National Bee Unit

FAQ 42

Bumblebees

The Food and Environment Research Agency

Bumblebees occur naturally through the temperate, alpine and arctic regions of the northern hemisphere. There are about 250 species some of which are inquiline with other bumblebee species that is they are cuckoo bumblebees.

How many species of bumblebee are there in the UK?

There are 25 species of bumblebee recorded but two of them are extinct, one thought to be so and about half are at serious risk of extinction only being found in small pockets. There are six common species all of which can be found in back gardens and have common names. Although apparently very similar there are marked differences in tongue length between species, varying between 6 and 14 mm. Face length reflects the length of tongue. Species tend to be faithful to flowers matching the tongue length. This aspect indicates that species do not compete for forage. There are six species of cuckoo bumblebee *Bombus (Psithyrus)* which generally prey on the common six species. Lazy behaviour could have been an evolutionary factor in the development of *B. (Psithyrus)* species.

How can I identify species?

This can be difficult as their markings show Mullerian mimicry. Bumblebees sting as a protection measure so all have similar markings creating a common warning to discourage predators. Some specific species are very similar the *Bombus(Psithyrus)* species in particular being virtually identical to their host *Bombus* species. There are many field identification guides to help but some species require observation of the genitalia or tongue length generally beyond the scope of the amateur and you may consider morally unacceptable.

As a general rule to make identifications you need to check:-

- Is it a queen, worker or drone of *Bombus* species? Queens and workers have pollen baskets.
- Is it a female or male of B.(Psithyru) species*?* (B. (Psithyrus) *species are less hairy and the black tergites are clearly visible. There is no worker cast and neither sex has pollen baskets)*
- Locality and habitat as if the species is not present it removes an element of confusion!
- Then check the coloured bandings particularly tail and thorax with your field guide.

This is difficult to do whilst bees are visiting flowers as they are constantly on the move, unless you are experienced and know the 'jizz' of the species. So you may wish to catch a specimen for examination. If caught they should not be contained in excess of 15 minutes. Some people use an aerial net but you may find it easier to use a clear plastic box and some stealth. When contained in the box it is easy to see the markings and other features, perhaps using a hand lens. However there is a tendency for bumblebees to buzz around. To stop this put the box in the dark for a moment or two, i.e. in a pocket, and the bee will quieten.

What is the bumblebee life cycle?

In early spring newly emerged queen bumblebees can be seen flying along hedgerow banks diving into the undergrowth to find mouse nest holes in which to establish nest. These queens are of the underground nesting species such as common buff tailed *B. terrestis*. They have lived through the winter alone living on fat deposits laid down the previous autumn. Some species such as common pasture *B. pascuorum*, nest in leaf litter or dense grass.

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Whilst searching for a nest site she will feed herself up, to develop her ovaries, by feeding on nectar and pollen. If she is carrying pollen in her pollen baskets then she has already selected or formed a nest site. If a mouse hole has been selected she will rearrange the nest material into a ball and forms a large wax cup in the centre. This cup is filled with pollen, several eggs are laid on it and then covered over with a wax dome. The queen sits astride this dome forming a dent to coincide with her body shape and generates body heat to raise the temperature of the cup to about 30c.

Bumblebees have sophisticated thermoregulation systems and there is some debate about how heat is generated. Some scientists suggest that chemical reaction plays a part and others that the flexing of flight muscles is responsible. The bumble bee can localise this heat into the thorax alone enabling it to fly at low temperatures, below 0c has been observed, or dissipate heat by pumping heated haemolymph (blood) into the abdomen. The very hairy body and nest material assists in heat retention.

After about 4-6 days the eggs hatch and the larvae feed on the pollen deposit. They take about 10-20 days to develop, spin a cocoon, pupate and emerge after about a further 14 days. These periods are variable depending on location, weather and the ability of the queen to maintain the nest temperature. This first brood of workers then sets about foraging for nectar and pollen, making wax and generally assisting the queen in developing the nest. Cycles of brood continue building the colony up to hundreds of bees depending on the species.

The size of these bees can vary significantly depending on the availability of food during the larval stage. Often bumblebees are seen that are no bigger than a honeybee, not a difference in species but purely not fed as well! These smaller bees also have shorter tongues.

Later in the season drones (males) and queens are developed. Drones are developed from unfertilised eggs. After development they leave the nest and do not generally return. They can often be found resting overnight on thistles and other flowers.

The development of queens is not fully understood. In species such as early bumblebee *B. pratorum* and common garden *B. hortorum*, it is thought to link with extra larval feeding, whilst with *B. terrestis* Common buff tailed, it may be determined by pheromone control. This possible explains why this species build up into comparatively large colonies. Young queens leave the nest and forage to build up their fat reserve and may collect nectar and pollen to take back to the mother nests. When they later mate they find a crevice, in which to hibernate, preferably on a north-facing bank so that winter sunshine does not awaken her. The parent nest dies out, any remaining larvae and pupae dying with it.

Species differ in the period in which they create the nest, peak and new queens emerge. This is most likely to avoid undue competition.

B. (Pisthyrus) the 'cuckoo' or parasitic bees invade the nest of a host that normally has a very similar appearance and take over leaving the host workers to rear the *Psithyrus* bees. *Psithyrus* species emerge after winter hibernation a little later than their host species to enable the latter to set up home. The timing of invasion is crucial as if too soon then the colony will not be large enough to care for the *Psithyrus* young and if too late then the colony can effectively defend itself and kill the invader. The female *Psithyrus* bee invades the nest of a host, burrows into the nest material to take on the colony odour and then either kills the host queen and take over the egg laying duties or eats the host eggs and replaces them with her own.

How at risk are bumblebees?

The U.K. probably has the best records of bumblebee occurrence in the world. A large survey was carried out in the 1930s and 50 years later it was clear that there had been a dramatic decline. Generally it is accepted that changing agricultural practice particularly accelerated during the Second World War and continued by the Common Agricultural Policy has caused this. Some would blame the wholesale use of chemical nitrogen fertilizer enabling rye grass to be grown at the expense of wild flowers particularly clover which is a legume used to fix nitrogen in the soil.

Bumblebees generally forage over a radius of 3km. so experts consider that an area of 10 square km. is the minimum needed to support a species. Somewhat larger than the average nature reserve!

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