

Cuckoo bumblebees

Cuckoo bumblebees are a group of related species that are descended from 'true' or 'social' bumblebees' (which evolved 80 million years ago)

10 species of cuckoo bumble bee in Europe – 6 species may be found in Britain

There are five species of 'cuckoo bumblebees' which are a similar colour and can be trickier to tell apart.

They often lack a thick yellow band before the tail and may appear shinier with sparser hairs.

Cuckoo bumble bees belong to the sub-genus, *Psithyrus* and are **brood parasites**

They are 'social parasites' – and are so called, because like the bird, this species lays its eggs in the nests of true social *Bombus* species, to be reared and fed by the host.

The tendency of some species to become nest parasites of others is sometimes called 'inquilinism'.

Called kleptoparasites as larvae steals food from other bumblebees as they have lost the ability to collect pollen.

An association between members of two different species in which one, the inquiline, lives on or in the other (the host), or inside the host's home, obtaining shelter and in some instances taking some of the host's food.

How are cuckoos different from social bumble bees?

All species have shortish tongues

They have a much harder exoskeleton than normal bumblebees

Cuckoos have a longer sting than queen and worker bumblebees

The female cuckoo has a number of morphological adaptations for combat, such as larger mandibles, a tough cuticle and a larger venom sac that increase her chances of taking over a nest

They also tend to have a more pointed abdomen, and because they are less hairy the tip of the abdomen is often visible

They are often brightly coloured, resembling wasps.

This is because they often hang around the nests of their hosts and have this warning colouration to protect themselves from predators.

The cuckoo female also cannot collect pollen for returning to her nest, since she has no pollen baskets (or corbicula) on the hind legs

However they do eat pollen like social bumble bees do

Pollen is important as it helps the ovaries to mature in the fertilized females, and it is used for feeding the brood The cuckoo has evolved a number of characteristics, which mean it is totally reliant upon its host for its future survival.

Firstly, cuckoo species are unable to establish their own nests.

They do not have the ability to excrete wax from between her abdominal segments for making egg cells in which to lay their eggs

Because no wax is exuded there are no weak points between the abdominal segments, so if there is a fight between a cuckoo and another worker or queen it is almost impossible for the queen or worker to force her sting into the cuckoo body

Neither can they make honey pots from which newly emerged brood may feed, and from which they may feed themselves whilst they incubate the brood

The cuckoo female must use the larval cells and cups made by the host queen.

Also, cuckoos are unable to rear workers!

The cuckoo merely lays eggs of males and queen females like herself ie. no female workers and these offspring are likewise limited

.

The Cuckoo bumblebee lifecycle

So how do cuckoo bumble bees take over a host nest?

Cuckoo females (having mated with males prior to hibernation) typically emerge from hibernation (late spring or early summer) a few (perhaps around 6) weeks after the target host species.

So by the time the cuckoo females have emerged the bumblebee queens will have already established their nests

Cuckoo bumblebees usually have the same pattern of hair colour as the bumblebees' nests they lay in

Some cuckoos target only one specific species of bumble bee Others

may select from two or three target hosts.

It must first locate a ready prepared nest at an appropriate stage of development.

It is thought that the cuckoo females locate an established nest by smell.

Whatever method she uses it spells the beginning of the end for the nest because the cuckoo larvae consume resources but contribute nothing to the nest.

Of course, bumble bee workers are very important for increasing the size of a colony and rearing the brood.

For this reason, the female cuckoo must choose her target host carefully.

There must be a colony already established of at least a few workers to help the cuckoo rear her offspring.

On the other hand, if there are too many workers in the nest, she may be attacked and easily defeated.

A nest with 2 broods already reared, may have enough workers to overpower the cuckoo, and prevent her establishing herself in the nest.

Once the cuckoo has found a suitable nest, she will typically lurk around it for some time, hiding in the nest debris for a while in order to 'pick up the scent' of the host.

This will help her to usurp the resident queen if necessary, and gain acceptance of the workers through physical attacks and the use of her pheromones.

Once the cuckoo enters the nest, there are a variety of scenarios that may occur, but the common one is that the original host queen is killed (described as queen-intolerant inquilines) so a monogynous colony cycle ensues unless there are sufficient workers to attack her

The cuckoo will then set about laying her own eggs, males and queen females (not workers) in the nest for the workers of the original queen to tend to and feed.

Timing is critical.

If the cuckoo has entered a nest that is well developed, and there are many workers, they may attack the parasite, and kill her.

On the other hand, if there are too few workers to support her, then she will not be able to rear many offspring.

Is the true queen always killed?

Very often, she will be.

Although cuckoos closely resemble social species, the female parasite is often a little larger than her host.

She has a more powerful, longer sting, and a thicker, though less hairy coat.

When the eggs hatch the larvae can directly kill the host larva or indirectly by eating the pollen in the nest ie. starving the host larva to death.

These cuckoos are highly specialised and co-evolved with their hosts to require the same amount of pollen, and in some cases pollen from the same species of plant, to develop and fly at the same time.

However, there have been reports of both host queen and cuckoo cohabiting in a nest for quite some time The cuckoo even incubating the host queen eggs, and offspring from both the cuckoo and host queen emerging! In addition, it has been observed that some cuckoos may take temporary refuge in the nests of non-target host species, without attempting to usurp the queen.

Because of the reproductive competition between workers and the queen, bumblebees are considered "primitively eusocial"

They then use pheromones to subdue the worker bumblebees which will then unwittingly raise the offspring of the cuckoo bumblebee, without realising that they are not related to them

Some species may use physical attacks to force the workers of that colony to feed her and her young.

Upon emerging from their cocoons, the cuckoo males and females disperse

Once a male has left the nest he does not return foraging for nectar and focused on mating with a female The males do not survive the winter

But unlike nonparasitic bumblebee queens, cuckoo females find suitable locations to spend the winter and enter diapause

They usually emerge from hibernation later than their host species.

Each species of cuckoo bee has a specific host species, which it may physically resemble

In the case of the parasitism of *B. terrestris* by *B. (Psithyrus) vestalis*, genetic analysis of individuals captured in the wild showed that about 42% of the host species' nests at a single location had lost their fight against their parasite"

Species Listed: * Most likely to be seen in NORTH EAST LINCOLNSHIRE**

*****Southern(Vestal) cuckoo bumblebee (*Bombus vestalis*)** targets [Bombus terrestris](#) *****Gypsy cuckoo bumblebee (*Bombus bohemicus*)** targets [Bombus lucorum](#)

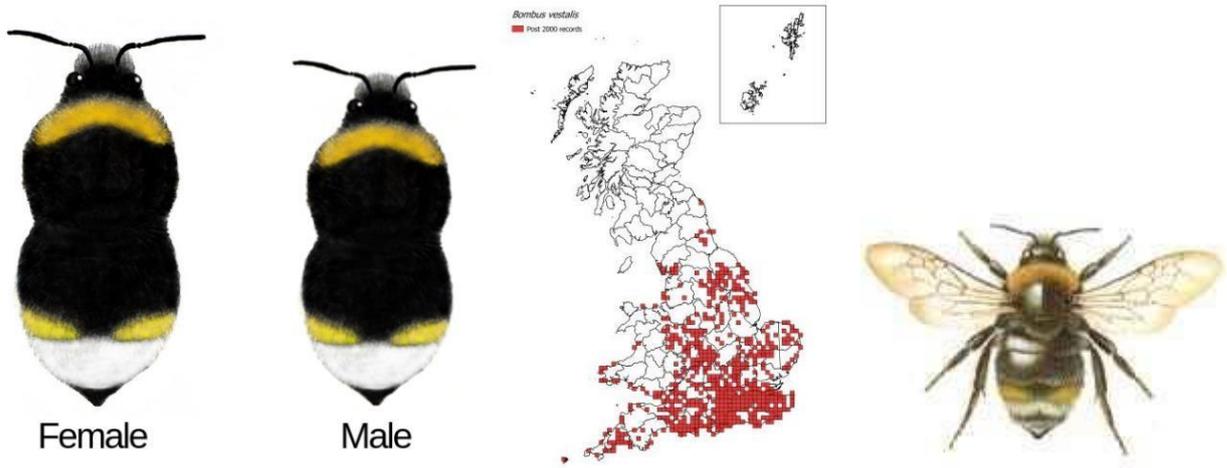
*****Forest (4 coloured) cuckoo bumblebee (*Bombus sylvestris*)** targets [Bombus pratorum](#) and possibly *Bombus jonellus* and *Bombus monticola*

*****Barbuts cuckoo bumblebee (*Bombus barbutellus*)** targets both [Bombus hortorum](#) and *Bombus rudertatus*

*****Red-tailed (Hill) cuckoo bumblebee (*Bombus rupestris*)** targets [Bombus lapidarius](#)

Field cuckoo bumblebee (*Bombus campestris*) targets [Bombus pascuorum](#), *Bombus humilis* and previously, *Bombus pomorum* (now extinct in Britain, but likely due to habitat loss).

Southern(Vestal) cuckoo bumblebee (*Bombus vestalis*)



Take over the nests of the Buff-tailed bumblebee (*Bombus terrestris*).

Status

Common and widely distributed in England, Wales and south-east Scotland

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.

Identification

Body lengths, female (above left) 21 mm, male (above right) 16 mm. Forewing lengths, female 18 mm, male 14 mm

A variable species, it has darkened wings, particularly females

Always has a yellow collar on the thorax

A white tail with a large yellow patch on each side of the abdomen, at the front of the tail.

Males sometimes also have a faint yellow band at the front of the abdomen.

The Gypsy cuckoo bumblebee (*Bombus bohemicus*) is very similar, but has noticeably smaller yellow side-patches.

Examination of the genital capsule is useful for accurate identification of males, which can also be determined by the ratio of the 3rd and 5th antennal segments (equally long in the Gypsy cuckoo, 5th longer than 3rd in the Southern cuckoo).

Females can be identified by checking the degree of pitting on the underside of the tail (6th abdominal sternite) – heavily pitted and not shining in Southern cuckoo bumblebees. **Habitat**

It is found in a wide variety of habitats, as is its host.

Flight period

Females leave hibernation during April or May and males from late May. New males and females are produced in July and August. **Pollen collected**

Like all cuckoo species, **they do not collect pollen** for their offspring (and so have no pollen baskets or worker caste)

This task is carried out by the host workers **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.

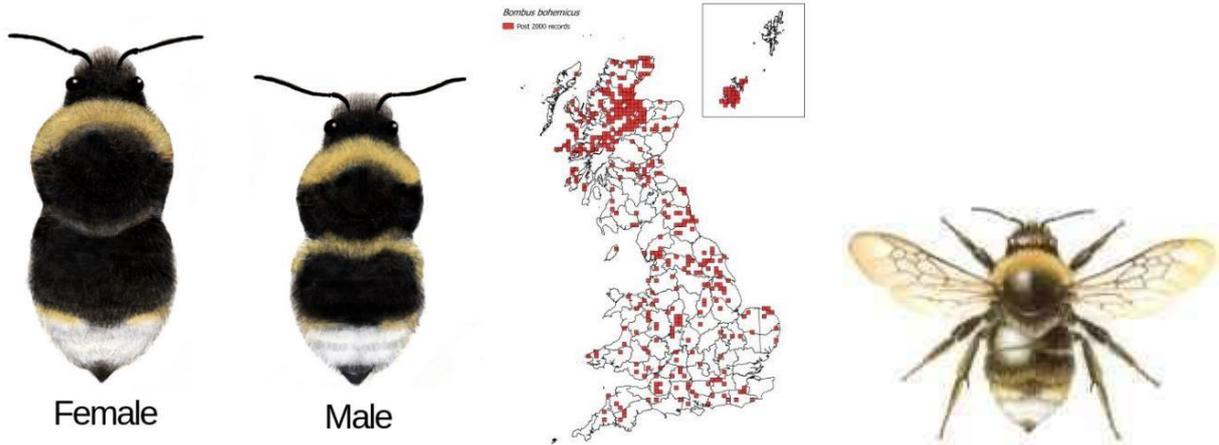
Flowers visited

A wide range of plants from different families but preferred flowers include willows, blackthorn, cherry, dandelion, ivy, dead nettle, thistle, teasel, bramble and lavender

Parasites

None specifically recorded in Britain.

Gypsy cuckoo bumblebee (*Bombus bohemicus*)



Take over the nests of the White-tailed bumblebee complex (White-tailed bumblebee, *Bombus lucorum*; Northern white-tailed bumblebee, *Bombus magnus*; Cryptic bumblebee, *Bombus cryptarum*).

Status

This bee is not regarded as being scarce or threatened.

Identification

Body lengths, female (above left) 19 mm, male (above right) 16 mm. Forewing lengths 16 mm female, 14 mm male

A variable species, it has darkened wings

Always has a yellow collar on the thorax

A white tail with a small pale yellow patch on each side of the abdomen, at the front of the tail.

Males often have a second yellow band at the rear of the thorax.

Examination of the genital capsule is useful for accurate identification of males, which can also be determined by the ratio of the 3rd and 5th antennal segments - equally long in Gypsy cuckoos

Females can be identified by checking the degree of pitting on the underside of the tail (6th abdominal sternite) – heavily pitted and not shining in Southern cuckoos

Habitat

It is found in a wide variety of habitats, as is its host but particularly in heathland, high meadows, and birch and pine woodland

A widespread and common cuckoo bumblebee, particularly in the north.

Flight period

Females leave hibernation during April or May. New males and females are produced in July and August.

Pollen collected

Like all cuckoo species, they do not collect pollen for their offspring

So they have no pollen baskets or worker caste), This task is carried out by the host workers.

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

A single queen will move into a host nest, usurping and sometimes killing the host queen.

After several days, the invading queen begins ejecting host larvae from their brood cells and eating host eggs

They will frequently let more-developed larvae and existing workers, typically one or two broods, survive to allow for a sufficient workforce to perform the necessary tasks of a functional nest

After a period of waiting, the new queen begins to lay her own eggs into host-constructed wax cells

The larvae formed that are sealed in wax cells, either the *B. bohemicus* queen or host workers bite a hole in the cell wall and then regurgitate pollen inside.

This pollen comes from nearby pollen storage receptacles in the nest and was originally collected by foraging host workers

The resultant new *B. bohemicus* females and males take no part in the running of the colony, all work being done by the host workers

These invasions are usually successful if they occur before the second batch of workers has been produced. *B.*

bohemicus will sometimes allow the original host queen to remain in the invaded hive.

The queen is marginalized within the hive and is the recipient of the majority of the parasite's dominance behaviour

It continues to perform grooming and brood-tending behaviours and may even continue laying her own eggs These will be promptly eaten by the parasite queen, preserving her reproductive dominance.

Reasons influencing whether or not the host queen is killed is unclear, but there is evidence that the invading queen is better able to maintain dominance over the workers when the host queen remains alive and in the nest

During observations, when the host queen reproductive dominance over the workers is lost (characterized by sexual maturation of the workers and associated behavioral changes), the *B. bohemicus* queen also loses dominance and she and her brood become the objects of worker aggression

Flowers visited

A wide range of plants from different families but particularly dandelion, bilberry, thistles, brambles, heather, and scabious. **Parasites**

None specifically recorded in Britain

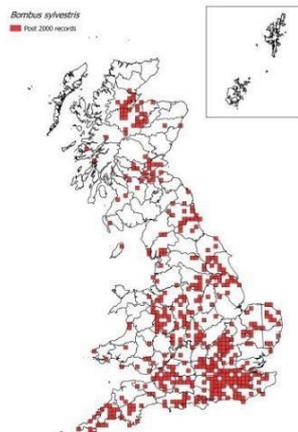
Forest (4 coloured) cuckoo bumblebee (*Bombus sylvestris*)



Female



Male



Parasitic on the Early bumblebee (*Bombus pratorum*) and also probably on the Heath bumblebee (*Bombus jonellus*) and the Bilberry bumblebee (*Bombus monticola*).

Status

This bee is not regarded as being scarce or threatened.

Identification

Body lengths, female (above left) 15 mm, male (above right) 14 mm. Forewing lengths, female 15 mm, male 13 mm. As small species, they have darkened wings, a yellow thoracic collar and a yellow abdominal band with a white tail, the very tip of which is orange (in males) or black (in females).

Females also have a characteristic stance, with the tip of the abdomen very curled-up underneath

Males can sometimes show an extra yellow band at the rear of the thorax or at the front of the abdomen.

The lack of abdominal yellow side-patches separates this species from the Southern cuckoo and Gypsy cuckoo bumblebees

The orange tail tip of the male splits it from the male Field cuckoo bumblebee Habitat

This cuckoo-bee occurs in a wide variety of habitats.

Flight period

Over-wintered females can be found from late March onwards (In the north they are not normally seen until May), 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.

Pollen collected

Like all cuckoo species, they do not collect pollen for their offspring, and so have no pollen baskets or worker caste.

The females eat pollen in order to develop their ovaries.

Foraging for pollen for the nest is carried out by the host workers.

Nesting biology

During spring the over-wintered and fertilised female searches for a small nest of the host bumblebee, *B. pratorum* using smell to locate

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*.

Males tend to patrol mating circuits within 1 m off the ground.

There are also reports of the males lekking i.e. congregating to attract females.

Flowers visited

Visits are made to a wide variety of flowers but favourite flowers include, dandelion, nettles, bilberry, thistles, bramble and scabious

Parasites

None specifically recorded in Britain or Ireland.

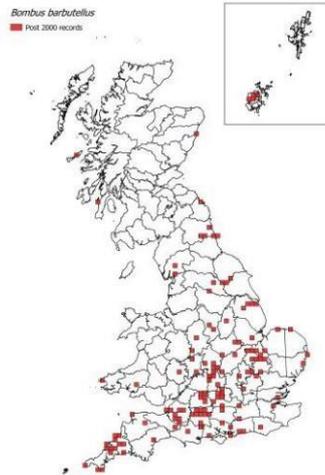
Barbuts cuckoo bumblebee (*Bombus barbutellus*)



Female



Male



A large cuckoo species which parasitizes the nests of the Garden bumblebee (*Bombus hortorum*) Also probably those of the Ruderal bumblebee (*Bombus ruderatus*).

Status

This bee is not regarded as being scarce or threatened.

Identification

Body lengths, female (above left) 18 mm, male (above right) 15 mm. Forewing lengths female 16 mm, male 13 mm

Like the hosts, this species has a yellow-black-yellow thorax

The first abdominal segment is yellow (sometimes faintly so in females), with a black band between that and the greywhite tail.

Similar in appearance to the host species, the Garden and Ruderal bumblebees, but distinguished from them by having a much shorter face, only around as long as it is wide.

Habitat

This cuckoo-bee occurs in a wide variety of habitats.

It is found across the UK, though its northern distribution is largely coastal and it is only truly widespread in the south.

Flight period

Over-wintered females can be found from late April onwards, males and new females in July to September

New females emerge from September

Pollen collected

Like all cuckoo bumblebees this species does not collect pollen to feed offspring Therefore neither sex has pollen baskets and there is no worker caste.

Females eat pollen in order to develop their ovaries.

Foraging for pollen for the nest is carried out by the host workers.

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*.

Flowers visited

Visits are made to a wide variety of flowers but preferred flowers include, dead nettles, hawthorn, thistles, clovers, knapweed and Buddleia

Parasites

None specifically recorded in Britain or Ireland.

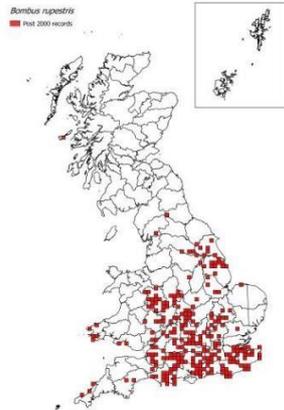
Red-tailed (Hill) cuckoo bumblebee (*Bombus rupestris*)



Female



Male



Targets *Bombus lapidarius*

Status

Listed as a Notable (B) now known as Scarce but becoming more abundant.

Identification

Body lengths, female (above left) 22 mm, male (above right) 16 mm. Forewing lengths 19 mm female and 14 mm male. A large red-tailed cuckoo bumblebee, with a big subquadrate head and long body

Females are sparsely hairy and have very dark, almost black wings, unlike any similar species.

Males have largely un-darkened wings

But the indistinct greyish-yellow banding and lack of obvious yellow facial hair separates them from male Red-tailed bumblebee and Early bumblebee (*Bombus pratorum*).

The male genital capsule is useful to check the ID, particularly of worn specimens.

Hind legs are hairy with no pollen baskets

Habitat

Widespread but not particularly abundant across the south of the UK

The species has been increasing in abundance and spreading northwards in recent years.

Although its host is a frequent species in gardens, most records relate to areas of unimproved grasslands

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 **Pollen collected**

Like all cuckoo bumblebees, this species does not collect pollen to feed offspring. Instead, it takes over nests of the Red-tailed bumblebee (*Bombus lapidarius*).

So this task is carried out by the host workers.

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.

The males form small mating swarms or leks to attract females on hillsides

Flowers visited

Favourite flowers include dandelions, comfrey, oil-seed rape, thistles teasel, ragwort, brambles and scabious.

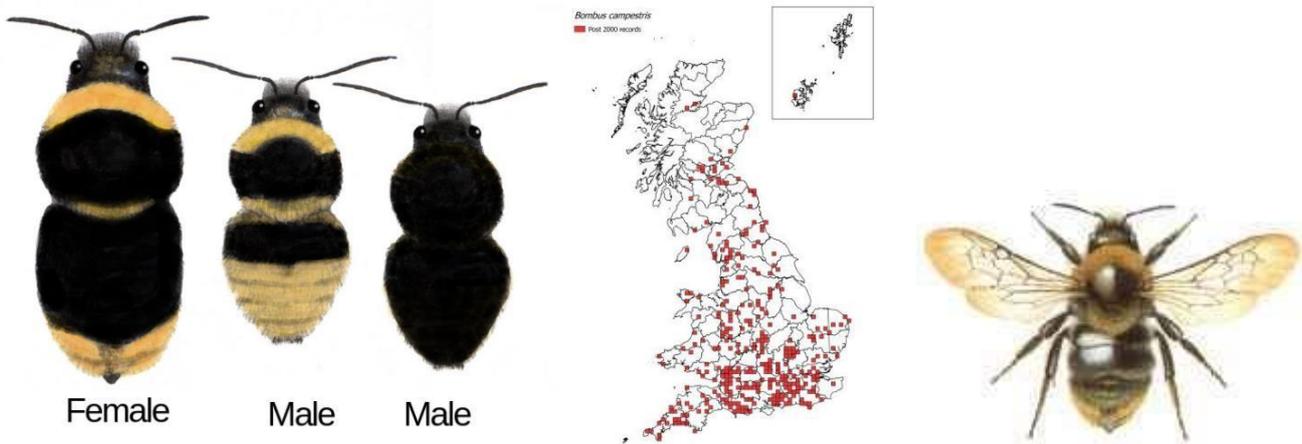
Mainly plants in the families Apiaceae, Lamiaceae and Asteraceae.

Parasites

None specifically recorded in Britain

She takes over the nests of *Bombus lapidarius*. Has darker wings than *Lapidarius*.

Field cuckoo bumblebee (*Bombus campestris*)



Targets *Bombus pascuorum*, *Bombus humilis* and previously, *Bombus pomorum* (now extinct in Britain, but likely due to habitat loss).

Status

The bee is not regarded as being scarce or threatened.

Identification

A very variable species

Body lengths, female (above) 18 mm, male, light and dark forms below, 15 mm. Forewing lengths 15 mm female, 13 mm male

The species has dark wings, but generally has a very yellow appearance, with a yellow-black-yellow thorax

Large yellow patches on the sides of the abdomen, sometimes so extensive that the entire abdomen can appear yellow, with a narrow black strip along the top.

At the other extreme, melanic (all black) individuals are not uncommon.

Males can be rather similar to males of the Forest cuckoo bumblebee (*Bombus sylvestris*), but have black hairs at the tip of the tail rather than orange.

Habitat

A widespread species of cuckoo bumblebee

Has no particular habitat preferences

Flight period

Over-wintered females can be found from late April onwards, males and new females in July to September.

Pollen collected

WNE 2019

As this bee is parasitic it does not collect pollen for its offspring (and so have no pollen baskets or worker caste)

However females eat pollen in order to develop their ovaries.

Foraging for pollen for the nest is carried out by the host workers.

Nesting biology

Take over the nests of carder bumblebees, mainly the Common carder bee (*Bombus pascuorum*)

But probably invades all four scarcer carder species (Brown-banded carder bee, *Bombus humilis*; Moss carder bee, *Bombus muscorum*; Red-shanked carder bee, *Bombus ruderarius*; and Shrill carder bee, *Bombus sylvarum*). There may be two generations of this species per year in the south

Flowers visited

Visits are made to a very wide variety of flowers including, ivy, dandelion, clovers, hawthorn, thistles, knapweeds, brambles and scabious

Parasites

None specifically recorded in Britain or Ireland.

