded as a nest parasite.

Subspecies.

The population of *C. cunicularius* in western Britain is morphologically and biologically distinct from the continental populations and have been given sub specific status as ***C. c. celticus***. The chemistry of the secretions of the Dufour's gland have also now been shown to be distinctive in the British subspecies too.

Male Close up

Female close up

Nesting biology.

The nest comprises a slightly inclined tunnel, some 45-55 cm deep, with cells built at the ends of side branches. These branches are concentrated in the deepest quarter of the nest, so that the vertical distance between the shallowest and deepest cells is only 4-8 cm. The mass emergence of males (from the upper cells) occurs in the afternoon of the day before mass emergence of females. Like all species of *Colletes*, *C. cunicularius* lines its brood cells with a transparent cellophane-like membrane. This is waterproof, resistant to fungal attack and presumably maintains the correct level of humidity during larval development. The source of the membrane is a liquid secretion of the Dufour's gland in the abdomen. The female bee uses her short, bilobed tongue as a kind of paint brush to spread the oily secretion over the internal surface of her cell. It dries to form a clear membrane.

Flowers visited.

In addition to creeping willow, both sexes have been observed in South Glamorgan by R Paxton (pers. comm.) visiting dandelion (*Taraxacum* sp.) flowers, presumably only for nectar. In Brittany, S Roberts has observed both sexes nectaring at blackthorn (*Prunes Spinoza*).

The species we have in Lancashire as a restricted habitat confined to Sefton and the Fylde with 97 recorded siting's. Mostly confined to large mature coastal dunes with abundant willows. Also on inland sandy Heathland and sand pits.

The earliest siting being in 1901. The records and distribution being highly accurate due to the study and research carried out by Phil Smith, Carl Clee and others.

Here in Lancashire.

Here in Lancashire it is restricted to Sefton and the Fylde where it is common. Up to 2018 we have 97 records with the earliest record being pre 1901. Recorded in Large, mature coastal dunes with lots of willows, especially *Salix repens (ss.celticus.* Also found inland on sandy heathland and sand pits. These records being highly accurate due to the intensive study and research by Phil Smith, Carl Clee and others.

Examples of locations where they can be found

Colletes daviesanus (Smith, 1846) (Davies Colletes)

Male

Female

Description.

Fore wing:: Male 6.5 to 7 mm Female5.5 to 6.00 mm. With a shiny, sparsely punctured and hairy tergite 1 of both sexes distinguishes it from other species except *C. Floralis* females which have narrower grey white abdominal bands and black hairs on the thorax top. Males are easily distinguished from all other *Colletes* when under a microscope by checking the sternite 6, which as tufts of long hairs arising from a small prominence in each basal corner. You also get some variation in size which occurs due to wear and tear. 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 Invernesshire. 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 Kilkenny, 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. Virtually ubiquitous in lowland Britain and it is the only *Colletes* regularly observed in urban localities, including private gardens. The flight period is Univoltine; mid June to mid September. Surprisingly there are no records of pollen collection for the British Isles but it is almost certainly oligolectic on Asteraceae, as in Germany (Westrich, 1989). Able to exploit a very wide range of flowering habitats in both inland and coastal locations, it is the main *Colletes* found in arable locations, areas with heavy clay soils, brownfield sites and urban and rural gardens.

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 (e.g. 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). Large nest can be formed in sparsely vegetated dry soil in south facing slopes. It is the only *Colletes* that regularly nest in walls where weathered sandstone or soft mortar is used and present.

Flowers Visited.

Dropwort (*Filipendula vulgaris*), hogweed (*Heracleum sphondylium*), ragwort (*Senecio* species), daisy (*Bellis perennis*), yarrow (*Achillea* species), feverfew (*Tanacetum parthenium*), tansy (*Chrysanthemum vulgare*), creeping thistle (*Cirsium arvense*). Mayweed (*Anthemideae)* yarrow (*Achillea millefolium*) and common fleabane (*Pulicaria dysenterica,). It will also visit a wider range of flowers in search of pollen.*

Here in Lancashire

Here in Lancashire it is locally common as with much of England. It can been seen in urban and rural gardens. It is not as common in Wales and Scotland where it appears to be scarce, and is very rare indeed in Ireland . There are also several records from the channel islands.

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.

Examples of locations where they can be found.

Colletes fodiens (Geoffroy 1785) (Hairy Saddled Colletes)

Female

Male

Description.

Both sexes have a similar forewing size of 5.5mm to 6.00 mm. The female look a lot like *C. similis* when observed in the field, but in hand have while densely haired faces, and the top of the thorax never has the reddish-brown pile of flesh has in *C.similis.* Also under magnification tergite 1 is seen to have to have hairs across the top which is lacking in *C.simiis* but not at the sides. Males are harder to define in the field , but sternite characteristics' is the key to identification under the microscope. There is some variation in size and colour due to wear and loss of facial hair and hair at the top of the tergite 1 in females which can easily result in confusion with *C. similis.*

Widespread in sandy districts in southern and central 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). Widespread in Europe and Asia: Fennoscandia south to Spain, and east to Siberia. Its Flight period is Univoltine; late July to early September. Oligolectic on the pollen of flowers in the family Asteraceae. Especially found at ragwort (*Senecio jacobaea*). *Epeolus variegatus* is recorded as a cleptoparasite (R C L Perkins 1920; Richards 1937). *Epeolus cruciger* may also be cleptoparasite on this species (Richards 1937).

Nesting Biology.

Nests occur in sandy ground but does not seem to form dense nesting aggregates. Strongly associated with sandy areas such as sandpits, sand dunes, shingle sites, soft rock cliffs, vegetated cliffs , acid grasslands and salty march edges and also can be found in and among lowland heathland.

Flowers Visited.

Ragwort (*Senecio jacobaea*), tansy (*Tanacetum vulgare*), fleabane (*Pulicaria dysenterica*), yarrow (*Achillea millefolium*), creeping thistle (*Cirsium arvense*), mayweed (*Matricaria* spp.), hawk's beard (*Crepis capillaris*), bramble (*Rubus fruticosus* agg.), English stonecrop (*Sedum anglicum*), sea spurge (*Euphorbia maritima*), bell heather (*Erica cinerea*), bog pimpernel (*Anagallis tenella*) and sheep's-bit (*Jasione montana*).

Here in Lancashire.

Here in Lancashire it is locally common, around coastal areas. The first unconfirmed record was in 1901 and the latest in 2018, with a total of 20 records up to date. With most of the confirmed records in the Sefton area of the county.

Examples of locations where they can be found.

Colletes hederae. *(Schmidt & Westrich,1993)* (Ivy Bee)

Male

Female

Female above right and male at the left . It's fairly simple to determine *Colletes hederae* – It is a typical *Colletes*, but it can be as large as, or larger than a honeybee, and the banding on the abdomen of fresh specimens has a distinct orange hue. This fades in older specimens. Any large *Colletes* visiting ivy (often in large numbers) in October is likely to be this species. *C. hederae* often occurs in large nesting concentrations in soft, crumbly banks and cliffs. Males may be seen in frenzied mating clusters as they "mob" females emerging from their nests.

Recently added to the list of European bees, being described as new to science in 1993. having been previously misidentified as both *Colletes halophilus* and *C. succinctus* by various authors. It is very closely related to both of these species, especially *C. halophilus*.

A recent arrival in Britain, with the first confirmed records from Dorset in 2001. By 2016, the bee had spread across Southern England and South Wales, northwards and eastwards to colonise most of East Anglia, the Thames and Severn Valleys. The species is now well established in South Wales and in 2014 was recorded in north Wales for the first time. Since the 2016 season, there has seen expansion northwards with new records from Nottinghamshire, Yorkshire, County Durham (Whitburn) and southern Cumbria. Also well known from the Channel Islands with confirmed records from Alderney, Guernsey, Herm, Jersey and Sark. It is widespread elsewhere in western Europe and it appears to be spreading rapidly, with records from Austria, Belgium, Croatia, France (including Corsica), Germany, Greece, Italy (including Sardinia), Luxembourg, The Netherlands, Serbia, Slovenia, Spain and Switzerland. Previous reports from Cyprus are likely to be of the close congener *C. brevigena*

This species is not regarded as being scarce or threatened in Britain

Nesting Biology.

Nesting aggregations are often extensive (containing several thousand nests) and have been encountered in a variety of sites, such as grassy slopes, coastal cliffs, roadside verges and gardens. In October 2006 immense numbers of nest burrows were seen in a number of adjoining gardens in Tisbury, Wiltshire. These were excavated both on lawns and in side beds (pers. obs). O'Toole (pers. comm.) found a dense nesting aggregation in Guernsey in a low earth bank above the beach, well within the spray zone. On the Channel Islands the bee is sometimes considered a pest, as numerous females excavating their nest burrows in roadside banks can lead to slumping of the soil (C O'Toole, pers. comm.).

Males, which generally far outnumber females, occasionally settle to inspect open burrows and, within very dense nesting aggregations commonly attempt copulation with each other. When female bees emerge from burrows they are often pounced upon by a number of males forming conspicuous mating clusters. Most females mate immediately on leaving their nest entrances. There they attract the attention of males that are awaiting such an event. This was demonstrated in dramatic fashion at Brownwich Cliffs, a coastal site on Southampton Water, Hampshire, in September 2010 (G R Else pers. comm.). A huge number of males were flying about the sandy cliff face though no females were immediately obvious. From time to time mating clusters would tumble down the cliff and come to rest on the more or less level ground at the base. There more males would join the cluster. Somewhere in the center was a freshly emerged female that had coupled with one of the males. After some minutes the mated pair would extricate itself and the bees would fly off in tandem. Some clusters, however, consisted only of males, perhaps as many as two dozen. Saxton (2009) describes in detail the sexual behaviour of this species near Hastings, East Sussex.

Bischoff, Eckelt and Kuhlmann (2005) studied in some detail the nesting biology of *C. hederae* in Germany. They found that nesting females utilised old nests and also dug new ones. Four nest burrows of this bee were excavated and studied by these authors. These first ran between 7-12 cm horizontally into a steep face, before turning downwards. The cells were located at a depth of 30-45 cm. Groups of up to four cells branched directly off the main vertical burrow and in most instances side branches were absent. Inland dunes and coastal paths, though probably found wherever its pollen source is firmly established. Often an abundant bee where it does occur (G R Else, pers. obs.). Since initial establishment in the UK in 2001, nesting sites have been found in sparsely vegetated banks and paths, on urban and suburban lawns and grassy areas, roadside verges, golf courses and on soft rock cliffs and undercliffs.

Pollen Colletion

Originally believed to be monolectic on ivy (*Hedera helix*) (Schmidt & Westrich, 1993). Recent work now tells us that the bee is Polylectic with strong preference for *Hedera helix* (Araliaceae). Males have been seen visiting the flowers of *Eryngium amethystinum* (Apiaceae) (Gogala, 1999) and on Jersey, males have been seen visiting *Calluna vulgaris* (Ericaceae) flowers close to a nesting aggregation (B. Bolton, pers. comm.).

Recent evidence suggests that *C. hederae* seems to be more flexible with respect to its pollen hosts than hitherto believed. 2 pollen loads of *C. hederae* from Switzerland were composed of 100% *Odontites* (Orobanchaceae) pollen resp. 65% *Hedera* and 35% Asteraceae pollen; 5 pollen loads from central Italy were composed of: 95% *Calluna* (Ericaceae) and 5% *Hedera*; 95% Asteraceae and 7% *Hedera*; 75% *Hedera* and 25% *Calluna* (Ericaceae); 72% *Hedera*, 15% Asteraceae and 13% *Calluna* (Ericaceae); Asteraceae 82% and *Hedera* 18%. (Müller pers. comm).

Müller & Kuhlmann (2008) list as pollen sources: *Hedera* (Araliaceae), Cichorioideae and Asteroideae (Asteraceae) and *Odontites* (Orobanchaceae) based on 41 pollen loads from 24 different localities.

Westrich (2008) reports similar foraging strategies in southern Germany, particularly early in the season. In the first half of the flight period of the year 2006 the pollen loads contained a high proportion of pollen of Asteraceae (*Aster* type, *Taraxacum* type), Fabaceae (*Melilotus* type, *Medicago* type) and especially Colchicaceae (*Colchicum* type) beside an increasing amount of Araliaceae (*Hedera* type), as time progressed. The most abundant pollen type was identified as *Colchicum autumnale*. Comparing the pollen types with the plant species of the surroundings showed that the females had collected pollen from the following plant species: *Solidago canadensis*, *Cosmea bipinnata* (Asteraceae); *Medicago sativa*, *Melilotus albus*, *Trifolium repens* (Fabaceae); *Colchicum autumnale* (Colchicaceae).

Westrich also observed *Colletes hederae* collecting pollen from non-host pollen sources in southern France, where females foraged at *Odontites viscosus* (Orobanchaceae). In south-western Germany females foraged at *Solidago canadensis* and *Solidago gigantea* (Asteraceae) At these sites Ivy was only partly flowering.

Both sexes visit ivy (*Hedera helix*). On Jersey, males have been observed visiting heather (*Calluna vulgaris*) flowers close to a nesting aggregation of this bee (B Bolton, pers. comm.).

Parasites.

None known in Britain. Elsewhere in Europe the Meloid beetle *Stenoria analis* is a parasite of the bee in the Channel Islands, Belgium and France but has not yet been found in Britain. There is evidence that patrolling males of *C. hederae* hover in front of, and are strongly drawn to, larval aggregations of *S. analis* in a manner reminiscent of approaching flights to emerging, conspecific females. Not only are the male bees strongly attracted by clusters of newly hatched triungulins, but they also attempted copulation (i.e., pseudocopulation) with the latter, which regularly resulted in small groups of triungulins being transferred onto the thorax of the male bees. Decent-sized groups of triungulins were exclusively found on the thorax of male bees, which suggests that triungulins of *S. analis* lure only males of the targeted host species, presumably by mimicking the female pheromonal cues of *C. hederae*. This is the first record of this kind of interaction for the whole West-Palaearctic, and only the second account on sexual deception between blister beetles and wild bees described to date. The triungulin larva of the beetle eventually slip off the bee and consume the food store of nectar and pollen that the female bee has prepared for its larva. (N J Vereecken & G Mahé, 2007).

Flight period

Univoltine; from late August or early September to late October, occasionally the beginning of November.

Here In Lancashire.

A very rare species of bee found in Lancashire with only 5 recordings up to 2020. The first being in 2016. With the species moving up from the south of England, more should be found .

Restricted to Inland dunes and coastal paths - but probably found wherever Ivy is concentrated. Not oligolectic on Ivy but strongly favours the plant

Colletes marginatus (Smith,1846) (Margined Colletes)

Male

Female

Description.

Britain's smallest Colletes (wing length 5mm). Females are compact in build and have a relatively short, dark brown hair pile on the top of the thorax through which the cuticle shines, even in the freshest specimens. The pile on the face is also much sparser than in most other Colletes and also fails to obscure the shining surface (but beware worn individuals of those other species). Tergite 1 is much more densely punctate than *C. daviesanus.*

Males are most easily distinguished by the lack of either lateral pits or lateral hair tufts on sternite 6 combined with dense fringes of white hairs along the hind margins of sternites 2-4 (missing in floralis). The male genitalia can also help confirm this species.

Colletes marginatus is a scarce species mainly recorded from coastal dunes (and the sandy areas of vegetated shingle) as far north as Merseyside. A further cluster of sites occurs in the Brecks of East Anglia, where it likes rabbit-disturbed sandy ground with a good variety of flowers.

This is one of our most polylectic Colletes, visiting a variety of flowers from numerous families, and with no particular attachment to Asteraceae (which are so attractive to species such as *C. daviesanus, fodiens and similis*), though it is known to rely heavily on legumes and brambles for pollen.

Habitat and Ecology.

In Britain this is predominantly a bee of coastal dunes, though it is also quite widespread on grass heaths in East Anglia. Elsewhere, it may be found on light, sandy soils.

Colletes marginatus is most typically associated with the semi-fixed mid dune area of coastal dunes but there are also inland records. This species apparently prefers looser sand than other Colletes species, and in any of these situations flower-rich areas are required for foraging (Falk, 1991). Confirmed records are almost exclusively from southern coasts from Carmarthenshire to West Norfolk.

Flight Period.

This species is Single-brooded; flying from late June to mid-August.

Nesting Biology.

Nesting site in Formby Dunes

Nests of this bee are constructed in burrows excavated in the soil and are not often encountered. They have been reported as occurring in aggregations, though in Hampshire a single burrow entrance in firm, sparsely vegetated sand was found. The depth of the burrow and the arrangement of the cells within it are not known.

Flowers Visited.

Mignonette (*Reseda lutea*), white clover (*Trifolium repens*), sea-holly (*Eryngium maritimum*), parsley water-dropwort (*Oenanthe lachenallii*), cowbane (*Cicuta virosa*), fennel (*Foeniculum officinale*), angelica (*Angelica sylvestris*), wild parsnip (*Pastinaca sativa*), hogweed (*Heracleum sphondylium*), wild carrot (*Daucus carota*), sea spurge (*Euphorbia paralias*), heather (*Calluna vulgaris*), thrift (*Armeria maritima*), dodder (*Cuscuta epithymum*), sheep's-bit (*Jasione montana*), ragwort (*Senecio jacobaea*) and creeping thistle (*Cirsium arvense*). It is not known if these are pollen sources.

Parasites.

It is attacked by a small, early-flying form of *Epeolus cruciger.*

Here in Lancashire

Restricted to the Formby coastal dunes in the Sefton area where up to date only 19 records are shown from 3 sites. The earliest unconfirmed record was recorded in 1954

Colletes similis (Schenck1853) (Bare Saddled Colletes)

Male

Female

Description.

FW. 6-7 female. 5.5– 7 male. Females mostly resemble *C. fodiens* but the worn females of both species can be very difficult to spot. But the pile on the top of the thorax on fresh *C.similis* is reddish brown whereas in *C. fodiens* it is bright orange brown. Tergite 1 is entirely bare over most of its surface. Even basally and the face is never densely haired. Males are not easily recognised in the field , but under the microscope the chrysanthemum pattern of hairs on sternite 3 allows easily identification against all other Colletes. There is some size variation due to wear and tear.

Range

Throughout much of southern Britain, from the Isles of Scilly to Kent, and northwards to Lancashire, South-east Yorkshire and the Isle of Man. In Wales, known from West Glamorgan and Pembrokeshire. Apparently reported in the Channel Islands only from Alderney (Luff 1900, Saunders 1902). In Ireland it is widespread, though mainly coastal, from Louth to Waterford. There are no records from Scotland. 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, the range encompassing southern Sweden to Greece, Spain to Siberia, the Middle East, north Africa (Morocco and Algeria) and Asia Minor. In Britain. 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. Flowery dry habitats are preferred including coastal dunes, soft rock cliffs, heathland, shingle and chalk grasslands Likes brownfield sites but not attracted to sandy soils and not liking clay soils either. On the south-east coast of Ireland, the species flies with *Colletes floralis*, the two often visiting the same flowers.

Flight Period

Univoltine; mid June to mid September.

Pollen Collected.

Not known for the British Isles, so therefore it's the same for Lancashire, though females are strongly attracted to Asteraceae. On the Dorset coast, several females of this bee were apparently collecting pollen from wild carrot (*Daucus carota*) blossom (pers. obs.). Oligolectic on Asteraceae in Germany (Westrich 1989).

Nesting Biology.

Often occurs in small nesting aggregations consisting of only a few closely scattered burrows, generally in level soil.

Flowers Visited.

Although no information is available at the moment of what pollen they obtain. They visit the plants below suggesting that pollen would be gathered from these species.

Wild mignonette (*Reseda lutea*), dropwort (*Filipendula vulgaris*), wild angelica (*Angelica sylvestris*), hogweed (*Heracleum sphondylium*), wild carrot (*Daucus carota*), white bryony (*Bryonia dioica*), spurge (*Euphorbia* species), sheep's-bit (*Jasione montana*), ragwort (*Senecio* species), fleabane (*Inula* and *Pulicaria* species), yarrow (*Achillea* species), tansy (*Tanacetum vulgare*), cat's-ear (*Hypochaeris* species), autumn hawkbit (*Leontodon autumnalis*), creeping thistle (*Cirsium arvense*), milk thistle (*Silybum marianum*) and sow-thistle (*Sonchus* species).

Here in Lancashire.

Here in Lancashire it is restricted to the Fylde coast around the Sefton Area with only 4 records up to date with the earliest being in 1990

Colletes succinctus (Linnaeus, 1758) (Heather Colletes)

Male

Female

Description.

Colletes succinctus is a medium-sized bee which has pale hairs on its clypeus and pale transverse bands on the thorax but with an orange, transparent band on the first tergite. It is similar to two rare related species, the ivy bee (*C. hederea*) and the sea aster mining bee (*C. halophilus*), both of which were identified as separate species from *C. succinctus* in 1993 and 1943 respectively. They are all, however, separated from each other by their ecology. *succinctus* measures 10mm in length. *Colletes succinctus*, the *common colletes* or *heather colletes*, is a species of Palearctic mining bee from the family Colletidae. It is part of the *succinctus* species group within the genus *Colletes* and is especially closely related to the ivy bee (*Colletes hederae*) and the sea aster mining bee (*Colletes halophilus*) which are partially sympatric with *C. succinctus* but ecologically separate.

Habitat

Colletes succinctus is found on heathland and moorland in Britain and also in Europe where there are also some populations which occur among maritime dunes and on beaches. is a widespread bee occurring from the southern part of Ireland and from Portugal east through Europe into Asia, south to Iran and as far east as Tibet. In Britain it is widespread as far north as Orkney. In the southern part of its distribution it becomes more localised and is replaced by other closely related species, for example it is absent from North Africa where it appears to be replaced by *Colletes intricans*, another member of the *succinctus* species group.

Nesting Biology.

Colletes succinctus nest in aggregations which in most of its range are quite small and can be difficult to locate *C. succinctus* as the females will nest singly or in small groups but in northern England and Scotland they may form large, dense aggregations of nests, with one aggregation recorded in North Yorkshire made up of 60-80,000 nests which were counted along 100m of river bank. In such dense aggregations the nests can be separated by just a few centimetres. They are univoltine and the flight period is July to October. In the early part of the fight period the males swarm around the aggregation and try to mate with emerging females. Sometimes a number of males will surround a single female and they will roll around on the ground until one of the males successfully mates with the female. Once the females have mated they start to dig their short burrows and create cells with walls made of a thin and transparent material which resembles cellophane in appearance and which is formed from a secretion produced in the Dufour's gland located in the bee's abdomen.

The main food plants are heathers, especially ling *Calluna vulgaris* and the females have been recorded travelling up to 1.5 km from the nest to collect pollen to provision the cells. They have also been recorded foraging on *Erica*, ivy and Asteraceae as well as melilot (*Melilotus* sp.), yarrow (*Achillea millefolia*) and creeping thistle (*Cirsium arvense*).In Spain it has also been recorded feeding on *Daphne gnidium* and dwarf gorse (*Ulex minor*). Alternative pollen sources to *Calluna vulgaris* are mainly used once the pollen of that species starts to run low in late summer.

In southern Britain this species generally seems to nest singly or in small aggregations. However, in northern England and Scotland, large, compact nesting aggregations are more frequently encountered. Some of these are huge. For example, in North Yorkshire, one containing 60-80,000 nests occurred along a 100 m length of river bank (see photograph in O 'Toole & Raw (1991)). Nest architecture has been illustrated by O'Toole (1986). Winter can be passed in any of the early stages (egg to pupa), though more usually as a prepupa in diapause (C. O'Toole, pers. comm.).

Showing type os soil used for nesting

Flowers Visited.

In common with females, males visit heather and heaths. The bee also flies to melilot (*Melilotus* sp.), yarrow (*Achillea millefolia*) (S Roberts, pers. obs.) and creeping thistle (*Cirsium arvense*).

Pollen Collected.

Oligolectic on heather and heaths (including Cornish heath) in heathland and moorland sites. Females also collect pollen from yellow Asteraceae flowers (Perkins, 1945) and, on the Inch Peninsular, Kerry, exclusively from ragwort (*Senecio jacobaea*), ignoring nearby heather and heaths (C O'Toole, pers. comm.). The species was at one time found nesting at the top of the beach at Luccombe Chine, Isle of Wight: pollen collection was not observed, though heather and heaths were not seen in the vicinity (G R Else, pers. obs.).

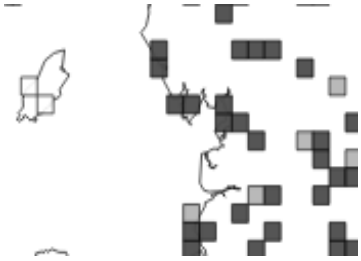
Parasites and predators.

Colletes succinctus nests are commonly cleptoparasitized by the cuckoo bee *Epeolus cruciger*.They may also be parasitized by the sarcophagid fly *Miltogramma punctata* while adults have been recorded as being predated by the crabronid wasp *Cerceris rybyensis*.

Here in Lancashire.

This species as a somewhat restricted habitat confined to heath, moors and dunes.

We have 20 records up to 2020 with the earliest record from 1901.



Family : Colletidae. Sub family: Hylaeinae

Genus: *Hylaeus*

Male

Female

Description.

The genus of bees consists of generally small, black and yellow/white wasp-like species. The resemblance to wasps is enhanced by the absence of a scopa, which is typical among bees.

Hylaeus carry pollen in the crop, rather than externally, and regurgitate it into the cell where it will be used as larval food. Like most colletids, the liquid provisions are sealed inside a membranous cellophane-like cell lining.

Nests are typically in dead twigs or plant stems, or other similarly small natural cavities, rather than constructing or excavating their own nests as in many other bees.

Solitary, small black hairless bees with a short, blunt tongue, bilobed at the tip. Limited yellow or cream markings usually present on the head, thorax and legs. No hairs for carrying pollen, which is carried with nectar in the crop. Aerial nesters usually in dead stems, or in crevices such as old beetle burrows and nail holes in wood. Cells are arranged in a linear series and waterproofed by a cellophane-like material. Each cell with one egg which is laid on a semi-liquid food store of pollen and nectar. One generation a year, usually over-wintering as a diapausing prepupa. Usually polylactic for pollen sources.

Distribution and status.

This is a near cosmopolitan genus with over 500 species identified worldwide. 12 are recorded in the UK but with many more discovered on the near continent it could be that we have more in the Uk and should be looked out for.

A significant diversity of *Hylaeus* is found in Hawai'i — approximately sixty species are recorded as living there. *Hylaeus* are the only bees considered native to the islands and most of those are unique to the island chain; the diversity of this genus is far greater in Hawai'i than in all of mainland North America. Many of them are species of concern, and some recorded there are possibly extinct. For example, *H. finitimus* was last collected 100 years ago, and only ever seen on the island of Kauai. The Hawaiian bee population and diversity is somewhat fluid — within the past ten to twenty years several *Hylaeus* species have been found and identified on the islands as new to science. In October 2016, seven species were officially listed as endangered by U. S. Fish & Wildlife, the first bees to ever be placed on the endangered species list.

UK Nationally: There are 12 species. In Lancashire 4.

Hylaeus brevicornis Nylander 1852 (Short Horned Yellow Face Bee)

Male

Female

Description.

Sexes similar with FW 3.5-4.00mm. Both sexes have a roundish face, but slightly rounder and longer in the male and with a shorter antennae. In females , the facial yellow spots are more narrow than the males, hugging the eye margins and well separated from the sutures

This species and *H. pictipes* are our smallest Hylaeus, with wing lengths not exceeding 4mm. Both species also have rather rounded heads in front view. *H. brevicornis* males can be separated from those of *H. pictipes* by their relatively shorter antennae which feature moderately swollen scapes (unswollen in pictipes). Females of brevicornis also have relatively shorter antennae and the facial spots are relatively narrow and well separated from the mid -facial sutures. Males have a dull abdomen and thorax. There is some variation in the facial spots in the females and also the leg markings on both sexes.

A common species found throughout much of lowland Britain from Kent to the Isles of Scilly, and northwards to Kirkcudbrightshire. There are remarkably few records from Wales, where the species may be under-recorded. Also known from the Isle of Man, Scilly and the Channel Islands. In Ireland it is widely distributed, mainly in the eastern and southern counties. Widely distributed throughout much of Europe, north Africa (see distribution map in Koster (1986a)), the Middle East, the Caucasus, Iran and in Japan (as *H. perforator*).

Habitat and Ecology.

H. brevicornis is a fairly frequent species in southern lowland Britain but becomes scarcer in the north - extending into south Scotland. A wide variety of habitats are exploited including grasslands of various sorts, heathland, brownfield sites, assorted coastal habitats and sometimes gardens. Found in woodland, fenland, calcareous grassland, heathland and on the coast.

Nesting Biology

Specimens have been reared several times from dead bramble (*Rubus*) stem-nests (Danks, 1971; G R Else, pers. obs.). The nesting habits, nests and prepupae have been described in detail by Danks (1971). *H. brevicornis* is a fairly frequent species in southern lowland Britain but becomes scarcer in the north - extending into south Scotland. A wide variety of habitats are exploited including grasslands of various sorts, heathland, brownfield sites, assorted coastal habitats and sometimes gardens. Nesting occurs in hollow plant stems.

Typical nesting site in Bramble

Life Cycle.

Hylaeus brevicornis follows the typical pattern for a solitary species. The flight period is long, May to September and there may be two broods each year. . Nests are built in dead plant stems (bramble is especially flavoured) and are not easy to detect. Females are small and inconspicuous even when foraging as they carry pollen and nectar in their stomach.

Flight Period

A long flight period from Late May to Mid-September.

Flowers Visited.

A variety of flowers are visited with no clear preferences. These include bramble (*Rubus fruticosus* agg.), sea-holly (*Eryngium maritimum*), wild parsnip (*Pastinaca sativa*), hogweed (*Heracleum sphondylium*), wild carrot (*Daucus carota*), sea spurge (*Euphorbia paralias*), bog pimpernel (*Anagallis tenella*), thyme (*Thymus* sp.), sheep's-bit (*Jasione montana*), ragwort (*Senecio jacobaea*), creeping thistle (*Cirsium arvense*) and beaked hawk's-beard (*Crepis vesicaria*).

Pollen Collected.

Polylectic, including dock and species of the families Apiaceae, Fabaceae and Rosaceae (Chambers, 1949; Danks, 1971).

Parasites.

Parasitic and ichneumonid and eurytomid wasps have been reared in their nests

Here in Lancashire

18 records up to date herein Lancashire with the earliest record being in 1908 and the latest in 2015 in a wide range of open and closed habitats. I guess if more work was done lots more records could be obtained from more sites.

Hylaeus communis. (Nylander, 1852) (Common Yellow Faced Bee)

Male **Female**

Both Male and female

Description.

The female can be identified by a combination of the finely striated clypeus, the wedge shaped paraocular (facial) markings and absence of white hair fringes on first gastral tergite. The male has, amongst British species, uniquely shaped paraocular markings, their apices being turned inwards around and above the antennal sockets. FW.4.5-5mm Female. 4.0 to 4.5mm Male. Female like *H.pectoralis* have unique facial triangular facial spots that hug the eye margins and complete lack of any white hair fringes on the hind margin of tergite 1 at the sides.. Males are easily identified from all other Hylaeus species by the distinctive facial patters Some reduced variation in female facial spots. The marking on the males face can also see some variation also. There is also moderate size variation.

Habitat and Ecology.

Generally distributed, having been found in many habitats, including open woodland, grassland and coastal sites. It is often observed in private gardens. Most often encountered at rest on sunlit surfaces (especially dead wood) and visiting umbellifer flowers.

Nesting Biology

An opportunistic cavity-nester, utilising existing burrows of a suitable diameter, particularly in dead wood and woody stems (such as bramble), but also in the soil and crevices in mortar joints.

Flight Period

Apparently univoltine; late May or early June to mid September. However, in parts of Germany this species has a second generation (Häseler, 1972) and this may occur in Britain, but may have been overlooked. It may be bivoltine in the south of the UK

Flowers Visited.

Visits many different plant species for nectar. . Umbellifers, composites and mignonettes are a particular favourite of this bee

Pollen Collected.

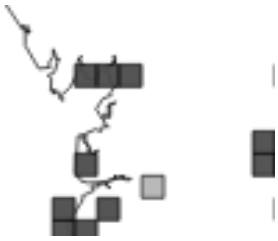
Polylectic, foraging from flowers in the families Apiaceae, Asteraceae, Boraginaceae, Brassicaceae, Campanulaceae, Crassulaceae, Lamiaceae, Liliaceae, Lythraceae, and Resedaceae (Westrich, 1989).

Parasites.

The cleptoparasite aculeate wasp *Sapyga quinquepunctata* (Fabricius) (Sapygidae; see Edwards & Telfer (2001)) has been reared from the nests of *Hylaeus communis* (Hallett, 1928). The gasteruptiid wasp *Gasteruption jaculator* (Linnaeus) and a chalcid wasp in the genus *Coelopencyrtus* (Encyrtidae) have also been reared from nests of this bee in trap nests (C R Vardy, *pers. comm*.)

Here in Lancashire.

A very wide range of habitats including gardens, open areas, woodlands, coasts and grasslands. 23 records to date here in Lancashire the first being 1975 and the latest 2015



Hylaeus confuses (Nylander, 1852) (White Jawed Yellow Faced Bee)

Male and Female

Male Front view

Female front View

Description.

This bee is a very close relative of the scarcer *Hylaeus incongruus* (Förster) (formerly misidentified in Britain as *H. gibbus* (Saunders)) and the females of the two species can be difficult to distinguish apart, although the extent of the yellow facial markings offers the best character for identification. In southern England both species are occasionally found flying together. FW.4.5-5mm female. 4-4.5mm Male. Females like *H.pectoralis* have the unique combination of triangular facial spots that hug the eye margins and also the complete lack of any white hair fringes on the hind margin of tergite 1 at the sides. They are smaller than *H.pectoralis* and with a more compact build and under the microscope you can see a band of sparce punctures occupying the apical third of tergite 1. Males are also easy to distinguish from all other *Hylaeus* species by the face pattern. Marking on males faces differ somewhat. Moderate size variation differs somewhat. With some of the smallest males being no bigger than those males of H.*bravicornis* and *H. pictipes*

Habitat and Ecology.

Mainly associated with open deciduous woodland but it also occurs in bushy places on chalk grassland, heaths, fens and on the coast. And are also the most *Hylaeus* found in gardens.

Nesting Biology.

Nests in a variety of burrows in dead stems and wood; a female has been seen burrowing in the ground. The nest has been described by Wiering (1954). Hollow twigs and stems. Holes in dead wood, timber, walls and cavities. This is the species of *Hylaeus* that make use of garden bee hotels compared to the others.

Flight Period

Presumed to be univoltine in the British Isles, flying from late May to the end of September. However, in France it is reported to be bivoltine, with spring and autumn broods (Janvier, 1972). This may also occur in the British Isles but has not so far been confirmed.

Flowers Visited.

Buttercup, mallow, cabbage, mignonette, bramble, cinquefoil, rose, water-dropwort, hogweed, hedge-parsley, wild carrot, speedwell, sheep's-bit, devil's-bit scabious, creeping thistle and goldenrod.

Pollen Collected.

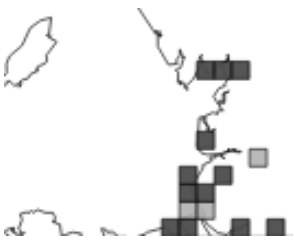
Polylectic, visiting pollen sources in the families Asteraceae, Campanulaceae, Fabaceae, Resedaceae and Rosaceae (Westrich, 1989).

Parasites.

The gasteruptiid wasp *Gasteruption jaculator* (Linnaeus) has been reared from a trap-nest containing a nest of this bee (C.R. Vardy, pers. comm.).

Here in Lancashire.

Rare here in Lancashire with only 4 records up to date. The first record was before 1901 and the last on in 2011. These records were all from the north of the county.



Hylaeus hyalinatus (Smith, 1842) (Hairy Yellow Faced Bee)

Male

Female

Both

Description.

The male has sparse, long, pale hairs on its face and a wide malar space (arrowed - the space between the bottom of the eye and the base of the mandible).

FW : 4-4.5 mm female. 3.5mm –4.5mm males. Female resemble *H. Confusus* and *H.incongruus* but easily recognised with the much longer face. The dense punctures at the sides of tergite 1 are easy to see when identifying in the field where females appear strongly marked. Females appear to be strongly marked, in the bases, pronotal tubercles, front of the tegulae and pronotal collar extensively white marked. Males are easily distinguished from all other Hylaeus species by the long hairs on the face. Both of the sexes have the underside of antennal flagella consciously orange. Females sometimes have the facial spots missing and these also sometimes lack pale markings on the pronotum and tegulae but remain distinguishable by the very long face and dense punctures on the sides of tergite 1.Old male can have the facial hairs largely abraded

Habitat and Ecology.

The species is found throughout much of England and Wales, though scarce in northern England and south-west Scotland. It is found sporadically in Ireland, with a few records from Waterford, Wexford, Wicklow and Kilkenny. It has also been reported from the Isle of Man. There are records from the larger of the Channel Islands: Alderney, Guernsey, Herm, Jersey and Sark. This is a locally common bee found in both coastal in inland parts of the Uk and Lancashire.

The species is very widely distributed throughout much of Europe, from Fennoscandia to Iberia and east to Crete, Turkey and European Russia. It is also known from western Asia (Azerbaijan; Iran) and North Africa (Morocco) (Koster, 1986; Ascher & Pickering, 2012). The species is apparently adventive in eastern North America, with records from southern Ontario, Illinois, Ohio and New York (Ascher & Pickering, 2012). In the UKT the species is not regarded as scarce or threatened.

Nesting Biology.

This bee is found in many kinds of surroundings, including gardens in towns and cities, sand pits, quarries and on the coast (sand dunes, shingle forelands and the bases of cliffs).

Flight Period.

Univoltine; late May to the beginning of September.

Flowers Visited.

White bryony, mock-orange, biting stonecrop, English stonecrop, bramble, silverweed, rose, spurge, bloody crane's-bill, ground-elder, water-dropwort, wild parsnip, hogweed, wild carrot, field bindweed, dodder, thyme, speedwell, hedge veronica, sheep's-bit, creeping thistle, greater knapweed, goldenrod, mayweed, autumn squill and onion.

Pollen Collected.

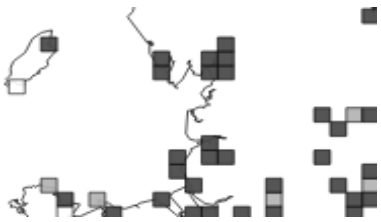
Polylectic, visiting species in the families Apiaceae, Asteraceae, Brassicaceae, Campanulaceae, Crassulaceae, Resedaceae and Rosaceae (Westrich, 1989).

Parasites.

Parasitic Gasteruption wasps

Here in Lancashire.

14 records here in Lancashire. First recorded in 1978 and last record in 2017. Not to frequent a visitor in the part of the UK as in other parts. But it is quite widespread over the county.



Family: Andrenidae. Subfamily :Andrenidae.
Genus *Andrena*
Fabricius, 1775

Andrena, commonly called the **mining bee**, is the largest genus in the family Andrenidae, and is nearly worldwide in distribution, with the notable exceptions of Oceania and South America. With over 1,300 species, it is one of the largest of all bee genera. In Europe there are around 600 species with quite a number present in the near continent and should be watched out for in the UK.

Here in the Britain and the Ireland we have 67 species ranging from the smallest to the largest. Here in Lancashire we have around 31 species

Species are often brown to black with whitish abdominal hair bands, though other colors are possible, most commonly reddish, but also including metallic blue or green.

Body length commonly ranges between 8 and 17 mm with males smaller and more slender than females, which often show a black triangle (the "pygidial plate") at the abdominal apex. In temperate areas, *Andrena* bees (both males and females) emerge from the underground cells where their prepupae spend the winter, when the temperature ranges from about 20 °C to 30 °C. They mate, and the females then seek sites for their nest burrows, where they construct small cells containing a ball of pollen mixed with nectar, upon which an egg is laid, before each cell is sealed. *Andrena* usually prefer sandy soils for a nesting substrate, near or under shrubs to be protected from heat and frost.

Andrena bees can be readily distinguished from most other small bees by the possession of broad velvety areas in between the compound eyes and the antennal bases, called "facial foveae". They also tend to have very long scopal hairs on the hind leg.

Andrena apicata (Smith 1847) (Large Sallow Mining Bee)

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

Male

Female

Description.

FW: 10-11 mm Female. 7-9 mm male. The female are large and furry looking with a dull brownish pile on the thorax and tergite1-4. In the field they can resemble other species such as *A. bimaculate.* The large headed males with long jaws have the combination of a large projection at the base of the mandibles and some black hairs arising from the sides of the propodeum. Females are very constant in their appearance , although older ones can fade and lose the fuzzy appearance.. Male vary in size and is not a reliable separator in the field.

Habitat and Ecology.

Open deciduous woodland and abandoned sand and chalk quarries. Willow rich locations are preferred. They use a variety of soil types.

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 zigzagging up tree trunks and telegraph posts, presumably in their search for receptive females. Both sexes occasionally alight on such surfaces.

Flight Period.

Univoltine; early March to late April, rarely seen in May.

Flowers Visited.

Gorse, sallow and plum. On mainland Europe, the species has been noted visiting alder (*Alnus glutinosa*), colt's-foot (*Tussilago farfara*) and dandelion (*Taraxacum officinale*) flowers (Dylewska, 1987). Males rarely seem to visit flowers, though specimens are commonly dusted with pollen grains, suggesting they do so.

Pollen Collected.

Mainly oligolectic on sallows (*Salix spp*.). In Sussex, the bee has been observed foraging for pollen from gorse (*Ulex europaeus*) (M Edwards, pers. comm.). Chambers (1968) analysed pollen loads of *A. apicata* and found that although most had been collected from sallow, a low percentage had originated from plum (*Prunus sp*.).

Parasites.

The bee *Nomada leucophthalma* (Kirby) is a well known cleptoparasite of this species (Perkins, 1919; Westrich, 1989). Stylopized individuals of the *Andrena* have been reported from Sussex (Perkins, 1919).

Here in Lancashire.

Locally confined to the Morecambe bay area. We have 25 records. First recorded in 1997, the last in 2011. Records are around the Silverdale Fylde and Scorton areas.

Typical quarry nesting site area

Andrena clarkella (Kirby, 1802) (Clarke's Mining Bee)

Male

Female

Description.

This is often the first solitary species of bee to be found in the spring, sometimes flying in mid February. As with many of the early spring bees, *A. clarkella* forages almost exclusively from sallow blossom. The female (above right) is a robust, medium sized mining bee. Fresh specimens are quite distinctive and with experience can be recognised in the field. Almost always found on sallow (*Salix*) flowers in early spring. The face (clypeus) has dense black hairs across its entire width. The thorax has dense, deep reddish-orange hairs across the dorsal surface. The abdomen has dense black hair, particularly on tergites 1 and 2. The hind tibia and basitarsus are yellowish-orange but this colour can often be obscured by pollen collected on the hind legs. **Similar species**: Larger specimens of female *A. bicolor* Fabricius may be taken for this species, but *A. bicolor* has dark hind tibia and basitarsus. The male (above left) is less distinctive, particularly so in older specimens. Very fresh specimens exhibit quite bright orange hair across the top of the thorax, with pale golden hairs on the sides of the thorax, with at least a few black hairs amongst these pale golden hairs. The posterior margin of the gena is almost right angled. Inexperienced students should restrict records to females. FW 10mm-11mm female. 8mm-9mm male

Habitat and Ecology.

Open woodland, heaths, moors and disused sand and gravel pits. Sites with willow rich habitats with sandy soils , sandy brownfield sites , sand pits and healthy woodland.

Nesting Biology.

Nests, which are excavated in the soil, occur either in small clusters (e.g. between the buttress roots of a large tree) or in extensive, dense aggregations on level and sloping ground. Nests have also been discovered in the soil attached to the root-plate of a fallen tree (G R Else, pers. obs.). In woodland, males have a very distinctive flight, zig-zagging up a tree trunk, flying off to a neighbouring tree and repeating the same behaviour. This would seem to be a mate-locating strategy, as females have been observed at rest on trunks, perhaps awaiting the arrival of males. Males also fly low over nesting aggregations.

Flight Period.

Univoltine; mid February to the end of May. The flight period peaks with the flowering of pussy willow. Males sometimes persist until late May. The winter is passed as a freshly emerged adult in its sealed natal cell (Box, 1919; G R Else, pers. obs.).

Flowers Visited.

In addition to the above species this bee has been reported to visit colt's-foot (*Tussilago farfara*) and dandelion (*Taraxacum* sp.) flowers, these two plants probably being only nectar sources. Males of this species are rarely encountered on flowers of any kind. In the former Czechoslovakia, males have been recorded flying to hazel (*Corylus avellana*) catkins in the absence of other flowers (Kocourek, 1966).

Pollen Collected.

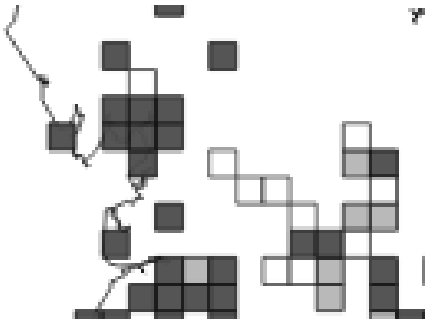
Oligolectic on sallows (*Salix* spp.). Mostly on goat willow and grey willow. Its as also been seen on coats foot and dandelion most probably looking for necter. In an Irish locality it was observed visiting gorse (*Ulex*) blossom (Stelfox, 1927).

Parasites.

The bee *Nomada leucophthalma* (Kirby) is a well-known cleptoparasite of this *Andrena*. Perkins (1919) and Parmenter (Oldroyd, 1969) found puparia of the bee-fly *Bombylius minor* Linnaeus in nests of *A. clarkella*. This might be a misidentification of *B. major* Linnaeus, as *B. minor* flies only in the summer, not in the early spring. The stylopid *Stylops transversus* affects *A. clarkella* in Belgium (Kinzelbach, 1971) and may do so in Britain, though stylopised specimens of this bee are rarely found in this country.

Here in Lancashire.

80 records here in Lancashire with the first record in 1901 and the last in 2018. Widely distributed in Lancashire but most records are from the north of the county.



Nesting site.

Andrena fucata (Smith, 1847) (Painted Mining Bee)

Male.

Female.

Description.

Females most resemble *A. varians* and *A. lapponica* but have a white-haired face, white hair fringes on the sternites ad brown rather than blackish hairs on the pollen brushes of the hind legs.
Males are one of the species with very long mandibles that have a triangular projection at the base. The yellowish-brown hind tarsi and rather long but sparse hair fringes along the hind margins of the sternites help separate them from males of *helvola and lapponica.*

FW: 8.5-9mm female . 7-8mm male. The medium sized females have a reddish brown pile on the thorax and a mainly black abdomen with longer pale hairs on tergite 1 and 2. The males belong to a group of 3 species with the combination of a ventral projection and the base of very long mandibles., antennal segments 3 and 4 of similar length and only pale hairs on the propodeum

Habitat and Ecology.

Woodland rides , heaths edges , moors where woodland is situated nearby and coastal dunes.

Nesting Biology.

The species is reported to nest solitarily (Kocourek, 1966; Dylewska, 1987; Westrich, 1989). However, R.C.L. Perkins (1919) found a small aggregation of about a dozen burrows placed close together.

Flight Period.

Univoltine; mid May to mid July, exceptionally early August.

Flowers Visited.

In addition to the forage species listed above, the bee has also been reported to visit bilberry (*Vaccinium* sp.), hawthorn (*Crataegus* sp.), plum (*Prunus* sp.), water-dropwort (*Oenanthe* sp.), wood spurge (*Euphorbia amygdaloides*) and yellow pimpernel (*Lysimachia nemorum*). Also records have been recorded visiting Roses, Brambles, Raspberries, Currents, Bilberry, Wood Spurge, Umbellifers and Crucifers

Pollen Collected.

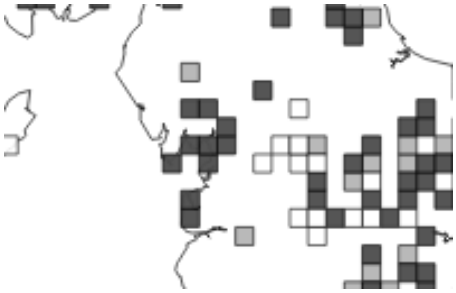
Polylectic. Chambers (1968) lists the following as pollen sources: a buttercup (*Ranunculus* sp.), cinquefoil (*Potentilla* sp.), common rock-rose (*Helianthemum nummularium*), dewberry (*Rubus caesius*), mustard (*Brassica* sp.), raspberry (*Rubus idaeus*), rose (*Rosa* sp.), rough chervil (*Chaerophyllum temulum*), sheep's sorrel (*Rumex acetosella*), speedwell (*Veronica* sp.) and winter-cress (*Barbarea vulgaris*).

Parasites.

Nomada panzeri Lepeletier is a probable cleptoparasite of this species (R.C.L.Perkins, 1919; Westrich, 1989).

Here in Lancashire.

Widespread and common to the county. Most records come from the north of the county. We have 26 records . The earliest in 1975 and the latest in 2018.



Typical Habitat

Andrena fulva (Muller 1766) (Tawny Mining Bee)

Male

Female

Description.

The female of this mining bee is one of the few *Andrena* species which can be instantly recognised in the field as it is clothed dorsally with long, dense, bright reddish hairs. For this reason it is frequently observed by householders when it excavates its nesting burrows in garden lawns. The male, however, is more somber, being clad in sparser reddish-brown hairs, thereby resembling the males of many other species in the genus. FW. 10-11mm female.6.5-9mm male. These bees are honey bee sized and our amongst our most unmistakable with a dark orange furred abdomen and reddish pile on top of the thorax. The head and legs are completely black haired. Females are constant in appearance but males vary considerably in size and large males with a wing length od 1.5mm can sometimes be seen.

Habitat and Ecology.

Found in a great variety of habitats, predominantly open grasslands, including chalk down land, pastures, parks and private gardens; occasionally open woodland. One of the most seen of all the mining bees in urban areas.

Nesting Biology.

Nests usually occur in aggregations which persist for many years. Most of these are established on level soil, preferably with short, sparse vegetation. One extensive aggregation was found in the side of a deep cart rut along a downland path in West Sussex (pers. obs.). The excavated soil forms a conspicuous tumulus in the centre of which is the nest entrance. Lateral burrows radiate away from the shaft of the main burrow at various intervals, each of these terminating in a single cell (see illustrations in O'Toole & Raw, 1991; Paxton & Pohl, 1999). A nest generally contains four or five cells, and a female can build two or three nests (O'Toole & Raw, 1991).

Flight Period.

Univoltine; late March to mid June. Peaking with spring blossoming scrubs.

Flowers Visited.

A wide range of herbs, shrubs and trees including spring flowering shrubs such as Hawthorn, Blackthorn, Maples, Currants and Willows. It will also visit herbaceous plants such as rape, buttercups, dandelions and umbellifers.

Pollen Collected.

Polylectic; sources include beech (*Fagus sylvatica*), blackthorn (*Prunus spinosa*), buttercup (*Ranunculus* sp.), garlic mustard (*Alliaria petiolata*), gooseberry (*Ribes uva-crispa*), hawthorn (*Crataegus monogyna*), holly (*Ilex aquifolium*), maple (*Acer* sp.), oak (*Quercus* sp.), plum (*Prunus domestica*), sallow (*Salix* sp.), sycamore (*Acer pseudoplatanus*) and wayfaring-tree (*Viburnum lantana*) (Chambers, 1968).

Parasites.

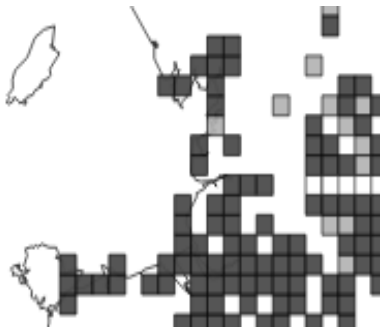
Nomada panzeri Lepeletier and *N. signata* Jurine are cleptoparasites of this bee (Perkins, 1919; Yarrow, 1941; Spooner, 1946; Guichard & Yarrow, 1948; Chambers, 1949; Westrich, 1989; Paxton & Pohl, 1999). In a site in south Wales, *N. panzeri* accounted for 18% cleptoparasitism of *A. fulva* (i.e. 18% of the host's offspring were replaced by *N. panzeri* offspring) (Paxton & Pohl, 1999). Other inquilines encountered in the nests at this site were the bee-fly *Bombylius major* Linnaeus, the anthomyiid fly *Leucophora obtusa* (Zetterstedt) and three mermithid nematodes (one in each of three female bees). In some sites the species is stylopized by *Stylops melittae* Kirby.

Here in Lancashire.

Widespread and common throughout the county. Recorded in gardens, farmland and dunes.

Earliest record is pre 1901 and the latest being in 2018

We have a total of 93 records.



Andrena helvola (Linnaeus, 1758) (Coppice Mining Bee)

Male

Female

Description.

This large *Andrena* is one of a group of three (*A. helvola*, *A. fucata* Smith and *A. synadelpha* Perkins) which are quite similar in appearance, phenology and habitat preferences (all found most often associated with clearings in deciduous woodland during May and June). The males are often seen visiting the flowers of wood spurge, the females at those of hawthorn and field maple. Females of all species have gasters which sport bands of brown pubescence, differing mostly in the density of the hairs. FW. 9-10mm female. 6.5-8.5mm male Females are a medium sized bee with a reddish brown pile on the top of the thorax and an orange or yellowish pile on tergites 1 and 2 which contrast with the greyish or pale buff on tergites 3 and 4. The hind tibiae have pale yellowish brown hairs dorsally and the face is white haired.

The males have a ventral projection at the base of very long mandibles, antennal sections 3 and 4 of similar length and only pale hairs on the propodeum.

Females fairly constant in appearance but males can vary considerably with bigger males more robust and bigger headed than small ones.

Habitat and Ecology.

This species is widely distributed in England and the south coast of Wales. There are several modern records from Scotland and it should be sought elsewhere in this country. It is unknown from Ireland.

It is widely distributed in Europe.

Nesting Biology.

A solitarily nesting species, nesting in wood banks and the edges of woodland rides that receive plenty of sunlight.

Flight Period.

A univoltine April to June. Peaking in May and sometimes but very rarely into August

Flowers Visited.

A wide variety of spring flowering scrubs trees and flowers are visited, perhaps more often the following: wood spurge, field maple, hawthorn and holly. Also herbaceous species such as dandelion and wood Spurge.

Pollen Collected.

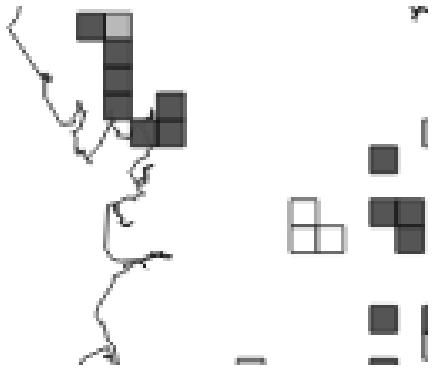
Very widely Polylectic.

Parasites.

Nomada panzeri Lepeletier has been recorded as a cleptoparasite. Stylopised males have been found on several occasions (G R Else and M Edwards, *pers. obs*).

Here in Lancashire.

An uncommon visitor to Lancashire where it is restricted to north of the county and the Brockholes area. Frist recorded in 1901 and the last record in 2018 with 17 recorded so far.



Andrena lapponica (Zetterstedt, 1838) (Bilberry Mining Bee)

Male.

Female

Description.

FW:8.5mm-10mm Female. 7.5mm-8mm Male. The females have a black haired head, reddish brown pile on top of the thorax and a mainly black abdomen. Males have a ventral projection at the base of very long mandible's, antennal segments 3 and 4 or of similar length and only pale hairs of the propodeum. The very short fringes od white hair son the third margins of the sternites and relatively large mandibular projections, allow easy separation form the other (*a. fucata* and *A. helvola*). Females are fairly constant in appearance whereas males can be variable in size.

Habitat and Ecology.

Widely distributed throughout Britain, the range reaching northwards to Golspie, East Ross (Speyside) and West Ross (Beinn Eighe). It includes the Isle of Man but not the Channel Islands. Very local in southern England but more widespread further north and on moors in the south-west. In Ireland it is known from Cork, Wicklow, Dublin and Armagh. Often locally common, though its presence is entirely dependent on the occurrence of its main forage plants. A boreo-alpine species in Europe, widespread in Fennoscandia, more sporadic further south, the range there reaching the Pyrenees and the Romanian Carpathians (Dylewska, 1987). The species is also known from Japan (Tadauchi, Hirashima & Matsumura, 1987). Habitats heathy open woodland both broadleaf and coniferous where there is plenty of bilberry. In upland areas it will use moorland and upland heath areas.

Nesting Biology.

The nest burrows seem to be widely scattered, rather than in close aggregations. Nest can be encountered singularly of in loose aggregations often of the edges of sandy woodland paths and tracks where there is an abundance of sunshine.

Flight Period.

Univoltine; early April to June, occasionally into early July. But will hang on in the north of England and therefore here in Lancashire. The flight period peaks with the flowering of bilberry.

Flowers Visited.

Bilberry (*Vaccinium myrtillus*), blackthorn (*Prunus spinosa*), common dog-violet (*Viola riviniana*), cowberry (*Vacciniumvitis-idaea*), dandelion (*Taraxacum officinale*), gorse (*Ulex europaeus*), rhododendron (*Rhododendron ponticum*), thyme (*Thymus polytrichus*) and willow (*Salix* spp.). Also visits and forages on Hawthorn, Blackthorn, dandelions, violets and Germander Speedwell but possibility only visiting for nectar.

Pollen Collected.

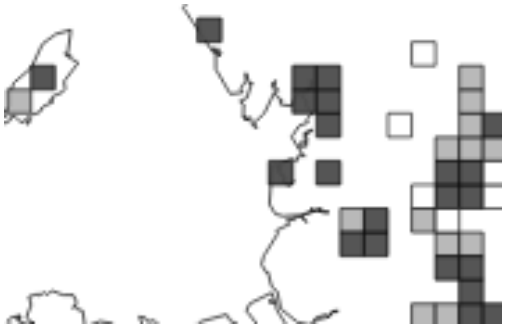
In the British Isles it is mostly associated with bilberry (*Vaccinium myrtillus*), though in northern Britain it additionally visits cowberry (*Vaccinium vitis-idaea*). In Cheshire, Neave (1921) observed the species gathering much pollen from rhododendron (*Rhododendron ponticum*) as well as from bilberry. In Germany, Westrich (1989) reports the species additionally visiting cranberry (*Vaccinium oxycoccos*) and bog bilberry (*Vaccinium uliginosum*) and it is probable it may do so in Britain. He also states that in areas where only bilberry is found, the females will exploit other flowers when the prime forage species is over. For example, females have been observed visiting germander speedwell (*Veronica chamaedrys*) and a dandelion (*Taraxacum* sp.). This may be important, as on a visit to a Hampshire woodland where *A. lapponica* occurred, it was observed that virtually all bilberry flowers had been killed by a severe late frost (pers. obs.).

Parasites.

Nomada panzeri Lepeletier is recorded as a cleptoparasite of this species (Perkins, 1919). The conopid fly *Myopa buccata* (Linnaeus) may be an inquiline of this *Andrena* as in both West Sussex and central Easterness, M. Edwards has encountered this dipteran flying with this bee in sites where other solitary aculeates were scarce.

Here in Lancashire.

Locally common first recorded in 1975 and the latest record in 2018 with 21 records



Andrena praecox (Scopoli,1763) (Small Sallow Mining Bee)

Male

Female

Both

Description.

Andrena praecox and *A. apicata* comprise a closely related species-pair, individuals of which can be difficult to identify (especially with respect to females). In some sites, both species fly together. FW: 9mm-9.5mm female. 6.5mm-8.5mm male. Females are a medium sized furry bee with buff haired abdomen and reddish brown pile on the thorax. They are fairly easy to recognise from other spring flying mining bees in the field. *A. Apicata* is very similar but rather larger and as black hairs on tergite 5. and the apical depression on tergite 4. The big headed long jawed males have the combination of a large projection at the base of the mandibles and black hairs arising from the sides of the propodeum . They can be separated from the very similar males of *A. apicata* by the pale hairs on tergites 3 and 4 (Black on *A.apicata*.) Also the blunter projection on the base of the mandibles and the notched tip to the projection of sternite 8 which is straight ended in *A. apicata.* Females are constant in their appearance but can fade towards the end of their flight season. Males on the other hand vary greatly and unlike females size is not a reliable separator. Large males are also much bigger headed than small males.

Habitat and Ecology.

Heathland and open woodland where there is sufficient sallow to support populations of this bee. They like willow rich habitats including open woodlands, quarries, sandpits, open woodland and brownfield sites.

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 1987). They tend to like south facing slopes.

Flight Period.

Univoltine; early March to the end of April or early May. Males sometimes appearing in late and females hanging on until late May . The bees populations peak with the flowering of pussy willow.

Flowers Visited.

Females have only been seen visiting sallow (*Salix spp*.)catkins, Pussy Willow and Goat Willow, but long leaved willows such as Weeping Willow and can also be visited at some sites. Although males often fly about these blossoms, they rarely seem to visit the flowers for nectar.

Pollen Collected.

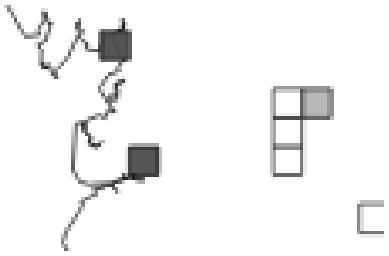
Strongly oligolectic on sallows, although Chambers (1968) also found bulbous buttercup (*Ranunculus bulbosus*) and pear (*Pyrus sp*.) pollens in the pollen load samples he analyzed.

Parasites.

The rare cleptoparasitic bee *Nomada ferruginata* attacks the nests of this species (Perkins 1919; Westrich 1989). Also the early flying conopid fly *(Myopa vicarial)* also seem to target this bee, Specimens are rarely stylopized.

Here in Lancashire.

A very rare bee to Lancashire with only 3 records obtained up to date. Restricted to Throwbarrow quarry in In Silverdale, Carnforth. The first record in 1996 and the last one in 2000



Andrena synadelpha (Perkins 1914) (Broad Margined Mining Bee)

Male

Female

Description.

This large Andrena is one of a group of three (*A. fucata* Smith, *A. helvola* (Linnaeus) and *A.synadelpha*) which are quite similar in appearance, phenology and habitat preferences (all found most often associated with clearings in deciduous woodland during May and June). The males are often seen visiting the flowers of wood spurge, the females at those of hawthorn and field maple. Females of all these species have gasters which sport bands of brown pubescence, differing mostly in the density of the hairs. FW 8.5-9mm Females. 6.5-7 Males. They are very similar to *H. helvola* but the hairs on the hind tibiae dark, and the face is partially or entirely dark haired. They look very similar to all Andrena but can be separated by the apical depressions of tergite 3 and 4. The long jawed males at first resemble males of *A. helvola, H.fucata* and *A lapponica* but lack the projection at the base of the mandibles, in this regard they look like other Andrena but can be distinguished by the presence of black hairs along the inner eye margins and also by the very large apical depressions of the tergites. Variations occurs in females with having black and pale haired faces. Males vary in size with the large ones tending to have a more robust build.

Habitat and Ecology.

Most often found in deciduous woodland on a variety of soil types. Particularly associated with open healthy woodland and heaths, also found on coastal scrubs and down land, well hedges farm land and sometimes seen in urban areas.

Nesting Biology.

Very little as been observed with regards to the nest biology of this species but it seems to occur singular or in loose aggregates in south facing locations such as south sunny facing banks.

Flight Period.

Univoltine flying from April to June.

Flowers Visited.

A wide variety of flowers are visited, perhaps more often the following: field maple, hawthorn, wood spurge and holly. Records include, Blackthorn, Hawthorn, Willows, Maple Roses, Gorse, Broom, Holly, Raspberry, various umbellifers, Wood surge and Dandelions.

Pollen Collected.

A wide variety of plants are visited for their pollen.

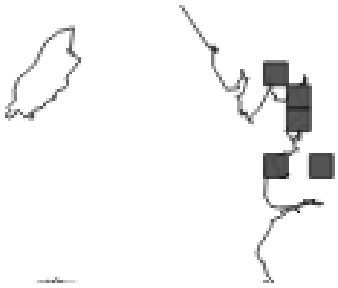
Parasites.

Nomada ruficornis (Linnaeus) has been recorded as a parasite. *Stylops nevinsoni* (Perkins) is also recorded as being found on it

Here in Lancashire.

Restricted in Lancashire to the North of the county., Fylde coast and Wyre where it is an uncommon resident. They have been found in Silverdale and Scorton.

Earliest record in 1996 and the latest in 2002 and a total recording of 13



Andrena humilis (Imhoff, 1832) (Buff Tailed Mining Bee)

Male

Female

Both

Description.

A distinctive, medium-sized Andrena, the female having a coat of golden hairs on the last two tergites. It shares this feature with the slightly smaller *A. fulvago* (Christ), but has dark hind tibiae, rather than pale ones. The male is one of the small group which have bright yellow markings on the clypeus. This species may be quite plentiful where it occurs, usually, but not exclusively, on sandy soils, but is decidedly local. FW.8mm-8.5mm female. 7mm-8.0mm Male. The medium sized females are a uniformed brown black with a conspicuous pile of buff hairs at the top of the abdomen and a buff colored pollen brush on the hind legs. They resemble mostly *H. fulvago* in the field but are duller and have the tibiae dark underneath the buff hairs the males have the surface of the clypeus yellow of white but can be distinguished by the very dull thorax and rough, pustulose surface of tergite 1

Very little variation in both of the sexes.

Habitat and Ecology.

Most often associated with sandy soils, although also known from coastal head deposits where the soils are friable. Likes compact sandy soils, heath land and acid grass land, coastal grass lands , soft rock cliffs, open healthy woodlands, sand pits and sandy brownfield sites. Sometimes found on chalk down land but usually where there is a topping of sandy clay.

Nesting Biology.

May nest colonially or singly in areas of bare, firm, usually sandy, soil exposed to the sun. Likes to nest around footpaths, but also uses vertical banks and slopes Very large nesting aggregates have been noticed.

Flight Period.

Univoltine; May to July.

Flowers Visited.

It seems to restrict all flower visits to yellow-flowered Asteraceae. Likes Cats ear, Mouse eared hawkweed, Hawks beard, Hawks bits and Dandelion.

Pollen Collected.

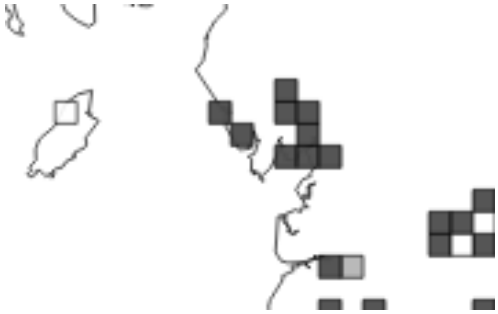
Oligolectic on Asteraceae, it specialises on species which have yellow flowers.

Parasites.

The cleptoparasite bee *Nomada integra* (Brullé) is specifically associated with this species.

Here in Lancashire.

Widespread throughout the county with 11 records. The first being in 1975 and the last in 2016.



Andrena denticulata (Kirby, 1802) (Grey Banded Mining Bee)

Male

Female

Description.

This is a medium-sized *Andrena*, one of a group of five species (*A. denticulata*, *A. fuscipes* (Kirby), *A. nigriceps* (Kirby), *A. simillima* Smith and *A. tridentata* (Kirby)) where the females have distinctive, triangular hind tibiae which do not incurve distally and with a strongly banded appearance to the copiously-haired abdomen. Within the group the species are all rather similar, especially the males. FW. 7.5-8mm female. 6.5-7.5 mm male. The females have greyish, white hair bands on the apical depressions of tergite2 to 4 these being preceded by a short black by a short black pile across the base of the tergites. The face is pale haired and the thorax as a pale pile at the sides but a black on at the top. Males look like small thin females. They have a flange running along the hind margin of the genae which can be seen by viewing the head from the side but also in viewing from the top where the top of each ridge forms an out curved lobe behind the eyes. The abdomen is particularly shiny with narrow whitish hair fringes along the rear margins of tergite 2-4. There are variations in the males with some being very large.

Habitat and Ecology.

May be found in open, grassland habitats where there is a good representation of yellow Asteraceae flowers. It is most often associated with sandy areas including heath lands, costal dunes, Chalk down lands, acid grasslands, clearing in woods and brownfield sites.

Nesting Biology.

Nests singly or in loose aggregates. in the ground in sparse vegetated , often sandy soil

Flight Period.

Univoltine; July to September.

Flowers Visited.

A variety of species of the Asteraceae, especially yellow-flowered ones such as ragwort, thistles, knapweed.

Pollen Collected.

There is disagreement about this species in the published literature. Chambers (1968) gives pollen sources from a wide range of plant species, but Westrich (1989) states that it is oligolectic on the flowers of the Asteraceae.

Parasites.

The cuckoo-bee *Nomada rufipes* Fabricius is a parasite of this species.

Here in Lancashire.

This species is widespread in the county by scarce.

We have only 9 records, the first being in 1995 and the last one in 2017

Andrena fuscipes (Kirby, 1802) (Heather Mining Bee)

Male

Female

Description.

Andrena fuscipes is a medium-sized *Andrena*, one of a group of five species (*A. denticulata*, *A. fuscipes*, *A. nigrceps*, *A. simillima*, *A. tridentata*) where the females have distinctive, triangular hind tibiae which do not incurve distally and with a strongly banded appearance to the copiously-haired abdomen. Within the group the species are all rather similar, especially the males. The silver-grey males may be found in numbers dashing over the tops of flowering heather plants.

FW. 6.5mm-7.00mm females.6.0mm to 6.5 males. A medium sized mining bbe with a short brown pile on the op of the thorax and distinctive bands of buff hairs across the apical depressions of tergites 2 to 4. Female hind tibiae that broaden progressively to their tips, if looking from the side. Males resemble small, slim females and are very similar to *A.simillima* and *A. nigriceps* but are smaller and shorter haired and also with a more strongly banded abdomen.. Both of the sexes have shiny galeae. They are often seen flying along side *Colletes* succinctus but this bee is less hairy and more strongly banded and also with slightly larger females. Moderate variations in size.

Habitat and Ecology.

Very strongly linked to substantial areas of flowering heather. Also dry encaceous heathland, moorland edge where the heather (ling) exists in Lancashire.

Nesting Biology.

Nests singly in areas of bare ground amongst heathers in very loose aggregates and in sandy ground.

Flight Period.

Univoltine: July to September. Peaking with the blooming of the heather (ling) in August.

Flowers Visited.

Males and females are rarely seen at anything other than heather.

Pollen Collected.

Oligolectic on Ericaceae and rarely found with anything other than *Calluna vulgaris* pollen.

Parasites.

The cuckoo-bee *Nomada rufipes* Fabricius parasitises this species.

Here in Lancashire.

A scarce bee here in Lancashire with only 9 records up to date . The first record in 2004 and the latest in 2017

Andrena nigriceps (Kirby,1802) (Black Headed Mining Bee)

Male

Female

Description.

A medium-sized, well-haired mining bee, the female of which has a distinctive banded appearance to the gaster, these bands being made up of paler hairs. It has jet-black facial hairs, which set it apart from females of its close relatives *A. denticulata* (Kirby), *fuscipes* (Kirby), *simillima* Smith and *tridentata* (Kirby). Males have a thickened ridge behind the eyes and ocelli. As in most other members of this group, males are much less frequently seen than females. FW. 7.5mm –9.5mm female. 7mm-8mm male. Female with hind tibiae that progressively broadens towards the tip if looking from the side.. They have a almost a black head and a reddish pile on the top of the thorax which contrast with the orange buff pile below. Tergite 1-4 are densely buff haired but with wedges of black at the anterior corners of tergites 3 and 4. that help to create a banded appearance when the abdomen is extended.. Tergite 5 is black haired. The legs are entirely black and grey haired. And the pollen brush of the hind legs is sooty colored. No other female of Andrena resembles this description. Males have a white haired face, reddish brown pile on top of the thorax and a buff pile on the abdomen that produces weak bands across the apical depressions of the tergites. The galeae are dulled by macrosculpture. There are moderate variations in size and the bandedness of the females abdomen is quite variable and not obvious in others.

Habitat and Ecology.

Associated with flowery grasslands on lighter soils, heathland, soft rock cliffs, brown field sites and costal dunes

Nesting Biology.

Nests singly or in spare aggregates in short turf or bare ground such as footpaths.

Flight Period.

Univoltine; July to late September.

Flowers Visited.

.Recorded as visiting a wide range of later summer-flowering plants including thistle, ragworts, knapweed and tansy and it may visit meadowsweet, brambles sheep's-bit, stonecrops thymes, scabiouses, umbellifers and bedstraws but most probably only for nectar.

Pollen Collected.

Although listed as Polylectic by both Westrich (1989) and Falk (1991), its is often found associated with the flowers of knapweeds.

Parasites.

Nomada rufipes Fabricius is recorded as being associated with *A. nigriceps*, in common with other members of this group of *Andrena*.

Here in Lancashire.

Uncommon and scarce to our region and restricted to the Fylde, Sefton, Billinge Hill and Ashurst beacon areas of the county. We have up to date 10 recordings , the earliest being in 1952 and the latest in 2018.

Andrena bicolor (Fabricius, 1775) (Gwynne's Mining Bee)

Male

Female

Both

Description.

Throughout much of the British Isles, though mainly coastal in Scotland and Ireland. It is also known from the Isle of Man and the Channel Islands. Very widely distributed in the western Palearctic, from Fennoscandia south to Iberia and Corsica, and east to Siberia. It has also been reported from North Africa, Israel and Iran. FW.6-8mm female. 6-7.5 mm male. The males have a reddish brown pile on the top of the thorax, an entirely black haired face and in distinguished bands of long yellowish hairs across the hind margins of tergites 1-3 . The sides of the thorax and femora can be extensively black haired in the spring brood, but no so much so in the summer brood.. The hind tibiae are dark but have conspicuous orange hairs.

Spring males have the head and the sides of the thorax almost entirely of black hairs, and the femora can be extensively black haired.. The top of the thorax is very dull with scarcely discernable punctures, and the tergites have weak punctures. Summer males often have the face partially brown haired and black hairs may be missing from the sides of the thorax. The top of the thorax is shinier and the tergite are more distinctly punctate. Variations occur as stated above betweel spring and summer males.

Habitat and Ecology.

Very catholic in its choice of habitats, occurring for example in open woodland and on calcareous grassland., but one of our most versatile mining bees but does not like high altitudes and shady parts of woods.

Nesting Biology.

Nest burrows are rarely encountered and, in parts of Germany and eastern Europe, the species nests solitarily (Kocourek, 1966; Westrich, 1989). Brood cells have been located at the extreme depth of 101 cm (Malyshev, 1936). Nesting alone or in loose aggregates typically on south facing, banks or slops.

Flight Period.

Bivoltine, the first brood flying from early March to May or June, the second brood from June to late August. Specimens of the first brood are usually locally abundant. However, second brood specimens are far less common and, indeed, males of this brood tend to be extremely elusive.

Flowers Visited.

Lots of species used . The spring generation foraging heavily on spring flowering shrubs and herbaceous plants such as dandelion, daisy, colts-foot, lesser celandine, wood anemone, great stitchwort, forget me knots, speedwells, buttercups, crucifers, daffodils and bluebells. The summer generation visit white bryony, bell flowers, sheeps bit, brambles, cinquefoil's, cranesbill, mallows, thymes and assorted composites and legumes

Pollen Collected.

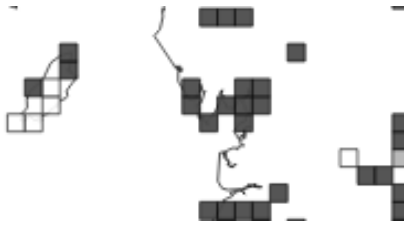
Polylectic. The first brood forages from barren strawberry (*Potentilla sterilis*), bluebell (*Hyacinthoides non-scripa*), butterbur (*Petasites hybridus*), buttercup (*Ranunculus sp*.), daffodil (*Narcissus sp*.), daisy (*Bellis perennis*), dandelion (*Taraxacum officinale*), germander speedwell (*Veronica chamaedrys*), hawthorn (*Crataegus monogyna*), marsh-marigold (*Caltha palustris*), mustard (*Brassica sp*.), primrose (*Primula vulgaris*) and willow (*Salix sp*.). The summer brood has been confirmed as foraging from bramble (*Rubus sp*.), buttercup, cat's-ear (*Hypochaeris radicata*), cinquefoil (*Potentilla sp*.), crane's-bill (*Geranium sp*.), knapweed (*Centauria sp*.), lime (*Tilia sp*.), meadowsweet (*Filipendula ulmaria*), mustard, rose (*Rosa sp*.), thistle (*Cirsium sp*.) and willow herb (*Epilobium sp*.). These pollen sources were identified by pollen samples taken from female bees (Chambers, 1968).

Parasites.

The species is a host of the cleptoparasite *Nomada fabriciana* (Linnaeus) (Perkins, 1919, 1924a, 1924b; Hallett, 1928, 1956; Spooner, 1931; Yarrow, 1941; Chambers, 1949; Westrich 1989). Specimens are occasionally stylopized, possibly by *Stylops gwynanae*, as in eastern Europe and Spain (Noskiewicz & Poluszynski, 1928).

Here in Lancashire.

Very widespread throughout the county with a wide range of habitats. We have 29 records the first being pre 1901 and the latest in 2019



Andrena ruficrus (Nylander,1848) (Northern Mining Bee)

Description.

The solitary bee *Andrena ruficrus* flies in early spring from March to May and sometimes even into early June. As they are such early fliers the adults are typically observed foraging for pollen on the catkins of Willow (Salix species) that flower early in the year. This species of solitary bee nests in areas of sandy bare ground and has been recorded nesting alongside other solitary bees such as *Andrena barbilabris*. They have been recorded in a variety of habitats including scrub and grassland edges, wet heathland and brownfield sites. There are very few records of this species across the UK Belt, *A. ruficrus* is typically recorded nesting at brownfield sites. This species of solitary bee is a UK Red Data Book species. *Andrena ruficrus* is vulnerable as it is restricted to a specialised habitat. It nests on sandy bare ground which is limited in the natural environment due to disturbance, natural succession and habitat loss with the development of sites particularly brownfield sites where the species has been recorded. FW. 8mm female. 7mm males. Females are similar in size to *a. bicolour* and *A. angustior* but have the hind tibiae clear orange in colour. The tergites are also almost bare, and a long dense thoracic pile which is brownish on top but conspicuously whitish on the sides. There is also conspicuous white hairs on the face, genae and femora. The scutum is very dull with inconspicuous punctures Male are nondescript and dark grey brown with the face and the lower genae densely white haired. Zones of black hairs occur alongside the inner eye inner eye margins and at the tops of the genae. Blackish hairs are present on the scutellum and propodeum, and males could therefore be mistaken for *A.praecox*. The hind tarsi and tips of the tibiae are dusky orange. The tergites are entirely dulled by macrosculptures and lack any obvious punctures..

There is very little variation in either of the sexes

Habitat and Ecology.

Associated with sallows and also requiring areas of bare ground in the sun for nesting. Willow rich habitats are preferred, which includedsopen woodland, moorland edge, heathland and brownfield sites.

Nesting Biology.

Nests in small aggregations in sunny patches of bare, or thinly vegetated, soil (N Robinson, *pers. comm*.) The like bases of fruit trees and sandy banks.

Flight Period.

Univoltine; March to June. . Peaking with the blossoming of willows.

Flowers Visited.

Recorded as visiting a wide variety of flowers for nectar but mostly willows of various species. Dandelion is rarely used as a nectar source but may sometimes be used for collecting pollen.

Pollen Collected.

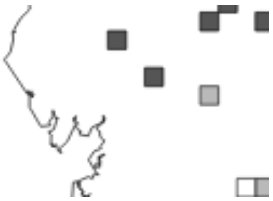
Oligolectic on species of sallow.

Parasites.

No parasites know in the UK but on the continent there is evidence of attacks by *Nomada obscura*

Here in Lancashire.

Restricted the upland areas of the Bolton area where it is rarely seen and only 1 record exists from 2016



Andrena scotica (Perkins, 1916) (Chocolate Mining Bee)

Male.

Female.

Description.

Although usually referred to as scotica in Britain, Schwarz et al. (1996) and Gusenleitner & Schwarz (2002) have treated *scotica* as a synonym of *carantonica* Peréz. However, Else & Edwards (in press), following P. Westrich's (in litt.) interpretation of the type of *carantonica*, regard this is a separate species, with *carantonica* a junior synonym of *trimmerana*. It is one of the larger *Andrena* species, with a generally dark brown abdomen and a contrasting pattern of dark upper and pale lower hairs on the scopa of the hind leg. This species is one of the later emerging spring bees. FW. 9.5-10 mm female. 7.5-9.5 mm male. This honey bee sized females resemble several other species noticeably *A. trimmerana* and the darkest forms of *A. rosae.* Fresh females have a brown haired abdomen and slightly redder brown thorax and look more darker and chocolate colored than *A. trimmerana , A. apicata and A.bimaculata.* Males belong to a group of 3 species with relatively long antennae and where antennal segment 4 is twice as long as segment 3, but they never have red at the sides of the tergites 1 and 2 or on the basal sternites. They also lack the long genal spine the characterize spring males of *A. trimmerana* and *A. rosae.* Variations occur with northern females having more extensive black hairs on the abdomen and face. Second generation females tend to look darker than spring ones and have a slightly shorter body pile. Males can vary considerably in size and giants with a wing span of 10.5 mm are sometimes encountered Sometimes males have a medium sized genal spine but can be separated from spring *A. trimmerana* males by the toothed mandibles, and they are more darker and long haired than spring *A. rosae*

Habitat and Ecology.

Found in a wide range of blossom rich habitats including wooded and open acidic , base rich rural and urban locations.

Nesting Biology.

Nesting occurs singularly or in loose aggregates mainly amongst vegetation and leaf litter on sunny banks and slopes where several females will use single nest entrance.

Flight Period.

Univoltine; April to June. Adult bees over-winter fully emerged in their natal burrows. Occasionally adults are reported in late September and October. These are most likely to be new adults responding to unusual temperature cues. Peaking with the flowering of hawthorns and blackthorns, Sometimes you get a second generation with females hanging on till late august and males appearing as early mid June.

Flowers Visited.

Visits a wide variety of flowers. Notably willows, Blackthorn, Hawthorn, Maples, fruit trees, Crucifers ,Dandelion ,Umbellifers and Rape.

Pollen Collected.

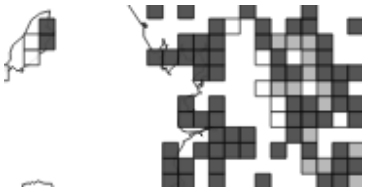
A widely Polylectic species.

Parasites.

Nomada marshamella (Kirby) and *N. flava* Panzer are cleptoparasites of this species. Both males and females may be frequently stylopised by *Stylops aterrimus* Newport.

Here in Lancashire.

A very wide range of habitats found in Lancashire and is very widespread. We have 70 records in the county . The earliest in 1922 and the latest in 2018.



Andrena barbilabris (Kirby, 1802) (Sandpit Mining Bee)

Male

Female

Description.

This medium-sized, spring-flying *Andrena* is strongly associated with loose, dry sandy soils. The females are quite colourful when fresh, but soon become dowdy. The males, which race over the surface of loose sand in the sun, wear out even more quickly and a bright silver-grey insect rapidly becomes a dull browny-black with few obvious hairs. It is closely related to the similar, but smaller and summer-flying, *Andrena argentata* Smith. FW. 7.5mm-8.5mm female. 6.5mm-8.5mm male. The medium sized females have a very furry thorax with a red brown pile above contrasting with yellower hairs on the sides and on the head. The abdomen is fairly shiny with weak whitish hair fringes along the hind margins of tergite 2-4 and a short but distinct pile of semi erect pale hairs between these fringes. The hind margin of tergite 1 has longitudinal creases, a feature also seen in *A. argentata*. The proportionally small head with very pale facial foveae and particular oval abdomen add to its distinguishness in the field. The males can appear silvery in the field because of the white pile on the sides of the thorax. The antennal segment is longer that segment 4 and the hind margins of tergite 1 has longitudinal creases. There is very little variation other than moderate size variation.

Habitat and Ecology.

Strongly associated with light, sandy soils, but widespread on these. They include healthy woodland, heath, soft rock cliffs, dunes, sandy brownfield sites and sandpits.

Nesting Biology.

Nests in the ground, forming small aggregations; usually in patches of loose sand although they also nest between the paving stones in my sandy garden. The females allow the burrow to collapse behind them as they enter and leave, possibly hiding the entrance. The actual nest is made in the firmer sand underneath, so excessive soil disturbance is damaging to the nests. Nests also in rabbit disturbed areas. Males are seen to swarm around the nest in large numbers.

Flight Period.

March to June. It flies later in the north of the UK than it does in the south of the country.

Flowers Visited.

There are flower-visiting records for a wide range of spring-flowering shrubs as well as herbaceous species such as dandelion, willows, hawthorn and blackthorn. Also umbellifer's, crucifers, speedwells and buttercups.

Pollen Collected.

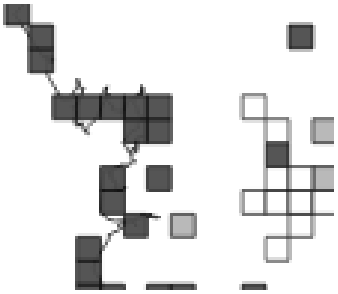
Very widely Polylectic.

Parasites.

Unusually for an *Andrena*, its special cleptoparasite bee is a *Sphecodes – pellucidus* Smith. One is often alerted to its probable presence by the *Sphecodes* flying over loose sand and digging into it as it searches for nest burrows of the *Andrena.*

Here in Lancashire.

A common and widespread bee to our county where we have up to date 33 records. The earliest being in 1922 and the last one in 2017



Andrena marginata (Fabricius,1776) (Small Scabious Mining Bee)

Male

Female

Description.

In common with *Andrena hattorfiana*, the females of *A. marginata* occur in different colour forms. There are three such morphs in *A. marginata*: tergites mainly black or blackish-brown (resembling coloration of males); tergites 2-5 of gaster entirely (or almost entirely) pale orange (female of this form figured by Westrich (1989)); and an intermediate form in which the gastral tergites have orange and black bands. The very dark form is apparently dominant in south-west England and in Ireland (but apparently not in Scotland) FW. 7.5mm female. 6mm male.. The medium sized females can have the abdomen varying from entirely dark to entirely dull red from the hind margins of tergite 1 onwards. A full range of intermediates can occur., although the abdomen never has a sharply defined apex as in *A.labialis*. The top of the thorax has an obvious brown pile. The pollen brush of the hind tibiae is dark haired. The scutum and tergites are polished and punctured, and there are only weak white fringe on the hind margins of the tergites. The males are one of the small number o Andrena species with the clypeus surface white or yellow coloured and can easily be distinguished from other by the out curved points on the lower corners of the clypeus. A flange is present along the hind margins of the genae. The only variations are with females which can have the abdomen varying from entirely dark to entirely dull red from the hind margins of tergite 1 onwards.

Habitat and Ecology.

Calcareous grasslands, heaths, moors, woodland and stabilised coastal dunes.

Nesting Biology.

Nesting occurs in light soils such as short turf and herbage and on the bare grown of tracks and nest are found on both flat and sloping areas. Aggregations of several hundred have been observed in very strong colonies.

Flight Period.

Univoltine; mid July to late September. . Populations associated with devils bit scabious and peaking later than populations using small scabious or field scabious.

Flowers Visited.

Devils bit scabious and peaking later than populations using small scabious or field scabious, the bee visits knapweed (*Centaurea* sp.), nipplewort (*Lapsana communis*) and creeping thistle (*Cirsium arvense*). It is not known if these are pollen or nectar sources but maybe nectar is obtained from brambles knapweeds, thistles meadowsweet and willow herbs.

Pollen Collected.

Polylectic, but strongly associated with devil's-bit scabious (*Succisa pratensis*), field scabious (*Knautia arvensis*) and small scabious (*Scabiosa columbaria*). Also forages from bramble (*Rubus fruticosus* agg.), meadowsweet (*Filipendula ulmaria*) and willowherbs (*Epilobium* sp.) (Chambers, 1968).

Parasites.

The rare *Nomada argentata* is a cleptoparasite of *A. marginata* (Perkins, 1919; Westrich, 1989). The conopid fly *Physocephala rufipes* has been seen apparently ovipositing on this *Andrena* in Norfolk (M Edwards, pers. comm.).

Here in Lancashire.

Very rare species to Lancashire with only 1 recorded in 2017 in the Woolfall Heath area of Knowsley.

Female

Andrena cineraria (Linnaeus, 1758) (Ashy Mining Bee)

Male

Female

Description.

A distinctive *Andrena* species with a bluish-black cuticle and ash-grey hairs on the thorax and propodeum. FW. 10mm-11mm female. 9mm-10mm male. Females with their shiny black abdomen are very distinctive and give a bluish reflection in some lights. A black and grey haired thorax, white haired face and hind legs, almost entirely black haired. Males resemble small, slim females but with more conspicuous whitish hairs to the sides of the thorax, base of the abdomen and femora. The face is mostly white haired but black haired alongside the inner eye margins. Some black hairs hare usually present at the front of the scutellum and at the rear edge of the scutum. Males vary in the amount of grey hairs they have in tergites 1 and 2 with the abdomen mainly black haired in some males.

Habitat and Ecology.

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. A very adaptable species with records from heathland down land ,open woodland, coastal grasslands, cliffs. Quarries, brownfield sites and moorland edges.

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 and when disturbed the burrows are closed. The species overwinters as adults within the natal cells.

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.

Flowers Visited.

Recorded visiting brambles (*Rubus* spp.), cabbages (*Brassica* spp.), cherries (including blackthorn (*Prunus spinosa*) and wild cherry (*Prunus avium*)), dandelion (*Taraxacum officinale*), daisies (*Bellis perennis*) , gorse (*Ulex Europaea*), hogweed (*Heracleum sphondylium*), pears (*Pyrus* spp.), plum (*Prunus* sp.), thrift (*Armeria maritima*), willows (*Salix* spp.) and wood spurge (*Euphorbia amygdaloiodes*). An important pollinator of rape where it is available here in Lancashire.

Pollen Collected.

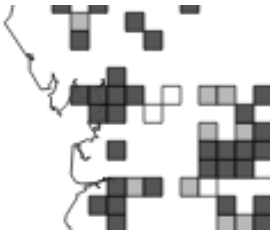
Polylectic including buttercups (*Ranunculus spp.*), mustards (*Brassica spp*.), roses (*Rosa spp.*) and rough chervil (*Chaerophyllum temulum*). In Cumbria females have been seen foraging from silverweed (*Potentilla anserina*) (N A Robinson pers. comm.).

Parasites.

Nomada lathburiana (Kirby) is a cleptoparasite of this bee. G M Spooner (pers. comm.) observed specimens of *N. goodeniana* (Kirby) flying about and entering the nesting burrows of this species at a Dartmoor, Devon site. It is also a major host of the bee fly *Bombyllius discolor* in other areas of the country and possible in Lancashire too.. The canopid fly Myopa pellucida is often found in association and is a suspected parasite.

Here in Lancashire.

Widespread and common here in Lancashire with the first record in 1912 and the last in 2017. With a total up to date of 40 records.



Nest site example

Andrena nigroaenea (Kirby,1802) (Buffish Mining Bee)

Male

Female

Description.

One of the larger *Andrena* species, with a generally dark brown abdomen and contrasting orange hairs on the hind legs and thorax. This species is one of the first to emerge in the spring, males often flying rapidly over areas of bare ground or sitting on dandelion flowers. Since the mid-1990s however, an increasing number of confirmed records of freshly emerged specimens in July point to the presence of a partial (at least) second generation. Whether this has become possible with the increase in duration of higher temperatures for a longer period in our summer is a moot point. FW 10mm-10.5 mm female. 8mm-10mm male. The honey bee sized females have a dense brown pile to the top of the thorax and a paler buff pile on tergite 1 to 4 which contrasts with the black hairs on tergite 5 . The hind tibiae are dark but have dark and neat orange pollen brushes . The head is mostly black haired. Males are mainly brown haired with black hairs across the clypeus and at the sides of the face,. Variation in females which can have entirely black faces or partly brown haired. Males vary in size with extra large ones of wing sizes 11.5 mm are sometimes found.

Habitat and Ecology.

No prefernces and is found in a very wide variety of habitats. It is one of the more frequent mining bees that visit urban environment's and extensive farming areas.

Nesting Biology.

Nests singly in short turf and bare ground such as bare ground and cliff faces. Also between soft mortar of walls. It can be found in large aggregates in some places. Found also in lawns and flowerbeds.

Flight Period.

Univoltine with a flight period from April to June, with a small second generation in July and August.

Flowers Visited.

A wide variety of flowers are visited with much forgoing of flowering fruit and scrubs such as Willows, Gorse, Blackthorn, and Hawthorn. It also visits herbaceous plants such as Dandelions, Hawks –beard, Umbellifers, Crucifers, Buttercups, Mignonettes and Spurges.

Pollen Collected.

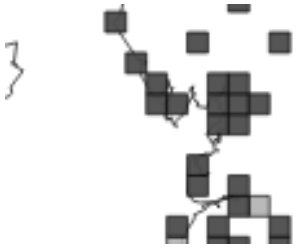
A widely Polylectic species. Collecting pollen from Willows, Gorse, Blackthorn, and Hawthorn. It also visits herbaceous plants such as Dandelions, Hawks –beard, Umbellifers, Crucifers, Buttercups, Mignonettes and Spurges.

Parasites.

Nomada goodeniana (Kirby) is a cleptoparasite on this species along with *N. marshamella*

Here in Lancashire.

Here in Lancashire, the earliest record is in 1975 and the latest in 2019 with a total of 46 records up to date.



Andrena haemorrhoa Fabricius 1791 (Orange-tailed Mining Bee)

Male

Female

Description.

This *Andrena* is a very widespread, spring-flying species. Females are very distinctive, with a bright, foxy-coloured covering of hairs on the thorax and a similarly-coloured tuft of hairs at the tip of the abdomen, which is otherwise almost completely hairless and shining black. In common with most other *Andrena* the males are much less distinctive. However, close examination with a hand lens will reveal a dark brown spot in the middle of the otherwise orange-brown hind tibia. The thorax in fresh examples is also covered in foxy-coloured hairs, but these are much less bright than those of the females. FW:8mm to 10mm females. 7mm to 9mm males. Females average a little smaller than the honey bee and a very distinctive with a , brick red pile on the top of the thorax and a dull, slate black abdomen, with bright orange hairs at the tip and very coursley puntate tergites. The face is whiteish haired with very pale facial foveae. The hind tibiae are yellow. Males are smaller and much less distinctive than the females but have buff pile on the face and sides of the thorax, and a brighter brown pile on top of the thorax and the tip of the abdomen The hind tibiae and tarsa are mostly orange and the tibiae usually have a dark patch beneath halfway along.. There is variation in the males which vary in size with the larger ones more robust . Old worn females can at the end of the season have bare and black thoraxes at the top.

Habitat and Ecology.

There appear to be no habitat restrictions for this species, beyond mountainous regions; even there it can be found in the valleys. It is one of the most common of mining bees found in urban environment's and intensively farmed areas where It can stand quite heavy clays,

Nesting Biology.

This species nests singly in short swards, and along the sides of trackways. Also in south facing grassy slopes and banks.

Flight Period.

Univoltine with a long flight period lasting from March to June. Peaking later in the north of the UK.

Flowers Visited.

Foraging mostly on flowering, blossoming scrubs such as willows and the *Prunus* species, Gorse, Hawthorne's, Maples and fruit trees. It will also use herbaceous plants such as Spurges, Dandelions Coldsfoot, Rape, Buttercups Etc.

Pollen Collected.

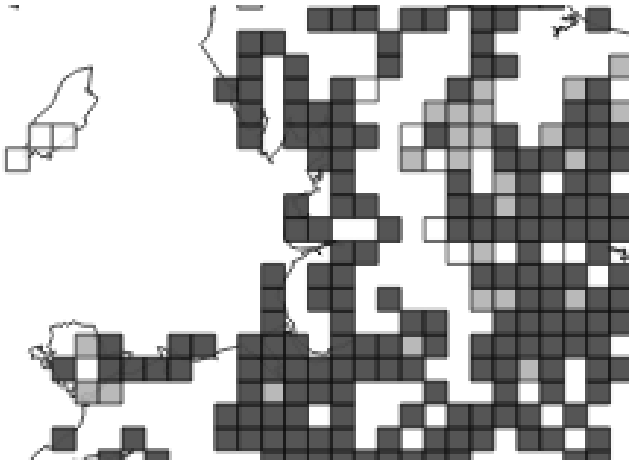
Widely polylectic. Collecting pollen from Willows, Gorse, Blackthorn, and Hawthorn. It also visits herbaceous plants such as Dandelions, Hawks –beard, Umbellifers, Crucifers, Buttercups, Mignonettes and Spurges.

Parasites.

Nomada ruficornis (Linnaeus) is the special cleptoparasite of this bee.

Here in Lancashire.

Widespread and common here in the county. Up to date we have 78 records, the first being in 1925 and the latest in 2019



Andrena nitida (Müller,1776) (Grey-patched mining Bee)

Male

Female

Both

Description.

There has been considerable confusion over the correct name to apply to this distinctive spring flying species,

A. nitida or *A. pubescens*. It is a large *Andrena* with, when fresh, bright, foxy-brown hair on the thorax and a polished black abdomen. Females have thin apical side-bars of white pubescence on abdominal segments 1-3, and males have copious white facial hair, especially on the clypeus.

FW. 9.5mm-12.5mm female. 8.5mm-10mm male. The females are a little larger than the honey bee and have a bright reddish pile on the top of the thorax, that contrast with the black, shiny abdomen. Patches of white hairs which look grey on tergites1-2, white haired femora, a paler pile on the thorax and a face that is substantially white haired. Males have a white haired face but with black hairs alongside the inner eye margins. The top of the thorax has a bright orange pile and the abdomen is polished black with distinctive punctures. Sparse bands of white hairs occur across the bases of tergites 2 and 3. There is moderate size variation and you sometimes get giant males with an 11mm wing length. Te face of the female varies from entirely black haired to mainly white haired. Older individuals show a dull brown thorax and the pales hairs to the tergites can become abraded.

Habitat and Ecology.

May be found in a variety of open grassland habitats where there is spring flowering scrubs including fairly intensely farmed areas and urban locations.

Nesting Biology.

This species nests among short to medium-length grassland; there is no obvious preference for areas of bare ground. Nests are always well-dispersed. Likes flat or sloped turfs, formal lawns and sheep grazed hillsides.

Flight Period.

Univoltine: April to June peaking in April and May.

Flowers Visited.

There are no strong preferences in the flowers visited, both males and females can be found quite high up on blackthorn (*Prunus spinosa*) and down low on dandelions (*Taraxacum officinale*). They tend to visit spring flowering plants such as willows, Gorse, Blackthorn, Cherries, hawthorn and maples. Also a visitor to herbaceous flowers such as dandelions, Colts foot, Umbellifer's, Speedwells, Rape, Raspberries and Hawks beard.

Pollen Collected.

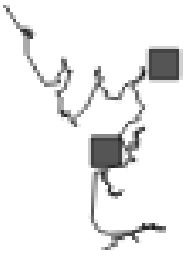
Widely Polylectic.

Parasites.

It is possible that the cuckoo-bee Nomada goodeniana parasitises this species. It is known to be parasitised by the *Strepsipteran Stylops melittae*, but this is not very frequent.

Here in Lancashire.

Widespread but rare with only 5 records up to date. First recorded in 1935 but this could be a mistake and the latest record in 2018. It was confined to costal areas but is now more widespread in the county.



Andrena minutula (Kirby,1802) (Common Mini Miner)

Male

Female

Description.

This is perhaps the most frequently encountered species of the subgenus *Micrandrena* in the British Isles. The bee is widely distributed throughout Britain from the south coast of England northwards to southern Scotland (Kirkcudbrightshire). The species was recorded for the first time in the Isle of Man as recently as 2009 (S M Crellin, pers. comm.). It is sporadic in Ireland, with records from Kilkenny, Carlow, Wicklow and Dublin (Stelfox, 1927). On the Channel Islands it occurs on Jersey, Herm and Guernsey (Richards, 1979; Archer, 1996); also Sark (Beavis, 2000). FW. 4.5mm-5 mm female. 4mm-5mm male. The most common mini-miner in lowland Britain. The females are one of 3 species with the tergites almost entirely dulled by macrosculpture and no obvious punctures. The rather obvious and dense punctures of the scutum separated by about there own diameter help to distinguish it from *A. Subopaca* and *A.minutuloides.* The hind margins of tergites2-3 have obvious lateral hair fringes and the front of the scutellum is less shiny than in *A.minutuloides.* Males of the spring generation usually have a face extensively black haired and with inconspicuous punctures on a very dull scutum. Those of the summer generation look a lot different with a pale haired face and both the scutum and tergites shinier and more obviously punctured. Variation occur in spring males occasionally with them having a white haired face with black hairs restricted to the areas around the antennal and insertion points . There is also some variation within each generation in the strength of the punctures of the male scutum. Variation in both older sexes with losing the hair fringes of the tergites. Females sometime have the antennal flagella reddish.

Habitat and Ecology.

Generally distributed, occurring for example in open woodland, grassland, coastal sites and in gardens.

Nesting Biology.

Despite the local abundance of this bee, its nests are not often found. In mainland Europe it is reported to nest solitarily (Dylewska, 1987) and the same behaviour may exist in the Britain and the Channel Islands. Noted here to nest in loose aggregates in dry soil but it is noted that a range of soil types are used.

Flight Period.

Bivoltine; the spring brood flies from mid March to early June, the summer one from late June or early July to the end of September. Females found in early June are impossible to know if they are of the spring or summer generation.

Flowers Visited.

Both broods visit the flowers and scrubs of many species

Pollen Collected.

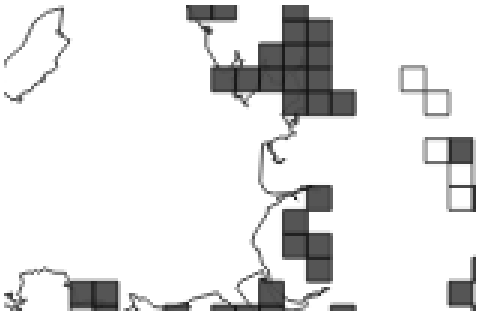
The species is broadly Polylectic, visiting species in numerous families (Westrich, 1989).

Parasites.

Several authors regard this bee as being the host of the common cleptoparasite bee *Nomada flavoguttata* (Kirby) (e.g. Perkins, 1919; Westrich, 1989). Individual bees are sometimes stylopised by *Stylops spreta* Perkins (Strepsiptera).

Here in Lancashire.

Widespread and common and considered much under recorded. We up to date only 25 records . The earliest in 1901 and the latest in 2018



Andrena semilaevis (Pérez,1903) (Shiny margined Mini minor)

Male

Female

Description.

This species was formerly known by the name *Andrena saundersella* (Perkins, 1914), now treated as a synonym of *semilaevis* Pérez. FW. 5mm-5.5 mm female. 4.5mm-5mm male. In both sexes this species can be easily recognised by the strongly defined shiny apical depressions of the tergites 2-4 and especially tergites 3 and 4. The sculpturing at the top of the propodeum is also distinctive, with a rogues basal area that contrasts with a more granular area beyond. Females have the top of the thorax and face shiner than *A.minutula* , a paler stigma and more conspicuous orange hairs at the top of the abdomen. Males have facial hairs longer and whiter than *A.minutula* . A paler stigma and dull scutum with sparser punctures amongst the macrosculpture. There is little variation noted.

Habitat and Ecology.

Generally distributed, occurring for example in open woodland, grassland and coastal sites.

Nesting Biology.

Not known in detail. Stelfox (1927), when describing the habits of this bee in an Irish context, simply states that it nests in dry sunny slopes and banks. Kocourek (1966) reports that in eastern Europe the species nests solitarily in loamy soil. Presumed to be similar to *A.minutula*

Flight Period.

Usually credited as being univoltine, with a peak in numbers in late spring (May). However, there are many records of specimens being recorded during the summer (as late as August) so it is possible that in some locations the species is bivoltine, with a smaller summer brood.

Flowers Visited.

The bee visits numerous flower species but is perhaps most closely associated with speedwell and umbellifers.

Pollen Collected.

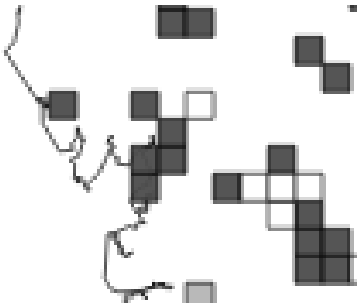
Polylectic. Westrich (1989) lists the families Apiaceae, Asteraceae and Scrophulariaceae as being pollen sources.

Parasites.

Nests are attacked by the cleptoparasite *Nomada flavoguttata* (Kirby) (Perkins, 1919; Kocourek, 1966). Some individuals are stylopised by *Stylops spreta* Perkins (Strepsiptera).

Here in Lancashire.

Much under recorded here in the county but known to be widespread. First recorded in 1975 with the latest being in 2016 with only 9 records.



Andrena subopaca (Nylander,1848) (Impunctate Mini miner)

Male

Female

Description.

FW: 4.5mm to 5.5 mm female.4.5mm to 5 mm male. Females are similar looking to *A.minutula* but have a very dull scutum and scutellum with the punctures so shallow that they are difficult to discern. (no other female mini miner has punctures this faint). Also the punctures on the clypeus are sparser. Males have a similar scutum and scutellum and so resemble first generation male *A.minutula* but never have black hairs on the face.. The male abdomen tends to be more ovate and less elongate than *A.minutula* with the apical depressions less well defined. Little variation noted.

Habitat and Ecology.

Occurs in various habitats but is perhaps most closely associated with open deciduous woodland. This bee is mostly found in upland areas than any other mini-minor. It also likes rides and clearings in woods.

Nesting Biology.

Nests are rarely encountered. Kocourek (1966) and Westrich (1989) describe the species as nesting in small aggregations in sparsely grassed banks.

Flight Period.

Generally regarded as univoltine, flying from late April to June. However, there are a few authentic summer records from June to September. These may represent a partial second brood. With the first brood being the strongest

Flowers Visited.

A wide range of species have been recorded: buttercup, lesser stitchwort, a willow, a cabbage, bilberry, tormentil, trailing tormentil, a strawberry, hawthorn, a spurge, small-flowered crane's-bill, a water-dropwort, germander speedwell, sheep's-bit, a dandelion, daisy, oxeye daisy, a squill. No real preference to any, unlike other mini-miners.

Pollen Collected.

Polylectic, foraging from species in the families Caryophyllaceae, Liliaceae, Rosaceae and Scrophulariaceae (Westrich, 1989).

Parasites.

Nomada flavoguttata (Kirby) is a cleptoparasite of this species. Individuals are occasionally stylopised by *Stylops spreta* Perkins (Strepsiptera).

Here in Lancashire.

Widespread across the county but well unrecorded . The first record was in 1975 and the last in 2015 with 16 records up to date.

Andrena chrysosceles (Kirby, 1802) (Hawthorn Mining Bee)

Male

Female

Description.

The females of this medium-sized *Andrena* can be found very commonly in late spring, often visiting the flowers of early umbellifers. Typical specimens are fairly easily recognised in the field: the male has a yellow clypeus with two small black dots at the sides, the female has a shining black abdomen with thin white hair lines at the apices of the segments and a tuft of brown-gold hairs at the tip. The scopa on the hind leg is a bright golden colour. Unfortunately, this happy state of affairs is often upset by the high frequency of stylopised specimens, where all manner of mixtures of male and female characters may occur. Confusion is most likely with female *Andrena fulvago* . However, that species flies a little later, from mid June onwards, and visits composites only. FW: 6.6 to 8.5mm female. 6-7mm male. Variation in males which can have the hind tibiae mostly orange or only orange at the tip and they also vary somewhat is size.

Habitat and Ecology.

Occurs in a range of habitats, but especially at the edges of woodland and in woodland clearings and rides, scrubby grassland, quarries, heathland hedge and other brownfield sites. Sometime seen in gardens and formal green spaces on clay soils.

Nesting Biology.

A solitarily nesting species or in loose aggregates, which is rarely observed. Nests in south facing slopes and hedge banks.

Flight Period.

Univoltine. Flying from late March to early July and even later than that in the north of the uk. Peaking with the blossoming of Hawthorn and Cow parsley..

Flowers Visited.

A wide range of late-spring flowers and trees. Also umbellifers, crucifers, dandelion, ox eyed daisies, buttercups and speedwell.

Pollen Collected.

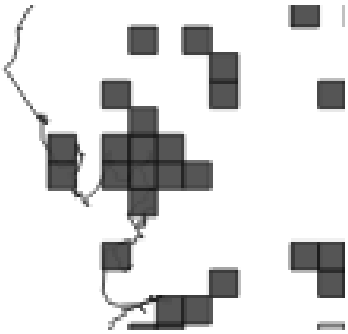
Widely Polylectic.

Parasites.

This species is often parasitised by *Stylops hammella* Perkins (Strepsiptera). . Possibly Nomada fabriciana. This is one of the most frequently stylopised of all mining bees, with stylopised intersexes often appearing in early spring before the rest of the population.

Here in Lancashire.

Widespread and common. The first record was in 1977 and the latest in 2018 with a total of 25 records up to date.



Andrena coitana (Kirby, 1802) (Small Flecked Mining Bee)

Male

Female

Description.

FW: 6.5-7mm female. 5.5-6.5mm male. A small dark looking species with narrow white hair fringes along the hind margins of tergites2 to 4 in both sexes. The pollen brushes of the females hind tibiae are dark haired above. Similar looking to *A. nitidiusculla* but *A. nitidiusculla* has a whitish pollen brush and looking from the top a more transverse head and rearward projecting propodeum . Smaller one could also be confused with the smaller group on mini-minor *Andrena* bees but the others have pale pollen brushes on the hind legs and much paler facial foveae. Males are one of several *Andrena* species with the surface of the face white or yellow but can easily be distinguished by the extent of the whitish facial markings which extend onto the lower face outside the boundaries of the clypeus, combined with a shiny thorax and black abdomen.

Habitat and Ecology.

Open, healthy woodland, moorland edge , commons, down land, fens and coastal grassland habitats on predominantly base poor soils.

Nesting Biology.

A rarely observed species with regards to nesting habits but appears to nest solitary in light soils. One found in deep shade in a wood was excavated below loose moss, the clay spoil being built up to form a pipe through the moss (Chambers, 1949). In Ireland, nests have been observed in dry, gravelly flats alongside rivers (Stelfox, 1927)

Flight Period.

Univoltine; from mid May and early June to the end of August. Peaking later in the north of the UK.

Flowers Visited.

Preferences are unclear but records include cat's ear (*Hypocaeris radicata*), common tormentil (*Potentilla erecta*), evening primrose (*Oenothera* spp.), lesser spearwort (*Ranunculus flammula*), lesser stitchwort (*Stellaria graminea*), mallow (*Malva* spp.), nipplewort (*Lapsana communis*), ragwort (*Senecio* spp.) and wild angelica (*Angelica sylvestris*).

Pollen Collected.

Polylectic, foraging from bramble (*Rubus* spp.), harebell (*Campanula rotundifolia*), hawkbit (*Leontodon* spp.), hawk's-beard (*Crepis* spp.), hogweed (*Heracleum sphondylium*), knapweed (*Centaurea* spp.) and thistles (*Cirsium* spp.) (Chambers, 1968).

Widely polylectic. *Nomada obtusifrons* is a cleptoparasite of this bee (Perkins, 1919, 1924a, 1924b; Hallett, 1928); perhaps also *N. roberjeotiana* (Westrich, 1989). Apparently no stylopized specimens of *Andrena coitana* have been reported.

Parasites.

Nomada obtusifrons Nylander is a cleptoparasite of this bee (Perkins, 1919, 1924a, 1924b; Hallett, 1928); perhaps also *N. roberjeotiana* Panzer (Westrich, 1989). Apparently no stylopized specimens of *Andrena coitana* have been reported.

Here in Lancashire.

A rare species and scarce in Lancashire with records from Blackburn , Dalton and Carnforth where they seen to be restricted. 9 records up to date with the first in 1975 and the latest in 2017

Andrena angustior (Kirby, 1802) (Groove –faced mining Bee)

Male.

Female.

Description.

A smallish Andrena. Females closely resemble A. bicolor but usually have whitish-haired faces and never have black hairs on the femora or sides of the thorax. Females occasionally have the face mainly black-haired. Check the upper clypeus for a longitudinal groove (never present in bicolor) and the broader apical depressions of tergites 2-4.

Males are rather nondescript with a whitish-haired face (usually with a row of black hairs alongside the inner eye orbits), a very dull and scarcely punctate scutum which bears a brown pile, and a shiny abdomen with weak macrosculpture and weak punctures. The jowls are unusually deep (creating sharply angled hind corners to the head and a deeply concave hind margin in top view) and antennal segment 3 is 1.5 times as long as segment 4 which rules out most other similar-sized males.

Habitat and Ecology.

A range of habitats, but especially at the edges of woodlands and in open healthy woodland clearings on light soils Usually in base poor soils. Soft rock cliffs. Coastal grasslands and heathland and sometime brownfield sites.

Nesting Biology.

A solitary nesting species, but has been reported in small aggregations, along sandy paths and in south facing slopes.

Flight Period.

Late April to mid June. Usually peaking with the Hawthorn blossoms

Flowers Visited.

A wide range of late-spring flowers including spring blossoms such as hawthorn, roses. And herbaceous plants such as Bluebell, Wood Spurge Speedwell, Bilberry, Dandelion, Daisy Various Umbellifers and Crucifers.

Pollen Collected.

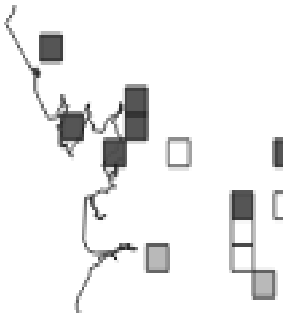
Widely Polylectic.

Parasites.

Nomada fabriciana (Linnaeus) has been reported as an associate, but this is an association with the burrows rather than a rearing record.

Here in Lancashire.

Very scarce and rarely recorded here in Lancashire with the earliest record being in 1975 and the latest in 2017 with only 9 records up to date. It also has a restricted habitat.



Andrena ovatula (Kirby,1802) (Small Gorse Mining Bee)

Male.

Female.

Both

Description.

A member of the subgenus *Taeniandrena*, represented in Britain by four species, *A. ovatula* is a very close relative of *A. wilkella* (Kirby) and is easily confused with that species, especially in the field. The two species are perhaps most readily distinguished in both sexes by the entire hair band on the third gastral tergite of *A. ovatula* (medially interrupted in *A. wilkella*) FW. 7-7.5mm female. 5-7mm male. The medium sized females have a short brown pile to the top of the thorax, an abdomen that is mainly hairless but with white hair fringes along the hind margins of tergites 2 to 4 and usually orange or partly orange hind tibiae. The resemble closely small dusky *A.wilkella,* but the abdomen is proportionally smaller with a brown haired tip. The top of the thorax has a darker pile and the white hair fringes of tergites of 2-4 are better formed, with that of tergite 3 continuous The hind tibiae and their pollen brushes are usually a dull buff orange and darkened at the base. The males have complete hair fringes on the hind margins of both tergites 2 and 4 and that of tergite 2 only narrowly broken in the middle The antenna are relatively short with the individual flagellar segments less elongated. There is varation in the hind tibiae of females from all orange to completely dark and in males vary somewhat in size, and some have hind tibiae partially pale.

Habitat and Ecology.

In contrast to its close sibling species, A. wilkella, this bee has a marked preference for gravelly or dry sandy soils, such as heaths and, on the coast, dunes, landslips and cliffs. Like to be around gorse such as healthland coastal grasslands and soft rock cliffs.

Nesting Biology.

First brood: willow, blackthorn, pear, kidney vetch, common bird's-foot-trefoil, gorse, ground-ivy, germander speedwell, dandelion. Second brood: thrift, bell heather, bramble, rest-harrow, gorse, thyme, sheep's-bit.

Flight Period.

Generally bivoltine; end of March to late May or June, and again from June to mid September. However, its flight times in the year may be more complex. Chambers (1949) states that in Bedfordshire the first brood sometimes fails. Perkins (1919) was not certain whether there is a univoltine race that appears between the first and second generations of the more common form.

Flowers Visited.

First brood: willow, blackthorn, pear, kidney vetch, common bird's-foot-trefoil, gorse, ground-ivy, germander speedwell, dandelion.

Second brood: thrift, bell heather, bramble, rest-harrow, gorse, thyme, sheep's-bit.

Pollen Collected.

Polylectic, gathering pollen from species in the families Fabaceae, Asteraceae and Brassicaceae (Westrich, 1989). In the British Isles, pollen sources are only known for the second brood: heather, white clover and red clover (Chambers, 1968).

Parasites.

No Nomada is known as a cleptoparasite of this species. Individuals are occasionally stylopised by *Stylops thwaitei* Saunders (Perkins, 1918).

Here in Lancashire.

Restricted to Blackburn and Whalley, this species is rare in Lancashire. First recorded in 1975 and lastly in 1978 with only 2 records up to date. These 2 worn specimens can be seen in Manchester museum

Andrena wilkella (Kirby,1802) (Wilke,s Mining Bee)

Male

Female

Description.

FW. 7-8mm with both sexes being similar.A close relative of *A. ovatula* (Kirby) and best separated from it by the broken hair -band in both sexes on the third gastral tergite (particularly obvious in the female). Females are one of several medium-sized mining bees featuring the combination of yellow hind tibiae and largely hairless tergites 2-4 with narrow fringes of white hairs along the hind margins. Compared with A. ovatula, it averages slightly larger and broader with the tip of the abdomen orange-haired (rather than brown-haired), the hairs on top of the thorax paler brown and the white hair fringe of tergite 3 usually clearly broken centrally. A. similis has denser, redder hairs on the thorax and the white hair fringes of tergites 2 and 3 much more widely separated.

Males closely resemble those of *A.ovatula* but have the white hair fringe on the hind margins of tergites 3 broken centrally and the antennae are relatively longer with the individual flagellar segments more elongate.

Habitat and Ecology.

Andrena wilkella is univoltine, flying from April to July and peaking between the two generations of ovatula. It is widespread and locally common over much of the British Isles and occurs in a variety of legume-rich habitats, especially unimproved grasslands, heathland, brownfield sites and soft rock cliffs. Pollen is obtained from legumes such as bird's-foot trefoils, clovers, vetches and gorses though it will use other types of flowers for nectar.

Nesting Biology.

Females nest either singly (Chambers, 1949) or in huge, compact aggregations (Perkins, 1919). The species over-winters as a larva or prepupa (Meidell, 1967). Males are often seen flying in large numbers about the foliage of bushes and trees. A range of soils are used including heavy clays.

Flight Period.

Generally considered to be a univoltine species, flying in the spring from April to June. However, records in July and August (sometimes including individuals in freshly emerged condition) may indicate a partial second brood. A similar situation involving late summer activity has been noted in the former Czechoslovakia (Kocourek, 1966).

Flowers Visited.

Sea campion, sheep's sorrel, thrift, willow, mustard, cherry, hawthorn, sainfoin, common bird's-foot-trefoil, tufted vetch, bush vetch, broad bean, melilot, white clover, red clover, broom, spurge, gorse, alder buckthorn, maple, water-dropwort, bogbean, speedwell, dandelion, ragwort, unidentified grasses.

Pollen Collected.

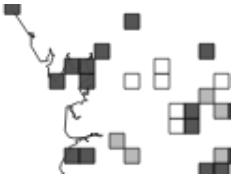
Oligolectic on Fabaceae (Westrich, 1989). However, Chambers (1968) analysed pollens from British females and found these bees to possess polylectic tendencies (although strongly biased towards Fabaceae). Flowers from which he identified pollens were as follows: sheep's sorrel, willow, mustard, sainfoin, common bird's-foot-trefoil, bush vetch, broad bean, melilot, white clover, red clover, broom, gorse, maple and unidentified grasses.

Parasites.

Nomada striata Fabricius is a cleptoparasite of this species. Specimens of *A. wilkella* are often stylopised, apparently by *Stylops thwaitei* Saunders. This stylops may be the species that Perkins (1918) called *Stylops wilkella*. Formerly these affected bees were misidentified, being given the name *Andrena convexiuscula* Kirby (e.g. Smith, 1855). Such stylopised bees tend to fly earlier in the flight period than unaffected individuals. In Norway, Meidell (1967) observed male Stylops (species not cited) emerging from a female *A. wilkella*.

Here in Lancashire.

Widespread and common in the county, first recorded in 1921 and the latest in 2018 with a total of 21 records up to date.



Andrena tarsata Nylander,1848 (Tormentil Mining Bee)

Male

Female.

Description.

This is a small (A. bicolor-sized), dark Andrena. Females have bright orange hind tibiae and tarsi. The abdomen is shiny black with weak whitish hair bands. The top of the thorax is black-haired but the sides have longer pale grey hairs. This creates a fairly distinctive appearance in the field.

Males are slimmer without such conspicuously orange hind legs. They have a whitish clypeus that usually bears two black lateral spots. Males of A. coitana look rather similar but the whitish facial markings extend outside of the clypeus onto the lower parts of the face. FW 6-7mm female. 6-6.5 mm males. Females have a three toothed mandible which is a unique feature within the group. Like others in the group, the males have the surface of the clypeus yellow or white but are easily distinguished by the presence of black hairs on top of the thorax and the partly orange tarsi. Both the thorax and the abdomen are shiny with with fine distinct puncture's. There is little variation in either sexes.

Habitat and Ecology.

Andrena tarsata is widely recorded in Britain but shows a strong preference for heathland and moorland districts. Strongly associated with heathland edge and open healthy woodland but also found on down land, coastal scrub and sometime urban locations as well, but with poor or rocky soils.. . *A. tarsata* has declined in many parts of its range and is a Section 41 species subject to a JNCC data sheet:

Nesting Biology.

Apparently nests in compact aggregations (Perkins 1919), though these are very rarely encountered. Nesting tends to occur in loose aggregations on bare footpaths and tracks plus south-facing slopes and banks.

Flight Period.

Univoltine; mid June to late August

Flowers Visited.

Bramble (*Rubus spp*.), harebell (*Campanula rotundifolia*), heather (*Calluna vulgaris*), wild angelica (*Angelica sylvestris*) and yarrow (*Achillea millefolium*). though other plants are visited for nectar.

Pollen Collected.

Oligolectic on tormentil; bridewort (*Spiraea sp*.) has been reported by Chambers (1968). Other plants are visited for nectar.

Parasites.

Nomada roberjeotiana is a cleptoparasite of this species (Perkins 1919). Stylopized specimens of *A. tarsata* have not been found.

Here in Lancashire.

Restricted to areas of West Lancashire and East Lancashire but with a wide range of habitats. First recorded in 1975 with the last record up to date in 2018 with a total of 10 records throughout the county.

Andrena haemorrhoa (Fabricius, 1781) (Orange Tailed mining Bee)

Description.

Halictus rubicundus This *Andrena* is a very widespread, spring-flying species. Females are very distinctive, with a bright, foxy-coloured covering of hairs on the thorax and a similarly-coloured tuft of hairs at the tip of the abdomen, which is otherwise almost completely hairless and shining black. In common with most other *Andrena* the males are much less distinctive. However, close examination with a hand lens will reveal a dark brown spot in the middle of the otherwise orange-brown hind tibia. The thorax in fresh examples is also covered in foxy-coloured hairs, but these are much less bright than those of the females. FW. 8-10mm female. 7-9mm male. A little smaller than the honey bee and are distinguished by a very neat brick red pile on the top of the thorax and a dull, slate black abdomen with bright orange hairs at the tip and also very punctate tergites. The face is whiteish haired with a very pale facial foveae and the hind tibiae are yellow. Males are smaller and much less distinctive but have a buff pile on the face and sides of the thorax, and a brighter brown pile on the top of the thorax and the tip of the abdomen. The hind tibiae and tarsi are mostly orange. Male vary considerably in size and the larger ones are more rebust. Old worn females have the top of the thorax bare and black can frequent towards the end of the flight season.

Habitat and Ecology.

There appear to be no habitat restrictions for this species, beyond mountainous regions; even there it can be found in the valleys. This is a widespread and locally common species (scarcer in the north).

Nesting Biology.

This species nests singly in short swards, and along the sides of trackways. Mostly in south facing, grassy slopes and banks.

Flight Period.

A long flight period from March to June. Peaking later in the north.

Flowers Visited.

Lots of foraging from blossoming scrubs such as willows, gorse, hawthorns, maples and fruit trees. It will also visit herbaceous plants such as colts-foot, dandelion, greater stitchwort, wood anemone, cow parsley, rape, buttercups spurges and mignonettes.

Pollen Collected.

Widely Polylectic.

Parasites.

Nomada ruficornis is the special cleptoparasite of this bee.

Here in Lancashire.

A very wide range of habitats across the county . First recorded in 1925 with the latest recording in 2019 and a total up to date of 78 records.

Halictidae.

is the second-largest family of Apoidea bees.

Halictid species occur all over the world and are usually dark-colored and often metallic in appearance. Several species are all or partly green and a few are red; a number of them have yellow markings, especially the males, which commonly have yellow faces, a pattern widespread among the various families of bees. The family is distinguished by the arcuate (strongly curved) basal vein found on the wing.

They are commonly referred to as "**sweat bees**" (especially the smaller species), as they are often attracted to perspiration. They are only likely to sting if disturbed; the sting is minor.

Most halictids nest in the ground, though a few nest in wood, and they mass-provision their young (a mass of pollen and nectar is formed inside a waterproof cell, an egg laid upon it, and the cell sealed off, so the larva is given all of its food at one time, as opposed to "progressive provisioning", where a larva is fed repeatedly as it grows, as in honey bees). All species (except for kleptoparasites) are pollen feeders and may be important pollinators.

Many species in the subfamily Halictinae are eusocial at least in part, such as *Lasioglossum malachurum* or *Halictus rubicundus*, with fairly well-defined queen and worker castes (though not the same as the caste system in honey bees), and certain manifestations of their social behavior appear to be facultative in various lineages. Those species who do not have a permanent, rigid, division of labor, such as *Lasioglossum zephyrus*, are considered primitively eusocial. Another example of a primitive eusocial bee species from this family is the *Halictus ligatus* species, for which aggression is one of the most influential behavioral attitudes for establishing hierarchy and social organization within the colony.[Primitively eusocial species such as these provide insight into the early evolution of eusociality. *Halictus sexcinctus*, which exhibits social, communal, and eusocial organization, provides insight into the evolutionary reversal of eusociality. Phylogenetic data from this species suggests that a communal strategy serves as a transitional step between eusociality and a reversion back to solitary nesting.

Several genera and species of halictids are kleptoparasites of other bees (mostly other halictids), and the behavior has evolved at least nine times independently within the family. The most well-known and common are species in the genus *Sphecodes*, which are somewhat wasp-like in appearance (often shining black with blood-red abdomen- German: *Blutbienen* - usually 4–9 mm in body length); the female *Sphecodes* enters the cell with the provision mass, eats the host egg, and lays an egg of her own in its place.

Halictidae is one of the four bee families that contain some crepuscular species; these halictids are active only at dusk or in the early evening, so are technically considered "vespertine" (e.g. in the subgenus *Sphecodogastra* of *Lasioglossum*), or sometimes truly nocturnal (e.g. in the genus *Megalopta*, or species *Megalopta genalis*).These bees, as is typical in such cases, have greatly enlarged ocelli. The other families with some crepuscular species are the Andrenidae, Colletidae, and Apidae.

Some species are important in the pollination of crops. Among these are the alkali bee, *Lasioglossum vierecki*- and *Lasioglossum leucozonium*.

Halictidae belongs to the hymenopteran superfamily Apoidea, series Anthophila. The oldest fossil record of Halictidae dates back to Early Eocene[14] with a number of species, such as *Neocorynura electra* and *Augochlora leptoloba*[known from amber deposits. Currently, the family is divided into four subfamilies, many genera, and more than 2000 known species. Rophitinae appears to be the sister group to the remaining three subfamilies (Nomiinae, Nomioidinae, Halictinae) based on both morphology and molecular data.

The genus *Halictus* (End banded Furrow Bees)

The genus ***Halictus*** is a large assemblage of bee species in the family Halictidae. The genus is divided into 15 subgenera, some of dubious monophyly, containing over 200 species, primarily in the Northern Hemisphere (a few species occur in South America, Asia and Africa).

Most species are black or dark brown, sometimes metallic greenish-tinted, with apical whitish abdominal bands on the terga (the related genus *Lasioglossum*, which is otherwise often similar in appearance, has the abdominal hair bands located basally, not apically).

Many species in the genus are eusocial, with colony sizes range from very small (two to four bees) to large (>200).

Nests are typically burrows in the soil, with several ovoid "cells" in which pollen mixed with nectar is provided as food for the developing larvae; a single egg is laid on a pollen mass, and the cell is sealed. In a few species, the cells are arranged in clusters resembling a honeycomb, but constructed of soil rather than beeswax. Like most ground-nesting bees, the brood cells are lined internally with a waterproofing secretion.

A few species in the genus have extensive geographic distribution, such as *Halictus rubicundus*, which spans virtually the entire Holarctic region. Previously, *Halictus ligatus* was considered to range from Canada to Venezuela, including the Caribbean. However, genetic data show that there are at least three species previously considered within this one. One of them is restricted to Southeastern USA and the Caribbean, one is Central American, and true *H. ligatus* is found in northern and western North America.[1] Common European species include *Halictus quadricinctus* and *Halictus sexcinctus*, as well as *H. rubicundus*. *H. rubicundus* is solitary at high altitudes and latitudes but has eusocial colonies in warmer areas.

8 species have been recorded in the united kingdom with one H. maculatus now extinct and and another two *H. scabiosae* and H. quadricinctus being found only in the channel isles.

Here in Lancashire we have only recorded 2 species which are *Halictus rubicundus* (Christ,1791) and *Halictus tumulorum* (Linnaeus,1758)

Halictus rubicundus (Christ,1791) (Orange legged Furrow Bee)

Male

Female

Description.

One of the largest British halictine bees with a body length often over 10 mm. It is a distinctive bee with strong white pubescent bands on the apices of the abdominal segments and yellow-orange legs in both sexes. A medium-sized bee, females of which have bright yellow hind tibiae - both ground colour and hairs. Fresh females have bright brown thorax hairs and narrow white hair bands on the hind margins of the tergites but not the hind marginsIn the field, females are most likely to be confused with those of *Lasioglossum xanthopum*, but this species has the white markings of the tergites located at the bases of the tergites not along the hind margins.

Males are much slimmer with long antennae. They also have a bright , brown thoracic pile an entirely black antennal flagella. They are most easily confused with those of the very rare *H. eurygnathus* but have a very different head shape, much narrower mandibles, shorter and darker antennae and less punctate tergites.

FW.7.5-8mm females. 7-7.5 mm males. Smaller specimens of both sexes are sometimes found and sun bleached males and greyish ones can also be found.

Habitat and Ecology.

H. rubicundus is a widespread and frequent species, though rarely abundant at a site. It can exploit a very wide variety of habitats.

Nesting Biology.

Individual nests support a small eusocial population, founded by a mated queen in the spring. This queen rears a small number of workers and then the colony produces new males and females at the end of the summer. Nesting occurs in aggregations, usually in light soils of south-facing slopes and faces. It exhibits primitive eusocial behaviour in that some females are non-reproductive and assist reproductive ones, though it apparently become solitary in the north (though can still form large nesting aggregations).

Flight Period.

The species is eusocial, with queens emerging from hibernation in April, workers present from May onwards and males and new females from July to early October. There have been suggestions that two generations of sexuals are produced in some years (G M Spooner, pers. comm.).

Flowers Visited.

The bee may be found visiting a wide range of flower species, but is probably most often found at those of the Asteraceae. Also likes thistles, knapweeds and ragworts for pollen and umbellifers, such as hogweed and wild parsnips for nectar.

Pollen Collected.

The species is highly Polylectic.

Parasites.

Two cleptoparasites bees attack this species: *Sphecodes gibbus* and *S. monilicornis*. It is also recorded as being attacked by the conopid fly *Zodion cinereum* (K G V Smith 1969).

Here in Lancashire.

Widespread and common throughout the county. First recorded in 1901 with the last record up to date being in 2019 with a total of 59 records to date.

Halictus tumulorum (Linnaeus,1758) (Bronze Furrow Bee)

Male

Female

Description.

A rather small, metallic green bee, with white tomentose hair bands on the gaster. The relationship with *H. confusus* is close and great care must be taken, particularly with females, when identifying specimens collected in southern Britain. May only be reliably determined from the male, which should always be dissected to show the vital character in the genitalia.

FW.4-4.5mm female. 4-5mm male. The commonest of our 3 small metallic *Halictus* bees. In the females the pale hair band on tegite is narrow in the middle where it occupies only half the width of the apical depression. In *H confusus* the band fills the entire depression. Males have a very long antenna and lack obvious hair bands on the tergites and can only be separated from *H. confusus* by examining the genitalia. The only variation between the sexes is in size.

The more frequent of two small, metallic Halictus species that can be difficult to separate. The other is *H. confusus*, a rare species of southern heathland. Females of *H. tumulorum* have the hair band across the hind margin of the tergite 3 not occupying the full width of the apical depression and narrower in the middle than at the sides (when viewed from behind). In H. confusus this band fully occupy the apical depressions when viewed from behind and is not narrowed, but many specimens are hard to assign with confidence.

Males of the two species are reliably separable using genitalia. The colour of the mid and hind trochanters can also indicate the species, as these are usually largely dark in *H. tumulorum* and largely yellow in confusus (but tumulorum occasionally has them extensively yellow too).

Habitat and Ecology.

Found commonly on sandy and calcareous soils but scarcer on heavy clay. Prefers open habitat. Also on open habitats such as brownfield sites, heathland and grasslands. *H. tumulorum* is our most frequent Halictus species and one of our commonest small solitary bees. It is widespread in Britain, extending to the north of Scotland.

Nesting Biology.

This mining bee is thought to be primitively eusocial; early accounts of a solitary life cycle are now considered incorrect. Nests are excavated in horizontal ground which is usually sparsely vegetated or with a short sward. The burrow is vertical or nearly so, occasionally branched, with sessile cells opening off the main shaft of the nest. The foundress female constructs 6-9 horizontal cells off a short tunnel in the spring, of which 2 or 3 may produce males, the remainder producing workers. Many of these workers mate but do not undergo ovarian development. The second brood produces males and females which mate and then the latter hibernate. There are accounts of foundresses hibernating for a second winter.

Flight Period.

Females are found from mid-March to October, with males appearing in late June or early July.

Flowers Visited.

Many sorts of flowers are visited, flowers including spring-blossoming shrubs like Sallows and Blackthorn are used by spring females.

Pollen Collected.

The species is widely Polylectic.

Parasites.

No *Sphecodes* are host specific on this bee. But maybe *Sphecodes ephippius* and *S. geoffrellus*

Here in Lancashire.

Widespread and common throughout the county. The first record being in 1911 and the latest in 2018 with a total of 74 records up to date.

Genus *Lasioglossum*

The sweat bee genus ***Lasioglossum*** is the largest of all bee genera, containing over 1700 species in numerous subgenera worldwide. They are highly variable in size, coloration, and sculpture; among the more unusual variants, some are cleptoparasites, some are nocturnal, and some are oligolectic. Most *Lasioglossum* species nest in the ground, but some nest in rotten logs. The genus *Lasioglossum* can be divided into two informal series based on the strength of the distal veins of the forewing. The *Lasioglossum* series (or strong-veined *Lasioglossum*) is mostly composed of solitary or communal species. Two possible exceptions are *L. aegyptiellum* and *L. rubricaudis*, both of which show signs of division of labour indicative of eusociality.

The *Hemihalictus* series (or weak-veined *Lasioglossum*) includes species with a wide range of sociality. The *Hemihalictus* series is composed of species which are solitary, communal, semi social, primitively eusocial, cleptoparasitic, or socially parasitic. Eusocial species may have small colonies with only one or a few workers or large colonies with dozens of workers. The largest colony sizes occur in *L. marginatum*, which forms perennial colonies lasting five or six years, with hundreds of workers.

A list of subgenera (modified from Michener's *Bees of the World*):

***Lasioglossum* series:**

Australictus, *Callalictus*, *Chilalictus*, *Ctenonomia*, *Echthralictus*, *Glossalictus*, *Homalictus*, *Lasioglossum s. str.*, *Leuchalictus*, *Oxyhalictus*, *Parasphecodes*, *Pseudochilalictus*, *Rubrihalictus*, *Urohalictus*.

***Hemihalictus* series:**

Acanthalictus, *Austevylaeus*, *Dialictus*, *Evylaeus*, *Hemihalictus*, *Paradialictus*, *Sellalictus*, *Sphecodogastra*, *Sudila*.

Subgeneric classification of *Lasioglossum* remains controversial, with disagreement among experts on the number and extent of subgenera.

Two of the better-known species are the European *Lasioglossum malachurum* and the North American species *Lasioglossum zephyrus*.

In the British isles we have thirty four recorded species but at least one seems now to be extinct, this being *L.laeve* and another two being restricted to the channel isles, this being *L. limbellum* and *L.mediterraneum*

Here in Lancashire we have 19 recorded species up to date.

Lasioglossum cupromicans (Pérez,1903) (Turquoise Furrow Bee)

Male.

Female

Description.

This species was formerly referred to in the British and Irish literature either as a form of *Lasioglossum smeathmanellum*, with the female gaster mostly black and not metallic (Stelfox 1927), or as a species without a name (R C L Perkins 1935). This neglected species was later considered to consist of two allied, but undescribed species, by A W Ebmer. He described them under the names *Lasioglossum scoticum* (described from Scotland, but clearly known also from England and Wales) and *L. hibernicum* (described from Ireland) (Ebmer 1970). Later he considered them to be subspecies of *L. cupromicans* (Pérez 1903) (Ebmer 1976).

One of four small metallic *Lasioglossum* species. Females have very sparse, uneven punctures on the scutum, a very long face, and the top of the propodeum much smoother than the other species. The tergites are particularly black and shiny with punctures fine and inconspicuous.

Males most resemble those of *smeathmanellum* because of the black hind tarsi combined with a shiny scutum, but have the clypeus entirely dark and the top of the propodeum much smoother. Both FW are similar at 4mm. Females have a shiny scutum that bear unevenly sized puncture's and little obvious micro sculpture. The tergites are shiny black and inconspicuously punctured. The top of the propodeum is relatively smooth with shallow ridges confined to the base and the head is much larger than in other metallic species, it also appears much darker in the field than the other species. There is variaition in themetalic colouring with some individuals greener and some bluer. Some males can have a weak yellowish mark at the top of the Clypeus

Habitat and Ecology.

Woodland, moors and coastal sites. Occasionally found in other habitats. Likes sites with calcareous and acid soils. In the north it like quarries and higher ground and uses moorland.

Nesting Biology.

Nest have been found in the mortar stone walls and also rock faces

Flight Period.

Females from late April to the end of October, males from mid August to the beginning of October.

Flowers Visited.

Cat's-ear species (*Hypochoeris* sp.), cinquefoil species (*Potentilla* sp.), hawkbit species (*Leontodon* sp.), hawk's-beard species (*Crepis* sp.), heather (*Calluna vulgaris*), sheep's-bit (*Jasione montana*), stonecrop species (*Sedum*), turnip (*Brassica rapa var. rapa*) and thistle species (*Cirsium* and *Carduus* spp.). P. Harvey (pers. comm.) has suggested that this bee species may have a close association with the flowers of rosebay willowherbs (*Epilobium angustifolium*) in lowland Britain.

Pollen Collected.

No information available, but probably Polylectic.

Parasites.

Possibley a host to the cleptoparasitic bee *Sphecodes geoffrellus*

Here in Lancashire.

Widespread and uncommon here in Lancashire. First recorded in 1975 with the latest record in 1998 with a total of 13 records up to date.

Lasioglossum leucopus (Kirby,1802) (White Footed Furrow Bee)

Male

Female

Description.

Although immediately recognizable as one of the small metallic green *Lasioglossum* bees, separation from the similarly-sized, and often more numerous, *Lasioglossum morio* requires a more detailed examination. The round face of the female and the white hind tarsi of the male should be sufficient to confirm *L. leucopus*. FW 4mm female. 3.5mm male. Females having densely and evenly punctured scutum but can easily recognised from other similar species with having a shinier scutum. The smooth and shining apical depressions of terites2, without minute transverse ridges and the smoother, semi shining hind margins to the top of the propodeum. The head is roundish rather than oval at the front view but be careful as some *L. moro* are similar.. Also the build is squattier with the thorax squarer on top view. Males are easily separated from other metallic species by the mid and hind tarsi, and they are also less elongated in build and have a shorter antenna. There are variation in females with tergite 2 more punctate than normal but these are uncommon

Habitat and Ecology.

This is a widespread and locally common species found in a range of habitats foraging on a wide variety of flowers. A possible host of Sphecodes geoffrellus. Distributed throughout almost the entire British Isles, with records from the Outer Hebrides (Barra) in the north, to the Channel Islands in the south, and to Ireland in the west (where there are no recent records). The worldwide distribution is the northern Palearctic, with a montane bias in more southerly areas.

Nesting Biology.

Although being a common and widely distributed species, nothing is known about its nesting habits apart from the fact that it nests in the ground.

Flight Period.

Females may be found between May and October, males between July and September. As with all *Lasioglossum* in Britain, only mated females hibernate.

Flowers Visited.

Recorded visiting a wide variety of flowers from several plant families.

Pollen Collected.

Polylectic (Westrich, 1989).

Parasites.

No records from Britain, although it is recorded as being parasitised by the bee *Sphecodes geoffrellus* in mainland Europe (Stockhert 1933; Westrich 1989). This is quite likely the case here as well.

Here in Lancashire.

Widespread but uncommon here in Lancashire with the first record in1978 and the latest in 2018 with a total of 16 records up to date.

Lasioglossum morio (Fabricius,1793) (Green Furrow Bee)

Male

Female

Both

Description.

Throughout England and Wales, the range extending from the Isles of Scilly to Kent, northwards to the Isle of Man (Nelson 1958), North-east Yorkshire (Archer 2002) and Cumberland. There are no records from Scotland or Ireland. In southern Britain and the Channel Islands it is usually a very common bee, colonising patches of exposed soil as nesting sites. Widely distributed in the western Palearctic, from central Fennoscandia (Elfving 1968) south to north Africa and the Azores, and east to the Urals and the Caucasus (Ebmer 1988). The commonest of our four small, metallic-green/turquoise Lasioglossum species. Both sexes are most easily distinguished from the others by the densely punctate, dull scutum which has obvious macrosculpture between the punctures. Some females of *L.leucopus* can difficult to separate, but morio has a duller thorax, duller hind margins to the upper part of the propodeum, and minute transverse ridges on the apical depression of tergite 2. FW of both sexes are similar at 4mm. Males have entirely black tarsi with the tip of the clypeus yellow marked. Lots of variation in the heads of females which in the front view can range from round to oval, the sculpturing on top of the propodeum and the densely punctures on tergite 1

Habitat and Ecology.

This is a widespread and often abundant species found in a wide range of habitats, where it exploits various flowers. It can sometimes be found nesting in the soft mortar walls.

Nesting Biology.

L.morio is primitively eusocial. The females normally nest in large aggregations in exposed soil. Chambers (1949) reported that in a Bedfordshire site the females were so numerous that the air was strongly pervaded by their scent for a distance of several feet from the bank in which they nested.

Flight Period.

emales are active from late March to the end of October, males from late June to late October (exceptionally early November). Possibly bivoltine as R C L Perkins (G M Spooner pers. comm.) reported "a colony in a Paignton [South Devon] garden produced males and females in June: these females paired and provisioned cells, and gave a second brood in August". However, we now know that workers cannot be reliably distinguished from females (queens) and therefore there is some doubt about the accuracy of this observation.

Flowers Visited.

Alder buckthorn (*Frangula alnus*) bloody crane's-bill, (*Geranium sanguineum*), bramble (*Rubus spp*.), burdock (*Arctium spp*.), carrot (*Daucus carota*), creeping buttercup (*Ranunculus repens*), dandelion (*Taraxacum officinale*), devil's-bit scabious (*Succisa pratensis*), field scabious (*Knautia arvensis*), garlic mustard (*Alliaria petiolata*), goldenrod (*Solidago virgaurea*), greater stitchwort (*Stellaria holostea*), ivy (*Hedera helix*), ivy broomrape ((*Orobanche hederae*), knotgrass species (*Polygonum spp*.), mayweed (*Tripleurospermum spp*.), primrose (*Primula vulgaris*), sea aster (*Aster tripolium*), sea campion (*Silene uniflora*), sheep's-bit (*Jasione montana*), speedwell (*Veronica spp*.), sow-thistle (*Sonchus spp*.), stonecrop (*Sedum spp*.), traveller's-joy (*Clematis vitalba*), water-dropwort (*Filipendula vulgaris*), wild mignonette (*Reseda lutea*) and willow (*Salix spp*.).

Pollen Collected.

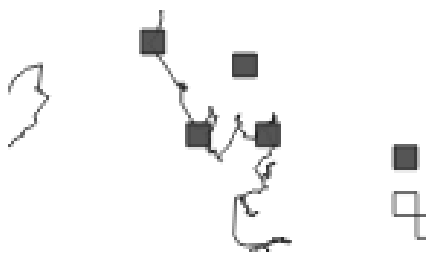
Polylectic, foraging from species in the families Asteraceae, Boraginaceae, Brassicaceae, Campanulaceae, Caryophyllaceae, Convolvulaceae, Hypericaceae, Lythraceae, Ranunculaceae and Rosaceae (Westrich 1989).

Parasites.

GHL Dicker (pers. comm.) observed *Sphecodes niger* around the nests of this species in Kent; the same species was also seen in large numbers flying over a nest site of *L. morio* on the Isle of Wight (pers.obs). M Edwards has also seen *S. niger* with *L. morio* in many situations (pers. comm.). *Sphecodes geoffrellus* and *Nomada sheppardana* may be additional cleptoparasites in Britain, as in Germany (Westrich 1989).

Here in Lancashire.

Restricted to north of the county and widespread in that area but rare . We have only 2 records with the first in1990 and the last in 1994



Lasioglossum smeathmanellum (Kirby,1802) (Smeathman's Furrow Bee)

Male

Female

Description.

One of two large metallic green *Lasioglossum* bees in Britain. This species has a rather blue-green sheen over both the thorax and abdomen which can often be discerned in the field. Although these features often serve to distinguish it from the similarly green *L. morio* and *L. leucopus*, separation from the closely related, but more northerly and westerly distributed, *L. cupromicans* requires considerable care and microscopic examination. FW: 4.5 mm female. 4-4.5mm male. Female resemble *L.cupromicans* in having a shiny scutum that bears evenly sized punctures and little obvious macrosculpture , but the punctures are denser in *L.smeathmanellum*. The tergite are greenish and conspicuously punctured with obvious tomentose patches at the front corners of tergites 2 and 3 and more sparingly around the base of tergite 4. The apical depressions of tergite 2 as minute traverse ridges like *L.morio*. The top of the propodeum id dull and rugose throughout and the head is oval in th front view.. They appear greener in the field than any of the other metallic species.. Males also resemble *L. cupromicans* in having a shiny scutum but have te top of the propodeum much rougher and the clypeus yellow marked apically. The metallic reflections can vary from greenish to turquoise, and the tergites are more obviously metallic in some more than others.

Habitat and Ecology.

Although *L. smeathmanellum* may be encountered almost anywhere in southern England and Wales, it is often abundant on coastal soft-rock cliffs. Inland it is frequently reported as nesting in the soft mortar of old walls and soft rocked cliffs but also uses quarries and brown field sites.

Nesting Biology.

Often nests communally in suitable areas of old walls and bare cliffs, vegetated slopes, but is not known to be eusocial, with a queen and a few workers.

Flight Period.

Females fly between late March and September, males are found between July and September. As with all British *Lasioglossum*, only mated females hibernate.

Flowers Visited.

Recorded visiting a wide variety of flowers from a number of different plant families, including spring flowering scrubs.

Pollen Collected.

This species is Polylectic.

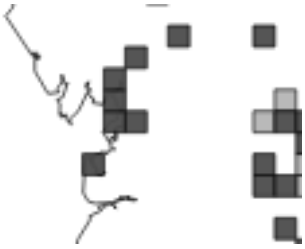
Parasites.

None known.

Here in Lancashire.

A widespread but scarce resident to the county .

First recorded in the county in 1915 with the latest in 2008 with just 8 records.



Lasioglossum brevicorne (Schenck, 1870) (Short Horned Furrow Bee)

Male

Female

Description.

FW.4.5mm female.4mm male. A small non-carinate Lasioglossum with very pale wing stigmas, a roundish oval head looking from the front view and a shiny sparsely punctate scutum which lacks macrosculpture. The top of the propodeum is relatively smooth with semi shining hind margin. Females have pale, translucent hind margins to the tergites, and tomentose patches are present on the anterior corners of tergite 2 and 3. Tergite 4 is completely covered with pale hairs which are scale like basally , and the whole tip of the abdomen appears very pale –pubescent compared to most other small species. Tergite 1 is shiny centrally but very densely punctured at the sides. The antennae are particularly short with the flagella orange beneath. Males can be confirmed by looking at sternites 5 and 6 . The former as a densely hairy hind margin except in the middle which is bare., the latter has a hairless depressed area centrally.. The antennae are exceptionally short for a male. The mandibles and lower clypeus are yellow but the labrum is black. There is some variation in the extent of the black markings of the legs of the male.

Habitat and Ecology.

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

Nesting Biology.

Nests in the ground and likes sandy areas . It is not known whether this is a eusocial species.

Flight Period.

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

Flowers Visited.

Yellow-flowered Asteraceae such as Cats-Ear and Smooth Hawks Beard.

Pollen Collected.

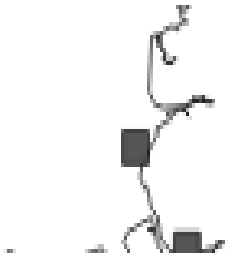
Only found collecting pollen from the flowers of plants of the family Asteraceae (M Edwards and P Westrich, pers.obs.). It is not known whether this is true throughout its entire range.

Parasites.

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

Here in Lancashire.

Restricted to Ainsdale where there is one record in 1999. Making it a rare bee in Lancashire.



Lasioglossum nitidiusculum (Kirby,1802) (Tufted Furrow Bee)

Male

Female

Description.

FW. 5mm female. 4.5mm male. The females are similar to other non-carinate Lasioglossum species who have roundish heads if looked at from the front, densely punctured Scutum's and no tomentose patches on the tergites. Can be distinguished form other Lasioglossum species by the combination of very short and weak longitude ridges on the top of the propodeum plus the rather densely punctured tergites including the base section of tergite 1 and also the apical depressions on tergites 2 and 3 . Males also have the same combination of a very long antennae and long hairs on sternite 2 and are easily distinguished by the presence of conspicuous lateral hair tufts on sternites3 and 5 . They have completely pale tarsi, black ringed hind tibiae and a yellow labrum. There is little noted variation in either sexes.

Habitat and Ecology.

Mainly from sandy habitats including some coastal sites. They like soft rock cliffs. Also inland on brownfield sites and heathland where the sites are disturbed and sandy

Nesting Biology.

The species is considered to be a solitary mining bee. The female nests in south facing steeply sloping, sandy soil, the bee digging a sinuous burrow which is reported to have linearly arranged cells at the end of branches (Pesenko *et al*. 2000). It can be a solitary bee but also is found in large aggregations

Flight Period.

Females from late March to October . Males from June to September.

Flowers Visited.

Visits a wide range of plant families for nectar. Seen regularly on Hawkish composites such as Cats ear and Smooth Hawks Beard.

Pollen Collected.

Widely Polylectic, although most often found with pollen from yellow-flowered Asteraceae.

Parasites.

Reported to be the host of the cleptoparasitic bees *Sphecodes crassus*, *S. geoffrellus*, *S. miniatus* and *Nomada sheppardana* (Westrich, 1989).

Here in Lancashire.

Restricted to the Ainsdale area of the county and is very rare with only one recorded in 1975.

Lasioglossum parvulum (Schenck,1853) (Smooth-gastered Furrow Bee)

Male

Female

Description.

Although widespread, this is essentially a southern species, found from Cornwall to Kent and north to North Wales and Norfolk. There is also, however, an outlying locality in Cumberland, this being by far the most northerly occurrence. Absent from Ireland. It occurs on many of the Channel Islands.

Abroad, this is a western Palearctic species, occurring to Iran in the east and north to southern Sweden and Lithuania.

FW.4-5mm female. 4-4.5mm male. Females look like *L.nitidiusculum* but have the top of the propodeum roughened throughout, and finer, sparser punctures on the tergites. Males have a combination of very long antennae and long hairs on sternites 3 and 5 and also have a dark hind tarsi, a dark labrum and the top of the propodeum rugose throughout. There is little variation in either sexes.

Habitat and Ecology.

Occurs in many open habitats, including, for example, open coppice, sandy heath and chalk grassland., soft rock cliffs, Chalk down land Heathland, moorland, woodland clearings brownfield sites and other brownfield sites.

Nesting Biology.

A solitary mining bee. The nest is constructed in inclined or vertical faces, sometimes in the root bole earth of uprooted trees. After a short, nearly horizontal section, the burrow slopes down to several cells, each at the end of short, lateral burrows. The cells are ovoid, with the long axis nearly horizontal. The pollen mass is spheroid in form, its top slightly flattened.

Flight Period.

The female can be found flying from early March to October. The species is univoltine, however, the females overwintering as adults. The male is found on the wing from early July to early October.

Flowers Visited.

The bee visits a wide variety of flowers, a few examples being: Alexanders, Blackthorn, Lesser Celandine, various Crucifers, Dandelion, Firethorn, Sallow, Tormentil, Wood spurge and Maples.

Pollen Collected.

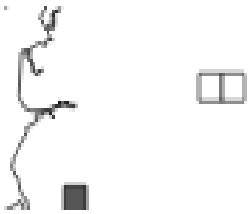
The female is widely Polylectic.

Parasites.

A putative host of several cleptoparasitic bees, including *Sphecodes geoffrellus* (Kirby), *S. crassus* Thomson, *S. miniatus* von Hagens, *S. ephippius* (Linnaeus) and *Nomada sheppardana* (Kirby). Specimens are occasionally collected carrying females of the stylops *Halictoxenos*.

Here in Lancashire.

Only one record here in the county from the Mucky Mountain area of St Helens in 2016, where the site is post industrial rich substrate.



Mating

Lasioglossum punctatissimum (Schenck,1853) (Long-faced Furrow Bee)

Male

Female

Description.

FW. 4.4 mm female. 3.5-4mm male. Female a a uniquely armed inner hind tibial spur with 4 projections of which the final 3 are broad and bluntly rounded rather that narrow and pointed. They also have a complete transverse ridge defining apical depressions of tergite 1 and a band of fine punctures anterior to this. Tergites 2 to 4 have pale , translucent hind margins, and are densely punctate. In front view the head is round and the antennal flagella are usually partly orange underneath. The hind face of the propodeum is carinate and the wing stigmas Buffish. Males have a shorter antennae than L.. *Laticeps* and *L. mediterraneum* , shorter second segment to the hind tarsi and a more strongly produced clypeus. The hairs on sternite 2 are longer, the hind tarsi is longer and slimmer and the scutellum shinier with obvious punctures Variation occurs in some female with the hind corners of the propodeum more angulated. Larger females are most probably queens. Variation in males is extent with being more yellow on the legs.

Habitat and Ecology.

England from Cornwall to Kent, north to Cumberland and Yorkshire, Wales and the Isle of Man. Also known from south-west Scotland. It also occurs on several of the Channel Islands. Most frequent in southern England.

Abroad, this is a western Palaearctic species, to Iran in the east and north to Finland. Found in a range of open habitats both inland and on the coast with a particular liking to chalk soils and calcareous brownfield sits. Sometimes found on arable farmland.

Nesting Biology.

A mining bee, probably solitary. The nesting biology is not to well known known, suggesting that the nests may be well dispersed and hard to locate. It as sometimes but rarely found in larger aggregates. And as been observed in bare to sparsely vegetated light soils.

Flight Period.

The female flies from mid-March to late September, the male from July (possibly June) to September.

Flowers Visited.

The females are found mainly on Lamiaceae, males will also visit flowers of a wide variety of other plant families such as Buttercups, Rape, Umbellifers and Common Fleabane. Also spring flowering scrubs such as Blackthorn.

Pollen Collected.

Westrich (1989) regards it as Polylectic, recorded from Lamiaceae, Asteraceae, Ericaceae, Fabaceae, Ranunculaceae, Rosaceae and Scrophulariaceae. However, Pesenko et al. (2000), supported by the views of Ebmer, consider it to be oligolectic on Lamiaceae; the long head of the female may be an adaptation for feeding on this plant family.

Parasites.

Sphecodes crassus has been recorded as a cleptoparasite (Westrich, 1989).

Here in Lancashire.

Been recorded in Ainsdale and Blackburn but scarce in the county with only 6 records, the first being in 1985 and the latest in 2016

Lasioglossum rufitarse (Zetterstedt,1838) (Rufous-footed Furrow Bee)

Male

Female

Description.

One of a group of medium-sized, predominantly black, *Lasioglossum* bees which require care in identification and which are unlikely to be easily recognised in the field. This is a species which is distributed throughout the northern regions of both the New and Old World, although it is montane in the southern parts of its range.

FW 5-5.5mm female 4-5mm male. This non carinate species looks much like *L. nitidiusculum* and *L. parvulum* but has the apical depressions on tergites 2 to 4 virtually impunctate and those of 2 to 4 in females or 3-4 in males with minute transverse ridges that need to be looked at a critical angle of light.. In females tergite 1 has punctures confined to the sides of the apical depressions and the top of the propodeum is almost entirely rugose, including the hind margins. Males have a combination of very long hairs on sternites 2 and a long antennae and have the hind tarsi short and stout with segments 2 only around 1.5 times as long as it is wide. There is variation in the males hind tarsi with it being blackish to entirely orange.

Habitat and Ecology.

This species occupies a wide range of habitat types. Open woodlands and partially wooded brownfield sites and also heathland with poor base areas.

Nesting Biology.

A solitary species which nests in exposed soils on upturned root-plates, ditch edges and cliffs. Also root plates of unturned fallen trees.

Flight Period.

Females are found between April and October, males between July and September. As with all British *Lasioglossum*, only mated females hibernate.

Flowers Visited.

In the British Isles has been recorded visiting bramble (*Rubus spp*.) and ragwort (*Senecio jacobaea*). Grey Willow and Cats- Ear.

Pollen Collected.

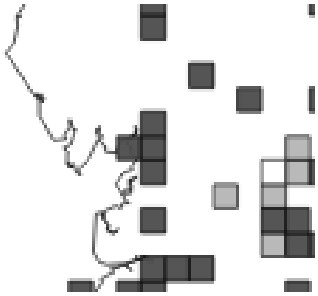
Polylectic (Westrich, 1989).

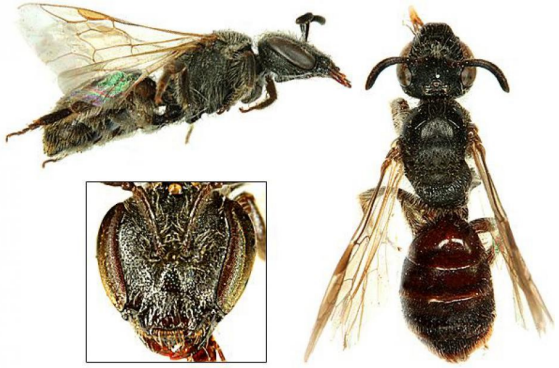
Parasites.

Both the cleptoparasitic bees *Sphecodes ferruginatus* and *Nomada fabriciana* have been suggested as parasites of this species. But at the moment ,confirmatory evidence from reared material is required.

Here in Lancashire.

Widespread and uncommon here in Lancashire with 19 records. The first in 1941 and the latest in 2018





Close up view of female

Lasioglossum villosulum (Kirby,1802) (Shaggy Furrow Bee)

Male

Female

Description.

Widely distributed in England and Wales, and north to southern Scotland. Also found in Ireland, the Isles of Scilly and the Channel Islands. . A small Lasioglossum with large and sparse punctures on the scutum. Females are most similar to *L. puncticolle* but lack the deep grooves on the genae and have a smooth and semi-shining hind margin to the upper part of the propodeum, and a non-carinate propodeal hind face. The scutum can be strongly bloomed in fresh females. *L. brevicorne* also has a sparsely punctate scutum but is smaller with much paler wing stigmas and more obvious pale hairs and tomentum on the tergites.

Males have a sparsely-punctured scutum like the female and have the abdomen and antennae rather short. The hind tarsi are rather short and stout and can vary from pale to dark. The mandibles, labrum and lower clypeus are all dark.

FW:4.5mm-5mm female. 4mm –4.5mm male . The head in the front view is oval. The wing stimas can vary from pale orange to dark brown and the male hind tarsi can be pale yellow or dark .Older females can loose the bloom on the scutum.

Habitat and Ecology.

Found in many habitats, including coastal soft rock cliffs. In Wales and north- west England it is largely coastal. Also found on brownfield sits and chalk downland.

Nesting Biology.

A solitary mining species, although nests may be found in aggregations. Occasionally, two females of the same generation share a nest entrance but these nests are thought to be communal rather than primitively eusocial. The main burrow is dug vertically, with lateral burrows off this leading to horizontal cells. A small tumulus accumulates at the nest entrance as digging is carried out. As soon as it is constructed, each cell is fully provisioned, an egg laid and the cell sealed off. This means the adult female bee has no contact with the larva.

Flight Period.

Bivoltine. The females are to be found in flight from mid-March, although more commonly from early April, until October. Males appear in late June and fly until mid-October. There is a peak of activity in July and August, and very limited data for early November. Information on the sex of these late specimens is not available.

Flowers Visited.

Included are: alexanders (*Smyrnium olusatrum*), buttercups (*Ranunculus spp*.), creeping thistle (*Cirsium arvense*), hawthorn (*Crataegus mongyna*), hogweed (*Heracleum sphondylium*) and plum (*Prunus sp*.), as well as yellow Asteraceae Buttercups, umbellifers, Cats-ear and hawks –beard, the latter 2 are much preferred.

Pollen Collected.

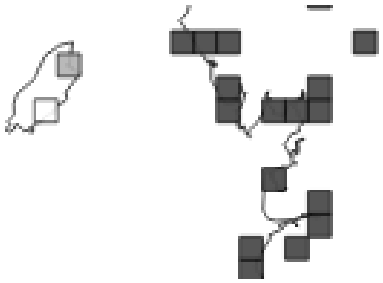
The species is polylactic but yellow-flowered Asteraceae predominate in host plant records.

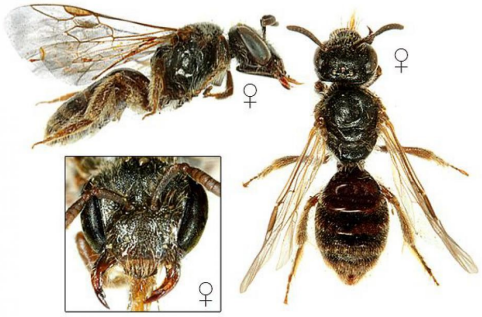
Parasites.

There are no *Sphecodes* species which are host specific on *L. villosulum*, but some of the more general *Spheroids* may parasitises this bee, It may also be host *to S.marginatus.* Also its been observed that the conopid fly as been seen around nesting colonies.

Here in Lancashire.

Widespread and common here in Lancashire with an unconfirmed record In 1985 and the latest confirmed record in 2018 and 21 records up to date.



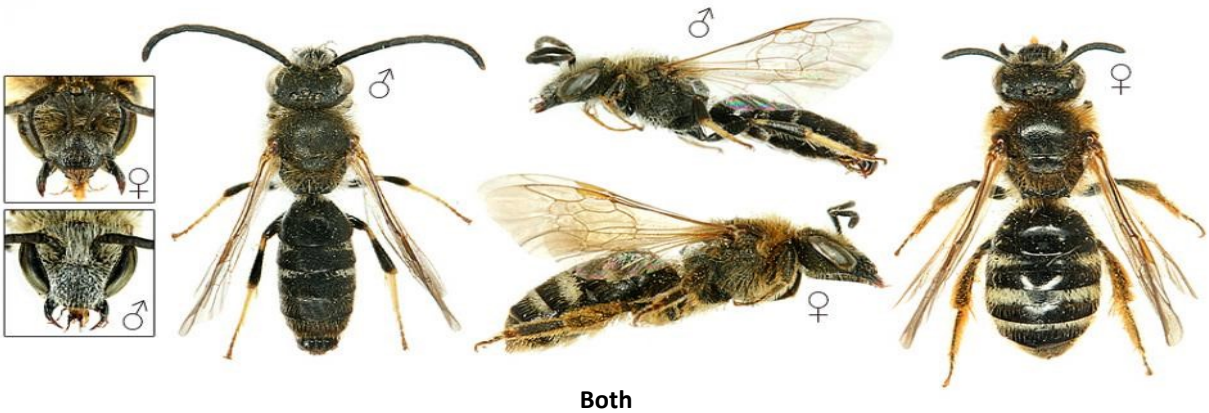


Close up of female.

Lasioglossum laevigatum (Kirby,1802) (Red- backed Furrow Bee)

Male

Female



Both

Description.

Mainly confined to southern England, with a few records from further north, 2 being in Lancashire.. Not known from Scotland, Ireland or the Channel Islands. A local mining bee but sometimes abundant where found. A western Palearctic species, the range extending from Britain to the Urals, and central Iberia to Iran.

FW: 6.7mm to 7 mm female. 5mm to 6mm male. Females are robustly built and carinate with a bright chestnut pile on the thorax. Tergites 2-4 have have unusually large tomentose patches and the legs are golden haired. The scutum and tergite 1 are shiny with rather large punctures and all of the tergite have apical depressions which are very broad and covering most of tergites 2 and 3 and about one third od tergite 1. In front view the head is round and the propodeum is coarsely rugose.

Males are easily recognized from other Lasioglossum species by the completely dark clypeus labrum, mandibles and antennae. They have a fairly large annenae which is capable of stretching to the mid point of tergite 1.. They have the tergites shiny, moderately punctured with tomentose patcheson the anterior corners of tergites 2 to 4. The legs are mainly black but with pale yellow tarsi. There is little variation in the sexes that has been noted.

Habitat and Ecology.

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

Nesting Biology.

Nesting habits are apparently largely unknown. But is presumed to nest in sparsly vegetated and close cropped enviroments.In Germany, the species is stated to be "solitary" (i.e. non-social) (Westrich 1989).

Flight Period.

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

Flowers Visited.

Lesser celandine (*Ranunculus ficaria*), broom (*Cytisus scoparius*), plum (*Prunus domestica*), wild parsnip (*Pastinaca sativa*), wild carrot (*Daucus carota*), willow (*Salix species*), speedwell (*Veronica species*), guelder-rose (*Viburnum opulus*), tormentil (*Potentilla erecta*) and ragwort (*Senecio species*).

Pollen Collected.

Has been observed collecting dandelion (*Taraxacum species*), but other flowers are doubtless utilised. Polylectic in Germany, foraging from species in the families *Apiaceae, Asteraceae, Brassicaceae, Caryophyllaceae, Cornaceae, Ranunculaceae, Rosaceae and Salicaceae* (Westrich 1989).

Parasites.

There is no know records of any parasites visiting this species..

Here in Lancashire.

Very rare and restricted to the Formby area of the county with only 2 recorded in 1950.

Lasioglossum lativentre (Schenck,1853) (Furry-claspered Furrow Bee)

Male

Female

Description.

Widespread in southern Britain, being found from the Isles of Scilly to East Kent and north to Yorkshire and in Wales but not in Scotland or the Isle of Man. It is known from the Channel Islands but only from Jersey. Recorded from Ireland in O'Connor et al. (2009). Very rare in Lancashire with only 1 record.

Abroad, a western Palearctic species, found from Western Europe east to Iran, north to southern Sweden and south to Iberia and Crete; accidentally introduced into the Azores (A W Ebmer, pers. comm.). FW 5.5mm-6mm female.4.5mm-5.5mm male. A medium sized robust species of *Lasioglossum* with conspicuous tomentose patches on tergites 2 and 3 and with a roundish head if looking from the front.. Females can be separated from the other species *(L.quadrinotatum*) by the orange brown rather than the yellowish wing stigmas and more punctured on tergite 1, with the punctures of the apical depression being not much denser than those of the basal section.

Males have a rather short antennae, pale yellow tarsi and long hairs on sternite 2.The top of the propodeum has the hind margin rather smooth.

There is a moderate size variation between the sexes and some variation in the extent of the black on the male tibiae.

Habitat and Ecology.

A woodland edge species, sometimes found in gardens in southern Britain, also from grasslands, ruderal habitats and orchards, open woodlands, brownfield sites and heathlands.

Nesting Biology.

Believed to be a solitary mining bee but the nesting behaviour is apparently unrecorded but presumed to favour light soils.

Flight Period.

Probably univoltine. The female flies from early March to late October; the male, from mid July to mid October.

Flowers Visited.

Flower visits are mainly to Asteraceae, including dandelions, but other families are also used, including Rosaceae, Ranunculaceae, Salicaceae and Ericaceae.

Pollen Collected.

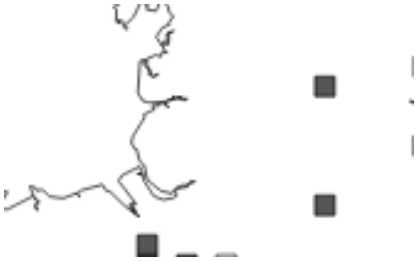
British pollen sources are apparently unknown but abroad the female is Polylectic.

Parasites.

The cleptoparasitic bees *Sphecodes ephippius* (Linnaeus) and *Sphecodes puncticeps* (Thomson) are reputed to parasitise this bee.

Here in Lancashire.

Very rare in the county with only 1 record in 2017 in the area around Woolfall Heath, Huyton.



Female in closeup view

Lasioglossum quadrinotatum (Kirby,1802) *(Four-spotted Furrow Bee)*

Male

Female

Description.

A very similar species to the more common *Lasioglossum lativentre* (Schenck) and some records are probably due to misidentification of that species. Perkins (1922) unfortunately transposed the male genitalia characters, the most reliable way of distinguishing the two species, in his seminal paper on *Lasioglossum.* FW.5.5mm to 6mm Female.4.5mm to 5mm Male. Tergite 1 on the female has the apical depression very densely punctate and contrasting with the more sparsely basal section. Tergite 2 is more densely punctate that and less shiny. The males lack the dense hairs of the gonostyli and tips of the gonocoxites which are seen in *L.lativentre*. There is little variation noted in both sexes.

Habitat and Ecology.

Found on heaths, calcareous grassland and in open woodland.

Nesting Biology.

This is presumed to be a solitary mining bee, although the nesting biology is not known. Spresumed to prefer sandy ground.

Flight Period.

Univoltine. The female flies from late March to late September and the male, from late July to late September.

Flowers Visited.

Visits a wide range of plants in Britain, including Asteraceae, Ranunculaceae, Euphorbiacaeae, Ericaceae and Scrophulariaceae (Falk, 1991; S Roberts, *pers. comm.*). Ling, Lesser Celandine, Germander Speedwell, Spurges, Rosebay Willowherb, Tansy and Smooth Saw thistle are amongst the plants visited.

Pollen Collected.

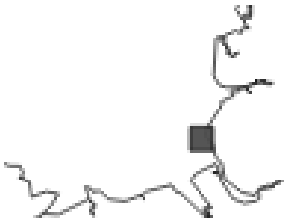
British pollen sources have not been established but in Poland, for example, it is widely polylectic, Asteraceae frequently being used.

Parasites.

Sphecodes ephippius (Linnaeus) and *Sphecodes puncticeps* Thomson are believed to be cleptoparasites of this bee.

Here in Lancashire.

Very rare here in the county with only one record from 1997 in heathland in the Formby area.



Lasioglossum leucozonium (Schrank,1781) (White-zoned Furrow Bee)

Male

Female

Description.

A widespread southern species, found in England and Wales north to Cumbria and Yorkshire; also found in the Isles of Scilly and the Channel Islands. An Holarctic bee; in the Palearctic found throughout Europe east to the Russian provinces of Krasnoyarsk and Irkutsk, being mainly montane in the south of its range. There is some geographical variation in the east.

FW.5.5mm to 6.5 mm Female. 5mm to 6mm Male. A robustly built medium to large carinate species. Females closely resemble L.zonulum with both species having the combination of conspicuous tomentose patches on tergite 2 to 4 which when the abdomen is descended form complete basal bands and also blackish hairs on the dorsal face of the hind tibiae. Males have the hind basitarsi and bases of the hind tibiae whitish and can be confused with larger individuals of L.lativentre and also L.quadrinotatum but have divergent ridges which form a V shape at the tip of sternite 6.. The propodeum is much courser rugose and segments 2 to 5 of the hund tarsi darker that the other 2 species.. There is moderate size variation in both sexes and also some variation in the density of the punctures on the tergites.

Habitat and Ecology.

Found in open areas, mainly on sandy and calcareous soils, scarcer on heavy clay. Heathland and sandy coastal dunes as well as brownfield sandy sites are used.

Nesting Biology.

A solitary mining bee, sometimes nesting in aggregations. There are instances of two females digging in the same burrow but this may be communal rather than social activity. The nest is dug in flat to slightly inclined, light soil, in sparsely vegetated conditions on south facing slopes. or where there is a short sward. The burrow descends vertically with cells at the end of short side tunnels. Each female constructs from six to fifteen cells, which produce a sexual brood the same year. These mate and the females hibernate, probably not in the maternal nests as nesting aggregations do not always seem to be located in the same places in consecutive years (Pesenko *et al*. 2000).

Flight Period.

Females can be found from late March to late October or early November. The male appears by mid-July but possibly earlier until October.

Flowers Visited.

Yellow-flowered Asteraceae are most frequently visited but visits to creeping thistle (*Cirsium arvense*) and other plants have been observed. Has a strong liking for Cats-ear, Hawkbit's, Common Fleabane and thistles.

Pollen Collected.

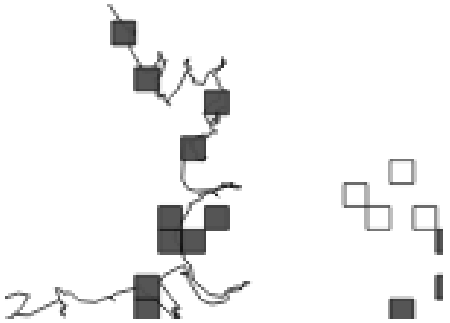
Widely polylectic but shows a preference for yellow-flowered Asteraceae.

Parasites.

There are no host-specific *Sphecodes* on *L. leucozonium* but *S. ephippius* will parasitize this species and other *Lasioglossum*. Also possibly *S.pellucidus.*

Here in Lancashire.

Widespread and increasing in the county . The first record is in 1998 and the latest in 2018 and 11 records up to date.



Lasioglossum albipes (Fabricius,1781) (Bloomed Furrow Bee)

Male

Female

Description.

A very similar bee to *Lasioglossum calceatum* (Scopoli) but not as frequent as that species. The males are most easily separated by the possession of a yellow labrum, that of the male *Lasioglossum calceatum* being usually black or blackish. The females are more difficult but in *L.albipes* the propodeum is less sculptured posterolaterally. They are also smaller and with a longer, less-rounded face. FW.5mm to 6.5 mm females. 5mm to 6mm males In the front view the head is oval as opposed to roundish in *L.calceatum,* also the abdomen tend to look duller and more strongly banded and with more abundant short hairs than *L.calceatum.* There is moderate size variation and the head view in the females can vary and older female lose the bloom on the abdomen

Habitat and Ecology.

Found in wide variety of habitats including woodland edges, also found in clearings, glades and scrubby areas. They are frequently found in urban greenspace areas and exposed costal districts.

Nesting Biology.

A primitively eusocial mining bee. The foundress female digs a vertical main burrow to a depth of about 15cm. The arrangement of the cells is open to question. One report (Verhoeff, 1897) stated that the cells are sessile, i.e. without a tunnel from the main burrow, whilst in artificial conditions the cells were constructed in a cluster supported by pillars within a chamber (Plateaux-Quénu, 1989), as found in *Lasioglossum calceatum.* Between 20% and 50% of the first brood are males but although many first brood females mate they remain as workers with undeveloped ovaries. These workers prepare about 50 brood cells in which males and reproductive females are produced. These females mate and dig hibernacula by deepening the main burrow of the maternal nest. There are reports of the old foundress females surviving the winter and establishing new nests in the spring (Plateaux-Quénu, 1992).

Flight Period.

The female flies from mid-March to early October, whilst the male appears by early July, flying to mid-October.

Flowers Visited.

The bees visit a variety of flowers for nectar. Females are very fond of buttercups and in late summer males are abundant on umbellifers., scabiouses and composites such as ragwort, thistles, knapweed and yarrow.. Also males sometimes cluster overnight on flowerheads and low vegetation.

Pollen Collected.

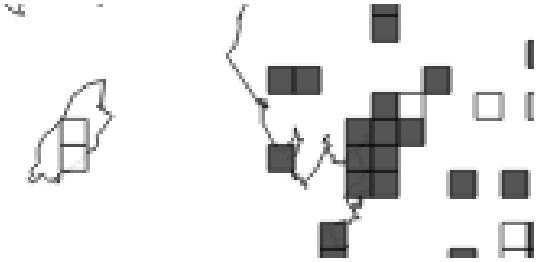
Polylectic but frequently visits species of buttercup for pollen.

Parasites.

There are no recorded cleptoparasites in Britain, but in continental Europe *Sphecodes monilicornis* (Kirby) is a cleptoparasite; possibly this association also exists in Britain (S Roberts, pers. comm.).

Here in Lancashire.

Widespread and common throughout the county with the first unconfirmed record in 1923 and the last up to date record in 2018 with a total of 52 records up to date.



Lasioglossum calceatum (Scopoli,1763) (Common Furrow Bee)

Male

Female

Description.

Found throughout Britain, from the Isles of Scilly and Kent north to the north coast of the Scottish mainland. Also found in the Channel Islands, the Isle of Man and parts of Ireland. Found across the Palearctic region from Britain to Japan, reaching north to northern Finland. In the south of its range, it is mostly montane, occurring up to 1800 metres: Iberia, south to Serra Estrela; Corsica; Italy, Monte Pollino; the high mountains of Greece south to Taygetos; north-east Turkey but south to Toros, Bolkar Daglari (A W Ebmer, pers. comm.). FW. 5.5mm to 7mm female and the same with the male. A medium sized carinate bee which resembles L.albipes with in front view the head is rounder. The females have a brighter brown pile on the top of the thorax and a less bloomed bare looking abdomen and transverse ridges at the sides of tergite 1, and more separated in the middle. Males can have the abdomen all black with extensively red marked and have a larger, denser tomentose patcheson tergite 2 to 4 than L.albipes. The labrum is dark, and usually the manibles and pronotal tubercles are too.. There is moderate size variation and larger females may be queens. In front view the females head varies from slightly broader than high to oval

Habitat and Ecology.

Found in most habitats, and can be abundant in more open, urban , dry areas.

Nesting Biology.

This is a primitively eusocial mining bee in the southern part of its range. In northerly latitudes it may be solitary. The nest is constructed in short turf or other open situations in the sun, but seems not to be found in large aggregations. The nest is usually founded by one female but rarely more than one are found. Here the dominant individual, usually the largest, becomes the queen and the others then serve as workers. In the more typical situation, the lone foundress female digs the length of all the main burrow, which is almost vertical. She then constructs a short lateral tunnel some distance from the bottom, which leads to a comb-like cell cluster surrounded by an air chamber. The lone female builds 4–7 cells, in which she rears smaller workers with under-developed ovaries and sometimes one or two males. The workers take over the foraging, helping rear a brood of males and sexual females. In the south of its range, there may be two broods of workers (Plateaux-Quénu, 1992). The nesting period in the north can be shorter.

Flight Period.

The female is found on the wing from mid-March to early October and the male from late June to end October, at least in the south. In the northern part of the range the flight period may be partly contracted. It can be the last solitary bee to fly in the season.

Flowers Visited.

Both the females and males will visit a wide variety of flowers for nectar. Males are abundant on thistles , knapweed and ragwort in late summer.

Pollen Collected.

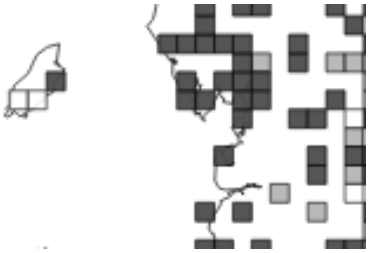
The female is widely Polylectic but often found on Asteraceae.

Parasites.

There are no known *Sphecodes* specifically cleptoparasitic on *Lasioglossum calceatum*, although more generalist *Sphecodes* may parasitise this species.

Here in Lancashire.

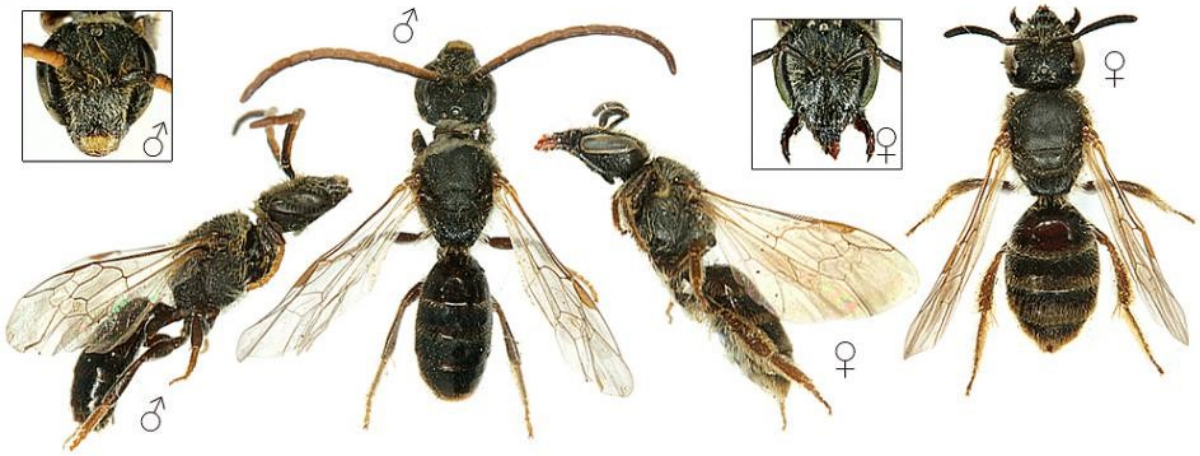
Widespread and a common species here in the county . The first unconfirmed record was in 1920 and the latest in 2018 with 46 records up to date.



Lasioglossum fratellum (Pérez,1903) (Smooth-faced Furrow Bee)

Male

Female



Both

Description.

Widespread throughout the British Isles. Also known from the Channel Islands. FW.5mm to 5.5 mm female. 5mm male. With a dull and densely punctured scutum and barely punctured first tergite. They can be separated in front view from *L.fulvicorne* by the longer head and and usually weak and shallow punctures on the face. The basal parts of tergite 2 and 3 lack distinct tomentose patches on the interior corners and are scarcely punctate basely The wing stigmas are orange-brown. Males are unique along with *L.fulvicorne* in having a long antennal flagella and only minute hairs on sternite 2. Only minor variation is that the males have a minor variation in the extent of dark on the legs.

Habitat and Ecology.

Mainly a species of moor and sandy heath, possibly preferring wooded parts and other poor base places.

Nesting Biology.

A mining bee with primitively eusocial colonies. The females have a long life span, up to a year, and a daughter will often remain with the foundress in the maternal nest. The latter then has more developed ovaries and usually guards the nest entrance, whilst the daughter carries out most of the foraging. The nest is illustrated by Heide (1992) and comprises an earth cell cluster held within a chamber by pillars. In a nest with only one female, there are up to nine cells, whilst a polygynous nest may have 17 (Pesenko et al. 2000). To provision one cell the female may make 10-13 foraging trips, the final few being for nectar only. Provisioning a cell may take two days. Small nesting aggregates in south facing banks and slopes have been observed. In some districts , females have been noticed to nest across 2 years which is possibility to cope with the harsher environments.

Flight Period.

Univoltine. Females fly from early April to September, with males from late June to September

Flowers Visited.

Various flowers which include bellflowers (Campanulaceae), bilberries (*Vacciniuim myrtillus*), daisies (*Bellis perennis*) and rosebay willowherb (*Chamerion angustifolium*). Also visits willows, Heathers Tormentil, Cats ear, Dandelion, Ragworts, Thistles, Bilberry and Brambles.

Pollen Collected.

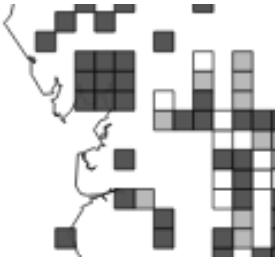
Widely Polylectic.

Parasites.

L. fratellum is a host of the cleptoparasitic halictine *Sphecodes hyalinatus*. Also possibly *S. ferruginatus.*

Here in Lancashire.

Our earliest record in the county was an unconfirmed record in 1928 and the last record was in 2016 with a total of 49 records. This species is a common bee in Lancashire.



Lasioglossum fulvicorne (Kirby,1802) (Chalk Furrow Bee)

Male

Female.

Description

England and Wales with a very few Scottish records. Widely distributed in Europe to 64°N and found eastwards to the eastern Palearctic, including Taiwan. There is a little geographical variation resulting in subspecies being recognised for parts of Asia. 5mm to 5.5mm female. 5mm male. A small bee with females resembling *L.fratellum* but with a rounder head in the front view and with the face distinctively punctured.. Small but obvious tomentose patches are present at the anterior corners of tergites 2 and 3 . The top of the propodeum is more coarsely roughened and the wing stigmas are paler. Males along with *L. fratellum* are unique in having a very long antennae combined with only minute hairs on sternite 2.. There are variation in males being that the antennal flagella, which is normally orange underneath can sometimes be almost entirely dark, and the amount of black on the legs can vary to some degree.

Habitat and Ecology.

Frequent on calcareous soils such as chalk scarps but also found on other strata. Shows a preference for short chalk grassland in dry areas. Brownfield sites and woodland sites are also used.

Nesting Biology.

The nesting biology is not well known but the species is solitary, the female digging a nest in short turf or sparsely vegetated soils in the spring.

Flight Period.

Probably univoltine; the female with a long life span, appearing on the wing from mid-March to the end September and males from mid-June until early October. Males from June to October.

Flowers Visited.

The species probably visits a variety flowers for nectar only. But visits spring flowering scrubs such as willows. Males are regular visitors to late summer umbellifers and composites and spring females have a preference for ground ivy.

Pollen Collected.

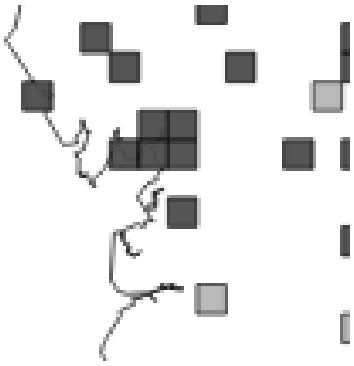
Widely Polylectic.

Parasites.

The halictine bees *Sphecodes hyalinatus* and *S. ferruginatus* are cleptoparasites.

Here in Lancashire.

Common here in the county with the first unconfirmed record in 1923 and the latest in 2011 with a total of 21 records up to date.



GENUS : *SPHECODES* : BLOOD BEES

Sphecodes is a genus of bees from the family Halictidae, the majority of which are black and red in colour and are colloquially known as "blood bees". *Sphecodes* bees are cleptoparasitic on other bees, especially bees in the genera *Lasioglossum*, *Halictus* and *Andrena*. The adults consume nectar, but because they use other bees' provisions to feed their offspring they do not collect pollen.

Small to medium sized, inconspicuously-haired, halictid bees typically with black and red abdomens, strongly punctate scutums. The male antennae have zones of pubescence on the antennal flagellar segments.
Seventeen species are recorded from the British mainland with another species *(S. marginatus)* found on the Channel Islands.

Sphecodes are cleptoparasites of other bees in the genera Lasioglossum, Halictus and Andrena. For many males, examination of the male genitalia is essential for accurate identification, and this needs to be pulled out when pinning fresh material. There is much scope for improving the understanding of Sphecodes-host relationships in Britain and it would be worth sequencing the DNA of the more variable Sphecodes species using assorted hosts (e.g. *S. monilicornis*) to see if any cryptic species are present.

Sphecodes crassus Thomson,1870 (Swollen-thighed Blood Bee)

Male

Female

Description.

This bee strongly resembles *Sphecodes geoffrellus* (Kirby) and *S. miniatus* von Hagens and is sometimes best identified from the male genitalia. It has been recorded more frequently in the last two decades. FW. 4mm to 5mm, sexes similar. One of the UKs smallest *Sphecodes.* The females are easily confused with *Sphecodes geoffrellus* g the sparsely punctate scutum. However the bases of the hind femora of this species are much more swollen than any other small *Sphecodes* . Also the labrum are much longer and the hind tarsi dark. Males are one of the small species with narrow zones of pubescence on the antennal segments and dorsal groves on the gonocoxites, which should always be confirmed using genitalia. There is some size and colour variation and also sometimes dwarfs, as little a wing length of 3mm. Small females tend to have the hind femora less swollen, but the long labrum remains a distinction from *Sphecodes geoffrellus* . Small males and females tend to be darker and have occasionally all black abdomens. There is some variation in the sculpturing of the top of the pro-podeum, though it usually remains more reticulate than *Sphecodes geoffrellus*.

Habitat and Ecology.

Recorded from the same habitats as its hosts, including heathland, calcareous grassland, disturbed locations such as quarries, and coastal soft rock cliffs.

Flight Period

Univoltine. The female flies from early April to early September and the male from mid June to late September.

Nesting/ Parasitic Biology.

The female is a cleptoparasite of mining bees of the genus *Lasioglossum*. It has been found in association with *L. nitidiusculum* (Kirby) and possibly *L. parvulum* (Schenck). Abroad, it has been reared from *L. pauxillum* (Schenck). As this latter bee has increased in frequency in Britain, so has *S. crassus*. Details of the parasitic behaviour have apparently not been observed.

Flowers Visited.

The females have been found visiting wild angelica (for nectar only), whilst the males have been recorded from Apiaceae such as hogweed and wild carrot (G A Collins, pers. comm.), ling, mayweed and other Asteraceae (Falk, 1991).

Pollen Collected.

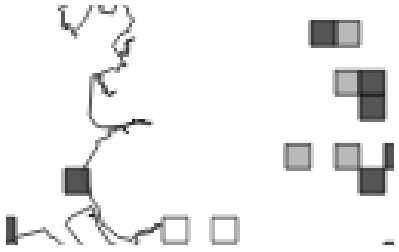
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Very scarce here in Lancashire .The first record was in 1975 and the latest in 1976 with a total of 2 records to date. Restricted to the Darwen and Bury areas of the county.



Sphecodes ephippius (Linnaeus,1767) (Bare-saddled Blood Bee)

Male **Female**

Both

Description.

Widespread in southern Britain, being found from the Isles of Scilly and Cornwall to Kent, north to Yorkshire and Cumbria. Also known from Wales, the Isle of Man and the Channel Islands. It is not presently known from Ireland. This is a Palearctic species, found in south and central Europe east across Asia to Mongolia and south to North Africa (S Roberts *pers. comm.*).

FW4.5mm to 6.5mm female.4.5mm to 5.5mm male. A medium sized species with the thoracic dorsum rather densely punctate. Females are readily separated from all other *Sphecodes* species, all except *S.rubicundus* by the very short, sparse hairs on the sloping anterior face of tergite 1**.** Of all the other species this one as long denser hairs present on fresh individuals. Males are one of tree smaller species with narrow zones of pubescence on the anterior faces of the antennal segments and no dorsal groves on the gonocoxites. This should always be confirmed using genitalia but have denser hairs punctures on the scutum than the other two *S. puncticeps* and *S.longulus*. There is considerable variation in size in both of the sexes, with dwarfs featuring wing lengths of as short as 3.5mm. Small individuals can be lots more darker than larger ones with some having all black abdomens.

Flight Period.

Univoltine; the female flies from late March to late September and the male from mid July to early October.

Nesting/ Parasitic Biology.

The species is probably a cleptoparasite of several species of *Lasioglossum,* including the common species *calceatum* (Scopoli), *lativentre* (Schenck) and *leucozonium* (Schrank). Less common *Lasioglossum* and also *Halictus* species can be used. Occasionally *Andrena* such as *chrysosceles* (Kirby) have been implicated as hosts. It appears that the parasitic behaviour has not been observed in any detail and there are no rearing records in the literature.

Flowers Visited.

This Sphecodes visits various flowers with shallow corollas for nectar only; particularly noted are the families Asteraceae, Apiaceae and Fabaceae. Females are often seen on dandelions in spring.

Pollen Collected.

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

Parasites.

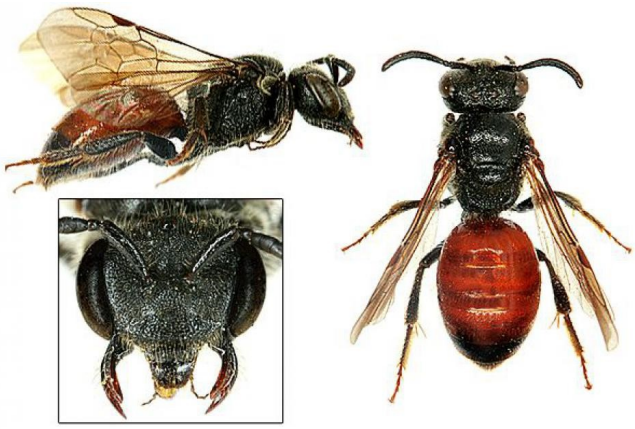
No parasites are reported as yet.

Here in Lancashire.

Widespread but scarce here in Lancashire. First recorded in 1964 and the latest record in 2018 with a total of 8 records to date.

Sphecodes ferruginatus von Hagens,1882 (Dull-headed Blood Bee)

Male.



Female.

Description.

A scarce species, found from Cornwall to Kent to the north of England. It is found rarely in Wales and reported from Ireland in O'Connor *et al.* (2009), but is not known from the Channel Islands. Abroad, a Palearctic species; known in the south from central Spain east to Greece and Azerbaijan and in the north from southern Fennoscandia east to Siberia (S Roberts *pers. comm*.) FW. 5mm to 6mm in both sexes. Females can be distinguished from other species by the densely punctate face and frons, both have which have punctures only narrowly separated and the surface between the punctures dulled by macrosculpture. This makes the head look dull , especially the frons. Compared with the other species the thorax is more densely punctate, with the size a little larger and a little more broad and robust. Other features that should be present include well formed rugosity on the sides of the thorax. The upper sides of the propodeum fairly smooth and shining. A long labrum, and bands of small punctures across the bases of tergites 2 and 3, Males are one of the smaller species with narrow zones of pubescence on the antennal segments and dorsal groovers on the gonocoxites. They have a broader build that the other male species with tergite 1-3 often entirely red, which makes them look distinctive, but they really should be confirmed using genitalia. There is some variation in size, colour and build , with some individuals with wing lengths as short as 4.5 mm, and sometimes semi-melanic are encountered.

Flight Period.

Univoltine; the female flies from late May to mid August and the male from mid July to the end of August (Falk, 1991).

Nesting/ Parasitic Biology.

The parasitic behaviour of this bee has apparently not been observed. It is believed to parasitise *Lasioglossum fulvicorne* (Kirby) and *Lasioglossum fratellum* (Pérez); possibly also other *Lasioglossum* such as *laticeps* (Schenck), *pauxillum* (Schenck) and *rufitarse* (Zetterstedt) (Falk, 1991).

Flowers Visited.

Flower visits in Britain, for nectar only, are known for a cinquefoil, fennel and wild carrot (Falk, 1991).

Pollen Collected.

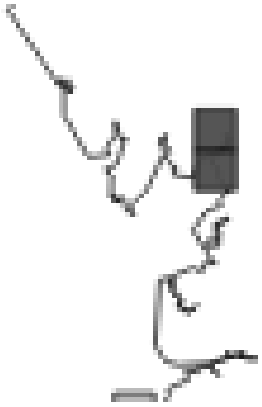
This is a cleptoparasitic species, so no pollen is gathered.

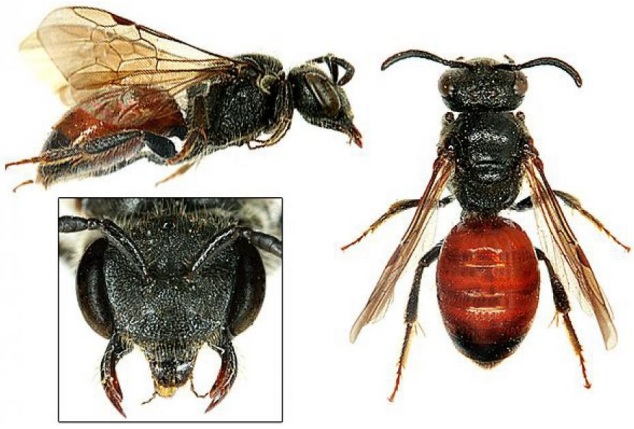
Parasites.

No parasites are reported as yet.

Here in Lancashire.

Very rare and restricted to Silverdale and Ainsdale in the county. First recorded in 1975 with the latest record in 2012, with only 2 records to date.





Sphecodes geoffrellus (Kirby,1802) (Geoffroy's Blood Bee)

Male

Female

Description.

This species closely resembles several other small *Sphecodes* species and is best identified from characters of the male genitalia. FW.4mm to 5mm female. 3mm to 4.5mm male. One of the smallest of the species. The females have only fine and sparse punctures on the scutum and simple longitudinal ridges on the top of the propodeum. Very similar to *S. miniatus*, *S. marginatus* and *S. hyalinatus*, but the scutum is more densely punctate. Males are one of the three small species with the anterior face of the antennal flagellar segments largely covered by pubescence but can be separated from *S. miniatus*, and *S. marginatus* using genitalia. There is some variation in size, build and colour and smaller individuals of both sexes are usually semi-melanic and occasionally have an all black abdomen. The female hind tarsi can sometimes be dark as in *S. miniatus* and *S. marginatus* The sculpturing of the top of the female propodeum varies somewhat and can be become more reticulate in some individuals.

Flight Period.

Univoltine. The female flies from early April to early September and the male from mid June to late September.

Nesting/ Parasitic Biology.

The female is a cleptoparasite and so it does not prepare its own nests. Hosts include *Lasioglossum nitidiusculum* (Kirby), *L. parvulum* (Schenck) and probably several other small *Lasioglossum* species, including *L. morio* (Fabricius), *L. leucopus* (Kirby), *L. pauxillum* (Schenck), *L. rufitarse* (Zetterstedt) and *L. sexstrigatum* (Schenck) (Bogusch & Straka, 2012).

Flowers Visited.

The bee visits Asteraceae such as dandelion, mayweed and thistle, and Apiaceae such as hogweed, but only for nectar.

Pollen Collected.

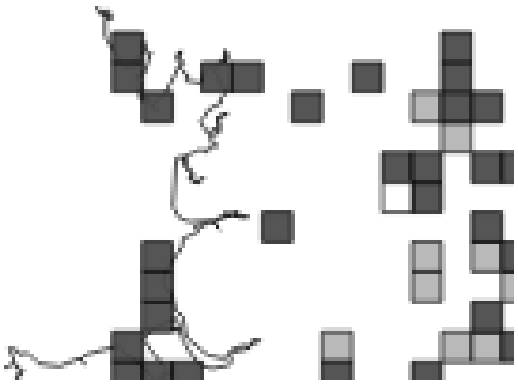
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and uncommon here in Lancashire. The first unconfirmed record was in 1953, with the latest record in 2017, with a total of 12 records up to date.



Sphecodes gibbus (Linnaeus,1758) (Dark-winged Blood Bee)

Male **Female**

Both

Description.

One of the larger British halictine bees with a body length in the region of 10mm. In common with most other bees of the genus *Sphecodes* it is black and red in general appearance. The red tends to be rather darker than in many other species and the wings are strongly infused with black, giving a very distinctive smoky appearance. FW. 6mm to 8mm female. 5.5mm to 7.5mm male. Large females are amongst the largest of the *Sphecodes* family, with their dark tinted wings and broad head with is distinctively larger than the thorax, which makes easy identification in the field. Females are on of the three *Sphecodes* with distinct punctures to the top of the head, behind the ocelli. Males belong to a group of larger species with somewhat compressed and shiny antennal flagellar segments. The scutum is more sparsely punctured than in other similar species and the genitalia of the males are very distinctive. There is considerable variation in the sixes of both sexes, and also variontion in colour and build. Smaller individuals are often much darker and featuring allometry. Larger individuals tend to have a proportionally larger head. There is also variation in the strength of sculpturing on the top and sides of the propodeum. The wigs of the females vary in darkness and are more darker than the other species of the *Sphecodes* family. Halictus rubicundus is the main British host for this species.

Flight Period.

Females may be found between April and September, males between July and September. Early season females are searching for host nests, late season ones are searching for mates or overwintering sites.

Nesting/ Parasitic Biology.

The larvae are cleptoparasitic on larger bees of the genera *Halictus* and *Lasioglossum*. An adult female *Sphecodes* bee enters the burrow of a host bee and searches out an almost completed cell of the host where it lays its egg. Some female *Sphecodes* are apparently unique among cleptoparasitic bees in that they remove (eat?) the host egg before laying their own (see, for example, Stephen, Bohart & Torchio, 1969). New adult *Sphecodes* emerge toward the end of the flight season.

Flowers Visited.

The bee may be found visiting a wide range of flower species but is probably most often found at those of the Asteraceae and Apiaceae, such as mayweeds, thistles, various composites and other composites.

Pollen Collected.

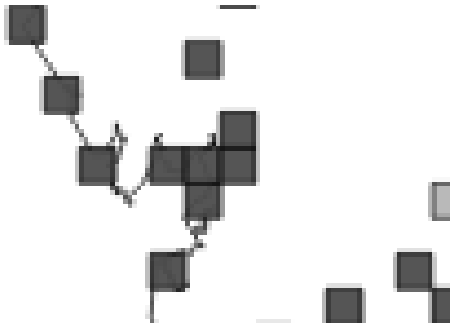
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and uncommon here in Lancashire. The first unconfirmed record was in 1953 and the latest confirmed record was in 2017 with 18 records to date.



Sphecodes hyalinatus (Von Hagens,1882) (Furry-bellied Blood Bee)

Male

Female

Description.

A widespread species. Occurring in England, Wales, Scotland, and Jersey in the Channel Islands. Also recorded from Ireland (O'Connor et al., 2009) A Palearctic species recorded mostly from Europe; north to northern Finland, south and east to Germany, Switzerland Poland and Hungary, but apparently also found in Kamchatka (eastern Russia) (S P M Roberts, pers. comm.). FW 4mm to 5mm in both sexes. This is one of our smaller *Sphecodes* . Females are very easily distinguished from other all species by the lack of conspicuous puncture bands around the bases of tergites 2 and 3.. The other species have bands of fine punctures. Also the particular smooth sides of the propodeum and the usually shallow sculpturing of the sides of the thorax. The scutum is less densely punctate than in *S. ferruginatus* but somewhat more in *S. geoffrellus*, and it is slightly more broadly built. The underside od the thorax has a dense pile of short, pale hairs between the fore and mid coxae, in fresh or well preserved specimens. Males are one of the three small species with zones of pubescence occupying about half the length of the apical antennal segments of their anterior face. They should be confirmed using genitalia. There is some variation in size and build with some individuals with wing lengths as short as 3.5mm and semi metallic are sometimes encountered.

Flight Period.

Univoltine. The female flies from late April to late September or early October, the male from mid June to early October.

Nesting/ Parasitic Biology.

This species is not regarded as scarce or threatened. Found in the same habitats as its hosts, i.e. mainly calcareous grassland but also sandy heaths and moorland. Prefers chalk or limestone places with its range alongside *S. ferruginatus* and limestone grasslands, quarries that are associated with *Lasioglossum fulvicorne* and also it occurs coniferous woodland, heathland and moorland areas in the north and west of its range which is used in association with *L. fratellum*. No information is available on the parasitic behaviour.

Flowers Visited.

In Britain, found on Apiaceae, Asteraceae and Campanulaceae.

Pollen Collected.

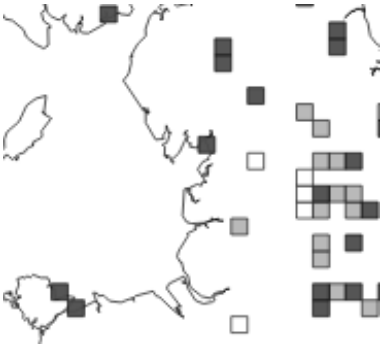
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Here in the county it is restricted to the Bury and Blackburn areas and it is even scarce in these two areas.. First recorded in 1975 and the latest record in 2018 with a total of 9 records to date.



Sphecodes monilicornis (Kirby,1802) (Box-headed Blood Bee)

Male

Female

Description.

Found throughout Britain, Ireland, the Isle of Man, the Isles of Scilly and the Channel Islands. A Palearctic species, known from Europe as far north as central Finland; also found in central Asia and North Africa (S Roberts, *pers. comm.*).
FW. 6.5mm to 7.5mm female.5mm to 6.5mm male. One of 3 medium, to large species of Sphecodes with distinct punctures on the top of the head behind the ocelli. They rae easy to tell from other two species, *S.gibbus* and S. *reticulatus* by the large box shaped head in top view, also more narrowly built and with paler hairs od the hind tibiae. Males belong to the group of larger species with compressed and shiny antennal flagellar segments. It can also be distinguished for the others by the distinct genitalia. There is moderate size variation along with allometry with larger individuals tending to be more robust and bigger headed than smaller one.

Flight Period.

A univoltine species. The female flies from mid April to early October and the male, late June to early October. They are the earliest of the species to appear in spring.

Nesting/ Parasitic Biology.

It parasitises *Halictus rubicundus* (Christ), and *Lasioglossum* species such as *malachurum* (Kirby), *albipes* (Fabricius), *calceatum* (Scopoli), *laticeps* (Schenck), *xanthopus* (Kirby) and *zonulum* (Smith).

Flowers Visited.

The bee visits a variety of plant families in Britain, for nectar only: Asteraceae, Apiaceae, Rosaceae, Campanulaceae and Euphorbaceae.

Pollen Collected.

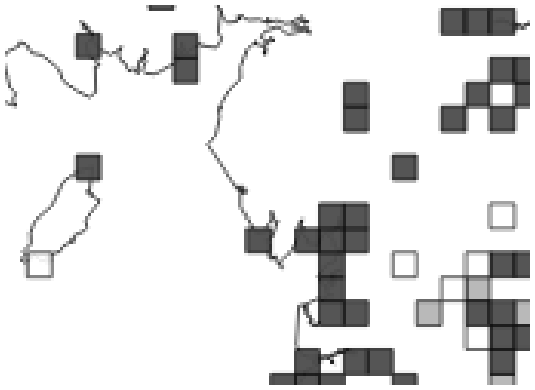
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and common here in the county wherever its hosts are found. First recorded in 1975 and the last record in 2018. With a total of 40 records to date.



Sphecodes pellucidus Smith,1845 (Sandpit Blood Bee)

Male

Female

Description.

Frequent in southern Britain, north to southern Scotland, although often coastal in Wales. Also occurs on the east coast of Ireland and in the Channel Islands.

Found widely in the Palearctic region, from Europe north as far as Sweden, east to Siberia and also in north Africa. FW 5mm to 7mm female.4.5mm to 6mm male. A medium sized and robustly built *Sphecodes* with a particular broad and transverse head when looked at from above.. A densely punctate scutum and rather long whitish hairs on the head and thorax. Females have a broad and dull pygidium. Looking on the sides of the thorax you can see a chitin flange just above core coxae, which will separate it from other similar species, which acts as a protective collar to the neck. Males are one of three small species with zones of pubescence occupying about half the length of the apical antennal segments on their anterior face and are best observed using genitalia. There is moderate size and colour variation, with smaller individuals tending to be darker. Some females have rather sooty hairs on the hind tibiae.

Flight Period.

The female flies from April to September and the male from early July to September.

Nesting/ Parasitic Biology.

The species is a cleptoparasite of *Andrena barbilabris* (Kirby), a mining bee frequent on sandy soils. Other Andrena species, including *A. wilkella* (Kirby), have sometimes been implicated as hosts. The female *S. pellucidus* is found at the nest sites of *A. barbilabris* inspecting the loose sandy soil with her antennae and when a burrow is located by scent, it burrows into the sand, disappearing. The destruction of the host egg or young larva has not been observed.

Habitat.

Frequent in sandy habitats, including inland heaths and coastal sands, where its host occurs.

Flowers Visited.

The bee particularly visits Asteraceae, including thistles and mayweeds, for nectar only.

Pollen Collected.

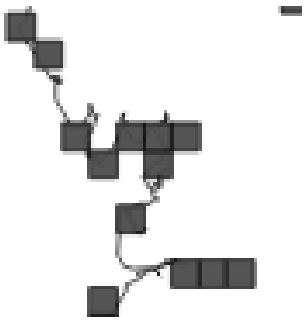
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and common here in Lancashire. First recorded in 1975 with the latest record in 2018 and a total of 27 records to date.



Sphecodes puncticeps Thomson,1870 (Sickle-jawed Blood Bee)

Male

Female

Description.

Frequent in southern England, north to Cumberland and Yorkshire, and on the south coast of Wales. Also found in the Channel Islands. Found in Europe, north Africa and east to central Asia. FW.4.5mm to 5mm female. 4mm to 5mm male. One of the smaller members od the species, with a robust build, strongly punctate scutum and very broad head if viewed from the front. It is one of two of the species with the females having similar mandibles lacking an apical tooth and emargination, and can be separated from the other by its larger size, broader build, broader head and darker legs and also the presence of a distinct median groove at the front of the thoracic dorsum. Males are one of three smaller species with narrow zones of pubescence on the anterior faces of the antennal segments and no dorsal groove son the gonocoxites. They should always be confirmed using genitalia. Both sexes vary in size and there are dwarfs with wing lengths less that 3.5mm . These individuals have black abdomens.

Habitat.

Occurs in the same habitats as its hosts and is not particularly ecologically restricted, e.g. can be found in coastal areas, sandy heaths, occasionally in calcareous grassland and also in open woodland such as chestnut coppice.

Flight Period.

The female flies from May to October and the male from July to October.

Nesting/ Parasitic Biology.

This bee is a cleptoparasite on various *Lasioglossum* species, particularly *L. lativentr*e (Schenck) and *L. quadrinotatum* (Kirby). *Lasioglossum villosulum* (Kirby) and *L. brevicorne* (Schenck) have also been implicated. There is no further information available on the parasitic biology.

Flowers Visited.

This bee frequently visits Asteraceae, including common fleabane, goldenrod, mayweeds and thistles, for nectar only.

Pollen Collected.

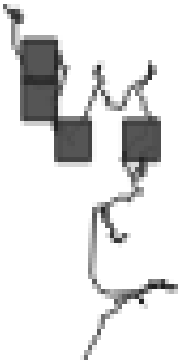
This is a cleptoparasitic species, so no pollen is gathered.

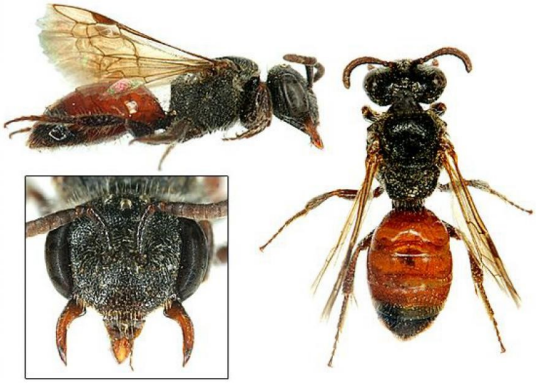
Parasites.

No parasites are reported as yet.

Here in Lancashire.

Very rare here in Lancashire, where it is restricted to the Sefton and Heysham areas of the county. Four siting's in 2001 are the only records in Lancashire.





Family: MEGACHILIDAE

Megachilidae is a cosmopolitan family of mostly solitary bees whose pollen-carrying structure (called a *scopa*) is restricted to the ventral surface of the abdomen (rather than mostly or exclusively on the hind legs as in other bee families). Megachilid genera are most commonly known as **mason bees** and **leafcutter bees**, reflecting the materials from which they build their nest cells (soil or leaves, respectively); a few collect plant or animal hairs and fibers, and are called **carder bees**, while others use plant resins in nest construction and are correspondingly called **resin bees**. All species feed on nectar and pollen, but a few are kleptoparasites (informally called "cuckoo bees"), feeding on pollen collected by other megachilid bees. Parasitic species do not possess scopae. The motion of Megachilidae in the reproductive structures of flowers is energetic and swimming-like; this agitation releases large amounts of pollen.

Nonparasitic species

The life cycle of nonparasitic Megachilidae is typically that nests are built, divided into cells. Each cell receives a supply of food (pollen or a pollen/nectar mix) and an egg; after finding a suitable spot (often near where she emerged), a female starts building a first cell, stocks it, and oviposits. She builds a wall that separates the completed cell from the next one. The larva hatches from the egg and consumes the food supply. After molting a few times, it spins a cocoon and pupates. It emerges from the nest as an adult. Males die shortly after mating, but females survive for another few weeks, during which they build new nests. Nests are often built in natural or artificial cavities. Some embed individual cells in a mass of clay or resin attached to a wall, rock surface, or plant stem. Nest cavities are often linear, for example in hollow plant stems, but not always (snail shells are used by some *Osmia*, and some species readily use irregular cavities).

Parasitic species

Some genera of megachilids are brood parasites, so have no ventral scopa (e.g. *Stelis* and *Coelioxys*). They often parasitize related taxa. They typically enter the nest before it is sealed and lay their eggs in a cell. After hatching, the parasite larva kills the host larva, unless the female parasite has already done so, and then consumes the provisions. Parasitic species are of equal size or smaller than their victims. In 1921, the journal *American Museum Novitates* published a preliminary report on parasitic megachilid bees of the western United States.

The scientific name Megachilidae refers to the genus *Megachile*, translating roughly as *large lipped* (Ancient Greek μέγᾰς (mégas, "big") + χεῖλος (kheîlos, "lip"); their "large lips" and strong jaws are well-suited for collection of nest building materials.

Most Megachilidae build their nests in above-ground cavities; they all are solitary bees. Their nesting habits means that in some studies of bee diversity, this bee family is most likely to be the one encountered, even though the many ground nesting bees are much greater in species numbers (~70% of all bee species are ground nesters). For example, in Krombein's trap-nesting survey (1967), almost all bees that nested in his offerings were Megachilid species—40 of 43 occupying bee species. (They were outnumbered in diversity by almost twice as many species of wasps (75) that utilized the nests).

Because they are (mostly) above-ground nesters and more commonly attracted to artificial nests, megachilid bees are also more commonly cultivated than ground nesting solitary bees. They accept nesting materials made from hollow stems, tubes, and blocks with preformed holes ("nest blocks"), and several megachilids have become important species for agricultural / horticultural pollination.

A suite of megachilid rely on plant resins for nest construction. These "resin bees" are typically smaller than honey bees, and effective pollinators, although the hard glue-like resins can complicate management of other tunnel nesting bees. Carder bees, *Anthidium*, are unique for using plant fibers; there are 80 to 90 species of them in North America. Ironically, a non-native is best known—*A. manicatum*, the European wool carder bee, was accidentally introduced to the Americas in the late '60s and has now spread across the continent. It has been described as "... perhaps the most widely distributed unmanaged bee species in the world. "Like most *Anthidium*, rather than cutting leaves or petals, *A. manicatum* scrapes the hairs from leaves to use for nesting material. It is atypical because the male is larger than the female and constantly on patrol, protecting a "harem" by chasing and even attacking all interlopers including honey and bumble bees, its tail equipped with multiple prongs that can knife in between the segments of most any intruder.

Family: MEGACHILIDAE

Genus: Coelioxys

Coelioxys, common name **leaf-cutting cuckoo bees** or **sharp-tailed bees** , is a genus of solitary kleptoparasite or brood parasitic bees, belonging to the family Megachilidae. The genus includes about 500 species in 15 subgenera. *Coelioxys* species can be found in most European countries, in the Afrotropical realm, in the East Palearctic realm, in North Africa, in the Nearctic and Neotropics.

Bees within this genus can reach a length of 8–12 millimetres (0.31–0.47 in). They show a broad head with large complex eyes and broad thorax and abdomen. Their body is only moderately hairy. They are usually black with white hair stripes. Legs maybe red or black. The females of *Coelioxys* species have a long pointed abdomen that resembles a cone, used to pierce the leaf lining in the laying of eggs. The male's abdomen is armed with spines or teeth. They are known to sometimes sleep upside down on vegetation.

These cuckoo bees are usually active from June to September, depending on the specific host species. They have no pollen-carrying adaptations, as they do not need to provision nests. Adults feed on nectar at flowers of a wide range of different nectar plants. In fact they mainly lay their eggs in the nests of bees in the genus *Megachile*, but also in the nests of *Osmia* and *Anthophora*, on their provisions of pollen. As this behavior is similar to that of cuckoos, such bees are sometimes referred to as "cuckoo bees". These host-parasite relationships are quite complex. The larvae of *Coelioxys* species kill the host larvae with their strongly developed mandibles and feed on the host's pollen provisions. They spin a cocoon at 11–16 days. These species are usually univoltine, but for some species a second generation is possible.

Coelioxys inermis (Kirby,1802) (Shiny-vented Sharp Tailed Bee)

Male

Female

Description.

Largely a southern species, appearing to favour the south-east of England but also the south coast of Wales. There are sporadic records from the south-west northwards to Cumberland and Yorkshire. There are no recent records for central England, central and north Wales or Scotland, but it is known from Ireland and the Channel Islands. Occurring in central Europe, Italy, Lithuania and Finland. FW6 to 9 mm with females on average larger than the males.. They closely resemble *C. elongate* but the females can be easily recognised if you check the sternites.. Males resemble *C.elongata* and *C. mandilbularis* and can only be reliably separated by the examination od the genitalia. There is moderate size variation and the shape of the hair bands on tergite 2 to 4 which can become abraded in older individuals. This species is a cleptoparasite of *Megachile maritima* (Kirby) and *M. centuncularis* (Linnaeus).

Habitat and Ecology.

This species is not regarded as being scarce or threatened. Quite varied in its habitats which include heathlands, chalk downland, woodlands and gardens. Also Found in the same habitats as its hosts

Nesting Biology.

This species is a cleptoparasite of *Megachile maritima* (Kirby) and *M. centuncularis* (Linnaeus). The females of all but one British species of *Coelioxys* have a pointed sixth tergite and fifth sternite which is apparently used to cut open the cell wall or cap of the host species. An egg is laid in this slit with at least one third protruding through into the cell or laid directly onto the host egg. There is currently no data to suggest which method *C. inermis* employs. Generally, *Coelioxys* larvae kill, and in some species eat, the host egg immediately on hatching. Pupation occurs within a cocoon spun within the host cell where the larva overwinters as a pre-pupa, prior to final pupation, presumably in spring of the following year.

Flight Period.

It is on the wing from June to August.

Flowers Visited.

Known to visit trefoils, clovers, scabious and sheep's-bit, brambles, Crossed leafed Heath and Birds foot trefoils in the UK but a wider range.

Pollen Collected.

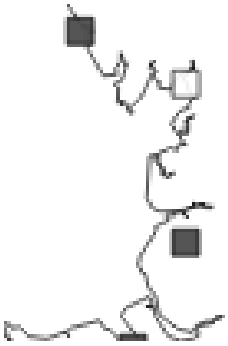
As the species is a cleptoparasite, no pollen is collected.

Parasites.

No data available.

. Here in Lancashire.

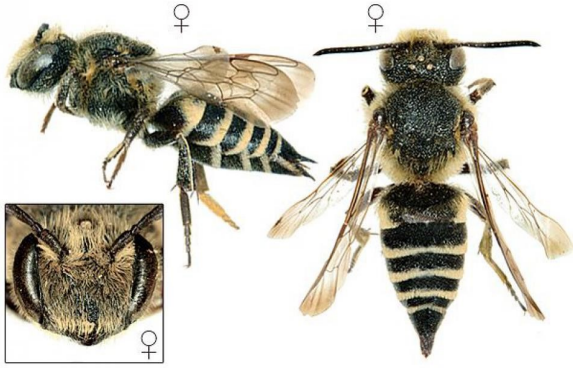
Restricted to the Sefton, Holmeswood Areas. It is a rare bee in Lancashire. An unconfirmed in 1917 and the latest record in 2017 with only 4 records .



Coelioxys rufescens (Lepeletier & Serville,1825) (Rufescens Sharp Tailed Bee)

Male

Female



Female.

Description.

Recorded from England and Wales, but most frequent in the south and south-east. Not known from Scotland or Ireland. It occurs in the Channel Islands. his species is not regarded as nationally scarce or threatened. It is regarded as regionally notable for northern England. FW 6.5mm to 8mm female.5.5mm to 8mm male. Females are easily distinguished by the apical shape of sternite 6 and also the long semi inclined pile of the face, which lacks the erect bristle like hairs of *C. elongate, C. Inermis, C.mandibularis* and *C. quadridentate.* Similar to *C. quadridentate* males have a semicircular incision along the hind margin of sternite 4 which is sometimes hidden by hairs and with no hint of lateral teeth along the hind margin of tergite 5, but the pale hairs bands of tergites 2 to 4 are distinctively narrowed in the middle, the gradulus groove of tergites 2 and 3 are weakened or broken in the middle, and tergite 1 has a much shorter hairs between the lateral pale spots. Variation in Individuals using *Athophora bimaculate* tend to be smaller than those that use other types of larger hosts. There is also variation in the apical shape of sternite 6 and the punctures and markings of the tergites.

Habitat and Ecology.

Found in a range of habitats as it can utilise multiple hosts and found in sandy habitats, soft rock cliffs, heathlands and sandpits.

Nesting Biology.

It is a cleptoparasite of *Megachile willughbiella* (Kirby), *M. circumcincta* (Kirby) and *Anthophora furcata* (Panzer). It may also parasitise *M. centuncularis* (Linnaeus) and *A. bimaculata* (Panzer). The females of all but one British species of *Coelioxys* have a pointed sixth tergite and fifth sternite which are apparently used to cut open the cell wall or cap of the host species. An egg is laid in this slit with either at least one third protruding through into the cell or laid directly onto the host egg. There is currently no work to suggest which method *C. rufescens* employs. In general, *Coelioxys* larvae kill, and in some species eat, the host egg immediately after hatching. Pupation occurs within a cocoon spun within the host cell where the larva overwinters as a pre-pupa, prior to final pupation, presumably in spring of the following year.

Flight Period.

It is on the wing from late May to August with the main activity in late June and July.

Flowers Visited.

Records in the UK include brambles and thistles but abroad a wide variety of flowers are recorded as being visited.

Pollen Collected.

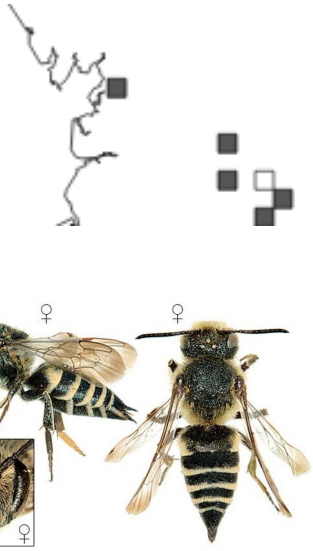
As a cleptoparasitic species no pollen is collected.

Parasites.

No data available.

Here in Lancashire.

A rare species in our county . The first record was in 1998 and the latest in 2018 with just 2 records



Female

Coelioxys elongata (Lepeletier,1841) *(Dull-vented Sharp Tailed Bee)*

Male

Female

Description.

A distinctive group of largely black bees, with the females of most species having a pointed tip to the gaster. This species flies low over the ground looking for its host's nests, often in a purposeful manner. FW 6to 8.5 mm with both sexes similar. A medium sized, brownish sharp tailed bee which are considered as part of a trio along with *C inermis* and *C mandibularis.* Females of this trio have a similar shaped sternite 6 bearing small, acute lateral teeth, and together with C.quadridentata have an inclined hair pile on the face through which protrude erect bristly hairs. To separate from C. inermis requires close examination of the sternites. In *C.elongata* these are dulled to an extent by macrosculpture and also the punctures of sternites 2 to 4 get progressively smaller and denser towards sternite 5 and may even be absent at the sides of tergite 4. Sternite 5 is very dull and has a shallow notch at the tip.. Males of the trio are very challenging and *C.elongata* and *C.inermis* can only be separated by examining the gonostyli of the genitalia. Variation.. There is very moderate size variation with some variation in the size and extent of the punctures and micro sculptures on the sternites. Also the the size and the shape of the hair bands on tergites 2 to 4, which on older bees can become braded.

Habitat and Ecology.

Coastal dunes, inland heaths, gardens and brownfield sites where its hosts occur. It is not regarded as being scarce or threatened in the UK.

Nesting Biology.

This species is a cleptoparasite of *Megachile willughbiella* (Kirby) and *M. circumcincta* (Kirby). The females of all but one British species of *Coelioxys* have a pointed sixth tergite and fifth sternite which is apparently used to cut open the cell wall or cap of the host species. An egg is laid in this slit with at least one third protruding through into the cell or laid directly onto the host egg. There is currently no work to suggest which method *C. elongata* employs. Generally, *Coelioxys* larvae kill, and in some species eat, the host egg immediately on hatching. Pupation occurs within a cocoon spun within the host cell where the larva overwinters as a pre-pupa, prior to final pupation, presumably in the spring of the following year.

Flight Period.

his species' flight period is from June through to August and is likely to appear slightly later than its host species.

Flowers Visited.

It is likely to visit bird's-foot-trefoils and possibly other legumes including species such as melilot.

Pollen Collected.

As this bee is a cleptoparasite, it does not collect pollen.

Parasites.

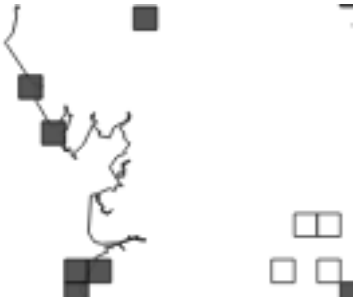
No data available.

Hosts.

The main host of this bee is *Megachile willughbiella* but it also clearly parasite's *M. circumcincta* in some northern areas of the UK.

Here in Lancashire.

A common bee in Lancashire and found wherever its host are . The first unconfirmed record was in 1944 and the latest in 2018 , with 21 records up to date.



Genus:Hoplitis

One of the largest megachiline genera with over 350 described species, though only two on the British list. Closely related to *Osmia* with a similar range of nesting habits and foraging behaviour. Females of the British species have a cream-coloured pollen brush beneath the abdomen (black or orange-haired in *Osmia).* Males have the tip of the front tibiae drawn into a sharp point (blunt in *Osmia).* The parapsidal lines on the sides of the scutum are longer than all Osmia species except *O. spinulosa.* Here in Lancashire we have only 1 species.

Hoplitis claviventris **(Thomson,1872) (Welted Mason Bee)**

Male

Female

Description.

Widely distributed but usually uncommon throughout much of southern England and in south Wales (where it is largely coastal); much more sporadic in the Midlands, East Anglia and northern England. There are no records from Scotland, Ireland or the Channel Islands. Widely distributed throughout much of Europe, from Fennoscandia south to central Iberia, Corsica, Sardinia, and eastwards to Greece and Russia. FW 5to 6mm female. 4.5 to 6mm male A small mason bee that resembles Osmia spinulosa in size. Females have an inconspicuous dull brown pile on the top of the thorax and a blue black shining abdomen with conspicuous white hair patches on the hind margins of tergite 1-4. The pollen brush beneath the abdomen is a creamy white. Males superficially resemble O.*spinulosa* or small individuals of *O.bicolor* but are easily distinguished under magnification by the large semicircular projection on sternite 2. There is little variation in size between the male and females, with small males not uncommon. Worn individuals can become grey haired and denuded and the females can lose the white patches on the tergites.

Habitat and Ecology.

The species has been recorded from a wide range of habitats, including, for example, open broad-leaved woodland, heathland edge, chalk grassland and the coast that are sparsely vegetated, quarries and brownfield sites. Most sites are characterized by the presence of birds-foot trefoils..

Nesting Biology.

Many nests of this bee have been found in dead stems, where the females had excavated the pith to form nesting burrows. Such stems included bramble, rose and ragwort. A nest has even been found in a buried bramble stem (Perkins, 1886). Other nest sites have been a buried, decaying root (Perkins, 1923); burrows in an old paling (Arnold, 1903); a burrow in the soil (Saunders, 1896); a small piece of dead pine branch lying on the ground (M Edwards, pers. comm.); and, on the Continent, an empty gall of the chloropid fly *Lipara lucens* on a reed stem (Blüthgen, 1919). The cells are separated from one another by partitions of leaf mastic, which is green when freshly made but later assumes a brownish-black colour. The inner surface of the nest burrow, rather than a layer of leaf mastic, forms the side walls of the cells. When full grown the larvae spin thin, semi-transparent silken cocoons in which the winter is passed; pupation takes place in the spring.

Flight Period.

Univoltine; late May to late August (rarely September).

Flowers Visited.

Buttercup, red clover, bird's-foot-trefoil, horseshoe vetch, heaths, field scabious, hawk's-beard and dandelion.

Pollen Collected.

Common bird's-foot-trefoil and greater bird's-foot-trefoil have been recorded (M Edwards, pers. comm.). However, the bee is probably polylectic, as in Germany, where it visits species in the families Asteraceae, Boraginaceae, Clusiaceae, Crassulaceae, Fabaceae and Rosaceae (Westrich, 1989).

Parasites.

The cleptoparasitic megachiline bee *Stelis ornatula* has been reared on several occasions from British nests of *H. claviventris*. The ichneumon wasp *Hoplocryptus bellosus* has also been reared in this country from stem-nests of the *Hoplitis* (Danks, 1971, as *H. signatorius*).

Here in Lancashire.

Restricted to the Sefton area of north Lancashire. The first record in 1964 and the latest in 2018 with a total of 20 confirmed records.

Genus: *Megachile* – Leaf cutter and mud bees

The genus ***Megachile*** is a cosmopolitan group of solitary bees, often called **leafcutter bees** or **leafcutting bees**; it also includes the called resin bees and mortar bees. While other genera within the family Megachilidae may chew leaves or petals into fragments to build their nests, certain species within *Megachile* neatly cut pieces of leaves or petals, hence their common name. This is one of the largest genera of bees, with more than 1500 species in over 50 subgenera. Here in Lancashire we have only 7 species.

Nests are sometimes constructed within hollow twigs or other similarly constricted natural cavities, but often are in burrows in the ground. Nests are typically composed of single long columns of cells, the cells being sequentially constructed from the deepest portion of the tunnel outwards. The female places an egg in each cell with a supply of food, generally pollen, sometimes mixed with nectar. She builds a cap and walls off the cell. The larva hatches from the egg and consumes the food supply. After moulting a few times, it spins a cocoon and pupates, often after several months of hibernation as a prepupa. It emerges from the nest as an adult. Males, which are typically smaller and emerge in advance of females, die shortly after mating, but females survive for another few weeks, during which time they build new nests. Numerous families of wasps and bees parasitize *Megachile* nests, including *Gasteruptiidae, Leucospidae, Sapygidae*, and various cleptoparasitic megachilids, such as the closely related genus *Coelioxys*. *Megachile rotundata* and *Megachile campanulae* are among of the first insects documented in scientific literature to use synthetic materials for making nests.

Many *Megachile* species use cut leaves to line the cells of their nests. It is thought that the leaf discs help prevent the desiccation of the larva's food supply.[1] Various species in the genus, especially those in the subgenus *Chalicodoma* and related groups, do not use cut leaves to line the cells, but instead use fairly dry plant resin, which they carry in their mandibles. The subgenus *Chalicodoma* includes the world's largest bee, *Megachile pluto*, as well as one of the largest megachilids in the United States, the recently introduced Asian species, *Megachile sculpturalis*.

Some *Megachile* species have no lobe (arolia) between their claws, thus are unable to climb smooth walls or glass.

***Megachile* shown cutting a leaf**

Megachile willughbiella (Kirby,1802) (Willughby,s Leafcutter Bee)

Male

Female

Description.

Megachile willughbiella is one of the most frequently observed and widely distributed leafcutter bees in the British Isles. It is found from the Isles of Scilly through Cornwall and Devon northwards, though sporadically, to Inverness, Scotland. Also recorded in Ireland and the Channel Islands. Records naturally are less frequent the more northerly one travels. Despite its wide geographical spread there are still gaps in its current distribution. Mid and north Wales and the north Midlands appear not to support this species though this is possibly a consequence of limited recording activity in these regions rather than a restriction in range. It should also be noted that these potentially under-recorded regions are high altitude which may have a bearing on this species' abundance and distribution.

It occurs in western Europe from Spain to Lithuania and Finland.

FW 8.5mm to 10mm female.7.5mm to 9mm male. The most common of the leafcutters. Females have a broad build like *M.maritima*, but average slightly smaller and with a paler appearance and also a longer body pile. Females have mostly orange pollen brush beneath the abdomen but with black hairs on sternites 5 and 6, but not in Ireland. The posterior hair fringe on the fore tarsi is much shorter than in *M. maritima.* The hind margins of the tergites have rather ill defined bands of buff hairs which are less dense than *M.maritima*. Males have greatly expanded whitish front tarsi, much the same as in M.maritima but without the massively swollen and curved tibiae and with a slimmer hind basitarsi. The outer faces of the front femora are mostly orange whereas *M. maritima* is mostly black. The hind margin of the male tergite 6 varies but usually features a series of small lateral teeth on either side of a lateral notch. There is variation in the Irish females who tend to have the pollen brush with less black at the tip and in some is entirely orange haired. Old males can have a greyish appearance due to sun bleaching and females can lose body pile on the tergites and can appear dark and un- banded. Irish males also tend to have white hairs on the thorax and the base of the abdomen.

Habitat and Ecology.

Found in a variety of habitats where there is suitable nesting and foraging. Gardens and brownfield sites are frequently visited and used for nesting by this species, particularly in the main centres of conurbation in England. It is one of the most common leafcutters of all sites.

Nesting Biology.

Nests can be located either in wood or soil, there is also a record of a nest in a length of rubber hose in a greenhouse (Else, 1999). The cells are constructed from leaves including beech and tutsan. A very versatile nester using dead wood and all kinds of cavities including gaps around windows frames, hole in walls, earth filled pots plants, rubber hoses, and even folded up parasols . It is also the main user of garden man made bee hotels. It sometimes uses the ground. The leaf section are gathered from a wide variety of plants, scrubs and trees.

Flight Period.

Mid-June through July and into early August is the optimum flight period for this species.

Flowers Visited.

Bellflowers, bird's-foot-trefoils, thistles and brambles are all visited by *M. willughbiella*.

Pollen Collected.

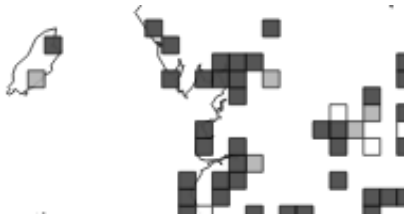
Polylectic, recorded from Asteraceae, Campanulaceae, Fabaceae and Onagraceae (Westrich, 1989). It is noted by Else (1999 and *pers. comm*.) that *M. willughbiell*a shows a preference for bellflowers.

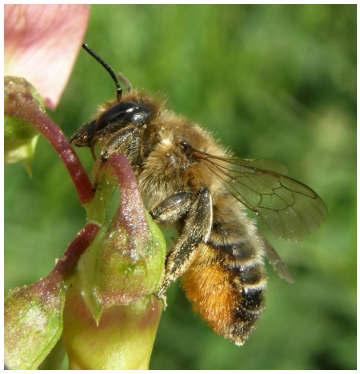
Parasites.

Coelioxys quadridentata (Linnaeus), *C. rufescens* Lepeletier & Serville, and *C. elongata* Lepeletier are all recorded as being cleptoparasites of *M. willughbiella*.

Here in Lancashire.

. Very widespread in the county. The first record which is unconfirmed was in 1914 and the latest being in 2017 with a total of 52 records up to date





Megachile centuncularis (Linnaeus,1758) (Patchwork Leafcutter Bee)

Male

Female

Description.

A widespread species in Britain, although it is more frequently recorded from the south. It also occurs in the east of Ireland and on the Channel Islands. FW 7 to 8.5mm Female.7 to 8 mm Male. A medium sized , brownish coloured leafcutter. Females have the pollon brush orange all the way to the tip and extending up the sides of the tergites which produces an orange halo around the abdomen in dorsal view. Tergites 2 to 4 have narrow fringes od white hairs along the hind margins which are widely broken centrally on tergites 2 and 3. Males have unmodified front legs and closely resemble *M.versicolor* and need to be checked under a microscope for proper checking of the hind margin of sternite 4 which is dull in this species and and shiny in M. versicolor. Small males can look similar to *M.ligniseca* but they have a much deeper apical notch on tergite 6 and also much longer hairs on the sternites. Variation occurs in both sexes such as smaller individuals and older females can lose their abdominal hair bands. Males can also become sun bleached and greyish.

Habitat and Ecology.

Gardens, both rural, on the coast and urban provide suitable foraging for this species. It is one of the most frequent leafcutter in the garden.

Nesting Biology.

The nests are generally constructed within large burrows in wood, cavities in old walls and also occasionally in soil. *Megachile* species construct nests from cut pieces of green leaf. *Megachile centuncularis* uses 6-14 circular leaf pieces per cell body with 6-7 discs forming the lid to each cell. Ash, birch, honeysuckle, horse-chestnut, lilac and rose leaves are utilised.

Flight Period.

This species is found from mid-June through to mid-August with its peak in July.

Flowers Visited.

Like many other *Megachile* this species is often found at bramble and thistle flowers. Also visits Burdocks, Common Fleabane, St Johns Wart and Knapweeds.

Pollen Collected.

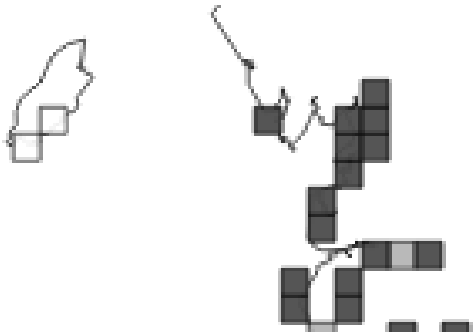
Polylectic, recorded from Asteraceae, Fabaceae and Hypericaceae (Westrich, 1989).

Parasites.

Coelioxys inermis (Kirby) is known to be a cleptoparasite of this species of leaf-cutter bee.

Here in Lancashire.

Very common here in the county . The first record is pre 1901 and the last being 2018 with a total up to date of 38 records.



Megachile ligniseca (Kirby,1802) (Wood-carving Leafcutter Bee)

Male

Female

Description.

An uncommon species more frequently found in the south-east of mainland Britain. It has a more scattered distribution further north, seemingly reaching its extremity in north Yorkshire and two recent records from Staffordshire. There is also a cluster of records from south Wales though apparently absent from north Wales. Also recorded from Ireland but apparently absent from the Channel Islands. Occurs in western and central Europe, also in Finland and parts of European Russia.

FW. 10mm to 12mm female. 8.5mm to 11mm male. A typical large brown leafcutter bee with a slightly more elongated and bigger headed one than the other large species such as *M.maritima* and *W. willughbiella.* Female lack the upright hairs on the top of tergite 6 in contrast to the other 2 large species but like the much smaller *M.leachella* and *M.versicolor.* Small females can be separated from *M.versicolor* by the more rounded tergite 6 and the much paler pollen brush beneath the abdomen, but be careful of getting mixed up with orange pollen it may be carrying. Males have unmodified front legs and can be separated from such species as *M.versicolor and M. centuncularis* by the deep notch in the hind margin of tergite 6. Dwarfs of both male and females are quite common and overlap with species such as *M.versicolor and M. centuncularis.*

Habitat and Ecology.

Since it is a species that utilises bramble, thistles and Himalayan balsam it is likely to be found at ruderal-dominated sites. It has also been found on post-industrial sites where it was recorded feeding on Himalayan balsam and found frequently flying about standing deadwood and bramble thickets.

Nesting Biology.

Nests are most frequently encountered in timber such as old trees and fence posts. One nest has been found in an iron tube. The nesting holes are typically of a large diameter and the cells constructed of sycamore leaves. It is surmised that other plant species are used though no evidence of this has been recorded to date. The powerful jaws are used to fashion nesting holes more than other wood nesting leafcutters.

Flight Period.

This is a summer-flying species with early records from mid-June to as late as early September. The majority of records however fall between early July and mid-August.

Flowers Visited.

It is known to visit thistles and bramble and has also been observed visiting Himalayan balsam (pers. obs.) though no information was obtained on whether this was for nectar or pollen. It is also know to visit Burdocks, Knapweed's, Chicory, and Everlasting peas.

Pollen Collected.

Polylectic, recorded from Asteraceae, Dipsaceae, Fabaceae, Lamiaceae and Plantaginaceae (Westrich, 1989).

Parasites.

There is no information on any parasites, though it should be assumed that *M. ligniseca* does have a parasite and that it is highly likely to be a *Coelioxy*s in parallel with other *Megachile* species.

Here in Lancashire.

Here in Lancashire it is widespread but scarce. The first record was in 2015 and the latest being 2018 with only 6 records up to date.

Megachile versicolor (Smith, F.,1844) (Brown-footed Leafcutter Bee)

Male

Female

Description.

Recorded from southern England northwards to the coast of south-west Scotland. The majority of records are from south-east England along the south coast and up to Bristol. Also recorded from Ireland but apparently absent from the Channel Islands. FW. 7mm to 9mm female. 6mm to 8.5mm male. A medium sized brownish leafcutter bee and resembling *M.centuncularis*. Female lack the upright hairs on tergite 6 of *M.centuncularis* and have a mainly orange pollen brush which is black haired on sternite 5 and 6. The whitish hair bands on the hind margins of the tergites are less conspicuous in M.centuncularis . Small individuals can resemble *M.ligniseca* but have a paler pollen brush and more rounded tip to tergite 6. Males have modified front legs and closely resemble *M centuncularis* which requires microscope checking of sternite 4 to provide accurate identification. The redder apical tarsi segments can provide another clue in identification. Also small males have a much deeper apical notch on tergite 6. Small variations and very small individuals are not unusual. Female can have the pollen brush orange to the tip of the abdomen and hairs of the head and top of the thorax mainly black and contrasting strongly with paler hairs on the sides of the thorax and base of the abdomen.

Habitat and Ecology.

Found in a variety of habitats both inland and on the coast from heathland to brownfield sites and formal gardens to ruderal verge habitats. It is more frequent in open expansive habitats such as downland and heathland than *M centuncularis* .

Nesting Biology.

Tree trunks, Old hollow thistle stalks, dead plant stems (including bramble), and roofing timbers are all noted as providing suitable locations for nests (Else, 1999).

Flight Period.

This species in on the wing from June through to September with a large proportion of records in July.

Flowers Visited.

Bird's-foot-trefoil, thistles, cats- ear and bramble are noted as being visited by this species.

Pollen Collected.

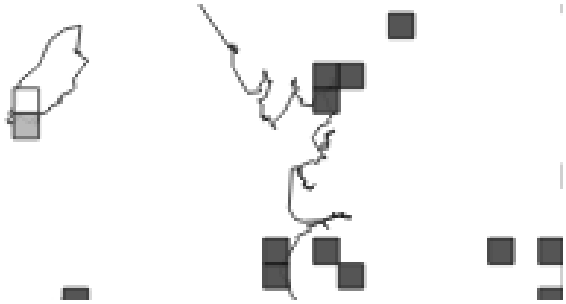
Polylectic, recorded from Asteraceae, Boraginaceae, Fabaceae and Plantaginaceae (Westrich, 1989).

Parasites.

Coelioxys inermis (Kirby) has been recorded as a cleptoparasite. The pteromalid wasp *Pteromalus apum* (Retzius) has been reared from this species

Here in Lancashire.

Awidespread and uncommon species that is found in the county using a wide range of habitats. The first record was in 1978 and the latest in 2018 with a total of 20 records up to date.



Megachile circumcincta (Kirby,1802) (Black-headed Leafcutter Bee)

Male

Female

Description.

Widely distributed throughout Britain from the southern coast of England to northern Scotland (Golspie). However, it is undoubtedly decreasing in southern England. For example, the most recent record from Hampshire is 1983 (S R Miles), West Sussex in 1974 (M Edwards, pers. comm.), and for Surrey in 1973 (D Baldock, pers. comm.). Populations still exist on the extensive coastal dune systems of eastern Scotland, including those at Culbin (abundant in June 1982, pers. obs.), Newburgh, and Rattray Head. FW.&.5mm to 9.5mm female.7.5mm to 9mm male. A medium- large leafcutter bee. Females are very distintive with the head and tergites4 to 6 black haired and contrasting with the rich tawney haired thorax and buff haired tergites 1 to 3. There are no obvious pale hair bands on the abdomen and the body pile is longer than in any other *Megachile,* which creates a rather *Osmia* like appearance. The pollen brush beneath the abdomen is tawney at the base and black at the tip. Males have extended whiteish front tarsi as in *M .willughbiella* and *M.maritima* but the tarsier much slimmer than to 2 other species.. There is variation in older individuals which lose distinctiveness and become sun bleached.

Habitat and Ecology.

Coastal dunes and inland heaths. Coastal brownfield sites.

Nesting Biology.

Nest burrows are reported to be excavated in the soil (Benno 1945) and in wood (Saunders 1896; Erlandsson 1955). The cell walls are known to be fashioned from rose and birch leaves (Saunders (1896) and Nielsen (1902) respectively). Nest occur in south facing sandy banks and slopes and most often in loose aggregates. The have also been observes wood and under stones. Nest building material include roses and birches leaves.

Flight Period.

Univoltine, late May to early August.

Flowers Visited.

Bramble (*Rubus fruticosus* agg.), common bird's-foot-trefoil (*Lotus corniculatus*) and restharrows (*Ononis* spp.). Broom, Brambles and Thistles

Pollen Collected.

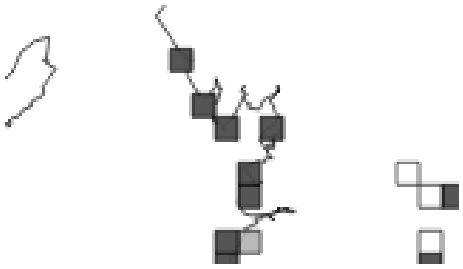
Polylectic, foraging from species in the families Campanulaceae, Fabaceae, Liliaceae and Onagraceae (Westrich 1989).

Parasites.

There are numerous published references to *Coelioxys elongata*, *C. mandibularis*, *C. quadridentata* and *C. rufescens* (Megachilinae) being cleptoparasites of this species.

Here in Lancashire.

A widespread and commonly local species here in Lancashire with an unconfirmed record in 1941 and the latest record in 2018 and a total of 10 records up to date. Records from Ewood Blackburn and Astley Moss



Megachile maritima (Kirby,1802) (Coast Leafcutter Bee)

Male

Female

Description.

Widely distributed and locally common in southern Britain, the range extending northwards to Caernarvonshire, Lancashire and Norfolk. Also known from the Isle of Man (Nelson, 1981) and the larger Channel Islands (Richards, 1979). In Ireland it has been recorded only from Wicklow and Wexford. FW 9mm to 10.5mm female. 9mm to 10mm male. A large brownish to blackish leafcutter. The biggest female have a bulk that can match the biggest *M.lignisica* but are broader and less elongate in build and have upright hairs on the top of tergite 6. Females closely resemble *M.willughbiella* but have much longer hairs on the outer sides of the front tarsi., a paler pollen brush beneath the abdomen and usually extensive dark hairs on the top of the thorax.. Males have a greatly expanded whitish front tarsi like *M.willughbiella* but are easily distinguished by the massive swollen and curved hind tibiae and shorter hind tarsi and a very broad basitarsus . The mandibles also just have 3 teeth whereas *M.willughbiella* as 4. Large males can be very impressive far exceeding male *M.lignisica* in size and with ginger coloured body hairs when fresh. Females vary greatly in the extent of the black hairs on the head and thorax and some can be almost as pale as *M.willughbiella* whist others are almost black. Fresh males are ginger haired but this rapidly disappears and sun bleached individuals are are greyish in colour. The margin of the males tergite 6 varies somewhat but usually features a series of lateral teeth on either side of a central notch.

Habitat and Ecology.

As the species name implies, this handsome leaf-cutter bee is mainly found on the coast, especially where there is light, sandy soil. Other populations occur on lowland heaths and, more rarely, on chalk grassland. Soft rock cliffs and vegetated shingle and brownfield sites are preferred.

Nesting Biology.

The nest burrows are excavated in the soil, although a nest was found in August 1944 in a wall at Croyde, Devon by O.W. Richards (a specimen bred from the nest is in The Natural History Museum, London). Individual cells are constructed from neatly cut sections of green leaves obtained from various plants (e.g. sallow (*Salix* sp.) and hound's-tongue (*Cynoglossum officinale*), round pieces being used for the end walls, oval ones for the side walls. The cell walls are, as in most *Megachile* species, multi-layered. Nests have been described and the cells figured by Walrecht (1958) and Grandi (1961).

Flight Period.

Univoltine; early June to mid August.

Flowers Visited.

Mignonette (*Reseda* sp.), heath (*Erica* sp.), bramble (*Rubus fruticosus* agg.), restharrow (*Ononis* sp.), common bird's-foot-trefoil (*Lotus corniculatus*), greater bird's-foot-trefoil (*Lotus pedunculatus*), sea-holly (*Eryngium maritimum*), hogweed (*Heracleum sphondylium*), viper's-bugloss (*Echium vulgare*), nettle-leaved bellflower (*Campanula trachelium*), spear thistle (*Cirsium vulgare*), common knapweed (*Centaurea nigra*) and ragwort (*Senecio* species).

Pollen Collected.

Pollen sources are not known, but the species is probably Polylectic, as in Germany (Westrich, 1989).

Parasites.

Coelioxys conoidea is a cleptoparasite of this bee. A large race of *C. mandibularis* may be an additional cleptoparasite in Glamorgan (Hallett, 1928) and Lancashire, but this requires confirmation, and only at a few sites, preferably with specimens reared from known *M. maritima* nests.

Here in Lancashire.

Restricted to the Sefton and Fylde areas of the county where it is locally common. The first record was in 1963 with the latest in 2015 and a total of 32 records to date.

Megachile leachella (Curtis, 1828) (Silvery Leafcutter Bee)

Male

Female

Description.

A small *Megachile* with green eyes in life. Tergite 6 of both sexes is clothed largely with adpressed white hairs and the female's scopal hairs are also white. These characters readily distinguish this species from other *Megachile* species in Britain. Formerly known in the British literature by the names *Megachile argentata* and *M. dorsalis*. FW 5mm to 7mm female.5.5mm to 7mm male. This is our smallest leafcutter bee. It is very distinctive due to its strongly banded tergites, and silvery brown appearance. Also very fresh ones have a strongly blue hue with is very rapidly lost. The females have a silvery pollen brush beneath the abdomen and 2 white hair patches on tergite 6 Males have tergite 6 covered in dense white hairs and very green eyes. Dwarfs are common. In older sun bleached individuals the brown thoracic hairs turn greyish and the buff tergite bands turn white and also become abraded.

Habitat and Ecology.

Mainly found on coastal sand dunes. There are, however, a few inland sites, most of which are on sandy soils. For example, in June 2005, D Baldock (pers. comm.) encountered an extensive nesting aggregation in a sand pit at Wrecclesham, Surrey, and there are confirmed records from localities well inland in Hertfordshire and Suffolk. They are restricted in Lancashire to Birkdale. They also nest on shingle, sandpits sorf rock cliffs and coastal brownfield sites.

Nesting Biology.

Nest burrows are excavated in the soil in very sandy ground and fine plant roots. . Occasionally nests occur in compact and extensive aggregations. Cut leaf sections from numerous species of plants have been reported, including petals of common bird's-foot-trefoil (*Lotus corniculatus*). Nests have been described by Grandi (1961) and by Holm & Skou (1972).

Flight Period.

Univoltine, Late May, June to late August.

Flowers Visited.

Common and greater bird's-foot-trefoil (*Lotus corniculatus* & *L. pedunculatus*), brambles (*Rubus fruticosus* agg.), white bryony (*Bryonia dioica*), wild carrot (*Daucus carota*), creeping cinquefoil (*Potentilla reptans*), hare's-foot clover (*Trifolium arvense*), white clover (*Trifolium repens*), cowbane (*Cicuta virosa*), bloody crane's-bill (*Geranium sanguineum*), germanders (*Teucrium* spp.), hawk's-beards (*Crepis* spp.), lizard orchid (*Himantoglossum hircinum*), bog pimpernel (*Anagallis tenella*), ragwort (*Senecio jacobaea*), restharrow (*Ononis* sp.), sea-holly (*Eryngium maritimum*), sheep's-bit (*Jasione montana*), squill (*Scilla*), English stonecrop (*Sedum anglicum*), thyme (*Thymus* sp.), viper's-bugloss (*Echium vulgare*). Males have been found sheltering within the corollas of sea bindweed (*Calystegia soldanella*).

Pollen Collected.

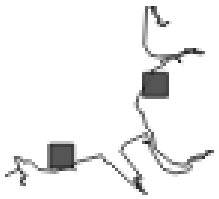
Polylectic, exploiting species in the families Crassulaceae, Fabaceae and Lamiaceae (Westrich 1989).

Parasites.

None confirmed for Britain. However, anecdotal evidence indicates that a small form of *Coelioxys mandibularis* (Megachilinae) on the east Kent coast (Deal, Sandwich and Pegwell Bay) may be a cleptoparasite of *M. leachella* in that region but, as yet, this remains to be confirmed. *Coelioxys afra* is reported to be a cleptoparasite of *M. leachella* in the Channel Islands (Richards 1979).

Here in Lancashire.

Restricted to the Birkdale area, makes this species rare in Lancashire. The earliest record being in 2015 and the latest in 2018 with a total of only 2 records to date.



Chelostoma Description

Scissor Bees.

A small to medium sized, slender megachilid bee with around 60 species worldwide. They nest in pre-existing cavities in wood, wall ans hollow stems. They love to nest in beetle holes in wood. Nest cells are arranged linearly with partitions and plugs, created out of mud mixed with saliva and small particles such as sand grains. Most of the species are oligolectic, restricting pollen gathering from specific single genus of plants with the bellflower, Campanulaceae and waterleaf family important for many species. Pollen is collected in a pollen brush under the abdomen. There are only 2 species recorded in the UK with only 1 here in Lancashire.

Chelostoma florisomne (Linnaeus,1758) (Large scissor Bee)

Male

Female

Both

Description.

A larger version of the more frequently encountered *C. campanularum*; of the same general long, thin cylindrical shape, but with distinctive white bands of short hairs on the apices of the abdominal segments. The males also have a two-pronged peg on the final segment of the abdomen and this may be used in the same way as that on the males of *C. campanularum*. FW 6mm to 8 mm both sexes. The boxed shaped female head and her very elongated and projecting labrum and mandibles are very distinctive. The males head is unremarkable. There is moderate size variation in both sexes

Habitat and Ecology.

Most often associated with the interface between woodland and meadow where buttercups are present. It has been recorded nesting in thatch, but is not a regularly-found bee in gardens. Also found in sunny woodland rides and clearings.

Nesting Biology.

Nests in old beetle burrows in dead wood, this may be quite firm, or fairly rotten, as long as it is in the sun. It may also use thatch and possibly similar, naturally-occurring cavities, such as old reed-stems, elsewhere. Very large nesting aggregations can often be found in thatch roofs.

Flight Period.

Univoltine; May to July.

Flowers Visited.

Very strongly associated with the flowers of *Ranunculus*. On dull days males will often be seen resting in the flowers of buttercups, hence the name *florisomne.* Nectar is also taken from Common Valerian, Roses and Speedwell.

Pollen Collected.

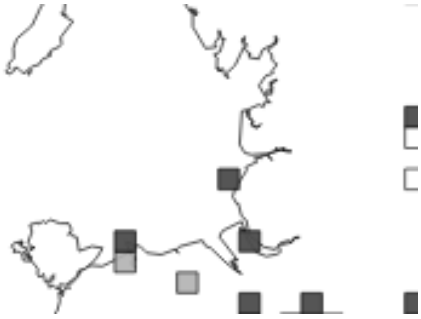
Oligolectic on Ranunculaceae. It is notable as one of the few bees ever to be found in the flowers of this plant family.

Parasites.

The Sapygid wasp *Monosapyga clavicornis* is well-known to be associated with this bee. The Evaniid wasp *Gasteruption jaculator,* a general parasitoid of wood-nesting aculeates, has been reared from nests of C. florisomne.

Here in Lancashire.

Very rare here in Lancashire with only 3 records found in the Ainsdale, Rainhill areas of the county. The first record was pre 1901 and the latest in 1999



Family Megachilidae: Genus: Osmia Description:

Mason bee

Is a name now commonly used for species of bees in the genus ***Osmia***, of the family Megachilidae. Mason bees are named for their habit of using mud or other "masonry" products in constructing their nests, which are made in naturally occurring gaps such as between cracks in stones or other small dark cavities. When available, some species preferentially use hollow stems or holes in wood made by wood-boring insects. Species of the genus include the orchard mason bee *O. lignaria*, the blueberry bee *O. ribifloris*, the hornfaced bee *O. cornifrons*, and the red mason bee *O. bicornis*. The former two are native to the Americas, the third to eastern Asia, and the latter to the European continent, although *O. lignaria* and *O. cornifrons* have been moved from their native ranges for commercial purposes. Over 300 species are found across the Northern Hemisphere.

Most occur in temperate habitats within the Palearctic and Nearctic zones, and are active from spring through late summer. *Osmia* species are frequently metallic green or blue, although many are blackish and at least one rust-red. Most have black ventral scopae which are difficult to notice unless laden with pollen. They have arolia between their claws, unlike *Megachile* or *Anthidium* species. Historically, the term mason bee has also been used to refer to bees from a number of other genera under Megachilidae such as *Chalicodoma*, most notably in "The Mason-Bees" by Jean-Henri Fabre and his translator Alexander Teixeira de Mattos in 1914. When the bees emerge from their cocoons, the males exit first. The males typically remain near the nests waiting for the females, and some are known to actively extract females from their cocoons. When the females emerge, they mate with one or several males. The males soon die, and within a few days the females begin provisioning their nests.

Osmia females typically nest in narrow gaps and naturally occurring tubular cavities. Commonly, this means in hollow twigs but can be in abandoned nests of wood-boring beetles or carpenter bees, in snail shells, under bark, or in other small protected cavities.They do not excavate their own nests. The material used for the cell can be clay, mud, grit, or chewed plant tissue. The palearctic species *O. avosetta* is one of a few species known for lining the nest burrows with flower petals. A female might inspect several potential nests before settling in. Within a few days of mating, the female has selected a nest site and has begun to visit flowers to gather pollen and nectar for her nests; many trips are needed to complete a pollen/nectar provision mass. Once a provision mass is complete, the bee backs into the hole and lays an egg on top of the mass. Then, she creates a partition of "mud", which doubles as the back of the next cell. The process continues until she has filled the cavity. Female eggs are laid in the back of the nest and male eggs toward the front. Once a bee has finished with a nest, she plugs the entrance to the tube, and then may seek out another nest location. Within weeks of hatching, the larva has probably consumed all of its provisions and begins spinning a cocoon around itself and enters the pupal stage, and the adult matures either in the fall or winter, hibernating inside its insulatory cocoon.

Most *Osmia* species are found in places where the temperature drops below 0 °C for long durations and they are well-adapted to cold winters; chilling seems to be a requirement for maturation. Some species of mason bees are semi-voltine, meaning that they have a two-year maturation cycle, with a full year (plus) spent as a larva. Solitary bees produce neither honey nor beeswax. They are immune from acarine and *Varroa* mites, but have their own unique parasites, pests, and diseases. The nesting habits of many *Osmia* species lend themselves to easy cultivation, and a number of *Osmia* species are commercially propagated in different parts of the world to improve pollination in fruit and nut production. Commercial pollinators include *O. lignaria, O. bicornis, O. cornuta, O. cornifrons, O. ribifloris*, and *O. californica*. They are used both as an alternative to and as an augmentation for European honey bees. Mason bees used for orchard and other agricultural applications are all readily attracted to nesting holes – reeds, paper tubes, nesting trays, or drilled blocks of wood; in their dormant season, they can be transported as intact nests (tubes, blocks, etc.) or as loose cocoons. As is characteristic of solitary bees, *Osmia* species are very docile and rarely sting when handled (only under distress such as when wet or squeezed); their sting is small and not painful, and their stinger is unbarbed.

Megachilidae *Osmia caerulescens* (Linnaeus,1758) (Blue Mason Bee)

Male

Female

Description.

Widely distributed in England and Wales as far north as Westmorland. Locally common but rarely abundant. Not known from Ireland or the Channel Islands. An Holarctic species, occurring throughout much of Europe from southern Fennoscandia southwards to the Mediterranean, and east to Greece. Also North Africa, central Asia, and North America.

FW.6mm to 8.5mm female.5mm to 6mm male. Females are easily recognised by the combination of the very large boxed shaped head, black pollen brush and slight blueish reflections. The pile body is less conspicuous than all the other *Osmia* species, though the tergite have narrow white hair fringes on the hind margins at the sides. Males are furrier than females with an orange brown pile over a metallic green or turquoise body They are very similar to males of *O.leaiana* and *O.niveata* but on average are smaller and have the tergites more obviously metallic. The undersides of the hind basitarsi when looked under a microscope will be seen to lacka pointed projection, although a very small, blunt one can be present, also the hind margin of tergite 6 is usually crenulation either side of the central notch compared to the smoothly curved in *O.leaiana* and *O.niveata.* There is very little variation beyond the size variation and old individualks can become denude and blackish.

Habitat and Ecology.

Occurs both on the coast and inland, including woodland and private gardens where it occurs quite frequently. Also regular at flowering brownfield sites.

Nesting Biology.

Nests are constructed usually above ground within existing cavities, including insect exit burrows in dead wood, crevices in masonry, fence posts and old timbers, soft mortar walls and trap-nests designed as nesting sites for various bees and wasps (see Krombein 1969; Free & Williams 1970; Raw 1974; O'Toole 2001). Cell partitions and the closing plug are manufactured from masticated leaf sections (leaf mastic). Cells are arranged linearly. They are a frequent user of bee hotels in the south of the country but not so much in the north. The winter is spent as diapausing adults within their intact cocoons. Nests and life-history are described by Grandi (1961), Krombein (1967), and Westrich (1989).

Flight Period.

Apparently bivoltine in Britain, flying from mid April or May to late July, and again in August. Saunders (1877) collected a male in West Sussex in late October (though this may have been either prematurely developed, or a very late emergence). Males appear first and a second generation peaking in august but only in southern UK and not in the north of the country.

Flowers Visited.

Included are: bird's-foot-trefoil (*Lotus corniculatus*), bramble (*Rubus fruticosus* agg.), cat-mint (*Nepeta cataria*), common knapweed (*Centaurea nigra*), germander speedwell (*Veronica chamaedrys*), ground-ivy (*Glechoma hederacea*), smooth hawk's-beard (*Crepis capillaris*) and snapdragon (*Antirrhinum* sp.).

Pollen Collected.

Polylectic, visiting species in the families Asteraceae, Brassicaceae, Fabaceae and Lamiaceae (see Tasei 1972; Raw 1974; Peeters, Raemakers & Smit 1999).

Parasites.

Occupied cocoons of the parasitic wasp *Sapyga quinquepunctata* have been recovered from a nest of *O. caerulescens* (Hallett 1920, 1928). They have olso been observed rest on posts etc near the nest of this species. There are British specimens of this wasp in the NHML which were reared from a nest of this bee.

Here in Lancashire.

Widespread and common in some parts and common in others, with the first record in 1975 and the latest in 2018 with a total of 20 records to date.

Megachilidae: *Osmia leaiana* (Kirby,1802) (Orange–vented Mason Bee)

Male

Female

Description.

One of two small *Osmia* bees frequently occurring in gardens as well as woodland clearings and edges. The males of both *O. leaiana* and *O. caerulescens* are extremely hard to distinguish, both being about 6mm long, shining metallic green and having bright ginger hairs when fresh. The best character is microscopic: look at the downward-sloping front surface of the first gastral tergite. It is shining in *O. caerulescens* and matt with reticulation in *O. leaiana*. This means that set specimens need to be arranged in order to see this feature. The females are quite different; both are about 10mm long, but *O. caerulescens* is generally smaller, dark blue with a black scopa under the abdomen and *O. leaiana* is generally larger, dark brown, with a bright orange scopa under the abdomen. FW.7mm to 8mm female.6mm to 7mm male. Females have particular large boxed shaped head, a sparse brownish pile on the top of the thorax and a relatively inconspicuous pile on the black tergites which shows up the bright orange pollen brush on the undersides od the abdomen. The wings look rather dark in the field. Males have a easily observed golden pile on the head and the thorax and golden hair bands across the hind margins of the shiny balck tergites. The head and the thorax are a slightly metallic green or turquoise. There is variation in both old sexes which when old can become extensively blackish and denuded.

Habitat and Ecology.

The species may be encountered almost anywhere in England and Wales, but it requires cavities in dead wood, walls or cliffs for nesting. It is most frequently found in scrubby grasslands and woodland rides and clearing where there are plenty of thistles and knapweeds growing.

Nesting Biology.

Nests in a variety of cavities, in walls, cliffs and dead wood old fence posts and walls. Sometimes too in vertical cliff faces. The nest closure and partitions are made from chewed plant material, bright green when fresh, which dries to a dark-brown, granular appearance. Cells are arrange linearly. They are a very frequent user of bee nest hotels with the nest entrances being plugged with leaf mastic and unlike *O. caerulescens* use larger diameter holes.

Flight Period.

This species may be found between May and August.

Flowers Visited.

Recorded visiting a wide variety of flowers from a number of different plant families for nectar, including especially thistles knapweeds and hawks-beard. Also garden plants such as chrysanthemums, but not the double varieties.

Pollen Collected.

Oligolectic on Asteraceae; it seems particularly fond of large, yellow-flowered species.

Parasites.

The cleptoparasitic bee, *Stelis phaeoptera* and possibly S. has been recorded as utilising this bee as a host (Westrich, 1989). It is likely that it is also attacked by the cuckoo-wasp *Chrysura radians* (Morgan, 1984)

Here in Lancashire.

Widespread and uncommon here in Lancashire with the first recorded Pre 1901 and the latest in 2015 with a total of 20 records up to date.

Male and female mating

Megachilidae: *Osmia aurulenta* (Panzer,1799) (Gold-fringed Mason Bee)

Male

Female

Description.

A few British bees, all megachilines, habitually nest in empty snail shells; one of these is *O. aurulenta* (the others being *O. bicolor and O. spinulosa*). Locally common in many coastal and inland localities in southern England. Apparently exclusively coastal in Wales, north-west England, south-west Scotland and Ireland. In the Channel Islands, it has been recorded from Alderney, Guernsey, Herm, Jersey and Jethou (Richards, 1979); also Sark (Archer, 1996a). The species is widely distributed in central and southern Europe, its range extending from The Netherlands south to southern Iberia (including Mallorca), and east to Romania. Also recorded from North Africa. FW.7mm to 8mm female.6mm to 7mm male. Females have the bodyalmost completely covered in dense tawny-orange hairs which form distinctive fringes along the hind marginsof the tergites and forming the pollen brush beneath the abdomen. Males are much slimmer than females and less orange haired than females. The abdomen of fresh individuals have orange-red hair bands on tergites 3-5 but these fade very quickly and they soon resemble the males of O.bicolor in the field. Old females lose the rich golden hue and can become a dull brownish, whilst sun bleach males turn a silvery colour but usually retain some hint of the golden hairs on the abdomen.

Habitat and Ecology.

Coastal dunes, soft rock cliffs, shingle ridges, grassland, landslips and abandoned quarries; inland on calcareous grassland and, rarely, clearings and rides in deciduous woodland on chalk.

Nesting Biology.

Females of this species commonly build their nests in empty snail shells, including *Helix aspersa*, *H. pomatia*, *Cepaea hortensis*, *C. nemoralis* and *Helicella itala*. On the Devon coast, R C L Perkins (1891) reported the species nesting in whelk shells. On Hayling Island, South Hampshire, females have been observed inspecting empty *Crepidula fornicata* shells (G R Else, pers. obs.). The bee is also reported to nest in burrows in soil (Smith 1855). The nesting habits are described in detail by Maréchal (1926) and Else (1992). It seems that males seek out the snail shells; each bee establishing a territory around one, to which a female may be attracted (O'Toole & Raw, 1991).

Flight Period.

Univoltine; April to early August.

Flowers Visited.

The bees visit yellow horned-poppy (*Glaucium flavum*), violet (*Viola* sp), kidney vetch (*Anthyllis vulneraria*), horseshoe vetch (*Hippocrepis comosa*), bramble (*Rubus fruticosus* agg.), burnet rose (*Rosa spinosissima*), creeping willow (*Salix repens*), thrift (*Armeria maritima*), toadflax (*Linaria* sp.), ground-ivy (*Glechoma hederacea*), dandelion (*Taraxacum officinale* agg.) and an orchid (Orchidaceae). They prefer birds-foot trefoils which at many sites preferred as main pollen sources.

Pollen Collected.

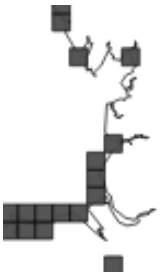
Probably polylectic in Britain (as in Germany (Westrich, 1989)); pollen collection observed from bird's-foot-trefoil (*Lotus corniculatus*)(G R Else, pers. obs.).

Parasites.

Sapyga quinquepunctata has been reared from nests collected on Portland, Dorset (Else, 1992). Maréchal (1926) cites this wasp as a cleptoparasite of *O. aurulenta* and figures the *Sapyga* cocoon. The chalcid wasps *Melittobia acasta* and *Pteromalus apum* have been reported as parasitoids of *O. aurulenta* (Maréchal (1926) and Else (1992) respectively). The drosophilid fly *Cacoxenus indigator* and the bombyliid fly *Villa modesta* have also been reported from nests of this bee (O'Toole, 1978). The mite *Chaetodactylus osmiae* has been found in *O. aurulenta* nests (Else, 1992).

Here in Lancashire.

The first unrecorded record was in 1940 and the latest in 2018 with a total of 25 records to date. All restricted to the Sefton and Fylde area of the county



Megachilidae: *Osmia parietina* (Curtis,1828) (Walled Mason Bee)

Male

Female

Description.

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.

FW. 6.5mm female.5.5mm male. The brown and black haired females resemble O.inermis and O.uncinata in the field but are smaller, less furry and slimmer with a shiny abdomen If looked under the microscope , the hind margin of tergite 1 can be seen to be polished and much smother that the rest of the tergite. The body also tends to have slight metallic blue or greenish reflections. The hind tibiae are slimmer than *O.inermis* and *O.uncinata* and have fine brown hairs but no black bristly hairs. Males have the integument of the head and thorax weakly greenish metallic like those of *O.bicornis* which is much larger and with a longer antennae and also *O.caerulescens* which as a much larger head. 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 and Ecology.

Associated with areas of unimproved grassland where its only known pollen source in Britain, common bird's-foot trefoil (*Lotus corniculatus*), grows. In Cumbria it seems to prefer areas with the shelter of scrub (N Robinson, pers. comm.). Also limestone pavements. Also brownfield site associated with old quarries are used.

Nesting Biology.

Females make their nests in a variety of cavities, including dry stone walls and dead wood. The nest is probably made of chewed plant material. Natural fissures in limestone pavement area are used.

Flight Period.

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

Flowers Visited.

Common bird's foot trefoil (*Lotus corniculatus*), bramble (*Rubus fruticosus* agg.) and bugle (*Ajuga reptans*). In Germany, Westrich (1989) also lists red clover (*Trifolium pratense*), horseshoe vetch (*Hippocrepis comosa*), reflexed stonecrop (*Sedum rupestre*), germander speedwell (*Veronica chamaedrys*) and strawberry (*Fragaria* sp.). Further UK records show Common Vetch, Western Gorse, Various Hawkish composites, Bugle, bramble and Ramsons.

Pollen Collected.

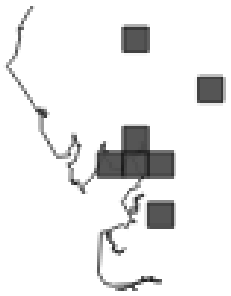
In Britain it has only been observed collecting pollen from common bird's-foot trefoil (*Lotus corniculatus*), although it is likely that pollens from other plants in the family Fabaceae are also utilised. Westrich (1989) states that it is polylectic in Germany, although many of the confirmed plant species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

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* has also been found flying round nest sites of *Osmia parietina* at Criccieth (NHML collection)

Here in Lancashire.

Common locally, but restricted to North Lancashire, around the Yealand Warton Crag, Gait Barrows and Carnforth Ironworks Areas First recorded in 1979 with the latest record in 2018 and a total of 24 records to date.



Megachilidae*: Osmia bicornis* (Linnaeus,1758) (Red mason Bee)

Male

Female

Description.

Previously *Osmia rufa* (Panzer,1806). This species has gained a notorious reputation from the females' habit of excavating their nesting burrows and cells in crumbling or soft mortar joints, thereby, in time, undermining and possibly weakening the fabric of masonry. The bee also utilises existing holes. It is colloquially known as the red mortar bee or red mason bee.

The Red Mason-bee (*Osmia bicornis*) is a very familiar and distinctive spring-flying solitary bee in gar-dens, parks and allotments. It is found in towns, cities and villages throughout England, Wales and lowland Scotland as far north as Perthshire (although Scottish records are still rather patchy). The bee is newly introduced into Ireland. Like many common and widespread species, the fine details of its distribution are less well known (or reported). FW.8mm to 10mm female. 6mm to 8mm male. This species is easily recognisable. The furry females have a black haired head, brown haired thorax and orange haired abdomen. The face bears a pair of long, incurved horns. Males are slimmer, with a much longer antennae and whitish haired faces.. When frest the the pile on the abdomen can be a very bright orange colour. There is significant size variation in both sexes. The hairs on the top of the thorax can be vary from dark to whitish. Fading and wear can significantly effect the appearance. With denuded blackish individuals of both sexes frequent towards the end of the flight season.

Habitat and Ecology.

Virtually ubiquitous in lowland Britain. Often common in gardens and parks in large cities. Nests in a variety of existing aerial cavities, and can easily be coaxed into using cut bamboo stems or stiff cardboard tubing.

Nesting Biology.

Females of this bee nest in a variety of existing cavities, from burrows in the soil and dead wood, the space beneath roof tiles, deep fissures in soft or crumbling mortar joints, to more unusual situations, such as the inside of door locks. Soft mortar or soil may also be excavated by the bee. The cell walls are built from mud, brought to the nest site as pellets held in the bee's mandibles and tamped into position with the pair of conspicuous prong-like extensions on the clypeus. *Osmia bicornis* is one of only two British *Osmia* species which utilise mud for their nests, all the others using leaf pulp. The winter is passed as fully-formed bees within tough, reddish-brown silken cocoons. A nest containing provisioned cells is illustrated by Westrich (1989). Nesting habits and life-history are described by Raw (1972), Westrich (1989) and O'Toole & Raw (1991).

Flight Period.

Univoltine; April (or occasionally late March) to June, or sometimes July. Males appear a couple of weeks earlier than the females, and females persist long after the males have gone.

Flowers Visited.

Lots of species of flowers are visited including a large variety of cultivated garden plants. They also visit spring blooming shrubs such as Apples, Pears, Sallows, Rape etc. A very significant pollinator of fruit trees and Oil seed rape and is used commercially for such ends.

Pollen Collected.

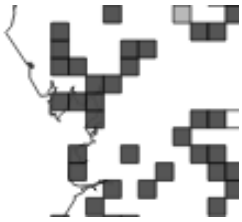
Polylectic, collecting pollen from a large number of plant species.

Parasites.

Nests of this species are invaded by the following hymenopterous cleptoparasites and parasitoids: *Chrysis ignita* (Chrysididae), *Sapyga quinquepunctata* (Sapygidae), *Stelis phaeoptera* (Apidae), *Monodontomerus dentipes* and *M. obscurus* (Torymidae). Inquilines belonging to other orders are the fly *Cacoxenus indigator* (Drosophilidae), the beetle *Megatoma undata* (Dermestidae) and the mites *Chaetodactylus osmiae* (Chaetodactylidae) and *Tyrophagus* species (Acaridae).

Here in Lancashire.

Very common here in Lancashire . The earliest record being Pre 1901 and the latest in 2017 with a total of 57 records to date.



Genus: Megachilidae*:* Anthidium. Description:

Anthidium is a genus of bees often called **carder** or **potter bees**, who use conifer resin, plant hairs, mud, or a mix of them to build nests. They are in the family Megachilidae which is cosmopolitan in distribution and made up of species that are mostly solitary bees with pollen-carrying scopa that are only located on the ventral surface of the abdomen. Other bee families have the pollen-carrying structures on the hind legs. Typically species of *Anthidium* feed their brood on pollen and nectar from plants. *Anthidium florentinum* bees are distinguished from most of its relatives by yellow or brick-red thoracic bands. They fly all summer and make the nests in holes in the ground, walls or trees, with hairs plucked from plants.

Most *Anthidium* species are leaf-cutting bees who use conifer resin, plant hairs, earth, or a combination of these as material for the nest walls. Their abdominal bands are usually interrupted in the middle. There is no lobe (arolium) between their claws. *Anthidium manicatum* is commonly known as the wool carder bee which uses comblike mandibles to "comb" plant fibers into its brood cell walls. It has spread from Europe to North and South America. The males are much larger (ca. 18 mm) than the females (ca.12 mm) which is not uncommon among Megachilidae, but very rare among other bee families (e.g., the true honey bees, genus *Apis*). The males also have three "thorns" at their abdominal apex which they use as weapons when defending their territory. Widespread and common here in Lancashire, but with only one species recorded in the county.

Megachilidae*: Anthidium manicatum* **(Linnaeus,1758) (Wool Carder Bee)**

Male

Female

Description.

Males of this strikingly-coloured, medium-sized bee hover and dart around patches of flowering labiates (and some other flowers) and regularly pursue other insects. FW. 8mm to 10 mm females. 9.5mm to 12mm males. A robust bee with males being larger than the females and often becoming g very large and impressive. The yellow spotrs on the abdomen on both sexes make them very easy to identify. There is a marked variation in size in both sexes and it is normal to see dwarfs with shorter wings than stated above. The extent of yellow on the tergites and legs also varies and some individuals can have yellow abdomen al spots which are enlarged into bars on tergites 3 to 5. The thorax usually remans black. Widely distributed throughout much of southern England and Wales, becoming scarcer in the north. Three Scottish records, all in Dumfries and Galloway. It is also found on the Channel Islands and on the Isles of Scilly (St Mary's). There are no records from Ireland. Recently (since about 1993) the bee has become locally common in many sites in southern England after a long period of scarcity. This species is certainly under-recorded in Britain. This species is not regarded as being threatened.

Habitat and Ecology.

Varied, including private gardens (both in rural and urban areas), open broadleaved woodland, heathland, woodland rides and clearings, river banks, wetlands, soft rock cliffs, vegetated shingles, a variety of brownfield sites, chalk grassland, coastal sand dunes and landslips.

Nesting Biology.

Large males vigorously defend clumps of favoured flowers and will intercept and chase away any other insect which enters such a territory. Males have even been known to kill such intruders (by crushing them between the ventral surfaces of the flexed down abdomen and the thorax). Females are allowed to visit the flowers and it is at these sites that mating takes place. Resource defense polygyny, as this behaviour is called, is discussed by Severinghaus, Kurtac and Eickwort (1981) and is summarised by Thomhill and Alcock (1983). Females select existing cavities as nest sites, examples including insect exit burrows in dead wood, hollow stems, crevices in the mortar joints of masonry, burrows in the soil, and various man-made objects. The cell walls and closing plug of the nest are fashioned from compacted layers of long, silky hairs which are shaved off leaves by the female's multi-dentate mandibles. Favoured plants are woundworts (*Stachys lanata [s. byzantina]*), yarrow (*Achillea millefolium*), great mullein (*Verbascum thapsus*), *Pelargonium*, cotton thistle (*Onopordum acanthium*) and house-leek (*Sempervivum*). Hairs are brought to the nest site in a ball and applied to the inner surface of the cavity by teasing them out with the mandibles; the gaster is then used to tamp down the hairs (A Raw, pers. comm.). The species has earned the colloquial name 'wool-carder bee' from this habit.

Flight Period.

Single-brooded; from late May to early August, with a peak in June/July. In 1995 both sexes in freshly emerged condition were noted in late July; it is not known if these represented a partial second brood, or a single, staggered emergence.

Flowers Visited.

The bees visit a wide variety of flowers. Strongly associated with labiates, particularly woundworts and black horehound, in which individual males will form a territory around these flowers and defend it form other males and also other large insects such as bumblebees and hoverflies by means of aerial hovering, head buts and even wrestling. They can even kill an intruder by crushing with the abdominal spines. Mating can also be seen on the foliage of the foraging plants. Females also visit birds foot trefoils kidney vetch, purple toadflax and restharrows.

Pollen Collected.

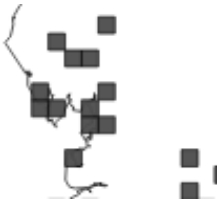
Pollen sources are not known: the bees are probably polylectic (Westrich 1989).

Parasites.

The bee *Stelis punctatissimum* is a cleptoparasite of *A. manicatum*.

Here in Lancashire.

Widespread and common in the county. The earliest record being in 1996 and the latest in 2017 with a total of 23 records up to date.



Genus: Megachilidae*:* Stelis (dark bees) Description.

Four UK species of mainly black, inconspicuously haired, strongly punctate megachilid bees. *S. ornatula* has whitish spots on the sides of the tergites and *S. punctulatissima* has pale bands on the hind margins of the tergites. These are the only two species that can be easily separated in the field. Abroad, some have yellow markings (often resembling Anthidium species or even wasps) and there are even some metallic species.

Stelis species are cleptoparasites of other megachiline bees, notably Osmia, Anthidium, Hoplitis and Heriades in Britain, also Chelostoma species on mainland Europe. These bees are a medium sized, strongly punctate but inconspicuously haired megachilids. The species we have here in the UK are mainly black, but some tergites can be sotted or with narrow bands. Both the males and the females are similar looking. These bees are surprisingly elusive and seem to occur at low population levels and the best way to find them is to look for the females in flight, resting or visiting flowers near to the nesting sites. They can also be reared from bee hotels and hosts nests which are a good source of potential parasite nests. Here in the UK there are only 4 species that have been recorded with one of these (*S.breviuscula*) being a recent colonist. There are a few other species that are capable of exploiting british host on the continent and may arrive here in the future.

Megachilidae*: Stelis ornatula* (Klug,1807) (Spotted dark Bee)

Male

Female

Description.

A rare cleptoparasitic bee which can sometimes be reared in small numbers from the stem-nests of its host, the megachiline bee *Hoplitis claviventris*. FW: 5mm with both sexes being similar. Can be easily distinguish from the other 3 stelis species by the lateral white spots on the first 3-4 tergites. There is variation in the tergite spots which can vary in size and the spots on tergites 1 and 4 can be small and even missing. mainly black, inconspicuously haired, strongly punctate megachilid bees. *S. ornatula* has whitish spots on the sides of the tergites and *S. punctulatissima* has pale bands on the hind margins of the tergites. These are the only two species that can be easily separated in the field.

Habitat and Ecology.

Both inland and coastal sites, including heathland, chalk grassland, open broad-leaved woodland, coastal dunes and landslips. They like open sites with lots of birds-foot trefoils. The strongest populations are found usually found on chalk downland and coastal dunes.

Nesting Biology.

In Britain, a cleptoparasite of *H. claviventris*, but on the Continent it is additionally associated with the closely related *H. leucomelana*, a species which is probably extinct in Britain, with no record in the wild for nearly two hundred years (it has been imported more recently from the Continent on at least one occasion). *S. ornatula* has been reared frequently from bramble (*Rubus fruticosus* agg.), rose (*Rosa* sp.) and ragwort (*Senecio jacobaea*) stem-nests of *H. claviventris*. The *Stelis* cocoons can readily be distinguished from those of its host species by their dense silken walls (through which the prepupae cannot be seen) and the presence of a conspicuous apical nipple; the *H. claviventris* cocoons differ by having thinner silken side walls which are more or less transparent, and a broadly rounded apex which lacks a nipple-like projection.

Flight Period.

Univoltine; end of May to late August.

Flowers Visited.

Bird's-foot-trefoi (*Lotus corniculatus*)l, cinquefoil (*Potentilla* sp.), ragwort (*Senecio jacobaea*), fleabane (*Pulicaria dysenterica*) and hawk's-beard (*Crepis* sp.).

Pollen Collected.

No information.

No information.

Parasites.

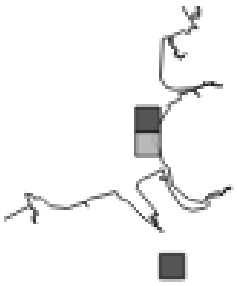
The chalcid wasp *Pteromalus apum* has been reared from a cocoon of *S. ornatula*.

Hosts.

Hoptis claviventris

Here in Lancashire.

A wide range of habitats in the Sefton area of the county where even here it is relatively rare. The earliest record being in 1975 and the latest in 2000 with only 9 records up to date.



Stelis punctulatissima (Kirby,1802) (Banded Dark Bee)

Male

Female

Description.

Widely distributed throughout much of southern Britain, from Kent to Cornwall, northwards to Gwynedd and Suffolk. In June 1974, the late A B Duncan collected several specimens of this species in his garden at Castlehill, near Dumfries, Dumfries and Galloway. This is the only species of *Stelis* which is known from the Channel Islands, where it has been found on Jersey. FW.7mm to 8mm female 7mm male. This is the largest of the Stelis. It has translucent hind margin on tergites 2 to 4 which overlie a pale pigment band on the base the next segment. The head is small when looking from the top compared with other Stelis species and peculiar shaped with a very sharp angled hind margin and right angled hind corners. The whole of the body is very densly and strongly punctate. There is variation across the band on tergites 2-4 which can vary from creamy white to a brownish colour.

Habitat and Ecology.

To be expected wherever its host species, *Anthidium manicatum* occur in Britain. It has a frequency to be in garden where most of the records are recorded.

Nesting Biology.

In Britain, this is apparently a cleptoparasite of three species of Megachilinae. These are *Anthidium manicatum* (specimens of the Stelis reared from a nest of this species are in the Natural History Museum, London), *Osmia leaiana* (Smith, 1876; Saunders, 1896; Perkins, 1923; Hallett, 1928) and *O. aurulenta* (Smith, 1876).

Flight Period.

Single-brooded; from mid-June to late August.

Flowers Visited.

Common mallow (*Malva sylvestris*), bird's-foot-trefoil (*Lotus corniculatus*), bramble (*Rubus fruticosus* agg.), wild marjoram (*Oreganum vulgare*), ragwort (*Senecio jacobaea*), common fleabane (*Pulicaria dysenterica*), yarrow (*Achillea millefolium*), spear thistle (*Cirsium vulgare*) and hawkweed (*Hieracium* sp.).

Pollen Collected.

No information.

Hosts.

The main host is *Anthidium manicatum* but also can be can also parasite *Osmia leaiana* and *O.auralenta*

Here in Lancashire.

Very rare here in Lancashire, with the first record in 1995 and the latest in 2014 and only 3 records up to date.

Genus: Melittidae

Melittidae

Are a small bee family, with over 200 described species in three subfamilies. The family has a limited distribution, with all described species restricted to Africa and the northern temperate zone. Fossil melittids have been found occasionally in Eocene amber deposits, including those of Oise, France and the Baltic amber. Early molecular work suggested that the family Melittidae was sister to all other bees, and also that it was paraphyletic. Because of this finding, it was suggested that the three subfamilies of Melittidae should be elevated to family status. Neither study included many melittids, due to their rarity. Later studies suggested that the family could still be monophyletic and a 2013 investigation including a greater number of melittid bees further supports this. Recent research has shown that Melittids have a lower extinction rate compared to other hymenopterans, yet this family is considered species-poor. This is attributed to a significantly lower diversification rate as seen in other bee families. Danforth et al. suggests that this is because they are oligoleges. Whereas other bees express polylecty (diverse host-plant preferences) allowing them to increase their diversification rate compared to melittids. Evidence of oil-collection behaviour has been present in melittids since the early Eocene. Amber from Oise, France provided the oldest record of Melittidae and the fourth oldest fossilized bee specimen. Melittids are typically small to moderate-sized bees, which are well known for their specialist and oligolectic foraging habits. Melittids are strictly solitary and they nest in burrows that they dig in soil or sand. All females can reproduce and tend to emerge from the ground some days before the male. They generally mate on host-plants surrounding the area they have emerged. After mating, the gravid female creates a burrow where they bring pollen. On top of the pollen, one egg is laid. This is consumed by the larva over 10 days, after which the larva overwinters and pupates in the next year. Many melittids (such as *Macropis*) possess specialized morphology that allow them to collect floral oil.

Species: Melitta

Melitta is a genus of bees in the family Melittidae. It includes about 40 species restricted to Africa and the northern temperate zone. Most of the species are Palaearctic, though three rare species occur in North America.

They are bees of moderate size, generally 8 to 15 mm long. They are commonly oligolectic, with narrow host plant preferences. They resemble bees of the genus *Andrena*, though with radically different mouthparts and a scopa limited to the hind tibia and basitarsus. Here in Lancashire we have only one recorded species.

Melitta haemorrhoidalis (Fabricius,1775) (Golden-tailed Melitta)

Male

Female

Description.

Melitta species generally have very narrow pollen preferences, either visiting a single species (monolectic) or a group of closely related species (oligolectic). The present species belongs to the second category.

FW. 8mm to 8.5mm female.7.5mm to 8mm male. The orange haired tip to the abdomen is the same in both sexes. Females are darker looking than other Melitta, having barely discernable abdominal bands and the top of the thorax which are mostly black haired. They also have orange knee caps on the hind femora which is dark in other species. Males lack the strong abdominal bands of *M.leporina* and *M.tricincta*. They are strongly associated with harebells and other bell flowers which is a great help in identification. There is very little variation between the sexes but fresh males are rather golden brown but quickly fade to a buff grey.

Habitat and Ecology.

Mainly calcareous grassland and open rides in broad-leaved woodland on chalk. Sometimes woodland rides and clearings.

Nesting Biology.

The nest burrows are excavated in the soil. A small aggregation of burrows in a sandy hedge bank was observed in the Isle of Man (C O'Toole, pers. comm.).

Nesting Biology.

The nest burrows are excavated in the soil. A small aggregation of burrows in a sandy hedge bank was observed in the Isle of Man (C O'Toole, pers. comm.).

Flight Period.

Univoltine; mid July to late August (occasionally September).

Flowers Visited.

Clustered bellflower (*Campanula glomerata*), nettle-leaved bellflower (*C. trachelium*), harebell (*C. rotundifolia*) and meadow crane's-bill (*Geranium pratense*). The bellflowers listed here are probably pollen sources, but the crane's-bill is likely to have been only a nectar source. Males have been observed visiting musk-mallow (*Malva moschata*), round-headed rampion (*Phyteuma orbiculare*) and hemp-agrimony (*Eupatorium cannabinum*). On overcast days specimens can sometimes be found sheltering in bellflowers (occasionally two bees in a flower).

Pollen Collected.

Oligolectic on bellflowers (*Campanula* spp.).

Parasites.

None reported from Britain, though on the Continent *Nomada flavopicta* may be a cleptoparasite of it (Tengö & Bergstrom, 1976) and this association may exist in Britain.

Here in Lancashire.

Restricted in the county to the Sefton and Lune valley areas, where even there it is a scarce bee. It was first recorded in 1997 with the latest record in 2018 and only 10 records up to date

Order Hymenoptera: Family: Apidae: Superfamily: Apoidea: Family: Apidae.

Apidae.

Is the largest family within the superfamily Apoidea, containing at least 5700 species of bees. The family includes some of the most commonly seen bees, including bumblebees and honey bees, but also includes stingless bees (also used for honey production), carpenter bees, orchid bees, cuckoo bees, and a number of other less widely known groups. Many are valuable pollinators in natural habitats and for agricultural crops.

In addition to its historical classification (honey bees, bumble bees, stingless bees and orchid bees), the family Apidae presently includes all the genera formerly placed in the families Anthophoridae and Ctenoplectridae.Although the most visible members of Apidae are social, the vast majority of apid bees are solitary, including a number of cleptoparasitic species.

The old family Apidae contained four tribes (Apinae: Apini, Euglossini and Bombinae: Bombini, Meliponini) which have been reclassified as tribes of the subfamily Apinae, along with all of the former tribes and subfamilies of Anthophoridae and the former family Ctenoplectridae, which was demoted to tribe status. The trend to move groups down in taxonomic rank has been taken further by a 2005 Brazilian classification that places all existing bee families together under the name "Apidae", but it has not been widely accepted in the literature since that time.

Cuckoo Bee on a flower

Carpenter bee on a flower

Bumblebee on a flower

Genus :Anthophora: Descriptioin

The bee genus ***Anthophora*** is one of the largest in the family Apidae, with over 450 species worldwide in 14 different subgenera. They are most abundant and diverse in the Holarctic and African biogeographic regions. All species are solitary, though many nest in large aggregations. Nearly all species make nests in the soil, either in banks or in flat ground; the larvae develop in cells with waterproof linings and do not spin cocoons. Males commonly have pale white or yellow facial markings, and/or peculiarly modified leg armature and hairs. *Anthophora* individuals can be distinguished from the very similar genus *Amegilla* by the possession of an arolium between the tarsal claws. Anthophora bees are a group of native bee species that do not produce honey but are important pollinators of crops and wild plants. Anthophora bees are not aggressive but can sting for defence.

Males commonly have pale white or yellow facial markings, and/or peculiarly modified leg armature and hairs. Anthophora individuals can be distinguished from the very similar genus Amegilla by the possession of an arolium between the tarsal claws. C. D. Michener (2000) The Bees of the World, Johns Hopkins University Press.

Honey bees are not the only bee species that are significant for human wellbeing. *Anthophora* bees are a group of native bee species that do not produce honey but are important pollinators of crops and wild plants. *Anthophora* bees are not aggressive but can sting for defence. Individuals are large often with yellow facial markings and some *Anthophora* species have distinctive bands. Individuals make nests in the soil and live independently of others (i.e. they are solitary), although nests can be close together. This fact sheet provides information about these bees to encourage farmers to understand and protect them to help ensure that their crops are effectively pollinated.

From a conservation and agricultural standpoint it is not necessary to recognise all the different bee genera. However, it is important to know that there is a large bee biodiversity. Different bee genera pollinate different plant species, although there is some overlap that acts as a buffer as bee populations wax and wane. For healthy ecosystems, including agro-ecosystems both diversity and abundance in the bee fauna is important.

Anthophora bees can be found in various habitats (land-uses) in East Africa such as grasslands, natural forests, wetlands, marshlands, open habitats, protected areas, farmlands, rangelands, woodlands, woodlots (forest plantations), riparian areas. All Anthophora species are solitary, though nests may be found close together.

Anthophora plumipes (Pallas,1772) (Hairy Footed Flower Bee)

Male

Female

Description.

With its swift, darting flight and predilection for lungwort (*Pulmonaria* spp.) flowers, this attractive bee is commonly encountered in private gardens in southern England in the spring and early summer. Sexual dimorphism is strongly pronounced, the male being clothed mainly with bright reddish brown hairs, the female entirely black-haired, except for reddish orange scopal hairs on the hind tibia. FW 10mm to 11mm with both sexes similar. Females are typically black with anorange pollen brush on the hind legs. Males are mainly buff haired with the apical tergites of the abdomen black haired. They also have a fringe of very long hairs arising from all segments of the mid tarsi, and a mainly yellow face.. They are both easily recognised in the field due to their size, early flight period and rapid flight movements. There is variation in females being buff coloured and can resemble dark faced males and the presence of the pollen load is a clear indication of them being female. You also get dwarf males which can be as short as 8.5mm but not to many and males also fade to a greyish colour by late spring.

Habitat and Ecology.

Almost ubiquitous, including gardens, open woodland, parks, churchyards and coastal sites (especially in the vicinity of soft rock cliffs). The like rabbit grazed locations and many types of urban locations.

Nesting Biology.

Usually nests gregariously in vertical soil profiles, such as coastal cliffs and, inland, in sand pits, soft mortar joints and cob walls. Such sites are used annually, so that with time and erosion old cells are occasionally brought to the surface. Individual cells are pitcher-shaped, the walls and closing lid being fashioned from compacted soil which is almost certainly impregnated with a secretion from the Dufour's gland. When excavated the cells can be readily extracted from the surrounding substrate. Both sexes pass the winter newly emerged in their sealed cells. Nest construction and provisioning is described by Malyshev (1928) and Lith (1947). Müller, Krebs & Amiet (1997) illustrate both nests and their contents.

Flight Period.

Males are amongst the first bees to appear to appear in spring around about late February in some years and fly into May. Females appear around 3 week later than the males and can persist into June and sometimes into July.

Flowers Visited.

A very wide range of flowers are visited with include their favourite dead- nettles, ground ivy, comfreys, lungwort's, green alkanet, primroses, gorse, willows, cherries and lungwort's.

Pollen Collected.

Polylectic, foraging from species in the families Berberidaceae, Boraginaceae, Fabaceae, Iridaceae, Lamiaceae, Liliaceae, Papaveraceae, Primulaceae, Rosaceae and Scophulariaceae (Westrich, 1989). However, it has a strong preference for Lamiaceae.

Parasites

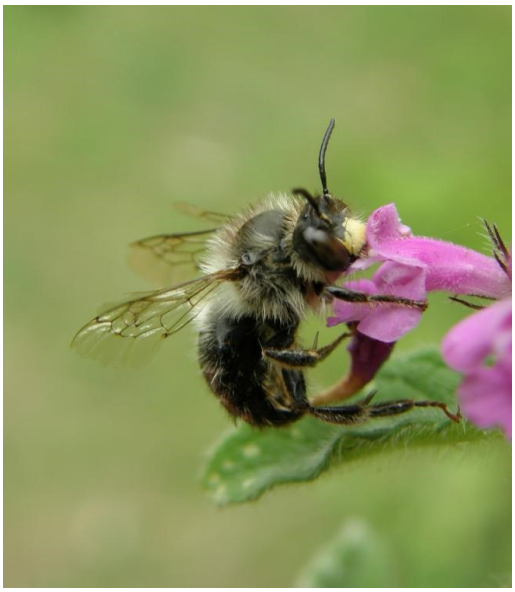
This is the common host of the cleptoparasitic bee *Melecta albifrons* (Hallett, 1928; Lith, 1947). Parasitoids of *A. plumipes* are the eurytomid chalcid *Monodontomerus obsoletus* and an unidentified eulophid chalcid in the genus *Melittobia* (a hyperparasitoid of the *M. obsoletus* larva). Females of the bee-fly *Bombylius discolor* have been seen about the nest burrows of the bee in Devon (Turner, 1972), and thus this fly may prove to be a cleptoparasite of *A. plumipes*.

Here in Lancashire.

Restricted to Liverpool, Blackpool and Maudesley areas of the county. First recorded in 2013 with the latest record in 2019 and only 9 records up to date thus making it a scarce bee in Lancashire.

Nest Chambers

Anthophora furcata (Panzer,1798) (Forked-tailed Flower Bee)



Male

Female

Description.

An unusual *Anthophora* species, which excavates its nest burrows in rotten wood, rather than in the soil. Unusually for *Anthophora* the mandible is tridentate, with both an inner and outer subapical tooth. FW.8mm to 8.5mm female. 7mm to 8mm male. A medium sized brownish *Anthophora* with a furry, unbanded abdomen and with a weak dark band on the top of the thorax situated between the wing bases. The males have unmodified mid-legs and also a yellow face.. Females have the tip of the abdomen orange haired and in the males it is black haired. It is also the only *Anthophora* with 3 teeth at the tip of the mandibles. There is very little variation in the sexes although young individuals can look very different form older ones.

Habitat and Ecology.

Virtually ubiquitous within its range in lowland Britain, being reported from gardens, woodland, grasslands, moors, heaths and fenlands, hedge margins, woodland rided and clearings

Nesting Biology.

Nest burrows and cells are excavated in rotten wood. A nest generally consists of two or more parallel burrows. Cells are oval in outline and are enlarged sections of the burrow; each cell is lined with compacted wood dust (pers. obs.). A nest is illustrated by Müller, Krebs & Amiet (1997). The winter is passed as a prepupa, not contained within a cocoon.

Flight Period.

Univoltine; late May to August or early September.

Flowers Visited.

Bastard balm (*Melissa melissophyllum*), black horehound (*Ballota nigra*), bramble (*Rubus fruticosus* agg.), butterfly-bush (*Buddleja davidii*), cat-mint (*Nepeta cataria*), hawkweed (*Hieracium*), hedge woundwort (*Stachys sylvatica*), iris (*Iris* sp.), knapweed (*Centaurea* sp.), marsh thistle (*Cirsium palustre*), marsh woundwort (*Stachys palustris*), nightshades (*Solanum* sp.), red dead-nettle (*Lamium purpureum*), spear thistle (*Cirsium vulgare*), white dead-nettle (*Lamium album*), wood sage (*Teucrium scorodonia*).

Pollen Collected.

Oligolectic on Lamiaceae (Westrich 1989). In the Netherlands, plants of the family Boraginaceae are additionally listed as important foraging plants for this species (Peeters, Raemakers & Smit 1999).

Parasites

Both *Coelioxys quadridentata* and *C. rufescens* have been cited as bee cleptoparasites of *A. furcata*, having been reared from nests of the species (M Edwards, pers. comm., and Richards (1949) respectively).

Here in Lancashire.

Widespread and common throughout the county. The first record was in 1979 and the latest in 2018 with a total of 17 recorded up to date.

Genus: Bombus: Description:

A **bumblebee** (or **bumble bee**, **bumble-bee**, or **humble-bee**) is any of over 250 species in the genus ***Bombus***, part of Apidae, one of the bee families. This genus is the only extant group in the tribe Bombini, though a few extinct related genera (e.g., *Calyptapis*) are known from fossils. They are found primarily in higher altitudes or latitudes in the Northern Hemisphere, although they are also found in South America, where a few lowland tropical species have been identified. European bumblebees have also been introduced to New Zealand and Tasmania. Female bumblebees can sting repeatedly, but generally ignore humans and other animals.

Most bumblebees are social insects that form colonies with a single queen. The colonies are smaller than those of honey bees, growing to as few as 50 individuals in a nest. Cuckoo bumblebees are brood parasitic and do not make nests; their queens aggressively invade the nests of other bumblebee species, kill the resident queens and then lay their own eggs, which are cared for by the resident workers. Cuckoo bumblebees were previously classified as a separate genus, but are now usually treated as members of *Bombus*.

Bumblebees have round bodies covered in soft hair (long branched setae) called *pile*, making them appear and feel fuzzy. They have aposematic (warning) coloration, often consisting of contrasting bands of colour, and different species of bumblebee in a region often resemble each other in mutually protective Müllerian mimicry. Harmless insects such as hoverflies often derive protection from resembling bumblebees, in Batesian mimicry, and may be confused with them. Nest-making bumblebees can be distinguished from similarly large, fuzzy cuckoo bees by the form of the female hind leg. In nesting bumblebees, it is modified to form a pollen basket, a bare shiny area surrounded by a fringe of hairs used to transport pollen, whereas in cuckoo bees, the hind leg is hairy all round, and they never carry pollen.

Like their relatives the honeybees, bumblebees feed on nectar, using their long hairy tongues to lap up the liquid; the proboscis is folded under the head during flight. Bumblebees gather nectar to add to the stores in the nest, and pollen to feed their young. They forage using colour and spatial relationships to identify flowers to feed from. Some bumblebees steal nectar, making a hole near the base of a flower to access the nectar while avoiding pollen transfer. Bumblebees are important agricultural pollinators, so their decline in Europe, North America, and Asia is a cause for concern. The decline has been caused by habitat loss, the mechanisation of agriculture, and pesticides.

The word "bumblebee" is a compound of "bumble" + "bee"—"bumble" meaning to hum, buzz, drone, or move ineptly or flounderingly.The generic name *Bombus*, assigned by Pierre André Latreille in 1802, is derived from the Latin word for a buzzing or humming sound, borrowed from Ancient Greek *βόμβος* (bómbos).

The bumblebee tribe Bombini is one of four groups of corbiculate bees (those with pollen baskets) in the Apidae, the others being the Apini (honey bees), Euglossini (orchid bees), and Meliponini (stingless bees). The corbiculate bees are a monophyletic group. Advanced eusocial behaviour appears to have evolved twice in the group, giving rise to controversy, now largely settled, as to the phylogenetic origins of the four tribes; it had been supposed that eusocial behaviour had evolved only once, requiring the Apini to be close to the Meliponini, which they do not resemble. It is now thought that the Apini (with advanced societies) and Euglossini are closely related, while the primitively eusocial Bombini are close to the Meliponini, which have somewhat more advanced eusocial behaviour.

Bumblebees vary in appearance, but are generally plump and densely furry. They are larger, broader and stouter-bodied than honeybees, and their abdomen tip is more rounded. Many species have broad bands of colour, the patterns helping to distinguish different species. Whereas honeybees have short tongues and therefore mainly pollinate open flowers, some bumblebee species have long tongues and collect nectar from flowers that are closed into a tube. Bumblebees have fewer stripes (or none), and usually have part of the body covered in black fur, while honeybees have many stripes including several grey stripes on the abdomen. Sizes are very variable even within species; the largest British species, *B. terrestris*, has queens up to 22 mm (0.9 in) long, males up to 16 mm (0.6 in) long, and workers between 11 and 17 mm (0.4–0.7 in) long. The largest bumblebee species in the world is *B. dahlbomii* of Chile, up to about 40 mm (1.6 in) long, and described as "flying mice" and "a monstrous fluffy ginger beast".

There are 3 bees in the genus Bombus that at the moment cannot be reliably identified. So I have just put them onto a single page . Maybe in time more research and information will become available.

Bombus cryptarum **(Fabricius,1775)**

Possibly

Bombus lucorum (Linnaeus, 1761)

Bombus lucorum male

Bombus magnus (Vogt,1911)

Male

Bombus terrestris (Linnaeus,1758) (Buff-tailed Bumblebee)

Male

Female

Description.

Characters on the sting sheath (queens and workers) are discernible with care and fresh workers often have a narrow band of brownish hairs at the base of the white 'tail'. However, as *B. terrestris* is such a widespread and frequently found species, it is best not to record distributions based on workers, but to target the distinctive queens (in spring) and males (in mid to late summer). Captive nests, not of the British sub-species, are now used by commercial tomato and fruit growers. Unfortunately, some sexuals may escape and inter-breed with wild bees. Bees from commercial nests are like *B. lucorum* agg., lacking the deeper yellow bands and darker tail markings of the British sub-species. FW: 18mm Queen, 13mm worker and 14mm males. Queens are distinctive due to their large size and rather narrow brown collar, orange –brown band across tergite 2 and buff tail. Workers have much whiter tails and yellower bands that the queens and they can be difficult to separate from the *Lucorum* complex, that tail though as a more narrower buff interface where it meets the black hairs that precede it and the bands have a buffer tint, especially around the collar. Males are patterned like workers although the collar tends to extend further down the sides of the thorax and the tail is often substantially Buffish. The head is entirely black haired in contrast to typical B. lucorum males. There is variation in the queens which frequently have the collar reduced and even missing to produces a completely black haired thorax and the abdomen bands can be darker, especially when the collar is missing. The tail varied from deep buff throughout to whitish buff. Workers and males vary in the extend of the bands and tail, with large workers tending to have stronger queen characteristics such as browner bands and a buffer tail.. Semi melanic or fully melanic males are sometimes found.

Habitat and Ecology.

It may be encountered almost anywhere in lowland Britain or Ireland. And are very common in urban areas.

Nesting Biology.

Nests are underground in old mouse or vole nests. Nests are large, with over 500 individuals in many instances. They are also a pollen storing species.

Flight Period.

Partially bivoltine, with a winter generation under favourable circumstances of available forage in gardens and relatively warm winters, such as between the years 1992 and 2005. Normally queens are found between February and April, according to latitude, males between July and October. Records of workers in January to March are common in southern England. Polylectic. This species probably has the widest diet of any British bumblebee.

Flowers Visited.

Visits are made to a wide variety of flowers, both for pollen and nectar. Spring queens visit a various amount of spring flowering scrubs and flowers, with large numbers attracted to sallows, *prunus* species and gorse. |It is the bumblebee that is most likely to be seen visiting spring flowering plants such as daffodils, crocuses and bluebells. Summer queen like thistles, knapweeds, brambles, Teasel and Buddleia with autum ones liking Ivy, iceplant, mickalmus daisy, snowberry and Devils-bit Scabious. Workers will visit a very wide range of flowering plants without any preference. And can still be seen foraging in October on Ivy. Winter active ones will visit winter flowering honeysuckle and Oregan grapes on which they are heavily reliant. Males will also visit a wide variety of plants and can be very numerous on thistles and garden lavender.

Pollen Collected.

Polylectic. This species probably has the widest diet of any British bumblebee.

Parasites

The cuckoo-bee *Bombus vestalis* is associated with *B. terrestris.*

Here in Lancashire.

Widespread and very common here in Lancashire. The earliest record was in 1916 and the latest in 2019 with a total of 912 recorded up to date.

Bombus hortorum (Linnaeus,1761) (Garden Bumblebee)

Male

Worker

Queen

Description.

A large bumblebee with a very long tongue, which is often held outstretched as the bee approaches a flower. It is one of three species found visiting very deep blooms such as foxglove (*Digitalis purpurea*) and honeysuckle (*Lonicera periclymenum*) (the other bees being *B. pascuorum* and *B. ruderatus*). Separating *B. hortorum* from its close relative *B. ruderatus* is very difficult and has resulted in considerable problems in establishing the range of the latter species.

FW 16mm queen. 13mm female. 14mm male. The longest faced of all the bumblebees with a malar gap at least half the length of the eye. It as a bright yellow collar and midriff band plus the conspicuous white tail. The midriff band involves the entire scutellum and the entire first tergite in all castes. Queens are a medium large sized and males have a particular long antenna. Smaller queens and males that are rounder, fluffier and with a yellow haired face look like *B.hortorum* but *B.hortorum* males always have a black-haired face. All the castes can vary and produce semi melanic individuals and fully melanic males are sometimes found. The head of the male is usually entirely black haired but some have yellow hairs of top.

Habitat and Ecology.

A widespread, although not always a frequently found species. It colonises a range of habitats, although absent from many upland areas, especially if these are of a moorland character. It likes gardens where is is frequently found and open and wooded habitats in both rural and urban areas.

Nesting Biology.

Nests are always under cover, but may be only shallowly underground, down to 50cm. Sometimes in dense vegetation on the surface. As with most other bumblebees an old small mammal nest is used by the queen as a starting point for her nest. Mature nests are medium-sized, with about 100 workers (Løken 1973; Hagen 1994).

Flight Period.

The species is eusocial with queens emerging from hibernation from March to June; workers are present from late April onwards, and males and new females from July to October. The colony cycle of this species is slightly earlier than that of is congener *Bombus ruderatus*. The species is much later emerging in northern Scotland and the Scottish Islands than in the south of England and allowance for this geographical variation must be made.

Flowers Visited.

A wide range of flowers are visited, both for pollen and nectar, however this bee has a very marked preference for the flowers of red clover (*Trifolium pratense*) if these are available. With its long tongue it is found often on deeper flowers, particularly by the workers. Newly emerged queen will visit spring blossoming scrubs such as sallows, blackthorn, cherries and gorses. All sexes like thistles foxglove, honeysuckles, Buddleia, Dandelions, Bluebells and comfreys amongst many other plants.

Pollen Collected.

Predominately pollen from the plant families Fabaceae, Lamiaceae and Scrophulariaceae. However, I have seen it regularly collecting pollen from greater celandine (*Chelidonium majus*) even in the presence of plentiful white dead-nettle (*Lamium album*). Pollen is only presented by greater celandine in the early morning (c. 07.00-09.00hrs) and is all gone by 10.00hrs, so it is easy to see why this has not been reported before. Papaveraceae are readily visited for pollen by the shorter-tongued bumblebee species, so I was intrigued to see this, one of the longer-tongued species, doing so avidly.

Parasites

The cuckoo bumblebee *Bombus barbutellus* parasitises nests of this species. Also known to be attacked by the conopid flies such as *Physocephala rufipes.*

Here in Lancashire.

Widespread and common throughout the county First recorded pre 1918 and the latest record being 2018 with a total of 301 recorded to date.

Bombus lapidarius (Linnaeus,1758) (Red-tailed Bumblebee)

Male

Queen

Worker

Description.

A very distinctive bumblebee with extensive red marking over the last quarter of the abdomen and no yellow bands on the thorax of the females; males have the red tail and (usually) extensive yellow markings on the face and thorax. Confusion with the much rarer *B. ruderarius* is possible as the basic colour pattern is similar. However, the abdomen of the female B. ruderarius is approximately circular in outline, whilst that of *B. lapidarius* is distinctly elongate. The corbicular hairs of female *B. lapidarius* are black, not orange as in *B. ruderarius*. The males of *B. lapidarius* are generally brighter in colour and the genitalia are very different. FW. Typically 17mm queen. 12mm worker.12mm male. The large rectangular queen with a neat, jet black body pile, deep crimson tail that starts on tergite 4 and black haired hind tibiae are easy to easily to spot ion the field. The males look very different from the females with extensively yellow haired heads and a yellow collar, a weak midriff band, an orange –red rather than crimson tail and orange haired tibiae. There are variations in queens with some having grey/yellow collars. Workers vary very little in size but males vary in width and intensity of the collar and midriff bands. Males and workers tend to become sun bleached and can eventually fade to brown with a whitish tail which can regularly if not looked at closely can lead to misidentification.

Habitat and Ecology.

Associated with a wide range of habitats, including woodland, rural, open habitats being one of the bumblebees regularly encountered in gardens as well as the open countryside and woodland. It is especially common in legume-rich grasslands which include lawns with white clover.

Nesting Biology.

Nests are underground and are started in old mammal nests. Populations are large, with between 100 and 300 workers. The life-cycle is long, about 5 or 6 months. The species is remarkable for its use of 'traditional' hibernation sites, which are north-facing banks, usually within open woodland. Large numbers of queens use these sites year after year. This species is also a pollen storing species of bumblebee.

Flight Period.

The species is eusocial, with queens emerging from hibernation in March, workers present from April onwards, and males and new females from July to early October. Colonies decline during august but new queens can persist well into October.

Flowers Visited.

There are no clear flower-visiting preferences for this species, although it is reputed to be fond of visiting yellow flowers. In spring queens visit many sorts of flowers but love sallows, gorses, dandelions and oil seed rape. Summer queens are often seen on thistles, Teasel and Buddleia. Workers love clover, St johns wort, various crucifers and composites, along with melilots. Males like knapweeds, thistles, ragworts and brambles.

Pollen Collected.

The species is polylectic.

Parasites.

This species is attacked by the socially parasitic bee *Bombus rupestris*.

Here in Lancashire.

Very common and widespread throughout the county . First recorded per 1901 with the latest in 2020 and a total of 746 records to date.

Bombus barbutellus (Kirby,1802) (Barbut's Cuckoo Bee)

Male

Female

Description.

Until recently this species was known as *Psithyrus barbutellus*, but *Psithyrus* has now been reduced to a sub-genus within *Bombus*. It bears a close resemblance to its host, *Bombus hortorum*, but has an almost circular face, most unlike the very elongated one of *B. hortorum*. FW. 16mm Female. 13mm Male. The females are a medium sized to large sized cuckoo bee with a well defined yellow buff collar and scutellum, place a conspicuous white tail. Its is easily separated from other similar species by the pair of u shaped ridges on sternite6 and the ridge along the midline of tergite 6. This though as to be done under magnification. Males have a strong midriff band and resemble *B.hortorum* but have the larger head and sparser body hairs that are characteristic of cuckoo bumblebees. Also under the microscope you can identify the genitals of this species against other cuckoo bumblebees. There is variation in the collar of both sexes and also variation in the yellow hairs on top of the head. Highly bleached males with greyish collars and midriff are also found in late summer.. Tergite 1 can also be black in some specimens.

Habitat and Ecology.

This cuckoo-bee occurs in a wide variety of habitats where *B.hortorum* and *B.ruderatus* are found.

Nesting Biology.

During spring the over-wintered, fertilised female *B. barbutellus* searches for a small nest of the host bumblebee, *B. hortorum*. It enters the nest and eventually dominates, or kills the host queen. The parasite female then lays eggs which will develop into either males or females of *B. barbutellus*. All foraging and nest duties are carried out by the host workers. It is likely that this species will also attack *B. ruderatus*.

Flight Period.

Over-wintered females can be found from late April onwards, males and new females in July to September.

Flowers Visited.

Visits are made to a wide variety of flowers. Spring females like ground ivy, dead nettles, Hawthorn and umbellifers.

Pollen Collected.

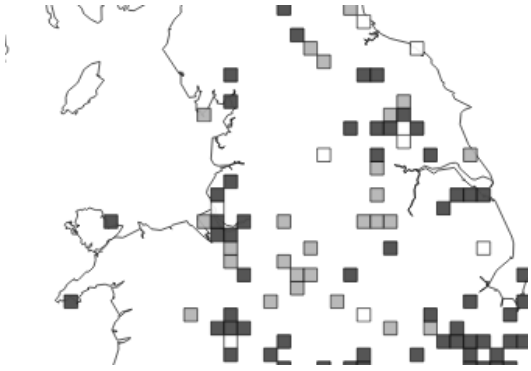
As this bee is parasitic it does not collect pollen, although females eat pollen in order to develop their ovaries. Foraging for pollen for the nest is carried out by the host workers.

Parasites.

None specifically recorded in Britain or Ireland.

Here in Lancashire.

Restricted to the Ormskirk, Silverdale and Croston areas of the county. It is a very rare species found in Lancashire. There are only 5 recorded, the first was pre 1901 and the latest 2017.



Bombus bohemicus (Seidl,1837) (Gypsy Cuckoo Bee)

Male

Female.

Description.

One of the socially parasitic bumblebees formerly placed in the genus *Psithyrus*, which is now regarded as a sub-genus of *Bombus*. It is known to parasitise the nests of *Bombus lucorum*. The general distribution is more northerly than that of its look-alike *Bombus vestalis*, which parasitises *B. terrestris*. Both males and females can be tentatively identified by the narrow yellow patches at the base of the white tail. These patches are generally less intense and extensive than in *B. vestalis*. However, microscopic examination will be required to reliably separate these two species. FW. 16mm female.14mm male. There is often a very weak midriff band which involve the anterior corners of tergite 1 and the hind fringe of the scutellum. In the field females never look quite as black as *B.vestilis*. Another aid to identification is to look at the shiny central, scarcely punctate central area of tergite6, which is duller and densely punctate in *B.vestilis* and will help to separate the two. Males are much longer haired than *B. Vestalis* with a well formed midriff band which extends into the scutellum and the collar is paler yellow. There is a little variation in the width of the collar and the brightness of the midriff band in both older individuals of both sexes.. The yellow hair patches on tergite 3 can become whiteish and merge with the white tail. Males with the white tail completely yellow have been noticed.

Habitat and Ecology.

It is found in a wide variety of habitats, as is its host. Associated with base poor and upland habitats such as heathland, upland meadows, moorland edge and open structured pine and birch woodland.

Nesting Biology.

After emerging from hibernation during April the mated female seeks out a small *B. lucorum* nest with a few workers. The female enters the nest furtively and hides while it acquires the nest scent. It may then dominate, or kill, the host queen and take over the egg-laying for the colony. These eggs produce only new *B. bohemicus* females and males, which take no part in the running of the colony, all work being done by the host workers.

Flight Period.

Females leave hibernation during April or May. New males and females are produced in July and August.

Flowers Visited.

A wide range of plants from different families, with spring females visiting flowering scrubs and flowers such as Dandelion and Bilberry. Summer males and females like Thistles, Heathers and Devils-bit Scabious.

Hosts.

A social parasite of Bumblebees of the Bombus lucorum complex with little dated of how which species are used.

Here in Lancashire.

Widespread and common here in the county . The first record is pre 1901 and the latest is 2017 with a total of 24 records to date.

Bombus campestris (Panzer,1801) (Field Cuckoo Bee)

Male

Female

Description.

Until recently this species was known as *Psithyrus campestris*, but *Psithyrus* has now been reduced to a subgenus within *Bombus*. A very variable species, colours ranging from forms which are all-black to those where the black is broken by two yellow stripes on the thorax and a yellowish tail. This is a cuckoo-bumblebee which is well-known to usurp the nests of *Bombus pascuorum* and has been recorded in nests of *B. humilis* as well. It is likely that it will attack all the carder bumblebees (*B. humilis*, *B. muscorum*, *B. pascuorum*, *B. ruderarius* and *B. sylvarum*). FW: 15mm female,13mm Male. Typical females have a broad buff collar and conspicuous buff scutellum. The abdomen is much more sparsely haired than the thorax, shiny and strongly downcurved. The tail comprises of two lateral patches od buff hairs separated by a broad zone of very short dark hairs which is a distinctive field characteristic.. If viewed under the microscope, sternite 6 will be seen to have a particular well developed pair of ridges which extend to the tip of the sternite. Males are very variable with the palest one being the easiest to recognise. As they are the only cuckoo bumblebee to have extensive pail hairs.. Under the microscope males can be identified by the pair of large hair tufts on sternite 6 and the particular broad genital claspers. There is variation in the males even within single populations with the palest individual's being almost entirely pale haired except for the black band across the top of the thorax and across tergite 2. Semi metallic and fully metallic males are frequent, and where a tai is present it can be buff or white.. Females are less variable but fully melanic individuals are not uncommon. A variety of females with the top of the thorax almost entirely buff haired have been recorded but not in Lancashire.

Habitat and Ecology.

This cuckoo-bee occurs in a wide variety of habitats, including woodlands, rural and open habitats

Nesting Biology.

A social parasite of carder bumblebees especially *B.pascuorum* but is known to attack other carders but does not seem to turn up frequently at theses other carders sites.

Flight Period.

Over-wintered females can be found from late April onwards, males and new females in July to September. It is suspected that it may be bivoltine in some areas.

Flowers Visited.

Visits are made to a very wide variety of flowers. Spring females like ground ivy, Clovers, dandelions and scrubs such as Hawthorn. Males like Knapweeds, Thistles, Devil-bit Scabious, Brambles and Thistles.

Pollen Collected.

As this bee is parasitic it does not collect pollen. This task is carried out by the host workers.

Pollen Collected.

As this bee is parasitic it does not collect pollen. This task is carried out by the host workers.

None specifically recorded in Britain or Ireland.

Hosts.

A social parasite of carder bumblebees especially *B.pascuorum* but is known to attack other carders but does not seem to turn up frequently at theses other carders sites.

Here in Lancashire.

Widespread and uncommon here in Lancashire . The first recorded in pre 1901 with the latest in 2018 with a total of 18 up to date.

Bombus rupestris (Fabricius,1793) (Red-tailed Cuckoo Bee)

Male

Female

Description.

Until recently this species was known as *Psithyrus rupestris* but *Psithyrus* has now been reduced to a subgenus within *Bombus*. This is a large cuckoo-bee which is a social parasite on the common and widespread red-tailed bumble bee, *Bombus lapidarius*. Both species are all black with a red tail, but the female parasite has darker wings. FM 19mm female. 14mm Male. The females are a very impressive bee with the largest wingspan of any other bumblebee. They have a shiny black body with rather sparse body hairs, a bright red tail and dark grey wings which are much darker than any other bumblebee. Males are very variable but are the only cuckoo bee with an extensively red tail.. The black haired head and rather greyish bands make them look similar to *B.ruderarius* and it ban be difficult to separate them in the field. Males are very variable in most populations with the palest having a greyish collar and scutellum and two greyish bands on the abdomen before the red tail.. Others are completely back but for the red tail and some individuals have the red tail starting on tergite 2 Fully metallic males have also been recorded. Females are usually constant in appearance , although some may have a yellow collar and also fully metallic ones have been recorded. Dwarf females with a wing length as short as 13mm have also been recorded.

Habitat and Ecology.

Although its host is a frequent species in gardens, most records relate to areas of unimproved grasslands Also found in open woodlands including rural and urban areas. Males have been spotted in the centre of Birmingham but no records of this activity in Lancashire.

Flight Period.

The females do not usually come out of hibernation until late May or June and can be seen searching for host nests during the latter month. The new generation of adults emerges in late July or August . Males will form lekking swarms on grassy hillsides which was possibly the basis for the earlier name of Hill cuckoo Bee

Nesting Biology.

In early summer, each female *Bombus rupestris* enters an established nest of *B. lapidarius* where it attacks and kills the resident queen. The parasite then establishes itself as the "queen" in the nest with its complement of *B. lapidarius* workers. The female *B. rupestris* lays female, and then male eggs that will be reared by the *B. lapidarius* workers. Once egg laying is completed, the female *B. rupestris* dies in the nest.

Flowers Visited.

Mainly plants in the families Apiaceae, Lamiaceae and Asteraceae. Spring females like Dandelion, Comfreys, Oil seed rape, Kidney Vetch and Ox eyed Daisy. Males and new queens visit Thistles, Teasel, Ragworts, Brambles Devils-bit Scabious and many garden plants such as Lavender, Ice plant and exotic composites.

Pollen Collected.

As this bee is parasitic it does not collect pollen. This task is carried out by the host workers.

Hosts.

In early summer, each female *Bombus rupestris* enters an established nest of *B. lapidarius* where it attacks and kills the resident queen. The parasite then establishes itself as the "queen" in the nest with its complement of *B. lapidarius* workers.

Parasites.

None specifically recorded in Britain

Here in Lancashire.

Widespread and uncommon here in Lancashire. The first record was in 1916 and the latest in2018 with a total of 16 records up to date.

Bombus sylvestris (Lepeletier,1832) (Forest Cuckoo Bee)

Male

Female

Description.

Until recently this species was known as *Psithyrus sylvestris*, but *Psithyrus* has now been reduced to a sub-genus within *Bombus*. The bee bears little clear resemblance to any of its probable host species in the *Bombus pratorum* group. FW.15mm female. 13mm male. The females are relatively small, fluffy cuckoo bumblebee with a strongly downturned abdomen. The midriff band is weak and usually confined to tergite 1. When under the microscope , the very small ridges on sternite 6 and triangular projection towards the tipoff tergite 6 allows for easy separation from all other species of cuckoo bee. Males on the other hand are highly variable, although the normal pale form tends to have a unique feature which is of a white tail, followed by black hairs on tergite 5 then orange hairs on tergite 6 and 7. The genitalia on the male also allows easy confirmation. Lekking males produce a strong and unique scent that can in woodland situations be easily, with experience, detected. There is variation in the females in the width of the collar and brightness of the midriff band which can also be absent. Males are considerably more variable. The tail can be yellow or white haired and sometimes but rarely with a yellow ring before the white hairs. Tergite 6 and 7 can be orange of black haired and semi melanic or fully melanic are frequent.

Habitat and Ecology.

This cuckoo-bee occurs in a wide variety of habitats. This cuckoo bee is more strongly associated with woodland areas than other cuckoo bees.

Flight Period.

Over-wintered females can be found from late March onwards, males and new females in July to September. It is probable that this species has two generations in areas where its major host, *Bombus pratorum*, is bivoltine.

Nesting Biology.

During spring the over-wintered and fertilised female *B. sylvestris* searches for a small nest of the host bumblebee, *B. pratorum*. It enters the nest and eventually dominates or kills the host queen. The parasite female then lays eggs which will develop into either males or females of *B. sylvestris*. All foraging and nest duties are carried out by the host workers. It is likely that this species will also attack other species in the *B. pratorum* group, e.g. *B. jonellus* and *B. monticola*.

Flowers Visited.

Visits are made to a wide variety of flowers such as Dandelions dead-nettles, Bilberries. Thistles, Brambles and Devils-bit Scabious.

Pollen Collected.

As this bee is parasitic it does not collect pollen. This task is carried out by the host workers.

Hosts.

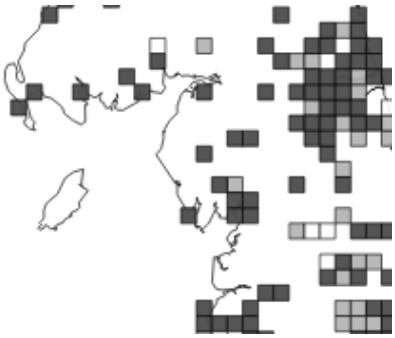
B. pratorum group, e.g. *B. jonellus* and *B. monticola*.

Parasites.

None specifically recorded in Britain

Here in Lancashire.

Widespread and common here in the county . The earliest record being 1976 and the latest 2018 with a total of 22 to date.



Bombus vestalis (Geoffroy,1785) (Vestal Cuckoo Bee)

Male

Female

Description.

One of the socially parasitic bumblebees formerly placed in the genus *Psithyrus*, which is now regarded as a sub-genus of *Bombus*. It is known to parasitise the nests of *Bombus terrestris*. The general distribution is more southerly than that of its look-alike, *Bombus bohemicus*, which matches the situation in the known hosts of these two species (*B. lucorum* is the host of *B. bohemicus*). This may be a species which is showing signs of distribution change due to climatic change. In view of the northward extension of distribution of several bumblebee species it will be interesting to see whether *B. vestalis* has also extended its range northwards. Both males and females can be suspected by the narrow yellow patches at the base of the white tail. These patches are generally more intense and extensive than in *B. bohemicus*, however, microscopic examination will be required to reliably separate the two species. FW.18mm Female. 14mm Male. Females closely resemble *B.bohemicus* but on average are slightly larger and when fresh have a ginger , rather than yellow collar and yellow side patches at the base of the bright sulfur yellow tail. There is never any hint of a midriff band. Under the microscope, the rather dull and densely punctate tergite 6 will easily identify this species. Males have the shortest and neatest body pile of any other cuckoo bumblebee, and in fresh individuals the sulfur yellow band at the base of the white tail is diagnostic. A weak midriff band can be present but mostly on tergite 1 rather than the scutellum. Variation in males consists of the midriff bands varying in intensity. Females are prone to darkening and they sometimes lack a collar and sometimes lose most of the tail as well. Old bleached individuals of both sexes can resemble *B.bohemicus* and need to me checked under the microscope.

Habitat and Ecology.

t is found in a wide variety of habitats, as is its host., *B terrestris* in both open and woodland habitats and also rural and urban habitats too

Flight Period.

Females leave hibernation during April or May. New males and females are produced in July and August and persist until late September.

Nesting Biology.

After emerging from hibernation during April the mated female seeks out a small *B. terrestris* nest with a few workers. The female sneaks into the nest and hides while it acquires the nest scent. It may dominate, or kill, the host queen and takes over the egg laying for the colony. These eggs produce only new *B. vestalis* females and males, which take no part in the running of the colony, all work being done by the host workers.

Flowers Visited.

A wide range of plants from different families. Spring females visit Sallows, Blackthorn and Cherries. They also love Dandelions. Workers and new summer queens like Thistles, Brambles, Teasel and Burdocks and a wide variety oif garden plants such as Lavender, exotic composites and Iceplant.

Pollen Collected.

As this bee is parasitic it does not collect pollen. This task is carried out by the host workers.

Hosts.

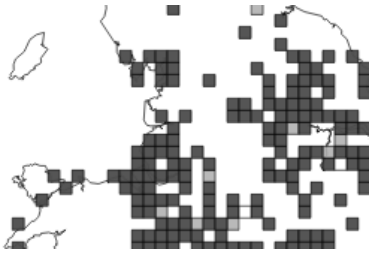
This is the social parasite of *B. terrestris*

Parasites.

None specifically recorded in Britain

Here in Lancashire.

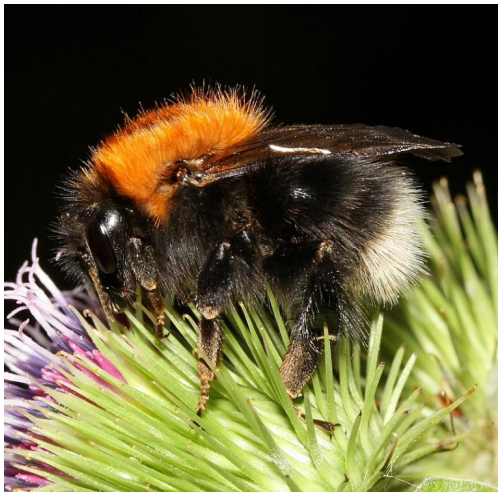
Widespread and common in Lancashire . The earlies being recorded in 1966 and the latest in 2018 with an up to date total of 54 records.



Bombus hypnorum (Linnaeus, 1758) (Tree Bumblebee)

Male

Female



Queen

Description.

The Tree Bee (Bombus hypnorum) was first re-ported in the UK in the summer of 2001 from a specimen found on the Hampshire/Wiltshire border. In the years immediately following its discovery, it appeared regularly in the Southampton area, and new populations were found in Hertfordshire. Since 2007, there has been a massive expansion of range and recorded abundance. Records have come in from as far north as Northumberland, and as far west as Wales and Cornwall. A unique colour pattern (brown/black/white) makes this bumblebee distinctive. The brown hairs of the thorax may be intermixed with black hairs, and the colour appears darker when this happens. Sometimes, the black hairs predominate and the thorax appears black to the naked eye. Occasionally, the bee could be confused with faded *B. pascuorum*, but the snow-white tail of *B. hypnorum* is always obvious. FW.15mm female. 11mm male. Males are easily recognised by the brown hairs on the head. Considerable variation mainly to the variation of darkening on the thorax in the females. This becomes darker from the centre and the thorax is entirely black haired in some individuals which results in a black bee with pure white tail. Males generally have tergite 1 ginger haired but tergite 1 can be black haired or ginger hairs can occupy both tergites 1 and 2.

Habitat and Ecology.

As with most other *Pyrobombus* this is a species closely associated with open woodland conditions. The species is strongly synanthropic in Britain, although this may change as it becomes more established. Also associated with scrubby grasslands, where brambles and cotoneasters are present. It is usually absent from open habitats.

Flight Period.

Queens emerge from hibernation in late February or March. It appears that this species can have two generations in the year (as do many other *Pyrobombus* in the south of England). Males have been found in the second half of May and again at the end of August and early September. Late flying queens have been noted in November and even early December.

Nesting Biology.

Nests in aerial cavities, often using old bird nests or nest boxes, but also small mammal nests as starters. The species is commonly associated with human activity and is regularly found nesting under eaves, behind soffit boards and in cavity walls. It also regularly nests low to the ground in compost bins. Løken (1973) notes that *B. hypnorum* has larger colonies than most *Pyrobombus*. Von Hagen (1994) suggests there may be up to 400 workers.

Flowers Visited.

Observations in Britain and elsewhere in Europe confirm that this species is broadly polylectic and will visit a very wide range of flowers from many plant families, with Spring queens visiting Sallows, Rhododendron , White dead nettle and Cotoneasters.

Pollen Collected.

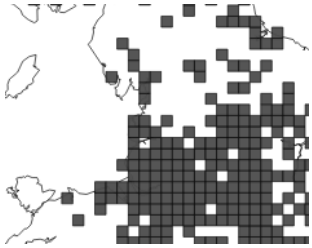
No data for Britain, but the species is known to be broadly polylectic.

Parasites.

No parasites are recorded for this species in Britain, but elsewhere within the wider range of *B. hypnorum*, the non-British *B. norvegicus* is a social parasite.

Here in Lancashire.

Widespread and common here in the county . The first record was in 2011 and the latest in 2019 with a total of 54 recorded to date.



Bombus jonellus (Kirby,1802) (Heath Bumblebee)

Male

Female

Queen

Description.

FW. 13mm female. 10mm worker. A short faced bumblebee with a body pattern very similar to *B.hortorum*, but all castes are smaller and have a longer body pile and buff rather than yellow bands. Male have much yellower haired head and a more rounder body than *B. Hortorum*. There is variation in the width of the collar and midriff bands and queen are prone to becoming semi metallic and can resemble *B. ruderatus* queens. It is either expanding into habitats it was not previously found in, or has been overlooked in these areas in the past. Whilst it undoubtedly does very well on heathlands.

Habitat and Ecology.

Although it has always been considered strongly associated with heathland and moorland, it does occur in a wide variety of other habitats, although it is usually less frequent in these. Uses sites from seas level to around 8oo metres. Will also use coastal dunes, chalk grasslands, saltmarsh edges and coastal grazing marsh.

Flight Period.

In southern lowland areas *B. jonellus* is often bivoltine, with first-generation queens searching for nest sites in March, and males and new females are produced in May. These queens may either enter hibernation or found new nests in June. These nests produce their sexuals in late August or September. In northern and upland areas nests are not founded until June, with males in late August and September. Workers may therefore be found between April and September in southern and lowland areas, but only between July and September in northern or upland areas.

Nesting Biology.

This species nests in a variety of situations, both underground or amongst dense vegetation. Including roof-spaces; old birds' nests (usually in holes); moss and leaf-litter on the surface of the soil and underground in old mouse or vole nests. The nest is small, usually with fewer than 50 workers.

Flowers Visited.

Visits are made to a very wide variety of flowers, both for pollen and nectar. Springs queens again visit a wide range of plants. Summer ones like clovers, thistles heather and scabiouses. The short tonged workers will forage amongst heathers but will switch to thymes on coastal areas. Males like umbellifers, brambles and thistles and also ragwort.

Pollen Collected.

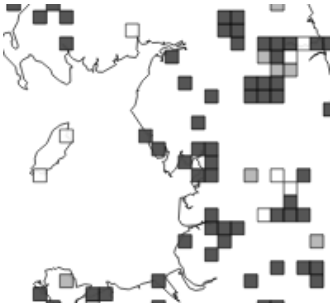
Widely polylectic.

Parasites.

The cuckoo bumblebee *Bombus sylvestris* attacks nests of this species.

Here in Lancashire.

Widespread and uncommon here in Lancashire. The first record was in 1915 and the latest in 2019 with a total of 18 records to date.



Bombus monticola Smith,1849 (Bilberry Bumblebee)

Male

Female

Description.

A very distinctive bumblebee with extensive red marking over at least the last half of the abdomen, and a very bright yellow band on the front of the thorax. FW.15mm Queen Female 10mm Male10mm. A distinctive short faced bumblebee with a yellow collar and a yellow-grey fringe to the scutellum. Quen are much broader shape that the other 2. Males have the top of the head and the face yellow haired and a fluffy haired body. The extent of yellow hairs on the collar scutellum and head of the m,ale can vary somewhat and the collar can in some individuals be weakly formed. The red tail can become yellowish or whitish at the tip.

Habitat and Ecology.

Associated with mountain and moorland habitat, although scarce in pure moorland areas. Recent research has shown a frequent connection with grassland habitats as well as moorland ones. Recorded at over 1000 meters. Likes heather moors. Unlikely to be away from areas that does not support Bilberry.

Flight Period.

The species is eusocial, with queens emerging from hibernation in April; workers are present from May onwards, and males and new females from July to early October.

Nesting Biology.

Nests are underground and are started in old mammal nests. Nest sizes are fairly small, and the colonies often have fewer than 50 workers. The life-cycle is also short, about 3-4 months.

Flowers Visited.

There are clear flower-visiting preferences for this species, with bilberries (*Vaccinium* spp.) and sallow (*Salix* spp.) being much used in spring; bird's-foot trefoil (*Lotus corniculatus*), clovers (*Trifolium* spp.) and raspberry (*Rubus idaeus)* and bramble (*Rubus fruticosus* agg.) in early to mid summer and bell heather (*Erica cinerea*) and bilberries in mid to late summer.

Pollen Collected.

The species is polylectic but shows a relatively restricted choice of pollen sources, including bilberries (*Vaccinium* spp.), clovers (*Trifolium* spp.) and bramble (*Rubus fruticosus* agg.).

Parasites.

It is very likely that this species is attacked by the socially parasitic bee, *Bombus sylvestris*.

Here in Lancashire.

A common but very localised bee here in Lancashire where it is mostly confined to Bilberry areas of the county. First recorded in 1901 with the latest record in 2018 with a total of 32 records to date.

Bombus pratorum (Linnaeus,1761) (Early Bumblebee)

Male

Female

Queen

Description.

FW Queen 13mm Male 10mm Female 10mm. A small short faced bumblebee with a fluffy body pile in all the castes. Queen have a bright orange collar and usually a bright yellow band across tergite 2. A reddish orange tail that starts on tergite 4. The head and scutellum are entirely black haired. Workers look like small queens but tend to have the band on tergite 2 missing or weak and the red tail starts on tergite 5. The fluffy dumpy males have a head that is mainly yellow haired, the collar extends to the back of the wing bases and down the sides of the thorax, and the yellow abdominal band on tergite 2 often extends onto tergite 1 and the hind margin of the scutellum. There is variation in all castes with the brightness of the abdomen and the width of the collar and sometimes abdomen band can also be missing. The palest males are mainly yellow haired except to an ill defined black patch between the wings,2 weak black bands across tergite 3 and 4 and an orange tail.

Habitat and Ecology.

B. pratorum is strongly associated with gardens and woodland habitats. Although it may also occur on open grasslands, heath and moorland it is much less frequent there. Likes to be around sites with plenty of brambles.

Flight Period.

Bivoltine in the south, with a smaller late-summer generation; univoltine towards the north. Nest-searching queens are among the first species to emerge throughout its range, being present from March to May, according to latitude. The males are similarly early to emerge, often being seen by the end of May or June.

Nesting Biology.

This species nests underground in old mouse or vole nests, or above ground in in old bird nests, especially if these are in holes in trees - or even bird-boxes. The nest is rather small, usually with fewer than 100 workers.

Flowers Visited.

Worker visits are made to a variety of flowers, both for pollen and nectar. Spring queens like sallows, prunus species, currants, Rhododendrons , Dandelions, Colds- foot and Dead nettles. Summer queens like Brambles, Raspberry and Clovers. Males have a very frenetic foraging behaviour and visit more or less the same flowers as the queens and workers.

Pollen Collected.

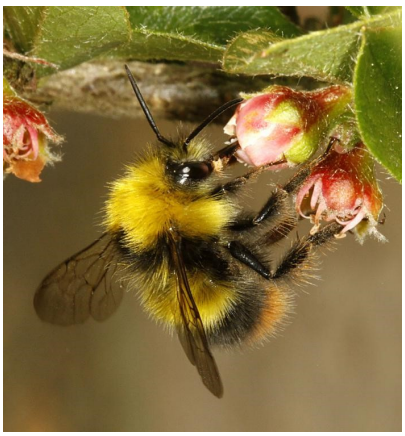
Polylectic. The flowers of rosaceous plants such as Blackthorn (*Prunus spinosa),* Bramble (*Rubus fruticosus* agg.) and Raspberry (*Rubus idaeus)* are especially popular. Queens are often seen at *Rhododendron* flowers in gardens.

Parasites.

The cuckoo-bee *Bombus sylvestris* is well-known as attacking this species.

Here in Lancashire.

Very widespread and common here in Lancashire. The first record is pre 1901 and the latest in 2018 with a total of 499 to date.



Bombus pascuorum (Scopoli,1763) (Common Carder Bee)

Male

Female

Queen

Description.

One of four brown bumblebees known from the British Isles, two of which, *B. muscorum* and *B. humilis*, are declining greatly. *B. pascuorum*, however, although it may well be less frequent than it used to be, is currently extending its range northward, being fairly recently found on Orkney. It may be seen in a great variety of habitats and is a regular inhabitant of gardens. Identification may be very difficult in the field, unless the black patches on the sides of the abdomen are well-developed, when the specimen will definitely be this species. Pale specimens, which occur with greater frequency towards the north, require very careful examination, records being best based on males, where the form of the genitalia is diagnostic (but requiring microscopic examination). FW. 13mm queen. 10mm worker. 11mm male. The commonest of our brownish carder bumblebees with small fluffy queens. Highly variable in all castes with the top of the thorax brownish or ginger and often centrally dark. The abdomen as a typically mix of cream and black hairs or have an orange ior cream coloured tail. Or can be almost pale haired. It is the most variable of all the carder bees with all castes varying in size with some workers having a wing length of less than 7mm. Sun bleached individuals can have a greyish appearance.

Habitat and Ecology.

A wide range of habitats are used, providing suitable pollen and nectar sources are available throughout the life of the colony. It is the most commonest bumblebee in arable lad and is very common gardens and urban greenfield spaces.

Flight Period.

The species is eusocial, with queens emerging from hibernation from March to June; workers are present from April onwards, and males and new females from July to October. The species may be two months later emerging in northern Scotland than in the south and these dates allow for this. In the south of the Uk you can get 2 generations but not in the north

Nesting Biology.

Nests are made above-ground in tall, but open grassland, under hedges and piles of plant litter. It may occasionally use bird boxes and holes in trees. It is one of the carder-bees: these bees gather moss and dry grass to make the covering of the nest. Nest sizes are fairly small, with 60-150 workers (Løken, 1973; von Hagen, 1994). The life-cycle of the nest is remarkably long, with workers still present in September and October in some cases.

Flowers Visited.

Associated with flowers with longer corollae, especially Fabaceae, Scrophulariacae. Spring females visit cold foot, comfreys, dead nettles, dandelions and gorses. Summer females and queens like thistles, brambles, foxglove, balsam, labiates of different sorts and assorted legumes.

Pollen Collected.

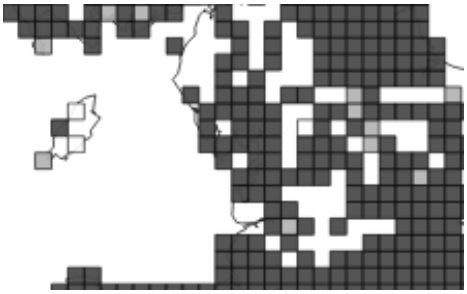
The species is polylectic but with a preference for flowers of the Fabaceae, Scrophulariacae, Lamiaceae and red-flowered Asteraceae.

Parasites.

This species is attacked by the socially parasitic bee, *Bombus campestris*.

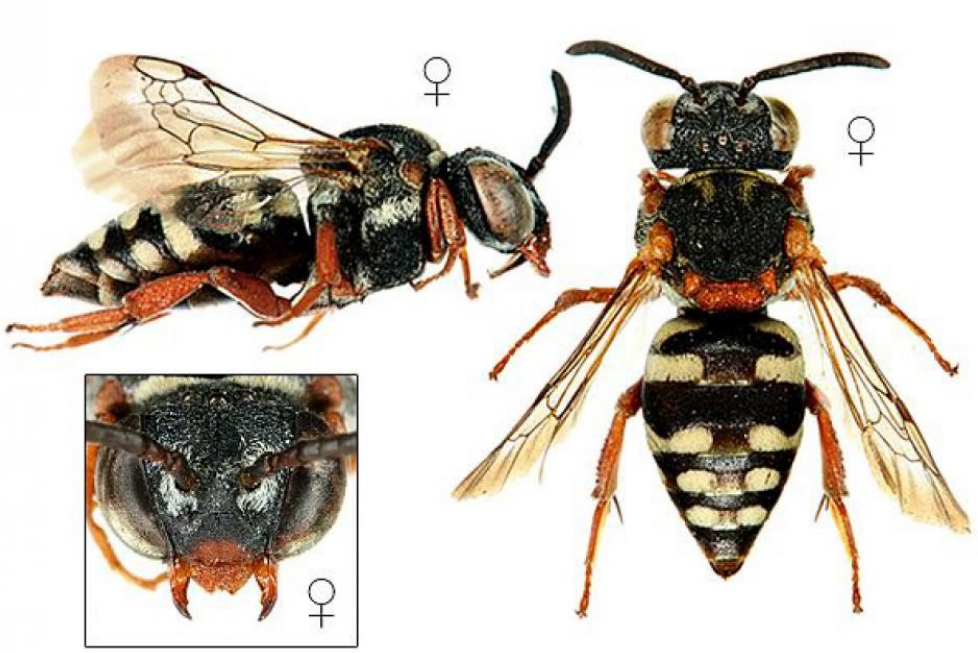
Here in Lancashire.

Widespread and common here in the county. The first record was Pre 1907 and the latest was in 2017 with a total of 1372 records to date.



Epeolus

Is a genus of cuckoo bees of the tribe Epeolini, the subfamily Nomadinae part of the honey bee family Apidae. They are often known as **variegated cuckoo-bees**.



Biology

The species within *Epeolus* are medium-sized bees with bright patterns. There are currently approximately 100 species described from throughout the world. All known species of *Epeolus* are cleptoparasites of mining bees of the genus *Colletes*. The female enters the nesting excavated by the female *Colletes* bee and lays an egg in an unsealed cell. The *Epeolus* larva then consumes the egg of the host bee and then feeds on the pollen the *Colletes* bee provisioned the cell with for her offspring. *Epeolus* bees may be rather obvious and easily observed in the vicinity of the nesting aggregations of their hosts and often use the same flowers to feed on. *Colletes* bees line their nesting cells with a cellophane like covering which they exude from the Dufour's gland to protect the cell from moisture and fungal infection, female *Epeolus* bees have spines on the end of their abdomens which they use to pierce u-shaped holes in this covering so that she can oviposit between its layers, she also secretes a small amount of glue so that the egg adheres to the cell.

Epeolus cruciger (Panzer,1799) (Red Thighed Epeolus)

Male

Female

Description.

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. FW. 4mm to 7mm female.4.5mm to 6.5mm male. A medium to small cream and black patterned bee with inconspicuous body hairs. Females closely resemble *E. variegatus* but have a less produced tip to the abdomen, and a reddish femora, sternites and axillae. Sternite 2 is more finely punctate. Males have mainly blackish femora, very like *E. variegatus* and the most reliable way of checking is checking the genitalia which will separate the 2 species. But this species as a red pygidium and the labrum is usually slightly rounder in shape, with a more evenly roughened surface and with the lower margin less indented in the middle that of *E. variegatus*. Some males cannot be separated by external morphology. There is variation on the amount of red verses black on the legs. Females sometimes also have the scutellum and axillae black.

Habitat and Ecology.

Inland heaths (where it is often common) and moors; also coastal sand dunes and undercliffs. Mostly anywhere where its hosts *C. marginatus* are present.

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. Populations associated with *C. succinctus* peak in august and linger on longer.

Nesting/ Parasitic Biology.

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

Flowers Visited.

Nectar sources include clover (*Trifolium* spp.), a hawkbit (*Leontodon* sp.), heather (*Calluna vulgaris*), a mint (*Mentha* sp.), ragwort (*Senecio jacobaea*) and sheep's-bit (*Jasione montana*).

Pollen Collected.

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

Parasites.

No parasites are reported as yet.

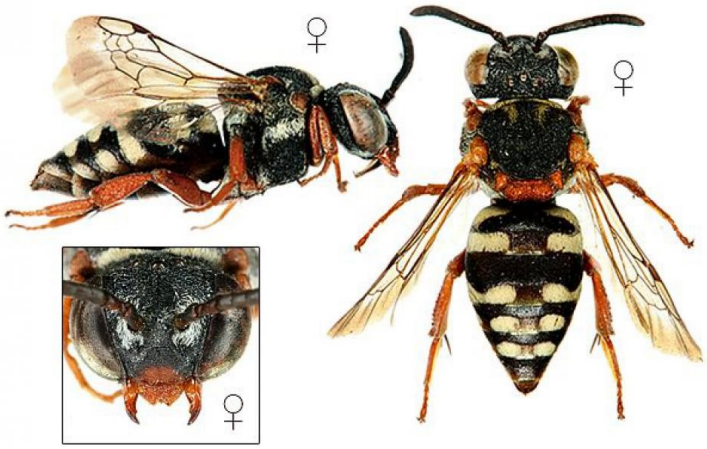
Here in Lancashire.

Restricted in the county to the Blackburn, Preston and the Fylde areas . First recorded in1975 with the latest recorded in 2016 and a total of 18 records to date.

Epeolus variegatus (Linnaeus,1758) (Black Thighed Epeolus)

Male

Female



Both

Description.

Distributed 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. FW. 5mm to 6.5mm in both sexes. A darker femora in the female than in other species of *Epeolus* but needs checking for the more produced tip of the abdomen which as a more concave lower margin when looked at from the side. Males need to be identified from other species using genitalia, but they usually have a dark pygidium and more transverse labrum. The amount of red against black on the legs can vary, so using structural features are important in identification.

Habitat and Ecology.

Open woodland, heathland, coastal dunes, cliffs and salt marshes A varied habitat depending on where the host are.

Flight Period.

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

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 was almost certainly attacking *C. fodiens*, though *C. floralis* was also present and in, apparently, greater numbers.

Flowers Visited.

Bog pimperel (*Anagallis tenella*), bramble (*Rubus fruticosus* agg.), clover (*Trifolium* sp.), common fleabane (*Pulicaria dysenterica*), common ragwort (*Senecio jacobaea*), creeping buttercup (*Ranunculus repens*), creeping thistle (*Cirsium arvense*), hawkbit (*Leontodon* sp.), oxtongue (*Picris* sp.), thyme (*Thymus* sp.), viper's-bugloss (*Echium vulgare*), and wild carrot (*Daucus carota*). It is most frequently seen on common ragwort (*Senecio jacobaea*).

Pollen Collected.

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

Parasites.

No parasites are reported as yet.

Here in Lancashire.

An uncommon species in the county which is restricted to the Sefton and the Fylde areas. First recorded in 1975 and the latest record in 2016 with 18 records to date.

Genus: Nomada. (Cuckoo Bees)

With over 850 species, the genus ***Nomada*** is one of the largest genera in the family Apidae, and the largest genus of kleptoparasitic "cuckoo bees." Kleptoparasitic bees are so named because they enter the nests of a host and lay eggs there, stealing resources that the host has already collected. The name "*Nomada*" is derived from the Greek word *nomas (νομάς*), meaning "roaming" or "wandering." *Nomada* parasitize many different types of bees as hosts, primarily the genus *Andrena,* but also *Agapostemon, Melitta, Eucera* and *Exomalopsis*. As parasites, they lack a pollen-carrying scopa, and are mostly hairless, as they do not collect pollen to feed their offspring. Like non-parasitic bees, adults are known to visit flowers and feed on nectar. Given the lack of scopa and general behavior, they are considered poor pollinators. Most kleptoparasitic bees are believed to be solitary, but some may be primitively eusocial. Kleptoparasitic bees have independently evolved more than 16 times where they target social hosts, and over 31 times where they target solitary hosts. They are often extraordinarily wasp-like in appearance, with red, black, and yellow colors prevailing, and with smoky (infuscated) wings or wing tips. They vary greatly in appearance between species, and can be stripe less, or have yellow or white integumental markings on their abdomen. There are specialized patches of hair on the tip of the abdomen of female *Nomada*. Males have an obvious, often notched pygidial plate. In general, females are easily identifiable by the lack of scopa, reduced body hair, thick exoskeleton, and mandibles. Separation of this genus from other Nomadinae can be difficult; details of the wing venation, and the nature of the patch of silvery setae at the tip of the female metasoma are the best distinguishing features. Species of *Nomada* exhibit an unusual behavior where adult bees are observed to be sleeping by using only their mandibles to hold onto plants. They occur worldwide, including Holartic, Central and South America, sub-Saharan Africa, and parts of Asia. *Nomada* parasitize ground-nesting bees, and therefore, their habitats correlate with their hosts. Ground nesting bees nest in soil, either in open habitats or in ones covered with vegetation, with a good floral source nearby. Bees of the genus *Nomada* most often parasitize bees of the genus *Andrena*. Species of *Nomada* have also been observed parasitizing ground-nesting bees in the families Andrenidae, Melittidae, Halictidae, and Apidae. As is the case for other nomadines, this behavior violates “Emery’s rule” which states that social parasites tend to be either closely related to or sister species of their host. *Nomada* are guided by visual cues to locate host nest entrances. In early spring, they can be spotted flying low to the ground, searching for nests to parasitize. Once a nest is found, studies show that *Nomada* females assess their hosts nests based on three guiding principles: vulnerability and quality of the host cell, threat of a maternal host's presence, competition with other *Nomada* bees. These three factors are assessed by the bees' olfactory senses to determine if the nest is provisioned with pollen, if a host bee is nearby or in the nest, if the nest has been parasitized before and if there are other parasitic bees nearby. The role of male and female cuckoos bees in the parasitism process differs. Before mating, male *Nomada* will fly locally secreting a scent which mimics the host female. Male cuckoo bees will secrete this scent near host nest options to help female *Nomada* find a nest to deposit eggs. Furthermore, when male and female bees mate, there is evidence that part of the male's secreted scent rubs off onto female bees, which will actually provide an advantage to her finding and entering a host nest. *Nomada* bees are distinct from other types of parasitic bees for several reasons. These bees are evolutionarily unique because they do not exhibit pollen collecting behaviors. *Nomada* parasitizes their host cells by laying eggs in host nests while the female host bee is foraging for pollen, nectar, or oil. The female *Nomada* preys on the host's cells before host oviposition and nest cell closure. The female cuckoo bee will lay her eggs in the host's nest and leave. *Nomada* are known to leave specialized egg structures in the host cell. These eggs are placed into the innermost wall of the host cell, yet there is a lot of diversity among Nomadinae regarding the manner of egg insertion. Some species are known to bury the egg at right angles into the cell wall, while some only partially insert the egg. Additionally, *Nomada* may sometimes leave multiple eggs into one host cell, a frequent trait of kleptoparasitic bees. Using their unique mandibles, the parasite larvae kill the host offspring and the conspecific larvae until only one is alive. This larva then steals the host's allocation of pollen or nectar. This type of parasitism is also known as brood parasitism, where the parasite's offspring develop on the nutrients gathered by the host for its own offspring.

Nomada fabriciana (Linnaeus,1767) (Fabricius Nomad Bee)

Male

Female

Description.

Females are easily identified by their reddish antennae with several of the intermediate segments being black. This banded appearance is visible in the field. It is also the only *Nomada* species which, in the British Isles, has (in both sexes) a combination of bidentate mandibles and a black labrum; the gaster is mainly reddish. Widely distributed in England and Wales (especially so in the south), sporadic in Scotland and Ireland (possibly more widespread in Ireland than the few records suggest (Stelfox 1927)). It is known too from the Isle of Man and the Channel Islands. As might be expected, this range closely mirrors that of one of its common host species, *Andrena bicolor* (see maps). The species occurs throughout much of central and southern Europe, with records from as far south as Corsica and east to Turkey.

FW>5.5mm-8mm female. 5mm-7mm male. A small to medium sized reddish nomad with usually small yellow spots on the sides of tergites 2 and 3 and an almost entirely black face and thorax. Easy to distinguish from all the other nomas by the combination of a black labrum and bifid mandibles. Females usually have antennal segments 4-7 and 12 orange and the rest dark. Males resemble females but have the antennae and tegulae entirely dark and with longer hairs on the head and the thorax. There is substantial variations in size which can name them look like *N.flavoguttata*. Females sometimes lack any yellow spots of the tergites and also both sexes can have black bands of variable intensity across the tergites. The mid and hindtibiae vary from mostly reddish to mostly blackish. Very dark females can have the antennae and legs almost entirely black.

Habitat and Ecology.

To be expected wherever its *Andrena* host species are well established, both in wooded and open coastal and inland regions

Flight Period.

Bivoltine, from March to June, and June to August. In Ireland, Stelfox (1927) did not detect a second brood.

Nesting/ Parasitic Biology.

A cleptoparasite of, apparently, several *Andrena* species (confirmation of these species being hosts is required): *A. bicolor* (Perkins 1919, 1924a, 1924b; Hallett 1928, 1956; Spooner 1931; Yarrow 1941; Chambers 1949); *A. nigroaenea* (Perkins 1919, 1924a, Spooner 1931, Richards 1979); *A. angustior* (Perkins 1919, 1924a; Richards 1979); *A. flavipes* (Chambers 1949); *A. varians* (Chambers 1949) and *A. chrysosceles* (Yarrow 1941). Specimens of the *Nomada* vary greatly in size, no doubt a reflection of the different host species utilized. The largest individuals may develop in the nests of *A. nigroaenea.*

Flowers Visited.

Species include; Bogbean (*Menyanthes trifoliata*), dandelion (*Taraxacum* sp.), daisy (*Bellis perennis*), ragwort (*Senecio jacobaea*), field scabious (*Knautia arvensis*), speedwell (*Veronica* sp.), spurge (*Euphorbia* sp.), stitchwort (*Stellaria* sp.), strawberry (*Fagaria vesca*) and willow (*Salix* sp.). Visits spring flowering shrubs and summer flowering scrubs too.

Pollen Collected.

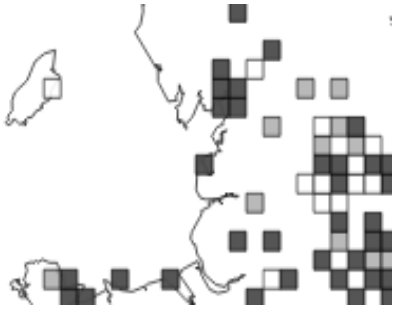
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and common here in the county with 29 records up to date. The earliest being 1975 and the latest in 2017



Nomada flava Panzer,1798 (Flavous Nomad Bee)

Male

Female

Description.

A bright brown and yellow cuckoo bee and one of the larger of our *Nomada* species. In common with its hosts (*Andrena* of the *varians* group as well as *A. scotica* Perkins and *A. nitida* (Müller)) this is a very widespread and frequently found species, often seen flying over short vegetation and bare ground in sunny places during the spring. Towards the north it appears to be replaced by *N. panzeri* Lepeletier. Separating males, in particular, of these two species is very difficult, but good characters concerning the standing hairs on the clypeus can be used for the females. FW.7.5mm to 10mm with both sexes similar. The commonest of the tricoloured Nonads with a red marked thorax. In females the tergites are extensively yellow and usually with a white spots on tergite 2 which narrowly separated by red. Tergite 1 has a broad red band but lacks any yellow. The scutum is red striped and the scutellum entirely red. The sides of the thorax have a red patch that is sometimes divided into two, The propodeum can be all black or have small red markings. The hairs on the propodeum , hind coxae and sides of the thorax have a yellowish tint and are never silvery.. The lower face is extensively red with markings extending completely around the eyes. The antennal flagella are completely orange, usually with any darkening above. The erect hairs of the clypeus and labrum are yellowish. Males tend to be smaller than females, with an entirely black thorax and a pair of red scutella spots can be present that as longer hairs. There is some variation in amount of yellow on the tergites in both sexes and also the red on the thorax and head of the female. Females with dark scutums and much reduced yellow markings on the tergites can sometimes be spotted. Males can vary considerably in size. They can have the scutellum entirely black or with red spots, and the pronotal can be red or yellow marked but rarely conspicuous.

Habitat and Ecology.

Occurs in a wide range of habitats, including woodlands inland areas, coastal areas and is a common Nomad on farmland

Flight Period.

Univoltine; April to June. Peaking in late spring.

Nesting/ Parasitic Biology.

A cuckoo species, it does not make its own nest, but lays its eggs in the nests of mining bees of the genus *Andrena*. Primery hosts are *Andrena scotica*. But possible *A.ferox, A. nitida* and *A.nigroaenea*

Flowers Visited.

Visits a wide variety of Spring blossoming flowers including dandelion, Greater Stitchwort, Garlic Mustard, Wood Surge, Rape, Cowslip and Bluebell.

Pollen Collected.

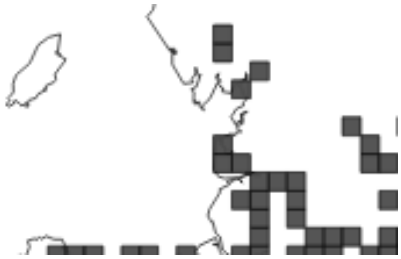
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

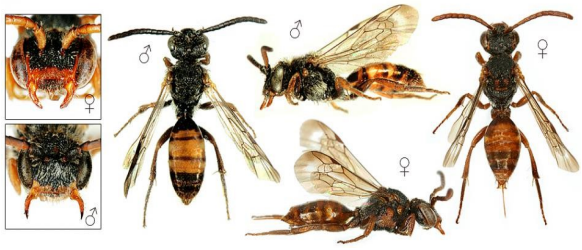
Here in Lancashire.

Widespread and common here in the county with 29 records so far to date. The first being recorded in 1975 and the latest in 2017



Nomada flavoguttata (Kirby,1802) (Little Nomad Bee)

Male



Both

Female

Description.

This is one of the smallest species of *Nomada* and is widely distributed throughout Britain. A very common bee, although, owing to its very small size, it is easily overlooked. Widely distributed throughout Britain, from southern England north to the Isle of Man and northern Scotland (Golspie, East Sutherland). In Ireland it occurs from Cork to Armagh and Down (Stelfox, 1927; Ronayne & O'Connor, 2003). Jersey is the only island in the Channel Islands where it has been reported, though not since 1903. FW 4.5mm to 6mm in both sexes. A small reddish Nomad with a large Labrum. The females have the abdomen mostly red with small yellow spots on the sides of tergite 2 and 3. The scutellum has 2 red spots and the sides of the thorax have a large red spot which is sometimes divided into two. The scutum has red side margins and often a pair of longitudal strips down the middle. The tegulae, pronotal collar and pronotal tubercules are reddish. The propodeum is black with a conspicuous patch of silvery hairs on each side.. The lower face is reddish, with markings sometimes completely surrounding the eyes. The antennae are orange below and brownish above. The males usually have the thorax entirely black and the lower face yellow with the tops of the antennal flagella blackish and tergites 1-3 often black and red banded. The legs are more extensively blacker than the females. Antennal segment 3 is very short and less than halfas long when looked at from below.

There is variation in the yellow spots of tergites2 and 3 which are sometimes missing. The extent of red on the females head and thorax is variable, with red markings completely surrounding the eyes in some individuals but barely in others. A pair of well formed longitudinal stripes can run down the middle of the scutum but are also often absent, although a red stripe remains above each wing base. Both sexes have variable amounts of black on the tergites, whilst at the other extreme well formed black bands are present on the intermediate tergites, whilst at the other extreme the abdomen is entirely red except for yellow spots. Males sometimes have the labrum yellow . They sometimes have a pair of red scutellar spots. There is substantial variation in size of both sexes.

Habitat and Ecology.

Generally distributed, occurring wherever its several host species are present. But widely varied which reflects on the host species being used. It can be seen at higher altitudes when using A. subopaca.

Flight Period.

Depending on the flight periods of its host species, it can be either univoltine or bivoltine. It can be found from the end of March to late August with a spring generation from late March to June and a summer one from late June to September.

Nesting/ Parasitic Biology.

A cuckoo species, it does not make its own nest, but lays its eggs in the nests of mining bees of the genus *Andrena*. Those recorded are *Andrena alfkenella* Perkins, *Andrena falsifica* Perkins, *Andrena minutula* (Kirby), *Andrena semilaevis* Pérez and *Andrena subopaca* Nylander.

Flowers Visited.

Many different flowers are visited for nectar. Spring flowering shrubs, composites such as dandelion, umbellifers, crucifers, Sheep's bit and Tormentil.

Pollen Collected.

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

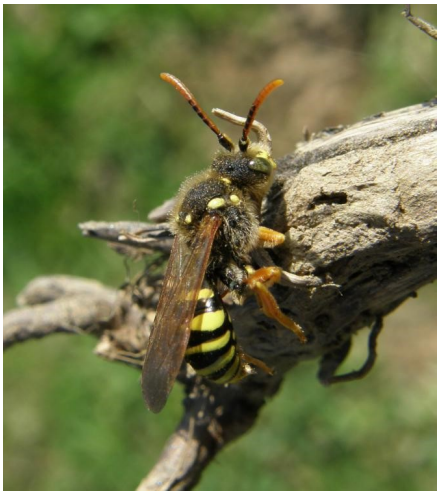
Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and uncommon here in Lancashire with 11 records up to date. First recorded in 1979 and the latest in 2017.

Nomada goodeniana (Kirby,1802) (Gooden's Nomad Bee)



Male

Female

Description.

A very bright, black and yellow cuckoo bee and one of the largest of our *Nomada* species. In common with its hosts (*Andrena* species of the *nigroaenea*-group) this is a very widespread and frequently found species, often seen flying over short vegetation and bare ground in sunny places during the spring and, in smaller numbers, late summer. These later dates support the supposition that its hosts may also have a later flight period than has been previously recognised. FW. 7.5mm to 10 mm female. 7.5mm to 8.5mm male. A large bodied black and yellow boldly marked nomad with complete yellow bands to tergites 2-5 and often on 1. In females the scutellum has a pair of yellow spots and the tegulae, pronotal collar ad pronota tubercles are yellow. A pair of yellow spots can also be present on the propodeum. The lower edge of the clypeus is orange, with narrow yellow markings alongside the inner eye margins. The antennae including the scapes are usually completely orange. The legs are orange with the femora variably black at the base. Males have the lower face and inner eye marginsmore broadly yellow than the females and the hind face of antennal segment 1-7 blackish. A small yellow mark is usually present at the side of the thorax near the front coxae. There are patches of dense adpressed hairs on the underside of the hind femora and on the adjacent trochanters. There is moderate variation in the extent of yellow markings on the tergites, thorax and face. Tergite 1 can have narrowly seperate d spots or complete bands.. The yellow propodeal spots can be quite large, especially in the second generation in both male a nd females , but are typical small and even absent in the spring generation and males sometimes lack scutellar spots. Sometimes the antennal scape of the female is black behind . The labrum can be all orange or partly darkened.

Habitat and Ecology.

They are present in assorted habitats both in inland and coastal areas and open or wooded areas. It is also one of the more frequent nomads that visit urban areas.

Flight Period.

Typically univoltine Flying from April to June, with a small new generation in July and August. Regularly bivoltine in some coastal areas where it most probably uses *Andrena thoracic.*

Nesting/ Parasitic Biology.

A cuckoo species, it does not make its own nest, but lays its eggs in the nests of mining bees of the genus *Andrena*. Those recorded are *Andrena nigroaenea., A nitida* and *A. thoracica* also possibly *A.scotica* to a lesser extent.

Flowers Visited.

Visits a wide variety of flowers for nectar. Such as dandelion, yellow composites Rape, forget-me-knots, buttercups and Greater Stitchwort.

Pollen Collected.

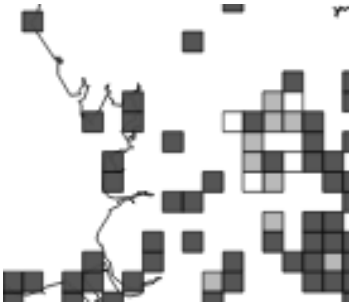
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and uncommon here in the county. The earliest record being in 1947 and the latest in 2017 with 17 records up to date.



Nomada integra (Brullé,1832) (Cat's-ear Nomad Bee)

Male

Female

Description.

This *Nomada* is one of those with a gaster which is red-brown with yellow spots. It is not often found, but may be sought wherever its host *Andrena humilis Imhoff* is present. It has been the subject of a lot of name changes in recent years, the current name being now generally accepted as the correctly applied one. Moderately widely distributed in England from the south coast north to Yorkshire, but absent from large areas of Wales and East Anglia. It is also unrecorded from Scotland and Ireland, but there is an old record from the Channel Islands. Overseas, widely distributed over most of Europe, North Africa and near-eastern Asia. FW 6.5mm to 7mm in both sexes. One of the small number of nomads with a complete lack of yellow or white markings on the tergites. The females have the tergites extensively red with blck patches at the sides of tergites 2 and 3 and a black band around the base of tergite 4 which tends to show through the translucent apical margin of tergite 3. The thorax is black apart from a pair of red spots on the scutellum and reddish tegulae, pronotal collar and pronotal tubercles. The face is black except for the mandibles and lower edge of the clypeus, and the antennal flagella are reddish with some darkening above.. The mandibles are very bluntly rounded. Males resemble females, more so in other nomads but have projections beneath antennal segments 5-9 and also a hairier thorax. The hind femora have the undersides densely white haired. There is variation on the amount of black on the tergites, legs and antennal scapes in both sexes and also the size of the scutellar spots which can also be missing on some males.

Habitat and Ecology.

Most often associated with sandy soils, although also known from coastal head deposits where the soils are friable. The presence of nests of its host species is an essential factor. Also associated with large host colonies on gorse clad hillsides, sandy heathland paths and vertical faces of sandpits.

Flight Period.

Univoltine; May to July and sometimes in August, peaking in late spring.

Nesting/ Parasitic Biology.

Well known as a cleptoparasite of *Andrena humilis* Imhoff. It has also been reported as being associated with *A. polita* Smith elsewhere in Europe.

Flowers Visited.

A range of spring and mid-summer flowering plants have been recorded as nectar sources.

Pollen Collected.

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

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Very rare here in Lancashire with only 3 records to date in the Billinge Hill Cuerden Valley Park area. First unconfirmed record in 1934 and the latest in 2016

Nomada lathburiana (Kirby,1802) (Lathbury's Nomad Bee)

Male

Female.

Description.

Nomada leucophthalma (Kirby,1802)A *Nomada* species with a tricoloured gaster and reddish hair on the thorax (more evident in the female) in Britain and Ireland is likely to be this species. FW. 7mm to 9mm Female. 7.5mm to 9mm male. Fresh females are easy to spot by the reddish pile on top of the thorax which can fade as she gets older. Also easy to spot by the red bordered yellow spots on the scutellum. The scutum is black and the red markings of the lower face no not extend around the eyes. Tergite 1 has a broad red band. Tergites 2 and 3 have continuos yellow bands which can be variably infiltrated by red in the middle. Males have small scutellar , yellow face markings and a darker antennae spots. They are easy to distinguish from other similar nomads by the presence of a sharp projection on the hind face of antennal segments 4 to 13. Both sexes show variation in the extent of the scutellar and head markings. Females can have variable amounts of red on the tergites 2 and 3, and dwarf females with wing lengths as short ar 6.5m are sometimes seen.. Males show additional variations on the amount and extent of yellow on the tibiae and also the tegulae can be orange or yellow.

Habitat and Ecology.

Found in open sunny areas within the nesting sites of the host. Where the host is nesting in large compact aggregations *Nomada* males and females can be very numerous, especially on gorse clad hillsides, sandy heathland paths and vertical faces of sandpits

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*. 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.

Nesting/ Parasitic Biology.

In Britain it is a cleptoparasite on *Andrena cineraria*. The *Nomada* female detects incomplete host cells which are still open and being provided with food. The *Nomada* oviposits 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 (*Prunus* spp.), Gooseberry (*Ribes uva-crispa*), Creeping Willow (*Salix repens*) and Dandelions (*Taraxacum* spp.).

Pollen Collected.

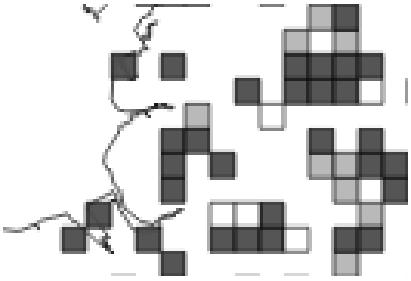
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and uncommon here in the county. First recorded in 1928 with the latest record in 2017 and a total of 20 records to date.



Nomada leucophthalma (Kirby,1802) (Early Nomad Bee)

Male

Female

Description.

Widely distributed and generally locally common throughout much of the British Isles. It is, however, inexplicably very scarce in Kent (G W Allen, pers. comm.) and Essex (P Harvey, pers. comm.). The range extends north to central Scotland (Renfrew, Midlothian and West Perthshire) and includes the Isle of Man. It is also widespread in Ireland. There are no records of the species from the Channel Islands. In Europe it is mainly found in the north (reaching northern Finland), with only scattered records from further south. FW. 7mm to 9mm female. 6.5mm to 8.5mm male. A tricolored nomad with a completely black scutem and propodeum. Females have a red band across tergite 1, yellow spots on the sides of tergites 2 and 3, separated by less than their own width.. Yellow bands across tergite 4 and 5 and black bands across the bases od tergites 2 to 5 which show through the translucent hind margins of the previous segment. The scutellum has a pair of reddish spots, and the tegulae, pronotal tubercles, extreme lower face and sometimes the pronotal collar are also reddish. The antennal flagella are black above but not all black, the scapes are usually mainly black with limited red markings in front. The thorax has a rather dense pile of brownish hairs and can be confused with *N. lathburiana.* Males have more extensive yellow on the tergites than the females. And brownish black bands on tergites 2 and 3 with brown and yellow marks on tergite 1. They also have brownish black bands across the hind margins. There is some variation in the extent of yellow, black and red/brown markings on the tergites and also the extent of balck on the anntenal scape of the females.

Habitat and Ecology.

Found with the host bee in open woodland, on heaths and moorland edges and brownfield sites.

Flight Period.

Univoltine; early March to mid-May. Peaking later here in the north of the country.

Nesting/ Parasitic Biology.

A cleptoparasite of *Andrena apicata* (Perkins, 1919, 1943, 1945; Chambers, 1949) and *A. clarkella* (Perkins, 1919). Often observed in the vicinity of the nest burrows of these two species of mining bees, especially *A. clarkella.*

Flowers Visited.

Barren strawberry, Bilberry, Dandelion, Forget-me knots, Willows. Colts-foot and Sallow.

Pollen Collected.

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

Parasites.

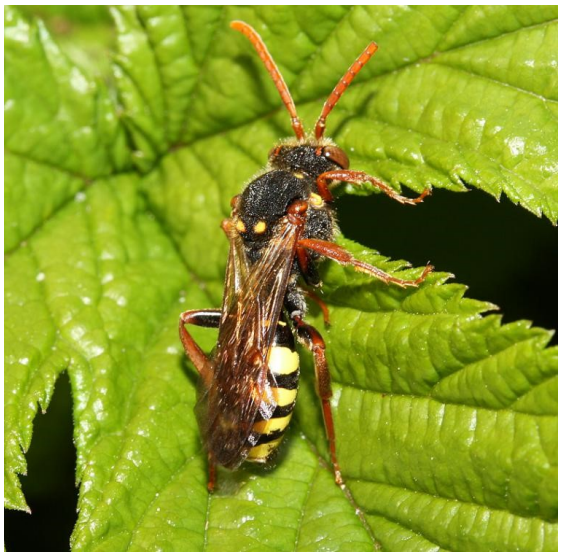
No parasites are reported as yet.

Here in Lancashire.

Widespread and common here in Lancashire. The first record was in 1926 and the latest in 2018 with a total of 25 records to date.

Nomada marshamella (Kirby,1802) (Marsham's Nomad Bee)

Male



Female

Description.

Distributed throughout much of Britain, from southern England to northern Scotland. Similarly widespread in Ireland. It is known too from the Inner Hebrides (Rum) and the Isle of Man. Surprisingly, there are no records of the bee from the Channel Islands, despite the abundance on several of the islands of its main host bee, *Andrena* Widely distributed in Europe, from southern Finland (Söderman & Leinonen, 2003) to Corsica and Malta, and further east to Turkey. FW 7mm to 9mm in both sexes. This is a large black and yellow species of nonad with the spots on tergite2 clearly but narrowly separated with rether squared off inner edges. Females usually have a pair of yellow spots on the scutellum, orange tegulae, a yellow pronotal collar and yellow pronotal tubercules. The lower face is reddish, but the iner eye margins are black. The antennae are completely orange, and the legs are mostly orange with partially black femora. Tergite 1 usually has a pair of small yellow spots. Males are similar but have a yellow lower face , partially yellow tegulae , partially black antennal scapes and basal segments of the antennal flagella black on top. The ofter lack scutellar spots. There is variation to the extent of the yellow on tergites. Tergite 3 can have a completely band or 2 separate spots, and the spots on tergite1 are often tiny or missing. Some of the females have orange scutellar spots, and the spots on tergite 1 are often tiny or even missing. Some females have orange scutellar spots. In bivoltine populations, the second generation have much shorter hairs on the thorax than the earlier generation.

Habitat and Ecology.

A very common species, occurring in many habitats, both coastal and inland. Regularly observed in private gardens in rural and urban situations. One of the more common nomad species of urban settings and woodland.

Flight Period.

Apparently both univoltine and bivoltine, depending on the host *Andrena* which is attacked. The univoltine form is apparently associated with *A. carantonica* and *A. nigroaenea* (Kirby) and flies in the spring and early summer from early April to late June. The host of the bivoltine form is not known for certain but it may attack both broods of *A. trimmerana* (Kirby) and late nesting *A. carantonica* and *nigroaenea*, both the latter species having a single, greatly extended flight period. This form flies from April to June and again from late June to the beginning of September. The Nomada is certainly more numerous in the spring and early summer than later in the year.

Nesting/ Parasitic Biology.

This species is mainly a cleptoparasite of *Andrena carantonica*. There are reports of the bee observed to enter nest burrows of this *Andrena* and also recovered from within such a burrow (Chambers, 1949; G M Spooner, pers. comm.). Other possible host bees are: *Andrena ferox* Smith (Yarrow & Guichard, 1941; *pers. obs*.), *A. trimmerana* (Perkins, 1919), *A. nigroaenea* (Chambers, 1949) and *A. haemorrhoa* (Fabricius) (at burrows, Gardner, 1901). In the former Czechoslovakia, Kocourek (1966) reports *A. rosae* Panzer as a host species of *N. marshamella*.

Flowers Visited.

There are numerous flower records, including the following: thrift, white willow, eared willow, creeping willow, cuckoo-flower, cabbage, rhododendron, bilberry, gooseberry, bramble, blackthorn, wild cherry, hawthorn, wood spurge, alder buckthorn, sycamore, bloody crane's-bill, alexanders, hogweed, wild carrot, bogbean, forget-me-not, speedwell, creeping thistle, dandelion, daisy, hemp-agrimony, bluebell, and three-cornered garlic.

Pollen Collected.

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

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and common here in the county with the first unconfirmed record in 1923 and the latest in 2015 with a total of 38 records to date.

Nomada obtusifrons Nylander,1848 (Flat-ridged Nomad Bee)

Male

Female

Description.

Widely distributed throughout Britain and Ireland, though generally scarce and very local. There are no records of the species from the Channel Islands. A northern and central European species, ranging from southern Finland to France, Germany and the former Yugoslavia. FW 5.5mm in both sexes. Being a small bumpy species it is easily recognised in both sexes by the large flat topped ridge between the antennae . Females have the head and thorax almost entirely black and the antennae brownish. The scutum is rather shiny between the punctures.. The abdomen is predominantly red with a black subterminal band and a cream coloured tergite 5. Small lateral cream spots are present on tergites 2-4. Males are generally much darker with wedge shaped cream markings on the sides of tergite 2 and 3 and usually a cream coloured pronotal collar and pronotal tubercles. The labrum is dark, an could be mistaken for *N. flavoguttata* but they have a shinier scutum and a rather longer antennae. Faemales are fairly constant in variation but males have variable amounts of red on the tergites and can resemble females at one extreme or be completely black with cream spots at the other. The darker ones tend to have black pronotal collar.

Habitat and Ecology.

Open woodland and grassland, heathland and most places that habitat of its host *Andrena*.

Flight Period.

Univoltine; end of June to late August, occasionally September.

Nesting/ Parasitic Biology.

A cleptoparasite of *Andrena coitana* (Perkins 1919, 1924a, 1924b; Hallett 1928; Chambers 1949) and possibly *A. tarsata* (Perkins 1919).

Flowers Visited.

Bramble (*Rubus fruticosus* agg.), creeping thistle (*Cirsium arvense*), golden-rod (*Solidago virgaurea*), nipplewort (*Lapsana communis*), oxeye daisy (*Leucanthemum vulgare*), ragwort (*Senecio jacobaea*), sheep's-bit (*Jasione montana*), smooth hawk'sbeard (*Crepis capillaris*) and wild angelica (*Angelica sylvestris*).

Pollen Collected.

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

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Very rare here in Lancashire with only one recorded in 2011 along the river Darwen parkway in Blackburn.

Nomada panzeri Lepeletier, 1841 (Panzer's Nomad Bee)

Male

Female.

Description.

One of the larger and more frequently encountered *Nomada* species. Females are rather smaller and browner than those of its frequent associate *Nomada flava* Panzer. Females of these two species can be reliably told apart by the erect black hairs on the clypeus of *N. panzeri* (these are pale in *N. flava*); but males of these two species are extremely difficult to separate with any degree of confidence. FW. 6.5mm to 9mm female.6mm to 8mm male. This species and *N Flava* is one of the biggest challenges in British bee identification and is also not helped by the considerable variation within each of the species. Females typically resemble a small, dark *N flava* but usually with less extensive yellow markings on the tergites and also darker wing margins. The hairs on propodeum, Hind coxae and the sides of the thorax are silvery without the hint of yellow. The antennae are slightly shorter and have the apical segments slightly darken above, which are entirely orange in *N.flava.* The long erect hairs of the clypeus and labrum are black rather than yellow. The propodeum can have extensive red markings in many which are never extensive in *N.flava*. When in the field they tend to look more purple than *N.flava.* Males are stated to be undistinguishable from *N.flava* but small slim *flava/panzeri* with along hair fringe behind the hind femora and the final six antenatal segments above will almost certainly be *N.panzeri.* Some males are impossible to assign with any confidence. *N ruficornis* can look superficially similar in the field, but it bifid mandibles sallow easy separation. Very dark female N.panzeri can also resemble *N.hirtipes*. There is considerable variation in the amount of yellow markings on the tergites and also the amount of red on the females thorax, scutum and head. The propodeum can be completely black in some females. Males can have the scutellum black or red marked, and the pronotal collar can have red or yellow marks but not to conspicuous.

Habitat and Ecology.

A wide variety of habitats, as befits its wide range of hosts. Usually open woodland, scrubby grassland and heathland edges in base poor areas and districts.

Flight Period.

Univoltine, flying from late June to late August and sometimes into September.

Nesting/ Parasitic Biology.

A cleptoparasite of some of the larger spring-flying *Andrena* bees, with records for *A. fulva* (Müller), *A. varians* (Kirby), *A. lapponica* Zetterstedt, *A. fucata* Smith and *A. synadelpha* Perkins.

Flowers Visited.

Visits a very wide variety of flowers, such as, Thistles, assorted Yellow composites ,Tormentil, Brambles, Sheep's-bit and Wild angelica.

Pollen Collected.

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

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and uncommon here in Lancashire. First recorded in 1926 which was an unconfirmed record and the latest in 2018, with a total of 17 records to date. It as been recorded from Crutchmans quarry in Hyndburn.

Nomada roberjeotiana Panzer, 1799 (Tormentil Nomad bee)

Male

Female

Description.

A rare species but widely distributed in Britain, the range extending from southern England north to southern Scotland. It has also been recorded from the Isle of Man (Nelson, 1958) but not the Channel Islands. There is no confirmed record from Ireland. Its appearance is irregular, being apparently subject to extreme fluctuations of scarcity and abundance. For example, in the period 1970-73 G M Spooner found the bee to be unexpectedly numerous in several sites in Devon and Cornwall (many specimens from these were donated by him to The Natural History Museum, London). Overseas, a northern bee, becoming sporadic further south in central Europe; it is also known from Japan. FW. 5mm to 5.6 mm, similar in both sexes. A small dumpy species with a unique pattern of red, cream and black markings in females, the scutellum, tegulae, pronotal collar, pronotal tubercules, lower face and antennae are orange. An orange band crosses the base of the abdomen, and cream spots are present on the sides of tergites 2 and 3 and much of tergite 5. The scutum and propodeum are entirely black and the body hairs are mostly minute. Males have the tegulae, pronotal collar, tubercles, greater part of the face and the front of the antennal scapes cream coloured. Tergites 2 to5 have cream colored lateral streaks. There is little variation that as been noted in either sexes.

Habitat and Ecology.

Mainly lowland heaths in southern England, and moorland in the south-west and north.

Flight Period.

Univoltine; end of June to late August.

Nesting/ Parasitic Biology.

Cleptoparasitic on *Andrena tarsata* (Perkins, 1919). G M Spooner observed females in the vicinity of the nest burrows of this species in the West Country (Spooner Collecting Diaries (unpublished) in The Natural History Museum, London).

Flowers Visited.

Associated mainly with tormentil (*Potentilla erecta*) (which is also the main forage species of *A. tarsata*); occasionally on ragwort (*Senecio jacobaea*).

Pollen Collected.

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

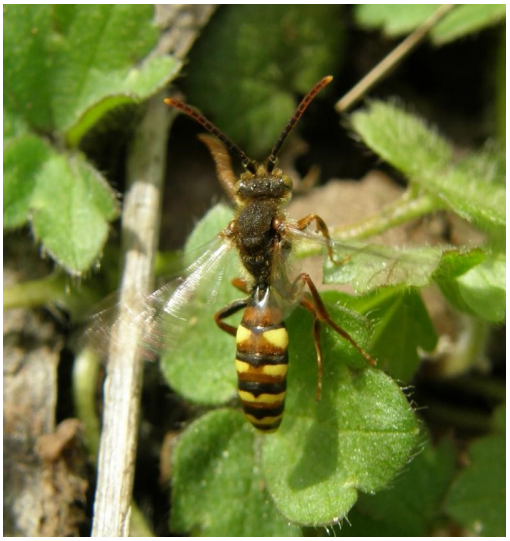
Parasites.

No parasites are reported as yet.

Here in Lancashire.

Very rare in the county and could probably be now extinct. The only record being in 1980 in the Witton country park area of Blackburn.

Nomada ruficornis (Linnaeus,1758) (Fork-jawed Nomad Bee)



Male

Female

Description.

One of the larger brown and yellow-striped *Nomada* species. Its presence should be checked wherever its host, *Andrena haemorrhoa* (Fabricius), is present. It is very similar in appearance to the very common *Nomada flava* Panzer, but rather darker generally, though not as dark as *Nomada panzeri* Lepeletier. The presence of a clear notch in the tip of the mandible will confirm this (the only other British *Nomada* with a bifid mandible is *fabriciana* (Linnaeus), and that under the microspore which is smaller and red). Males resemble N.flava and N.*panzeri* but are noticeably much hairier especially at the sides of the thorax. There is some variation in the extent of the yellow markings on the tergites, which are sometimes missing on tergite 3 of the female, also the red markings on the head and thorax of the female. Males sometimes have yellow markings on tergite 1 and can have complete or interrupted yellow band on tergite 2. ! FW. 7mm to 8 mm females. 6.5mm to 8mm males.

Take care when handling live females, however; female *Nomada* have quite a powerful sting.

Habitat and Ecology.

As widespread as its host and in a similarly wide range of habitats, which include open woodland, heathland, scrubby grassland, brownfield sites and sometimes garden.

Flight Period

Univoltine, flying form April to June and sometimes into July.

Nesting/ Parasitic Biology.

A specialist cleptoparasite of the bee *Andrena haemorrhoa* (Fabricius).

Flowers Visited.

Visits a wide variety of flowers and scrubs such as Dandelion, Greater stitchwort and forget-me knots.

Pollen Collected.

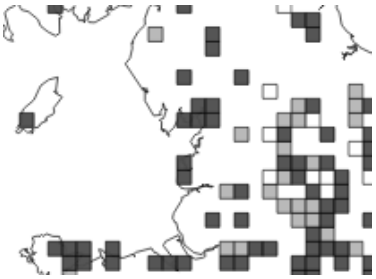
This is a cleptoparasitic species, so no pollen is gathered.

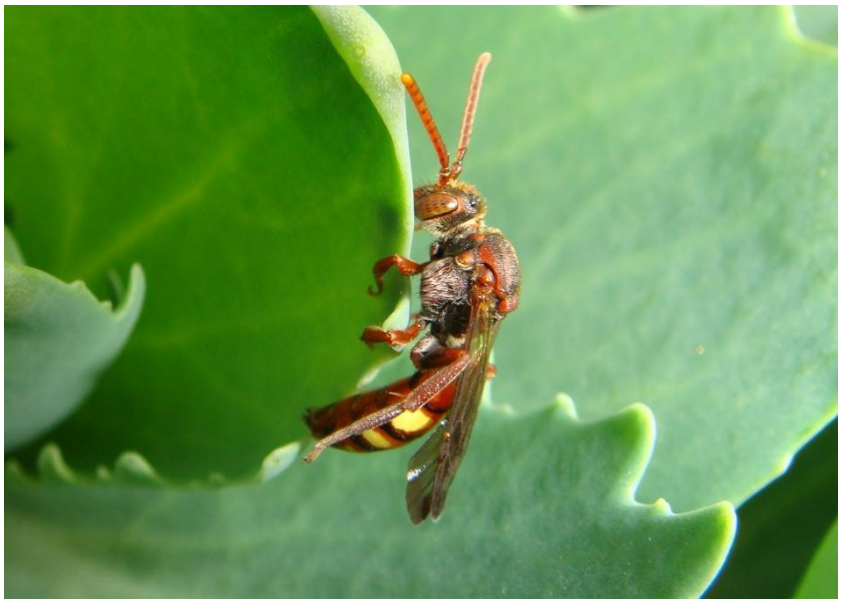
Parasites.

No parasites are reported as yet.

Here in Lancashire.

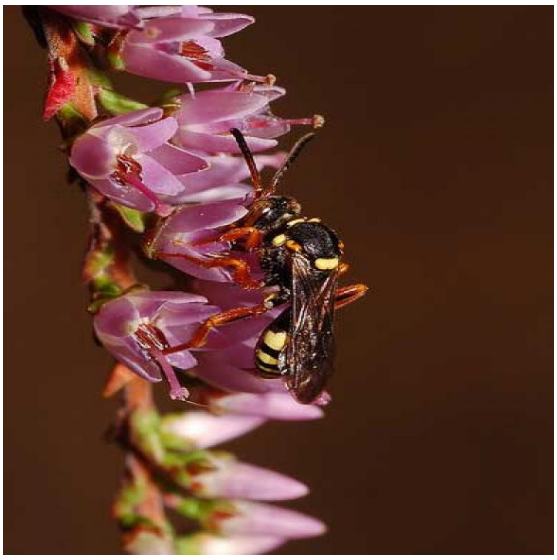
Widespread and common here in Lancashire. First recorded in 1947 and the latest record in 2017 with 23 records up to date.





Nomada rufipes Fabricius, 1793 (Black-horned Nomad Bee)

Male



Female

Description.

This is a medium-sized cleptoparasitic bee which is yellow and black, although some females may be red, yellow and black. The bees can be very obvious on some heathland sites, being more readily found than their hosts (bees of the *Andrena denticulata* group). FW.5mm to 7mm in both sexes. A medium small nomad and the only one with single yellow spot on the scutellum combined with almost an entirely black antennal flagella. It can have a bold black and yellow pattern or a tricolored pattern with much of the black of the tergites replaced by red. Tergites 2 and 3 have well separated, rater triangular yellow spots. The tegulae ,pronotal collar and pronotal tubercules are yellow, and a yellow spot is present on the sides of the thorax. The front coxae have an apical projection. Females usually have the lower face and 3 antennal segments orange. The legs are mostly orange with partially black femora. Males have the lower face yellow, more yellow on the legs and the underside of the hind femora shiny with only sparse hairs. The main variation is the replacement of the black markings on the tergites by red, more so in females, and this shows a gradation that at its extreme results in a mostly red and yellow abdomen. Further variation can effect the markings to the face with some females having and entirely black face. Also the mount of black or yellow on the legs. Dwarfs with wing lengths as short as 4mm are sometime encountered.

Habitat and Ecology.

As its hosts have a wide range of habitat types in which they may occur, so *N. rufipes* is found in a similarly wide range of habitats, such as chlk downland sites and brownfield sites. However, it is most frequently found on heathlands. There is a population on the calcareous grasslands of Salisbury Plain where the bee is associated with *Andrena nitidiuscula*

Flight Period

Univoltine: July to September. Heathland populations peaking with the blossoming of Heather (Ling)

Nesting/ Parasitic Biology.

The female bee lays her eggs in provisioned cells inside the underground nest s of its hosts, which are bees of the *Andrena denticulata* group, and probably *A. nitidiuscula* (S.P.M. Roberts pers. comm)

Flowers Visited.

Ragwort (*Senecio jacobaea*) and heathers (Ericaceae) are very frequently visited, although *N. rufipes* may be found at a much wider range of flowers than this.

Pollen Collected.

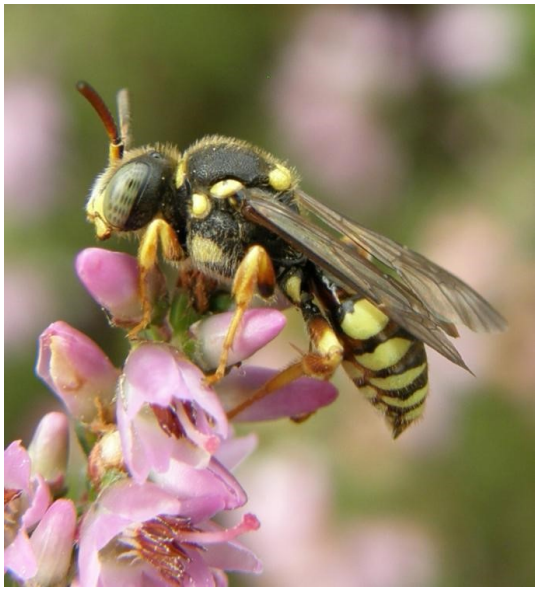
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread and uncommon here in Lancashire . First recorded in 1997 and the latest record in 2016, with 15 records to date.



Nomada striata Fabricius,1793 (Blunt-jawed Nomad bee)

Male

Female

Description.

Widely but very locally distributed throughout much of Britain as far north as Elgin. Also recorded from Ireland in O'Connor et al. (2009). The only Channel Island record is from Sark (Beavis, 2000). Not a common bee but very occasionally quite numerous where found. In mainland Europe, the range of this species extends from Fennoscandia to Turkey. It has also been collected in Morocco. FW. 6mm to 7.5mm female. 5.5mm to 7.5mm male. Females are one of several medium sized, reddish nomads with a red marked thorax, red marking son the lower face that extend around the eyes, and well separated yellow spots on the sides of tergite 2. The mandibles have squared off tips, which allows separation from all other species except *N gullutala*, but the comb spines at the top od the hind tibiae are longer and more widely spaced in *N.striata.* Males also have the unusual mandible shape, and can be separated from *N.guttulata* by the shorter third antennal segment, more extensive yellow markings along the inner eye margins, partial scapes and a much larger apical shiny zone on the underside of the hind femora. There is variation in both sexes in the extent of of red and yellow on the head and thorax and the extend of black and yellow on the tergites The extent of red on the antennal scapes is also variable., and sometimes they are entirely black at the from as in *N.guttulata*, or entirely red at the front as in species such as *N. panzeri* and *N.hirtipes.* The male scutellum usually has one large one red large marking but sometimes it has 2 red spots.

Habitat and Ecology.

Flower-rich grasslands (particularly chalk downs) supporting populations of *Andrena wilkella* (Kirby). It has also been reported from woodland on clay soils, the coast and a private garden

Flight Period

Univoltine; mid May to mid July, peaking in June and exceptionally August (perhaps as a partial second brood).

Nesting/ Parasitic Biology.

A cleptoparasite of *Andrena wilkella* (Perkins, 1919, 1924; Stöckhert, 1933; Spooner, 1946). It may also attack *A. fucata* Smith (Stöckhert, 1933).

Flowers Visited.

Bulbous buttercup, white bryony, bell heather, raspberry, wood avens, bird's-foot trefoil, wood spurge, bogbean, germander speedwell, ragwort and dandelion.

Pollen Collected.

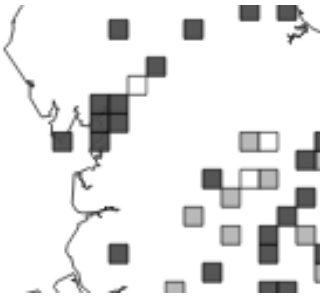
This is a cleptoparasitic species, so no pollen is gathered.

Parasites.

No parasites are reported as yet.

Here in Lancashire.

Widespread but scarce and uncommon in the county. First unconfirmed record was in 1941 and the latest record was in 2003. With a total of 10 records to date.



Apis Description

A small genes of seven species centered on south and southeast Asia. All of the species show highly developed eusocial behavior with workers well differentiated from queens both metrologically, and behaviorally. There are only 2 of the species that have been somewhat domesticated. These are the Eastern Honey Bee *(Apis cerana)* and the Western Honey Bee *(Apis mellifera)* which appears to have an African origin.

We have only one species in the Lancashire, in fact only one species in the UK which is the the latter *A. mellifera.*

Both species are kept where possible in artificial hive to help facilitate harvesting their large honey stores and wax combs for commercial uses.

The use of hives allows colonies to be transported that require bee pollination, such as orchards ond other flowering crops.

Pollen is collected in pollen baskets (corbiculae) on the workers hind tibiae, which resemble those seen in bumblebees, but are very different from the furry pollen brushes of most pollen gathering bee genera.

Nectar is collected in the crop.

The nest consists of was combs comprising hexagonal cells which are used for both the development of brood and the storage of honey and pollen. Queens and males (drones) develop in larger cells, which are very noticeable from other cells.

A colony is controlled by a single queen, largely through the use of pheromones . Her fertilized eggs produce both workers and new queens, the latter when a developing grub as been fed exclusively on royal jelly. Drone develop for unfertilised eggs that can be laid by either the queen or by workers.

Workers perform various role, including foraging, comb construction, nest maintenance and ventilation, honey production, care of brood, care of the queen and nest defence. As well as using pheromones , they can exhibit simple non-chemical communication, including the “waggle dance” which is used to indicate the direction and distance od good foraging areas.

Honey bees are very aggreesive in the defence of the nest and are few of the bees that can be classed as dangerous as mass stinging could result in serious illness and sometimes, but very rarely death.. The workers have barbed stings and sting sacs that are adapted to become detached following stinging, especially where mammalian flest ids involved. This allows venom to be pumped into the enemy but also results in the death of the worker involved in the stinging. Alarm pheromones alert and attract other workers to the source of the danger to facilitate multiply stinging. Africanised bees are well know for this phenomena , and fortunately these aggressive strains are not present in the UK.

Apis mellifera Linnaeus,1758 (Western Honey Bee)

Is the most common of the 7–12 species of honey bees worldwide. The genus name *Apis* is Latin for "bee", and *mellifera* is the Latin for "honey-bearing" or "honey carrying", referring to the species' production of honey.

Like all honey bee species, the western honey bee is eusocial, creating colonies with a single fertile female (or "queen"), many normally non-reproductive females or "workers", and a small proportion of fertile males or "drones". Individual colonies can house tens of thousands of bees. Colony activities are organized by complex communication between individuals, through both pheromones and the dance language. The western honey bee was one of the first domesticated insects, and it is the primary species maintained by beekeepers to this day for both its honey production and pollination activities. With human assistance, the western honey bee now occupies every continent except Antarctica. Western honey bees are threatened by pests and diseases, especially the *Varroa* mite and colony collapse disorder. There are indications that the species is rare, if not extinct in the wild and as of 2019, the western honey bee is listed as "Extinct" on the IUCN Red List, while also acknowledging "Data Deficient". Numerous studies indicate that the species has undergone significant declines in Europe; however, it is not clear if they refer to population reduction of wild or managed colonies. Further research is required to enable differentiation between wild and non-wild colonies in order to determine the conservation status of the species in the wild, meaning self sustaining, without treatments or management. Western honey bees are an important model organism in scientific studies, particularly in the fields of social evolution, learning, and memory; they are also used in studies of pesticide toxicity, especially via pollen, to assess non-target impacts of commercial pesticides. Colony life cycle[edit]Unlike most other bee species, western honey bees have perennial colonies which persist year after year. Because of this high degree of sociality and permanence, western honey bee colonies can be considered superorganisms. This means that reproduction of the colony, rather than individual bees, is the biologically significant unit. Western honey bee colonies reproduce through a process called "swarming".

In most climates, western honey bees swarm in the spring and early summer, when there is an abundance of blooming flowers from which to collect nectar and pollen. In response to these favorable conditions, the hive creates one to two dozen new queens. Just as the pupal stages of these "daughter queens" are nearly complete, the old queen and approximately two-thirds of the adult workers leave the colony in a swarm, traveling some distance to find a new location suitable for building a hive (e.g., a hollow tree trunk). In the old colony, the daughter queens often start "piping", just prior to emerging as adults,[13] and, when the daughter queens eventually emerge, they fight each other until only one remains; the survivor then becomes the new queen. If one of the sisters emerges before the others, she may kill her siblings while they are still pupae, before they have a chance to emerge as adults. Once she has dispatched all of her rivals, the new queen, the only fertile female, lays all the eggs for the old colony, which her mother has left. Virgin females are able to lay eggs, which develop into males (a trait shared with wasps, bees, and ants because of haplodiploidy). However, she requires a mate to produce female offspring, which comprise 90% or more of bees in the colony at any given time. Thus, the new queen goes on one or more nuptial flights, each time mating with 1–17 drones. Once she has finished mating, usually within two weeks of emerging, she remains in the hive, playing the primary role of laying eggs.

Throughout the rest of the growing season, the colony produces many workers, who gather pollen and nectar as cold-season food; the average population of a healthy hive in midsummer may be as high as 40,000 to 80,000 bees. Nectar from flowers is processed by worker bees, who evaporate it until the moisture content is low enough to discourage mold, transforming it into honey, which can then be capped over with wax and stored almost indefinitely. In the temperate climates to which western honey bees are adapted, the bees gather in their hive and wait out the cold season, during which the queen may stop laying. During this time, activity is slow, and the colony consumes its stores of honey used for metabolic heat production in the cold season. In mid- through late winter, the queen starts laying again. This is probably triggered by day length. Depending on the subspecies, new queens (and swarms) may be produced every year, or less frequently, depending on local environmental conditions and a number of characteristics inside the hive.

Individual bee life cycle.

Like other insects that undergo complete metamorphosis, the western honey bee has four distinct life stages: egg, larva, pupa and adult. The complex social structure of western honey bee hives means that all of these life stages occur simultaneously throughout much of the year. The queen deposits a single egg into each cell of a honeycomb prepared by worker bees. The egg hatches into a legless, eyeless larva fed by "nurse" bees (worker bees who maintain the interior of the colony). After about a week, the larva is sealed in its cell by the nurse bees and begins its pupal stage. After another week, it emerges as an adult bee. It is common for defined regions of the comb to be filled with young bees (also called "brood"), while others are filled with pollen and honey stores. Worker bees secrete the wax used to build the hive, clean, maintain and guard it, raise the young and forage for nectar and pollen; the nature of the worker's role varies with age. For the first 10 days of their lives, worker bees clean the hive and feed the larvae. After this, they begin building comb cells. On days 16 through 20, workers receive nectar and pollen from older workers and store it. After the 20th day, a worker leaves the hive and spends the remainder of its life as a forager. Although worker bees are usually infertile females, when some subspecies are stressed they may lay fertile eggs. Since workers are not fully sexually developed, they do not mate with drones and thus can only produce haploid (male) offspring. Queens and workers have a modified ovipositor called a *stinger*, with which they defend the hive. Unlike bees of any other genus and the queens of their own species, the stinger of worker western honey bees is barbed. Contrary to popular belief, a bee does not always die soon after stinging; this misconception is based on the fact that a bee will usually die after stinging a human or other mammal. The stinger and its venom sac, with musculature and a ganglion allowing them to continue delivering venom after they are detached, are designed to pull free of the body when they lodge. This apparatus (including barbs on the stinger) is thought to have evolved in response to predation by vertebrates, since the barbs do not function (and the stinger apparatus does not detach) unless the stinger is embedded in elastic material. The barbs do not always "catch", so a bee may occasionally pull its stinger free and fly off unharmed (or sting again).[

Although the average lifespan of a queen in most subspecies is three to five years, reports from the German honey bee subspecies (*A. m. mellifera*) previously used for beekeeping indicate that a queen can live up to eight years. Because a queen's store of sperm is depleted near the end of her life, she begins laying more unfertilized eggs; for this reason, beekeepers often replace queens every year or two. The lifespan of workers varies considerably over the year in regions with long winters. Workers born in spring and summer work hard, and live only a few weeks, but those born in autumn remain inside for several months as the colony clusters. On average during the year, about 1% of a colony's worker bees die naturally per day. Except for the queen, all of a colony's workers are replaced about every four months.

Queens

The queen bee is a fertile female, who, unlike workers (which are also female), has a fully developed reproductive system. She is larger than her workers, and has a characteristic rounder, longer abdomen. A female egg can become either a queen or a worker bee. Workers and queen larva are both fed royal jelly, which is high in protein and low in flavonoid, during the first three days. After that, workers are switched to a diet of mixed pollen and nectar (often called "bee bread"), while queens continue to receive royal jelly. In the absence of flavonoid and the presence of a high-protein diet, queen bees develop a healthy reproductive system, a task necessary for maintaining a colony of tens of thousands of daughter workers.

Periodically, the colony determines that a new queen is needed. There are three general causes:

1.The hive is filled with honey, leaving little room for new eggs. This will trigger a swarm, where the old queen will take about half the worker bees to found a new colony and leave the new queen with the other half of the workers to continue the old one.

2.The old queen begins to fail, which is thought to be demonstrated by a decrease in queen pheromones throughout the hive. This is known as supersedure, and at its end, the old queen is usually killed.

3.he old queen dies suddenly, a situation known as emergency supersedure. The worker bees find several eggs (or larvae) of the appropriate age range and try to develop them into queens. Emergency supersedure can generally be recognized because new queen cells are built out from comb cells, instead of hanging from the bottom of a frame. Regardless of the trigger, workers develop the larvae into queens by continuing to feed them royal jelly. Queens are not raised in the typical horizontal brood cells of the honeycomb. A queen cell is larger and oriented vertically. If workers sense that an old queen is weakening, they produce emergency cells (known as supersedure cells) from cells with eggs or young larvae and which protrude from the comb. When the queen finishes her larval feeding and pupates, she moves into a head-downward position and later chews her way out of the cell. At pupation, workers cap (seal) the cell. The queen asserts control over the worker bees by releasing a complex suite of pheromones, known as queen scent. After several days of orientation in and around the hive, the young queen flies to a drone congregation point – a site near a clearing and generally about 30 feet (9.1 m) above the ground – where drones from different hives congregate. They detect the presence of a queen in their congregation area by her smell, find her by sight and mate with her in midair; drones can be induced to mate with "dummy" queens with the queen pheromone. A queen will mate multiple times, and may leave to mate several days in a row (weather permitting) until her spermatheca is full. The queen lays all the eggs in a healthy colony. The number and pace of egg-laying is controlled by weather, resource availability and specific racial characteristics. Queens generally begin to slow egg-laying in the early autumn , and may stop during the winter. Egg-laying generally resumes in late winter when the days lengthen, peaking in the spring. At the height of the season, the queen may lay over 2,500 eggs per day (more than her body mass). She fertilizes each egg (with stored sperm from the spermatheca) as it is laid in a worker-sized cell. Eggs laid in drone-sized (larger) cells are left unfertilized; these unfertilized eggs, with half as many genes as queen or worker eggs, develop into drones.

Workers. Workers are females produced by the queen that develop from fertilized, diploid eggs. Workers are essential for social structure and proper colony functioning. They carry out the main tasks of the colony, because the queen is occupied with only reproducing. These females raise their sister workers and future queens that eventually leave the nest to start their own colony. They also forage and return to the nest with nectar and pollen to feed the young.

Drones Drones are the colony's male bees. Since they do not have ovipositors, they do not have stingers. Drone honey bees do not forage for nectar or pollen. The primary purpose of a drone is to fertilize a new queen. Many drones mate with a given queen in flight; each dies immediately after mating, since the process of insemination requires a lethally convulsive effort. Drone honey bees are haploid (single, unpaired chromosomes) in their genetic structure, and are descended only from their mother (the queen). In temperate regions, drones are generally expelled from the hive before winter, dying of cold and starvation since they cannot forage, produce honey or care for themselves. Given their larger size (1.5 times that of worker bees), inside the hive it is believed that drones may play a significant role in thermoregulation. Drones are typically located near the center of hive clusters for unclear reasons. It is postulated that it is to maintain sperm viability, which may be compromised at cooler temperatures. Another possible explanation is that a more central location allows drones to contribute to warmth, since at temperatures below 25 °C (77 °F) their ability to contribute declines.

Thermoregulation

The western honey bee needs an internal body temperature of 35 °C (95 °F) to fly; this temperature is maintained in the nest to develop the brood, and is the optimal temperature for the creation of wax. The temperature on the periphery of the cluster varies with outside air temperature, and the winter cluster's internal temperature may be as low as 20–22 °C (68–72 °F) Western honey bees can forage over a 30 °C (86 °F) air-temperature range because of behavioral and physiological mechanisms for regulating the temperature of their flight muscles. From low to high air temperatures, the mechanisms are: shivering before flight and stopping flight for additional shivering, passive body-temperature regulation based on work, and evaporative cooling from regurgitated honey-sac contents. Body temperatures differ, depending on caste and expected foraging rewards.[The optimal air temperature for foraging is 22–25 °C (72–77 °F). During flight, the bee's relatively large flight muscles create heat which must be dissipated. The honey bee uses evaporative cooling to release heat through its mouth. Under hot conditions, heat from the thorax is dissipated through the head; the bee regurgitates a droplet of warm internal fluid — a "honey crop droplet" – which reduces the temperature of its head by 10 °C (18 °F). Below 7–10 °C (45–50 °F) bees are immobile, and above 38 °C (100 °F) their activity slows. Western honey bees can tolerate temperatures up to 50 °C (122 °F) for short periods.

Communication. Western honey bee behavior has been extensively studied. Karl von Frisch, who received the 1973 Nobel Prize in Physiology or Medicine for his study of honey bee communication, noticed that bees communicate with dance. source by the dances of the returning (honey bee) worker bee on the vertical comb of the hive.

Honey bees direct other bees to food sources with the round dance and the waggle dance. Although the round dance tells other foragers that food is within 50 metres (160 ft) of the hive, it provides insufficient information about direction. The waggle dance, which may be vertical or horizontal, provides more detail about the distance and direction of a food source. Foragers are also thought to rely on their olfactory sense to help locate a food source after they are directed by the dances. Western honey bees also change the precision of the waggle dance to indicate the type of site that is set as a new goal. Their close relatives, dwarf honey bees, do not.[31] Therefore, western honey bees seem to have evolved a better means of conveying information than their common ancestors with the dwarf honey bee. Another means of communication is the shaking signal, also known as the jerking dance, vibration dance or vibration signal. Although the shaking signal is most common in worker communication, it also appears in reproductive swarming. A worker bee vibrates its body dorsoventrally while holding another bee with its front legs. Jacobus Biesmeijer, who examined shaking signals in a forager's life and the conditions leading to its performance, found that experienced foragers executed 92% of observed shaking signals and 64% of these signals were made after the discovery of a food source. About 71% of shaking signals occurred before the first five successful foraging flights of the day; other communication signals, such as the waggle dance, were performed more often after the first five successes. Biesmeijer demonstrated that most shakers are foragers and the shaking signal is most often executed by foraging bees on pre-foraging bees, concluding that it is a transfer message for several activities (or activity levels). Sometimes the signal increases activity, as when active bees shake inactive ones. At other times, such as the end of the day, the signal is an inhibitory mechanism. However, the shaking signal is preferentially directed towards inactive bees. All three forms of communication among honey bees are effective in foraging and task management.

Beekeeping.

The western honey bee is a colonial insect which is housed, transported by and sometimes fed by beekeepers. Honey bees do not survive and reproduce individually, but as part of the colony (a superorganism). Western honey bees collect flower nectar and convert it to honey, which is stored in the hive. The nectar, transported in the bees' stomachs, is converted with the addition of digestive enzymes and storage in a honey cell for partial dehydration. Nectar and honey provide the energy for the bees' flight muscles and for heating the hive during the winter. Western honey bees also collect pollen which, after being processed to bee bread, supplies protein and fat for the bee brood to grow. Centuries of selective breeding by humans have created western honey bees which produce far more honey than the colony needs, and beekeepers (also known as apiarists) harvest the surplus honey. Beekeepers provide a place for the colony to live and store honey. There are seven basic types of beehive: skeps, Langstroth hives, top-bar hives, box hives, log gums, D. E. hives, and miller hives. All U.S. states require beekeepers to use movable frames to allow bee inspectors to check the brood for disease. This allows beekeepers to keep Langstroth, top-bar and D.E. hives without special permission, granted for purposes such as museum use. Modern hives also enable beekeepers to transport bees, moving from field to field as crops require pollinating (a source of income for beekeepers). In cold climates, some beekeepers have kept colonies alive (with varying degrees of success) by moving them indoors for winter. While this can protect the colonies from extremes of temperature and make winter care and feeding more convenient for the beekeeper, it increases the risk of dysentery and causes an excessive buildup of carbon dioxide from the bees' respiration. Inside wintering has been refined by Canadian beekeepers, who use large barns solely for the wintering of bees; automated ventilation systems assist in carbon dioxide dispersal.

Here in Lancashire.

I could talk forever about honey bees, and many, many books have been written on all aspects of them.
They are many beekeeping associations where anyone who as an interest can join and gain more knowledge of these fascinating insects. Here are the associations::

Blackpool and Fylde. East Lancashire. Lancaster. Liverpool and District. Oldham and District. Ormskirk and Croston. Preston and District. Southport and District

Notes and Comments

Biography

Throughout his entire life Michael Birt as always been interested in nature. From an early childhood, just after the 2nd world war, when things were very tight and the family keep chickens, goats, pigs and honey bees on a small piece of land in East Lancashire.

As things got better, his love of all things with fur and feather increased and he was lucky to have people around him who felt the same.

He was lucky to meet a wonderful naturalist by the name of Trevor Smith who introduced him to the world of small mammals and in particular bats and they both worked on species protection for bats and other small mammals such as captive breeding Hazel Dormice and Water Voles. Trevor ran the small British mammal collection at Witton country park in Blackburn and Michael was very much involved. This led him along with Trevor to work on species protection with English Nature (Now Natural England) from 1989 to 2010. Working mainly with all species of British Bats. At the same time Trevor and Michael started and became founder member of East Lancashire Bat group from 1989 until 2008

Trevor retired and the bat group was handed over to what it is today, but Michael carried on his work alone and started the Michael Birt Consultancy from 1987 until 2018

Michael from around 1977 started to keep honey bees and was a very respected beekeeper both in the UK and other parts of Europe and became the Chairman of East Lancashire Beekeepers Association from 2005 until 2013

In 1914 he was offered the position of consultant at the largest educational bee farm in Thailand so He left the UK in 2014 to go and live in there where he is now the Consultant at Big Bee Farm Thailand from 2014 to present day.

He also does research on the 41 plus species of stingless bee that are in Thailand, Laos, Cambodia and Vietnam, and works with a few universities over in the far east.

His routes though have always been in the UK and he was fascinated to know more about the bees we have in Lancashire, hence this book.

———————————————————————————————————————-

Michael with some of the beekeepers in Thailand

English Names Index

Index

Glossary

Abdomen.
The most posterior of the three major body divisions, strictly speaking consisting of the propodeum fused to the hind part of the thorax and the gaster, which is connected to the propodeum by a narrow petiole (wasp waste) and is the abdomen referred to in the text here.

Aculeate.
A species belonging to the section Aculeata of the insect order Hymenoptera.

Adpressed.
Describing hairs that lie flat against the body surface.

Aggregation of nests
A concentration of nests, usually in relation to the entrance holes of ground nesting species.

Allometry.
The relationship between the overall size and the physical proportions the bee, best exhibited in some *Andrena* species where larger males are proportionately 'bigger headed than smaller ones.

Antenna.
The segment sensory appendages arising from the head of a bee where the face meets the frons.

Anterior.
At the front, e.g., the face of the antennae of the legs that would face you if they were stretched outwards perpendicular to the body when you are looking at the bee directly from the front, also the front (foremost) part of the thorax , abdomen, a tergite etc.

Apex.
The tip.

Apical depression of the tergites
The hind margin of the tergites where this is slightly lower than the anterior section and usually demarked by a shallow step or change of texture, especially in *Andrena.*

Arolium.
The pad like lob projecting between the tarsia claws.

Axilla(e)
The plate located on either side of the scutellum, most noticeable in *Coelioxys* and *Epeolus* species.

Basal.
At the base as in nearer the center of the body or the initial point of articulation in the case of the appendage such as a limb.

Basitarsus (basitarsi)
The first and usually longest of the five tarsal segments, joined to the tibia.

Bifid.
Ending in a pair of similar sized points e.g. the mandibles of *Nomada ruficornis*

Bivoltine.
Having two generations, and therefore two flight periods in a year, **or facultatively bivoltine.** i.e. bivoltine under some circumstances but univoltine in others.

Bloom (ed)
Where the body surface has a greyish, waxy covering like that of damsons or blueberries, eg. Tergites of Lasioglossum albipes

Bristle.
A relatively large, thickened and rigid hair (usually modified hair)

Calcicolous.
Preferring habitats featuring calcareous rocks and soils.

Carinate.
Bearing ridges (carinae) used here to describe the hind face of the propodeum of some Lasioglossum species (carinate species) where ridges separate this face fron the side faces.

Caste(s)
The different forms of a social insect i.e queen, worker and male (drone)

Clavate.
Hooked, usually in relation to the abdomen when it is strongly downcurved in side view.

Cleptoparasite.
A species that robs or uses ups the nest and food provisions of another species, replacing the host egg or larva with one of its own, e.g. the cuckoo bee in this book.

Clypeus.
Usually the main part of the face, between the antennae and the labrum.

Cocoon.
The silk case spun by a fully grown grub of some bees to protect the prepupa and pupa inside the nest cell.

Collar.
The pale hair band at the front of the thorax immediately behind the head of many bumblebee species.

Glossary

Comb Spines.

The small spines at the tip of the hind tibiae dorsally of most *Nomada species*, which can be arranged like a teeth of a comb.

Compound Eye (s).

The pair of large eyes on the sides of the head comprising many ommatidia

Corbicula (e)

The concave, shiny, hair fringed 'pollen basket' of the hind tibiae of honey bees and social bumblebees (corbiculate bees)

Coxa (e)

The first segment of the leg, which in bees has rather limited movement but has a more flexible articulation with the trochanter.

Crenulate.

Where the edge of tergite 6of male bees is very unevenly serrate, with projections od different sizes, as in leafcutter bees.

Cuckoo.

See cleptoparasite.

Dimorphism.

The phenomena whereby one species has two rather different appearances which may relate to gender (sexual dimorphism), generation (brood dimorphism) or some other genetic or environmental factors.

Dorsal.

At the top, e.g. the sides of the antennae or the legs that would face you if they were stretched outwards perpendicular to the body when you are looking at the bee from directly above, also the top of the body.

Drone.

The make of a social bee, wasp or ant.

DuFour's gland.

A gland located off the vagina that can produce a variety of substances such as waterproof nest cell lining, pheromones and larval food supplements.

Emarginated

Where a margin has a shallow notch or concavity, e.g. the lower margin of the clypeus of many bees or the margin of tergite 6 in some male bees.

Eusocial.

Insects that use non-fertilized and often sterile females to help serve on or more reproducing queens, through assorted duties such as foraging, care of grubs, nest defence , nest building etc.

Extant.

Not extinct.

Extinct.

No longer present within a given area, e.g. Britain, England or a county.

Face.

Her used in a general sense to denote the front of the head below the level of the antennal insertion points, including the entire clypeus (other definitions include the top of the head as well.

Facial fovea(e)

The strips of short, felt like hairs that run alongside the inner eye margins of bees such as the *Andrena* species.

Facial suture(s)

The grooves of the face that define the edge of the clypeus and so me other parts of the face..

Femur (femora)

The third segment of the leg, functionally equivalent to our thigh or upper arm and usually relatively long and thick compared with other segments.

Flagellum (flagella)

The long articulated part of the antennae, comprising the final 10 segments of the female antenna and the final 11 segments of the male antenna

Floccus (flocci)

The tuft of curled hairs on the hind trochanters, notably in female *Andrena* species, where they help to form a larger pollen basket/pollen brush.

Frons.

The top of the head between the ocelli and the antennal insertion points, which can bear features such as the bristles of female *Rophites*

Galea.(e)

Lateral appendages of the mouthparts which can provide valuable identification features in some *Colletes* and *Andrena* species.

Glossary

Gena. (e)

The area on the side of the head behind and below the eyes.

Genitalia.

The sex organs, which in males are normally folded inside the tip of the abdomen, but can easily be hooked out in fresh specimens and often contain valuable ident cation features.

Gonocoxite (s)

A pair of structures that usually form the greater part of the male genital capsule and give rise to a pair of claspers, the gonostyli.

Gonostylus (gonostyli)

See Gonocoxite.

Gradulus.

The transverse groove that runs across a tergite, notably in *Coelioxys* species.

Hawkish composites.

Flowers of the family *Asteraceae* that resemble hawkweeds, hawkbits, hawks-beard, cats-ears etc.

Impunctate.

Lacing punctures.

Inquiline.

A species that lives in the home/nest of another species, often as a relatively harmless scavenger or small time thief, usually without preventing larval development in a way a cleptoparasite does.

Instar.

One of the several stages of larval development.

Integument.

The hard external skeleton, composed of the cuticle, i.e. the hard areas of the body surface.

Intersex.

A bee that has both male and female characteristics, especially stylopised bees.

Knee(s)

The junction of the femur and tibia.

Labrum.

The lowest part of the face, flap like, articulating appendage immediately below the clypeus, the shape and colour of which can be important in identification.

Lekking.

Sexual swarming by males.

Malar Gap.

The gap between the bottom of the eyes and the base of the mandibles.

Mandibles(s)

A pair of articulated jaws that flank the mouthparts at the bottom of the head.

Marginal cell.

The last cell along the front part of the forewing, immediately after the stigma.

Median.

Located on, or running down, the midline.

Melanic.

A black form of a specialist hat is not usually black, most often seen in certain bumblebees.

Mesonotum.

See scutum.

Mesopleuron (mesopleura)

The main plate forming the sides of the thorax beneath the wings.

Macrosculpture.

The minute grooves, ridges or other texturing of the integument of many bees that can create a dull appearance.

Midriff band.

A pale usually yellow hair band that takes in both the scutellum and the first tergite of a bumblebee e.g. *Bombus hortorum* and *B. jonellus*

Monolectic.

Obtaining pollen from just one plant species.

Ocellus. (ocelli)

The three 'simple eyes' arranged in a triangle on the top of the head between the two main compound eyes.

Oligolectic.

Obtaining pollen from a limited number of flowers such as plants belonging to just one genus or a series of closely related genera.

Glossary

Parapsidal Lines.

The pair of short or longer lines on the scutum about halfway between the base of the wings and the mid-line.

Parasitoid.

An animal that lives on or without a host animal, obtaining its food form the tissues or liquids of the host, eventually killing it.

Parthenogenesis.

Reproduction without sex, the normal form of male reproduction in all bees but apparently sometimes used for the production of females too in come *ceratina* species of bee.

Pile.

Dense, more or less upright hairs (much longer that pubescence.

Pollen basket.

See Corbicula.

Pollen Brush.

(also termed a scopa). The dense hairs, usually either on the hind legs or the underside of the abdomen, that are designed to carry pollen whilst the female is foraging.

Polylectic.

Obtaining pollen from a varied assortment of flowers, representing assorted plant genera, plant families and often varied flower structure.

Posterior.

At the rear. e.g. the face of the antennae or the legs that would face you if they were stretched outwards perpendicular to the body when you are looking at the bee from directly behind, also the hind part of the thorax or the abdomen (or a tergite of the abdomen.)

Postscutellum.

The narrow section of the thorax between the scutel-lum and propodeum, also known as the metathorax

Prepupa.

The final fully fed, inert larval stage prior to pupation (often the overwintering stage)

Pronotal collar.

The top part of the pronotum, which usually manifests itself as a narrow 'collar' at the front of the scutum and immediately behind the head.

Pronotal tubercle.

A rearward extension of the pronotum that takes the form of a large circular tubercle which is often white of yellow on the side of the thorax in front of the wing bases.

Pronotum.

The most anterior section of the thorax.

Propodeum.

The rear section of the thorax, technically the base of the abdomen but separated from the rest of the abdomen by the petiole (Wasp waste)

Pubescence.

Short but fairly upright hairs (much shorter than pile).

Punctate.

Bearing punctures.

Punctures.

Small to minutes pits on the body integument, but not on soft, membrane areas.

Pustulose.

The sense used here, where punctures have raised rims, like minute volcanoes, to create a form of roughened surface e.g. tergite 1 of *Andrena humilis.*

Pygidium.

A ridged, narrow projection at the tip if the abdomen of many bees, both male and female, often used by females in lining the nest cell with waxy secretions.

Queen.

The mated, egg laying female of eusocial species, served by her worker daughters.

Rima.

The bare or microscopically hair groove or furrow running down the center of tergite 5 in *Halictus* and *Lasioglossum* females.

Rugose.

A surface roughened by a course network of ridges rather than punctures or bumps.

Scape.

The first segment of the antennae, usually elongate but highly swollen in the males of some *Hylaeus* species.

Glossary

Scope(s)

See pollen brush.

Scutellum.

The section at the top of the thorax immediately behind the scutum, usually semicircle in shape.

Scutum.

The main part at the top of the thorax, located between the wings, with the pronotal collar to the front and scutellum to the rear, also known as the mesocosms or mesonotum.

Sensoria.

External sensory organs, which in bees often takes the form of parches of pubescence on the segments of the antennal flagella , e.g. Melecta albifrons.

Social Parasite.

A parasite that takes advantage of the social behavior of other species. i.e. A cuckoo bumblebee.

Solitary Bee.

A bee that does not use workers and is therefore not eusocial, though it may still be communal and nest in dense aggregates.

Spine.

A slim, elongate, often pointed projection such as those at the tip of the abdomen of male *Anthidium manicatum* or *Coelioxys species,* which are part of the integument and not modified hairs.

Spur.

The term used for some large, ridged spines, notably those at the tips of the tibiae.

S.S

A species defined in the sense (sensu stricto) e.g. the true *Bombus lucorum* as opposed to *B.lucorum* s.l (sensu lato) which equates to *B.lucorum*, *B.magnus* and *B. cryptarum.*

Sternite(s)

The series of overlapping hard plates (one per segment) that form the lower surface of the abdomen and also contribute to parts of the genitalia.

Stigma.

The thickened and darkened section along the anterior edge of the forewing immediately before the marginal cell.

Stylopised.

A bee containing one or more stylopid parasites.

Submarginal cell(s).

The two or three cells in the apical part of the wing behind the marginal cell.

Subspecies (ssp.)

Variation within a species that represents significant and consistent genetic differences (genetic distance) but not quite enough to justify a split into more than one species.

Supraclypeal plate.

The small plate of the face above the clypeus.

Tarsus (tarsi)

The final five segments of each leg, representing the functional equivalent of our hands and feet.

Tegula(s).

The pair of semicircular plates that protect the base of each pair of wings on top.

Tergites.

The series of overlapping hard plates (one per segment) that form the upper surface and sides of the abdomen and also contribute to parts of the genitalia.

Thorax.

The middle of the three major body divisions, between the head and the abdomen, giving rise to the legs and wings, though in bees the hind part of the thorax (the propodeum) is technically the base of the abdomen.

Tibia (tibiae)

The forth segment of the leg, between the fumr and the tarsus, functionally equivalent to our shin or forearm.

Glossary

Tomentum (tomentose)

Wolly looking patches of tiny adpressed, flattened hairs, best featured on the tergites of various *Lasioglossum* species.

Transverse.

Situated or extended from side to side across a body part perpendicular to the axis, e.g. a band of hairs, punctures or colour on a tergite.

Triungulin.

The newly hatched (first instar) larvae of parasitic meloid beetles (oil beetles and blister beetles) and stylopids.

Trivoltine.

Having three generations , and therefore three flight periods, in a year. e.g. winter-active Bombus terrestris.

Trochanter.

The second segment(but first freely articulating segment) of the legs, between the coxa and the femur.

Truncate.

Square ended, as if abruptly cut off, as opposed to pointed, rounded or bifid. E.g. The mandibles of *Nomada striata.*

Type specimen.

The specimen (holotype) or further specimens (paratypes) on the bases of which a specimen was originally described as new to science.

Tumulus (tumuli)

The small mound of sand or soil that surrounds the nest entrance of many ground nesting bees.

Univoltine.

Having one generation, and therefore one flight period, in a year.

Variety (var.)

Variation within a species that has a more trivial genetic bases than found in a sub-species, often variation that exists within a population or even a single nest.

Ventral.

At the bottom. e.g., the sides of the antennae or the legs that would face you if they were fully stretched outwards perpendicular to the body when you are looking at bee from directly below; also the underside of the body.

Voltinism.

The number of broods or generations within a year.

Worker.

An unmated , often sterile female with poorly developed ovaries that carries out assorted duties in support of her queen and nesting colony, as in eusocial species.