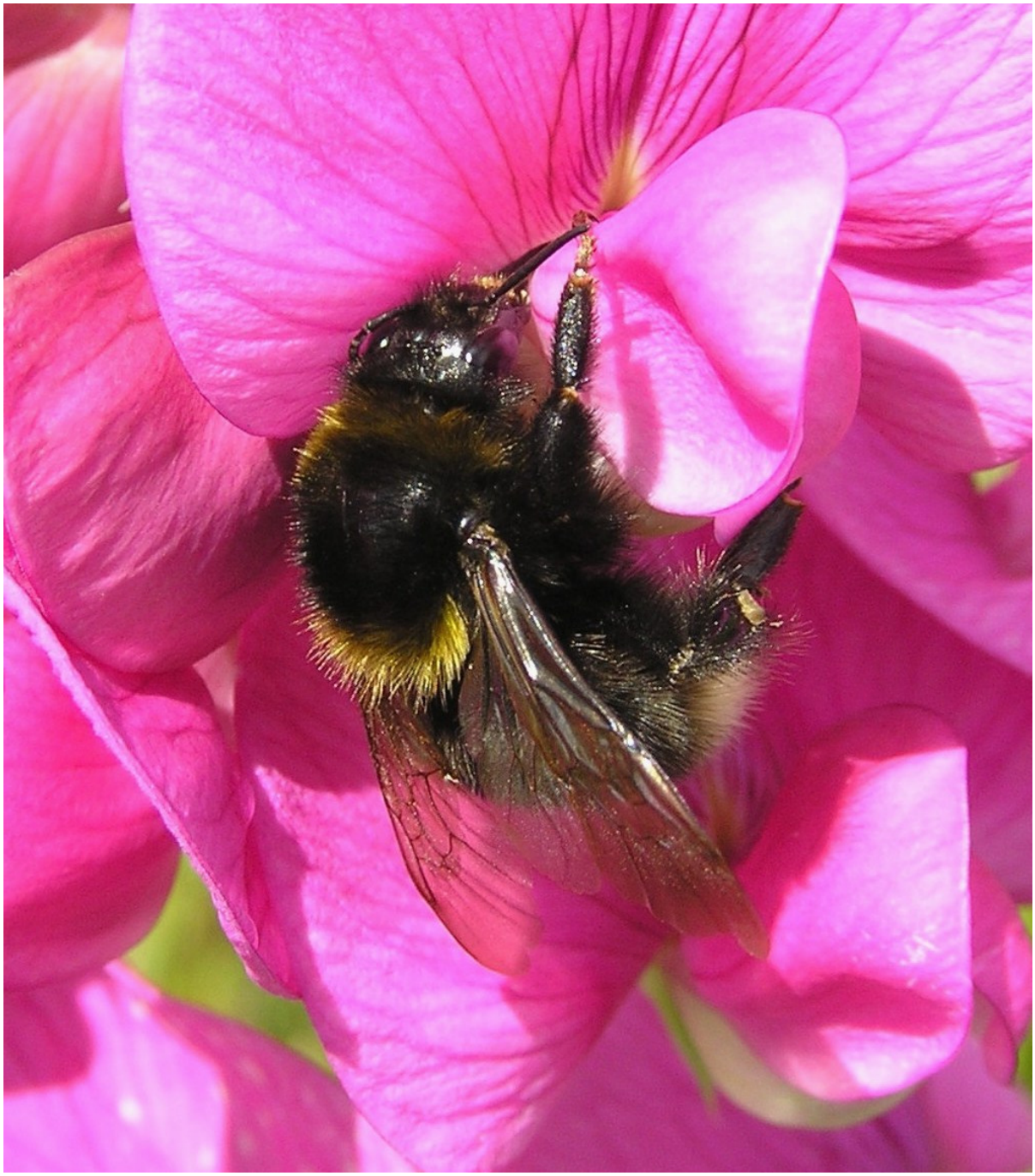
WARWICKSHIRE'S BUMBLEBEES

Steven Falk, 2011



Large Garden Bumblebee worker

Warwickshire Biological Records Centre

Warwickshire County Council

WARWICKSHIRE'S BUMBLEBEES

Introduction

Bumblebees are some of our most easily recognised insects, and they serve a vitally important role as pollinators of wild and cultivated plants. In the latter role, they are vital for local fruit and seed production in orchards, allotments and gardens. They help pollinate our apples, pears, plums, raspberries and important crops including Oil-seed Rape, Pea and Broad Bean. But like so many other important pollinators such as hoverflies, moths and butterflies, bumblebees are not having a particularly easy time in Britain's intensively managed countryside. Several species have completely disappeared from Warwickshire and other parts of central Britain, whilst others are currently scarce and vulnerable. This publication places the spotlight on this attractive group of insects, helping you to identify, understand and conserve them.

What is a bumblebee?

Bumblebees are specifically bees of the genus *Bombus*. Together with all other British bees they are placed in the family Apidae. The Apidae belongs to the largest insect order – the Hymenoptera, which also contains wasps, ants, sawflies, gall wasps etc. The vast majority of the order is dominated by tiny parasitic wasps that you would hardly notice. Bumblebees represent just a tiny proportion of the order, but are the most conspicuous representatives within Britain and also in many other parts of the temperate northern hemisphere. They are large, fluffy and often distinctively marked with coloured bands or coloured tails, and some species can be abundant in the right habitat. The females (queens and workers) can sting you, but are very reluctant to do so. It is most likely to happen if you interfere with a nest. The males do not have stings.

Bumblebee life cycles

Most bumblebees are social insects. They create nests dominated by a single large fertile female (the queen) served by numerous smaller sterile females (workers). In this sense they are similar to the Honey Bee, though bumblebee colonies are smaller and less sophisticated, and never survive more than one summer (those of a Honey Bee can survive for several years).

The annual life cycle kicks off with a fertilised overwintering queen emerging from hibernation, usually in March or April. Some queens may even emerge on mild winter days. Emergence time also depends on the species, with queens of the Large Garden Bumblebee and Brown-banded Carder-bee rarely emerging before May. Overwintered queens forage on spring-blossoming shrubs and other flowers, and initiate new nests. The location of those nests varies between species, with many favouring pre-existing rodent burrows and other small cavities, whilst the various carder-bees nest on the surface of the ground, often at the base of grasses and other rough herbage. The Tree Bumblebee is the only species that habitually nests well above the ground, often using bird nest boxes or roof cavities.


Left: Red-shanked Carder-bee nest, located at the base of grasses and constructed from moss; right: nest of Early Bumblebee opened up to show the untidy arrangement of wax cells.

By May, the workers of several species can be on the wing collecting pollen and nectar to build up food stores in the nests though they do not mix pollen and nectar to create honey like a Honey Bee and the wax cells are not arranged in a comb. The workers build new wax cells and feed the larvae and the queen. The queen does not normally leave the nest once it is established.

Colony size varies between species and may involve several hundred workers or just a few dozen. Double-brooded species like the Early Bumblebee and Tree Bumblebee will produce males and new queens by May if not earlier. Those new queens will then establish another nest in mid summer to bring about two nesting cycles (or 'broods') in a single year. But single-brooded bumblebees such as the Buff-tailed Bumblebee or garden bumblebees typically produce new queens in late summer, and once these have mated and built up their fat stores they find hibernation sites to overwinter in. Hibernation sites can include an assortment of sheltered holes or cavities, compost heaps, grass tussocks and so on. The males, workers and old queens do not survive the winter.

The males are patterned like queens and workers in species such as the Buff-tailed Bumblebee, Small Garden Bumblebee, Common Carder-bee and Brown-banded Carder-bee. However, in some species they are rather different-looking, either due to yellow-haired faces, extra bands on the body, or a different-coloured tail. Males also have noticeably longer antennae (with 13 rather than 12 segments) and the body is generally longer and narrower. They tend to move in a less frenetic manner to foraging workers and never collect pollen on the hind legs.

Britain currently has 18 social bumblebees, six of which can be described as widespread and locally common, with a further 11 that are localised or geographically restricted (and often highly declined). There is also one recent colonist (the Tree Bumblebee) that is spreading rapidly across Britain. Three species are extinct, though one of these (the Short-haired Bumblebee) is currently subject of re-introduction. Warwickshire currently supports 11 social

bumblebees but has lost five species, which is a typical state of affairs in lowland Britain away from coastal areas.

Cuckoo Bumblebees ('Cuckoo-bees')
Not all bumblebees are social. Six British species, all of which occur in Warwickshire, are social parasites that we term cuckoo bumblebees. They have large, queen-like females and smaller males, but no workers. The females are more heavily armoured than queen bumblebees and have simple hind legs that lack the pollen-collecting apparatus found in social bumblebees. The body hairs are sparser which means that the shiny black body beneath the hairs is more apparent. They use social bumblebees of specific types to rear their offspring, just like cuckoos use songbirds to rear their chicks. The female cuckoo-bee emerges from hibernation a few weeks later than the host species and eventually enters a host nest. In late spring you can often see them searching hedge-banks or coarse grassy areas for host nests, emitting a deeper hum than normal queen bumblebees. Once in the host nest, the female will either kill or functionally displace the existing queen. She then enslaves the bumblebee workers and uses them to rear her own larvae. By summer, male cuckoo-bees are produce in vast numbers and often outnumber social bumblebees on flowers like thistles and Garden Lavender. The Four-coloured Cuckoo-bee is double-brooded like its hosts, so males and new queens can be produced by late spring.

Left: Hind leg of Red-tailed Bumblebee showing the flat, shining, hair-fringed pollen basket of the tibia; middle: hind leg of Brown-banded Carder-bee showing a full load of pollen; right: hind leg of Hill Cuckoo-bee showing simple structure with no pollen basket.

Cuckoo-bees may be restricted to a single host (e.g. the Buff-tailed Bumblebee in the case of the Vestal Cuckoo-bee) or a group of several closely related hosts (e.g. the various carder bumblebees in the case of the Field Cuckoo-bee). Cuckoo-bees used to be placed in their own genus *Psithyrus*, but studies have shown that they are more closely related to social bumblebees than had been previously thought, and have probably evolved from social bumblebees on several independent occasions. Even true bumblebees can parasitise the nests of other social bumblebees, either of their own species or a closely-related one.

Bumblebee foraging

Bumblebees are very active flower-visitors. They imbibe liquid nectar into their crop through a long, extendible tongue. At the same time they collect sticky pollen grains into a device called a pollen basket on their hind legs. Back at the nest, the pollen is placed into wax storage pots. By being furry and cold-adapted, bumblebees can forage on cooler days, in colder places and for a greater-number of hours per day than Honey Bees or any other types of wild bee. You can find them foraging early in the morning, late in the evening, in light rain or very overcast weather, and at exposed uplands and coastal locations when no other bees are active.

Different bumblebee species have different tongue and face lengths, and different floral preferences in terms of flower colour and structure. So whilst each species may use a variety of different flower species, those with longer tongues will concentrate on deeper flowers (e.g. Red Clover in the case of the Large Garden Bumblebee) whilst others prefer shallower flowers (e.g. Bramble in the case of the Early Bumblebee). This allows up to ten species of social bumblebee to co-exist at a single location in Warwickshire. The choice of flowers also varies on the time of year. Bumblebees with early emerging queens take advantage of blossoming sallows, Blackthorn, fruit trees like Plum and Apple, and early flowers like Dandelion, Ground-ivy and dead-nettles.

Left: Small Garden Bumblebee, a long-tongued bumblebee that is able to forage from deep flowers like Bluebell; right: Early Bumblebee, a short-tongued bumblebee that uses shallower flowers like Bramble.

Workers will then use a sequence of preferred flowers over their long foraging period, moving from one group of flower species to another as different flowers wane and wax. Some species typically use a broad spectrum of flowers e.g. the Common Carder-bee and Small Garden Bumble-bee. Others seem to concentrate much of their activity into a much smaller variety, notably the Large Garden Bumblebee which shows a very strong liking for Red Clover, Kidney vetch and everlasting-peas in Warwickshire (using other

flowers to a much smaller extent than the closely related Small Garden Bumblebee).

A few of the short-tongued bumblebees, notably the Buff-tailed Bumblebee, have developed a neat trick called nectar stealing. They bite a hole at the base of a deep flower that their tongues would not ordinarily be long enough for, and then steal the nectar through the hole.

Bumblebee declines and increases

Up until the early 20th century, counties like Warwickshire supported good populations of perhaps ten to fifteen species of social bumblebee. However, by the latter part of this century a phenomenal change had taken place with several species completely disappearing from the greater part of their former national ranges. Some retreated to coastal districts whilst the Great Yellow Bumblebee retreated to the far north. The area of greatest loss, which co-incides with the more intensively-farmed areas of lowland Britain, is called the ***Bumblebee Impoverished Zone***. The main cause of the declines seems to be the fragmentation and deterioration of flowery, bumblebee-friendly habitats such as traditional unimproved hay meadow and pasture, heathland, wet meadows, and flowery arable land. Bumblebee populations tend to operate at a landscape scale rather than site scale, with queens and workers often using a variety of habitats over several square kilometres to achieve a successful colony cycle. Warwickshire was particularly badly affected by agricultural intensification in post-war years losing most of its heathland and unimproved grassland, and now has relatively few large tracts of bumblebee-friendly flower-rich landscape. Coastal districts by contrast still widely support extensive and varied tracts of flowery habitat, which is presumably why they have often retained more bumblebee species. Climate change is also implicated in some bumblebee declines, and probably exacerbates the effects of habitat loss.

However, it is not all bad news. In Warwickshire, two of the formerly declining social species are currently increasing, the Large Garden Bumblebee and the Brown-banded Carder-bee. The creation of new clover-rich grasslands and field margins has clearly promoted the former species, and both have benefited from the abandonment of various large limestone quarries in southern Warwickshire. These can become very flowery and are often being managed for butterflies such as the Small Blue, Grizzled Skipper and Dingy Skipper (which promotes bumblebee-friendly flowers like bird's-foot trefoils and Kidney Vetch). Warwickshire has also gained the recent British colonist Tree Bumblebee. The consequence of this is that by 2011 we had two localities in the county with recent records of ten social bumblebee species, something that would have been hard to imagine just a few years ago.

Of the Cuckoo-bees, one species, the Hill Cuckoo-bee, is now widespread and locally common having been incredibly rare just 30 years ago. Given that its host has always been common here, one has to assume that climate change is allowing it to increase here.

The existing species

The following is an account of the eleven species of social bumblebee and six species of cuckoo-bee you can currently find in Warwickshire. Photographs of all species are furnished at the end of this report. In lowland southern Britain, bumblebee recorders often refer to the 'common six' i.e. the six most widespread and familiar species. These are the Buff-tailed Bumblebee, Small Earth Bumblebee, Small Garden Bumblebee, Early Bumblebee, Red-tailed Bumblebee and Common Carder-bee. If the Tree Bumblebee continues to increase at its current rate, we may have to refer to the 'common seven' in the near future!

The Buff-tailed Bumblebee *Bombus terrestris*
The very large fat bumblebee queens you typically see in spring and late summer with a beige tail and two brownish-yellow bands, belong to this species. The brownish collar at the front of the thorax is often reduced and occasionally missing altogether. The workers resemble tiny queens but typically have a whitish tail which is brownish tinged where it meets the black hairs. They can be quite difficult to separate from the next species. The males also resemble the queens and workers but are intermediate in size and with a dirty-white tail. The males never have a yellow-haired face like the next species. Being a short-tongued bumblebee, it likes shallow flowers such as Bramble, Marjoram, Thyme, mints and White Clover. Spring queens can be especially numerous on sallows, Blackthorn and fruit tree blossoms. New summer queens like Teasel, Spear Thistle and garden flowers such as Ice Plant. Nests are usually located in underground cavities and can be very large compared to most other bumblebees with several hundred workers. Widespread and common in a variety of habitats, including gardens, woods and meadows.

The Small Earth Bumblebee *Bombus lucorum*
The queens of this common bumblebee resemble those of the previous species but average a bit smaller, have pure white tails and much brighter yellow bands on the body, especially the collar behind the head. The workers resemble small queens but can be confused with those of the previous species, though again the yellow bands on the body are a brighter yellow and the tail is clear white with a greyish tinge where it meets the black. The males have a conspicuous yellow-haired face and are quite variable, with the yellow bands often expanding onto adjacent parts of the body to partially mask the black bands. The nesting and foraging habits resemble the previous species, though workers have a particularly strong liking for heathers. Widespread and common in a variety of habitats, including gardens, woods and meadows, but keep a look out for queens of the similar Northern Earth Bumblebee.

The Small Garden Bumblebee *Bombus hortorum*
Queens of this species somewhat resemble the previous one in being quite large with a pure white tail and the impression of two bright yellow bands. However, the middle band will be seen to occupy a different part of the body - the rear of the thorax and base of the abdomen. The face and tongue are also considerably longer – this is a classic 'long-tongued bumblebee' with a

noticeably elongate face. The workers and males are patterned much like the queen. Semi-melanic (dark) examples of queens, workers and males are occasionally encountered, but are fluffier than the next species. Workers like to forage on deep flowers such as woundworts, dead-nettles, sages, Self-heal, Black Horehound, Honeysuckle, Foxglove, clovers, bird's-foot trefoils, peas and vetches. Males and new queens prefer plants like Spear Thistle, Teasel and umbellifers. Nesting usually occurs underground. Widespread and common in a variety of habitats, including gardens, woods and meadows.

The Large Garden Bumblebee *Bombus ruderatus*

This bee has traditionally been regarded as one of the more seriously declined British bumblebees. It was considered long extinct in Warwickshire until its rediscovery near Shipston-on-Stour in 1999. Since then it has exhibited a remarkable increase in southern Warwickshire, perhaps the most pronounced increase anywhere in Britain, and could be described as locally common here by 2011. It is the only British social bumblebee that regularly produces all-black individuals (known as variety 'Harrisellus'), and the great variability of its appearance can make identification challenging. The queens are typically very large, matching the size of queen Buff-tailed Bumblebees but rather more elongate in build. They can vary from entirely velvety-black to the palest state which has a dirty white tail, a yellow-brown collar and a yellow-brown patch on the rear section of the thorax. A few pale hairs may occur on the sides of the abdomen base too, but it never has the broad, bright yellow bands of the Small Garden Bumblebee, and the body fur is much shorter and neater.

The workers vary from all-black to yellow-banded with a white tail. Banded ones can closely resemble those of the Small Garden Bumblebee. However, the body fur is shorter and neater, the yellow bands are a duller buff-yellow, and the pale collar behind the head tends to be narrower and more crescent-shaped (though rarely it can be quite broad). Males generally come in two well-defined forms, a deep-velvety black variety, or brightly yellow-banded with a whitish tail. The banded ones can resemble males of the Small Garden Bumblebee but the fur, again, is shorter and neater, the yellow bands more neatly defined and a deeper yellow, and the whitish tail is often tinged with yellow. Several cuckoo-bumblebees also produce black males, but these are fluffier and have no hint of a pollen basket on the hind leg.

Queens of this species are late emerging (typically early May) and prefer to forage on White Dead-nettle, Kidney Vetch, comfreys and early Red Clover. The workers exhibit a very strong liking for Red Clover but have also been noted locally on Kidney Vetch, bird's-foot trefoils, everlasting-peas, woundworts, comfreys, knapweeds and thistles. New queens favour Spear and Musk Thistles in late summer. Males also like these flowers, but will visit many of the flowers being used by the workers and are surprisingly active and frenetic for drones.

This species has shown a remarkable response to the deliberate sowing of Red Clover-rich flowery margins around arable fields in several parts of southern Warwickshire, and this seems to have promoted its presence in

further habitats such as old quarries, road verges and clover-rich hay meadows. Males have also turned up in several suburban locations but seem to travel some distance from nests, so this may not reflect the location of nests. Widespread and local but increasing in southern Warwickshire, generally avoiding woodland and gardens.

The Early Bumblebee *Bombus pratorum*
The relatively small fluffy queens are amongst the most numerous bumblebees in spring. They have a dull reddish-orange tail, a fairly bright yellow collar behind the head, and a yellow band of variable brightness across the abdomen. The workers resemble tiny queens but often have the yellow band of the abdomen entirely missing. The males are particularly fluffy with conspicuous yellow-haired faces and broad yellow collars. This is one of the species that fits two nesting cycles into a year, which means workers, males and new queens can appear by late spring. It is a classic short-tongued bumblebee that loves foraging on flowers like Bramble, Raspberry, cotoneasters, *Pyracantha* and comfreys. Nesting is usually underground in pre-existing cavities but it will occasionally use bird nest boxes. Common and widespread, especially in woods, gardens and bramble-dominated areas, though less frequent in open grasslands and arable settings.

The Tree Bumblebee *Bombus hypnorum*
This species was added to the British list in 2000 and had reached the Warwickshire area by 2009. In 2011 it was already widespread here and frequent in suburban Warwick, Leamington and Kenilworth. It is usually an unmistakeable bee, with a bright orange-red thorax, contrasting with a black abdomen that has a conspicuous white tail. The thorax of queens and workers is occasionally darkened to the extent that it appears like a black bee with a white tail. Males have pale haired faces and the base of the abdomen can have the black hairs partially replaced by brown ones. This species is closely related to the Early Bumblebee and visits the same types of flowers. But its ecology varies markedly on two counts. Firstly, it nearly always nests well above the ground, commonly in roof cavities, bird nest boxes and holes in trees. Secondly (and uniquely for British bumblebees) the males swarm in large numbers around a nest. Widespread and increasing with a strong preference for suburban gardens and allotments, but occasionally turning up in woodland, arable situations and meadows.

The Heath Bumblebee *Bombus jonellus*
Closely related to the previous two species but resembling the Small Garden Bumblebee. However, it is a classic short-tongued and short-faced species, with smaller and fluffier queens, and males have conspicuously yellow-haired heads. This bee is widespread in heathland and moorland districts of northern and western Britain but absent over most of lowland southern Britain except some coastal, downland and heathland districts. It was historically known from places like Sutton Park though was not rediscovered at this site during a major invertebrate survey carried out in the late 1990s, which is surprising given that it looks so suitable. However, a single queen was recorded near Atherstone in 1994, providing hope that colonies may be lurking somewhere in the north of the county, perhaps in some of the quarries and heathy areas

of the Atherstone-Nuneaton Ridge. Workers are particularly keen on heathers, Thyme and Bramble, whist spring queens like sallows. Rare and possibly not permanently established in Warwickshire.

The Red-tailed Bumblebee *Bombus lapidarius*
This is the familiar bumblebee with a velvety-black body and a deep crimson-red tail. The queens are very conspicuous in spring and the workers can be amongst the most numerous bees in meadows, waste ground and arable settings, foraging heavily on clovers, bird's-foot trefoils, knapweeds and melilots. The males look very different with a bright yellow-haired face, a well-formed yellow collar, a weak yellow fringe at the back of the thorax and a more orange-red tail. The male hind legs also have lots of reddish hairs like a Red-shanked Carder-bee, thought it is much brighter than males of that species. Nesting often occurs under stones and slabs, hence its other name of the Stone Bumblebee. Beware the similar-looking Red-shanked Carder-bee and Hill Cuckoo-bee. Common and widespread in a variety of habitats including gardens, woods and meadows.

The Common Carder-bee *Bombus pascuorum*
This is the common brownish, non-banded bumblebee you see in a wide variety of habitats. It is highly variable in appearance, which can make separation from several scarcer species challenging. Typically it has a brownish-chestnut thorax top which becomes creamy at the sides. The base of the abdomen has a mixture of black and pale hairs, and the tail can be orange, though it is not bright or well-defined. However, some specimens can be exceptionally pale, with few black hairs on the abdomen, and others can have the thorax and abdomen extensively dark-haired. Males resemble workers and queens. This is quite a long-tongued species and is particularly fond of clovers, vetches and various members of the sage/mint family such as dead-nettles, Self-heal and Thyme. Being a carder-bee, nesting occurs on the surface of the ground in locations like grass tussocks. Common and widespread in a variety of habitats including gardens, woods and meadows.

The Brown-banded Carder-bee *Bombus humilis*
This is another species that was recently rediscovered in Warwickshire (Marton, 1995) having been considered long extinct, and seems to be spreading, though at a much slower rate than the Large Garden Bumblebee. It resembles the Common Carder-bee, though fresh specimens are much brighter. They have the top of the thorax a deep chestnut, contrasting strongly with the creamy-whitish sides. The abdomen is cream-haired except for one or two distinct brown bands across the base. There are never any black hairs on the abdomen, though a few scattered black hairs are typically present on the thorax above the wing bases (an important clue that you do not have a Moss Carder-bee). This is a bee of flower-rich grasslands and old flowery quarries with plants such as bird's-foot trefoils, Kidney Vetch, knapweeds, Wild Basil, Rough Hawkbit etc. Very scarce in southern Warwickshire but slowly increasing here.

The Red-shanked Carder-bee *Bombus ruderarius*
This bee looks nothing like our other carder-bees, but is easily confused with the Red-tailed Bumblebee. However, queens are smaller and fluffier, with the tail orange-red rather than deep crimson, and the pollen basket of the hind leg is fringed with orange hairs. The workers are similar to the queen but smaller, though often larger and fatter-looking than the workers of the Red-tailed Bumblebee. Males usually have a rather dull greyish collar and band across the base of the abdomen, and resemble males of the Hill Cuckoo-bee in the field but have less box-shaped heads and a weak pollen basket on the hind leg. This is a scarce bumblebee in Warwickshire but widely recorded in recent years. Queens can turn up in a variety of habitats and visit White Dead-nettle, Ground-ivy, Kidney Vetch and sallows. Workers are much more localised and like flowery meadows and old quarries with plants like Kidney Vetch, bird's-foot trefoils, clovers, knapweeds and Bramble. Widespread but very localised, with nesting colonies typically associated with flowery meadows and old quarries.

The Vestal Cuckoo-bee *Bombus vestalis*
This is our commonest cuckoo-bee and the special parasite of the Buff-tailed Bumblebee. The females have a brownish collar and a white tail that has two bright yellow patches at its base. The body fur is short, neat and relatively dense for a cuckoo-bee. Males are more elongate than females with much longer antennae. Their white tail has an entire yellow ring at the base and there may be an extra yellow band at the base of the abdomen. Males can be very abundant on umbellifers, thistles and ragworts in summer, and also garden plants like Lavender. Common and widespread in a variety of habitats including gardens, woods and meadows.

The Bohemian Cuckoo-bee *Bombus bohemicus*
This closely resembles the previous species and is the parasite of the Small Earth Bumblebee. Females average smaller than the Vestal Cuckoo-bee, the collar is paler, and the yellow patches at the base of the white tail are paler and less conspicuous. The males are best separated by examining the genitalia and antennae, as faded males of the Vestal Cuckoo-bee look almost identical. This bee shows a strong northern bias nationally, being absent from large parts of the host's southern range. Very scarce and mostly recorded from woods and heathy areas in the northern half of Warwickshire.

The Barbut's Cuckoo-bee *Bombus barbutellus*
This is the parasite of our two garden bumblebees, and rather resembles the Small Garden Bumblebee in pattern, though never as bright-looking and rather fluffier. Widespread and locally common in a variety of habitats.

The Four-coloured Cuckoo-bee *Bombus sylvestris*
This cuckoo-bee attacks the Early Bumblebee, the Heath Bumblebee and possibly the Tree Bumblebee, and makes no attempt to look like any of them. Females are relatively small and fluffy, with a yellow collar, another weak band across the base of the abdomen, and a white-tailed abdomen that is strongly curved downwards and black-haired that the extreme tip. The even fluffier males are usually patterned like the female but have the white tail

usually tipped with black, then red hairs, hence the common name. However, males can be darker and not infrequently all-black. This bee is especially frequent in and around woods where bramble is present. The males give off a particularly strong mousy-smell, most likely a pheromone to attract females. Widespread and locally common especially in woods.

The Hill Cuckoo-bee *Bombus rupestris*
This is the special parasite of the Red-tailed Bumblebee. Females are arguably our most striking cuckoo-bee, usually very large and shiny-black with a red tail (like the host), but with dark wings and a large, box-shaped head. Males are highly variable in appearance, ranging from entirely black with a red tail to extensively grey-banded with an orange tail. Fully melanic males have also been recorded locally – only confirmed as such through checking of the genitalia. This bee used to be very rare in Warwickshire but is now the second commonest species in non-wooded locations, and males are often abundant in late summer and can sometimes be observed swarming over grassland. Widespread and locally common in a variety of habitats, still increasing in the north.

The Field Cuckoo-bee *Bombus campestris*
This is a parasite of the various carder-bees, and another cuckoo-bee that looks nothing like any of its hosts. It is also the most variable of all six cuckoo bees. The relatively small females typically have a conspicuous beige collar and beige patch at the back of the thorax. The tail has beige side-patches but is black down the midline, unlike any other female bumblebee. It is also possible to find much darker females. The males vary from entirely black to largely beige-haired except for a black band across the thorax and base of the abdomen. Some have white rather than beige tails. Widespread and locally common in a variety of habitats.

Extinct species

The Moss carder-bee *Bombus muscorum*
Our largest carder-bee, closely resembling the Brown-banded Carder-bee, but without dark bands across the abdomen and never with black hairs above the wing bases. The body pile of queens is also noticeably shorter, denser and neater making for a very fine-looking insect. In both sexes, the cream-coloured abdomen is often suffused with yellow in fresh specimens. Today this is mainly a species of clover-rich grasslands in coastal districts, especially in the north and west of Britain and it shows no sign of returning to our area. Last recorded at Coombe in 1921.

The Great Yellow Bumblebee *Bombus distinguendus*
Possibly Britain's most striking bumblebee – a bright yellow bee with a single black band across its thorax. It was once widespread but over the past 100 years it has shown a retreat to the coasts and moors of Scotland where it is heavily dependent upon traditional hay meadows with plentiful clovers, knapweeds and bird's-foot trefoils. Last recorded locally at Stoke, Coventry in 1921.

The Short-haired Bumblebee *Bombus subterraneus*
A close relative of the Great Yellow Bumblebee but with queens that resemble pale examples of the Large Garden Bumblebee. However, the face and tongue are shorter, the collar is usually broader and there are usually faint pale bands across the black part of the abdomen. It too was formerly widespread across Britain but declined southwards and was last recorded at Dungeness, Kent in 1988. By 2000 it was officially announced as extinct in Britain, though it is currently subject to re-introduction attempts, using the progeny of British bees that were taken to New Zealand many years ago to pollinate clovers there. Last recorded at Brandon and Ryton in 1921.

The Broken-banded Bumblebee *Bombus soroeensis*
F.W. Morice apparently recorded this bee from Rugby in the late 19th century, but it has not been seen in Warwickshire since and has disappeared from most of lowland Britain. Queens and workers closely resemble the Small Earth Bumblebee, but the yellow band on the abdomen is broken in the middle, and there are a number of other structural differences that can be viewed under a microscope (important as some worn Earth Bumblebees can look similar).

The Shrill Carder-bee *Bombus sylvarum*
A rather unusual-looking bumblebee with a dull orange tail and straw-coloured bands across the thorax and abdomen. There are a scattering of old records for Warwickshire, the last being for Ufton Fields in 1965. It has shown a severe decline nationally with recent records almost entirely confined to the Thames Gateway and coast of South Wales.

Keep an eye out for….

The Northern Earth Bumblebee *Bombus magnus*
This species can only be reliably separated from the Small Earth Bumblebee as a queen. Its queens average larger (about as large as those of the Buff-tailed Bumblebee) and have a much broader, paler yellow collar that extends down the sides of the thorax well below the level of the wing bases. It is mainly a bee of moorland, heathland and upland districts, though it has been recorded at Cannock Chase and some other sites in the West Midlands so it is not beyond the realms of possibility that it might turn up somewhere like Sutton Park or north Warwickshire.

The Cryptic Earth Bumblebee *Bombus cryptarum*
Strictly speaking, you'd need a DNA testing kit to spot this one as it is virtually identical to the Small Earth Bumblebee. It has a more northern distribution but may well extend into our region. Some experts say the yellow collar at the front of the thorax of the queen is narrower and ends in a sort of 'S'-shape in front of the wing bases, though many seemingly genuine Earth Bumblebees exhibit this feature too.

The Mountain or Bilberry Bumblebee *Bombus monticola*
This attractive relative of the Early Bumblebee has never been recorded in Warwickshire but does occur at Cannock Chase not too far from the county

boundary. It is a relatively small fluffy species with a broad yellow collar, a yellow hind fringe to the thorax, and the greater part of the abdomen brightly red-haired. The males have yellow-haired faces. Occasionally males of the Hill Cuckoo-bee can have the abdomen similarly patterned, but they are larger, less colourful, with a squarer head and simple hind legs. This is mainly a bee of upland and moorland districts of northern and western Britain and forages heavily from heathers, Bilberry, bird's-foot trefoils and Bramble.

Bumblebee mimics and look-alikes

Not everything that looks like a bumblebee is actually a bumblebee. The natural world is full of harmless insects that pretend they can sting or are distasteful or harmful in some other way, by looking like something that is potentially dangerous. The best bumblebee mimics in Warwickshire are without doubt certain hoverflies. These include *Merodon equestris* (a garden pest of daffodils bulbs), *Volucella bombylans*, *Criorhina berberina*, *C. ranunculi*, *Eristalis intricarius*, and the rare but particularly convincing *Pocota personata*. Some of these hoverflies don't just look like bumblebees, they fly just like them too, closely resembling workers searching for nests around trees. Most of these mimics have two or more colour forms which enables them to resemble several types of bumblebee.

Examples of hoverflies that mimic bumblebees: left: *Volucella bombylans*; middle: *Merodon equestris*; right:: *Pocota personata*.

There are also a number of solitary bees that can be confused with bumblebees, notably the Hairy-footed Flower-bee *Anthophora plumipes*. The females are all black, whilst the males are mainly beige. They can be very common in gardens in spring, but dart and hover in a manner quite unlike a bumblebee. Some mining bees are fluffy and colourful, but they are much narrower in build than a bumblebee and with very different patterns.

Identifying and recording bumblebees

The photographs at the end of this publication will help you to become familiar with many species in the field, allowing you to submit records to the Warwickshire Biological Records Centre and Bee, Wasp and Ant Recording

Society. However, it is important to recognise that some species can only be identified by examining microscopic features and the male genitalia. This will entail killing and pinning specimens. A good identification key can be found in Prys-Jones & Corbet (2011). For important records or challenging identifications, you may need to submit photos or specimens to experts. The Bee, Wasp and Ant Recording Society (BWARS) has a very useful forum linked to its website for seeking advice from others.

Conserving bumblebees in Warwickshire

Site protection and management

Many important bumblebee sites in Warwickshire receive a level of protection by either being Sites of Special Scientific Interest, Local (County) Wildlife Sites, Sites of Importance for Nature Conservation, Country Parks or Local Nature Reserves. But valuable bumblebee foraging areas can still fall outside of such protected zones, for example certain flowery road verges, allotments, brown-field sites and arable field margins. Careful management can sometimes sustain the value of such areas if the landowners or site managers are aware of the ecological interest and are sympathetic to nature conservation. Many sites in Warwickshire are managed primarily for their biodiversity, notably the reserves of Warwickshire Wildlife Trust.

Southam By-pass which is now being managed for the Small Blue butterfly, indirectly benefiting the Large Garden and Red-shanked Bumblebees which like to forage on the butterfly's foodplant, Kidney Vetch (the yellow flower).

Careful management of woodlands, grasslands and abandoned quarries e.g. Ryton Wood, Ufton Fields and Harbury Spoilbank, can result in fine bumblebee habitat with some of the scarcer species. Recent work by Butterfly Conservation to promote species like the Small Blue, Dingy Skipper and Grizzled Skipper has been especially effective, resulting in new or strengthened colonies of the Large Garden Bumblebee, Brown-banded Carder-bee and Red-shanked Carder-bee. Kidney Vetch, in particular, is a popular forage plant for all three. Much of this has taken place within the abandoned sections of active quarries through the support of quarrying companies such as CEMEX. Private gardens can also play an important role, and the website of the Bumblebee Conservation Trust gives lots of information on what you can do to make your garden bumblebee-friendly.

The final important category of conservation/management is called **agri-environment**. This is the funded management of farmland and other informal green-space for wildlife using various options. Higher Level Stewardship (HLS) in particular has resulted in some fine examples of grassland restoration (from species poor 'improved' grassland to a more floristically diverse and bumblebee-friendly state) and also the seeding of clover-rich margins around arable fields. The latter has been especially important for promoting the Large Garden Bumblebee.

Red Clover-rich arable margins like this one near Shipston-on-Stour can promote strong populations of the Large Garden Bumblebee.

Research and recording

Don't assume we know everything about our bumblebees, and bear in mind that their foraging habits may vary from one part of Britain to another. It is always useful to know what flowers and foraging habitats are being used locally by the scarcer species, but try to separate pollen sources from nectar sources where possible (by checking if pollen is being accumulated on the hind legs). There is also much that needs to be learnt about the nesting habits, especially the most favoured nesting spots for each species. The need to constantly monitor the distribution and frequency of different species to detect any local increases and declines never stops. This will also help to keep the national BWARS/NBN maps up-to-date.

Biodiversity Action Planning
This operates at both a national and local level and sets hard targets for the conservation of key 'priority' species. The national 'UK BAP' currently has action plans for seven bumblebee species, the Large Garden Bumblebee, Brown-banded Carder-bee, Red-shanked Carder-bee, Shrill Carder-bee, Moss Carder-bee, Great Yellow Bumblebee and Short-haired Bumblebee. These action plans can be viewed at:
www.ukbap.org.uk/species

The Warwickshire, Coventry and Solihull Local Biodiversity Action Plan has a specific action plan that covers the Large Garden Bumblebee and Brown-Banded Carder-bee which can be viewed at:
www.warwickshire.gov.uk/biodiversity

Much research of these BAP-priority bumblebees is carried out by the Bumblebee Conservation Trust, the conservation panel called Hymettus, Buglife and some local entomological groups. In Warwickshire, research into the Large Garden Bumblebee and Red-shanked Carder-bee has contributed greatly to more fully understanding the conservation requirements of these two species. Visit the websites of Hymettus and the Bumblebee Conservation Trust to view some of their bumblebee research.

Groups you can join

The Bumblebee Conservation Trust – a national charity devoted to the study, appreciation and conservation of bumblebees:
www.bumblebeeconservation.org.uk

The Bee, Wasp and Ant Recording Society – the national study group devoted to the recording and study of Britain's bees, wasps and ants:
www.bwars.com

Buglife – the national charity devoted to the conservation of invertebrates generally in Britain and heavily involved in bumblebee conservation in areas such as the Thames Gateway:
www.buglife.org.uk

Warwickshire Wildlife Trust – the leading Warwickshire-based nature conservation organisation with many fine reserves that support good bumblebee populations and sometimes the scarcer species.

Viewing existing records, specimens and maps

A dataset of validated bumblebee records for Warwickshire (*sensu* Vice-county 38) up to 2008 is held by the Warwickshire Biological Records Centre (managed by the Warwickshire County Council Ecology Unit). This can be viewed by appointment (01926 418060). No Warwickshire-specific maps are currently available, but the validated Warwickshire dataset has been provided

to the Bee, Wasp and Ant Recording Society and National Biodiversity Network (NBN) for national maps covering each species. These are regularly updated and can be viewed at: www.bwars.com/maps_bees (underscore between maps & bees) or through the NBN website. A fine reference collection of bumblebees, with important voucher material of rare and extinct Warwickshire species, can be viewed at the Herbert Art Gallery and Museum, Coventry, by appointment.

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The Buff-tailed Bumblebee

Top left: typical queen; top right: queen with collar poorly developed; bottom left: worker (notice the buffish zone at the base of the white tail); bottom right: male (notice the black-haired head and buffish base to the white tail).

The Small Earth Bumblebee and Northern Earth Bumblebee

Top left: Small Earth Bumblebee queen (notice the pure white tail and brighter yellow bands compared to a queen Buff-tailed Bumblebee); top right: Northern Earth Bumblebee queen (notice the broader and paler yellow bands, the collar extending far below the wing bases); bottom left: Small Earth Bumblebee worker (compared with Buff-tailed Bumblebee worker the yellow bands are brighter and the white tail is greyish where it meets the black hairs at its base); bottom right: Small Earth Bumblebee male (notice the yellow-haired head and bright yellow bands compared to male Buff-tailed Bumblebee).

The Small Garden Bumblebee

Top left: typical queen (notice how the middle yellow band occupies the rear of the thorax and the base of the abdomen unlike the previous species); top right: typical worker, which resembles a small queen; bottom left: typical male; bottom right: semi-melanic male, showing the fluffier appearance compared with black males of the next species.

The Large Garden Bumblebee




Top left: a pale queen, they vary from this state to entirely black (notice how the base of the abdomen is entirely black unlike the previous species, plus the browner bands); top right: a typical banded worker, these also vary from this state to entirely black (the collar is typically narrower and darker than the previous species and the body pile shorter and neater); bottom left: typical banded male (notice the neat body pile, very well defined and deeper-yellow bands and yellowish-white tail); bottom right: a fully melanic male, showing the very neat pilosity that creates a velvety appearance. This is the only social bumblebee that regularly produces all black individuals.

The Early Bumblebee

Top left: typical queen; top right: male, this one with a very well-developed yellow band at the base of the abdomen – this can be more weakly developed in other males; bottom left: worker showing a strongly developed yellow band on the abdomen; bottom right: worker without a yellow abdominal band.

The Tree Bumblebee

Top left: typical queen, the thorax can be darker in some specimens; top right: male, the orange hairs at the base of the abdomen can be more extensive in some specimens; bottom left: typical worker; bottom right: a darker worker (some can have the thorax entirely black).

The Heath Bumblebee


Left: queen, which resembles a smallish, fluffy Small Garden Bumblebee but with a very short face and pale-haired pollen basket on the hind legs; right: male, showing the conspicuously yellow-haired head and face. Workers resemble small queens.

The Red-shanked Carder-bee


Left: queen, which is smaller, rounder and fluffier than those of Red-tailed Bumblebee and with a red-haired pollen basket on the hind leg; right: male, showing a weak greyish collar and band across the base of the abdomen, features which can be stronger in some specimens or entirely missing in others. Workers resemble small queens.

The Red-tailed Bumblebee and Shrill Carder-bee

Top left: Red-tailed Bumblebee queen (notice the very neat, deep black fur and deep crimson tail); top right: typical male, some can have more extensive yellow at the rear of the thorax, others can be somewhat darker; bottom left: worker (notice the entirely black-haired pollen basket). Bottom right: Shrill Carder-bee, present in Warwickshire until the 1960s (image courtesy of British Bumblebee Conservation Trust).

The Common Carder-bee

Top left: typical queen, the thorax can be darker in some specimens (notice the bands of black hairs on the abdomen); top right: an exceptionally pale queen, which could easily be mistaken for a Moss Carder-bee (but it is smaller, fluffier and with the paler sides of the thorax less conspicuous); bottom left: typical worker, though they are highly variable; bottom right: a typical male, these are also highly variable. The Brown-banded Carder-bee and Moss Carder-bee never have any black hairs on the abdomen.

The Brown-banded Carder-bee and Moss Carder-bee

Top left: Brown-banded Carder-bee queen (notice the very obvious brown band across the base of the abdomen and the very pale sides of the thorax); top right: worker, this one showing a second brown band on the abdomen; bottom left: male, patterned much like the females. Bottom right: Moss Carder-bee male showing the complete lack of any banding on the abdomen and the yellowish tinge that is characteristic of very fresh specimens.

The Vestal Cuckoo-bee and Bohemian Cuckoo-bee

Top left: Vestal Cuckoo-bee female (notice the brownish collar and bright yellow patches at the base of the white tail - but note that these features fade in old specimens); top right: semi-melanic females are not uncommon; bottom left: typical male, showing the very bright yellow ring at the base of the white tail. Bottom right: Bohemian Cuckoo-bee pinned female above a pinned Vestal Cuckoo-bee female showing the paler collar, paler yellow patches at the base of the white tail, and a less velvety-black appearance. Males have a very pale yellow band at the base of the white tail, but faded Vestal Cuckoo-bees look very similar so you will need to examine the genitalia of a pinned specimen to be certain of which species you have.

The Barbut's Cuckoo-bee

Left: female showing the pure white tail, broad buff collar and large patch of buff hairs at the rear of the thorax; right: male, showing the conspicuously yellow-buff band across the rear of the thorax and base of the abdomen (giving an appearance much like males of the Small Garden Bumblebee).

The Four-coloured Cuckoo-bee

Left: typical female showing the pure white tail, broad buff collar but lack of buff hairs at the rear of the thorax; right: typical male, showing the broad yellow collar, weak yellow band across the base of the abdomen and the black-then-red tip to the white-tailed abdomen. Males are rather variable and can have the white tail hairs replaced by yellow. Partially- or fully-melanic males are frequent.

The Hill Cuckoo-bee

Top left: female which superficially resembles a Red-tailed Bumblebee (but notice the narrow build, box-shaped head and very dark wings, and often very large in size); top right: a male with a bright red tail but otherwise black; bottom left: a male with extensive pale banding and an orange tail; bottom right: a fully-melanic male - seemingly quite rare but only distinguishable from other black male cuckoo-bees by checking the genitalia.

The Field Cuckoo-bee

Top left: typical female (notice how the beige hairs of the tail are restricted to the sides); top right: a variety of the male with a bright beige tail; bottom left: a very pale male with the abdomen almost entirely pale-haired; bottom right: another very pale male but with a white tail (looking rather like Barbut's Cuckoo-bee). All-black males are also frequent and can only be distinguished from other black male cuckoo-bees by checking the genitalia.