SOCIAL WASPS Vespidae. Eyes deeply notched or crescent-shaped. Wings folded longitudinally at rest, with most of abdomen exposed from above. Prothorax reaches back to tegulae. Middle tibia has 2 spurs. Insects live in annual colonies, each founded by a mated female (queen) in spring. Nests are built of paper, which wasps make from wood. A few hundred to several thousand female workers are reared in summer; always smaller than queens. Males appear in late summer: most often seen on flowers. They have longer antennae than females 13 segments compared with 12; base of antenna usually yellow beneath in males but yellow or black in females. Adults feed mainly on nectar and other sweet materials. Young reared mainly on other insects collected by workers. The colony disintegrates in autumn and only mated females survive the winter. Some species, known as cuckoo wasps, have no workers: they lay their eggs in the nests of other wasps. The following notes refer only to females: male patterns are more variable.

- **Common Wasp** Vespa vulgaris. Face usually with anchor mark: malar space (between bottom of eye and jaw) very short; Antennae black at base. Vertical yellow line behind eye broken by a black patch. Thoracic stripes parallel-sided, 4 yellow spots at rear of thorax. Nests in hollows in ground or buildings: paper yellowish and formed into shell-like plates on outside.
- **German Wasp** V. germanica. Face with 3 dots: malar space very short. Antennae black at base. Vertical yellow line behind eye complete. Thoracic stripes usually blurred in middle. 4 yellow spots at rear of thorax. Needles like that of vulgaris but greying.
- **Red Wasp** V. rufa. Face with thick vertical line, sometimes forming anchor-like mark: malar space very short. Antennae black at base. Only 2 yellow spots on thorax. Tibiae without long hairs. 1st abdominal segment with long black hairs and often dull red. Subterranean nest covered with more or less smooth sheets. All Europe, but rare in S.
- **Dolichovespula media.** Face with slim black bar: malar space long (nearly as long as distance between antennal bases). Antennae yellow at base. Eye notch completely filled with yellow. Thorax often tinged red, especially on female and with 4 yellow or chestnut spots at rear. Abdomen, often tinged red, with very variable amount of black. Nest hung in bushes and clothed with smooth sheets. Recently established in SE England and spreading rapidly.
- **D. saxonica.** Like Norwegian Wasp but face bar often irregular. Thorax with pale hairs at sides. Abdomen never red. Thorax with black hairs at sides. Abdomen yellow at base. Thorax with black hairs at sides and 2 yellow spots at rear. Abdomen often tinged red, with very variable amount of black. Nest in bushes and clothed with smooth sheets. Recently established in SE England and spreading rapidly.
- **D.媒体.** Like Norwegian Wasp but face bar often irregular. Thorax with pale hairs at sides. Abdomen never red. Thorax with black hairs at sides. Abdomen yellow at base. Thorax with black hairs at sides and 2 yellow spots at rear. Abdomen often tinged red, with very variable amount of black. Nest in bushes and clothed with smooth sheets. Recently established in SE England and spreading rapidly.
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BEES A very large group of hymenopterans feeding on pollen and nectar. Although several families are mentioned on the following pages, the current trend is to put all the bees into a single family – the Apidae. The pronotum does not extend back to the tegulae (p. 218) and the body is generally rather hairy – an adaptation to pollen-gathering. Pollen is often carried back to the nest attached to the broad and hairy hind legs, among the honey bees and bumble bees, the hind tibiae are fringed with stiff hairs that form distinct 'baskets'. Some bees carry their pollen on the underside of the body. Only females are equipped for carrying pollen. Important features used in the classification and identification of bees include the sub-marginal cells (p. 218) and the form of the tongue. The latter is short and broad in Colletidae and Hylaeus, but otherwise pointed and quite long. Unless otherwise stated, all the bees described here are solitary species.

**Colletidae**, 3 sub-marginal cells. Tongue short and broad. 7½ ground-nesting in sandy areas. One of several similar species with bands of pale hairs on abdomen. Thoracic hairs paler in male.

**Hylaeus signatus**, 2 sub-marginal cells. Tongue short and broad. Face almost entirely white in male: white spotted in female. Almost nowhere: pollen carried in crop. Abdomen very parallel-sided, especially in male. 6-8 on bramble and umbellifers: nests mainly in sandy banks. S & C one of several similar species.

**Andrena**, 1 sub-marginal cell. Tongue short and pointed. Oftten dark, black and hairy in male. Andrenidae. A large genus with many species superficially like honey bees. Abdomen often rather flat. 3 sub-marginal cells. Tongue short and pointed, often brown or black and hairy in male. Abdomen very parallel-sided, especially in male. 6-8 on bramble and umbellifers: nests mainly in sandy banks. S & C one of several similar species.

**Panurgus banksianus**, 2 sub-marginal cells. Tongue short and pointed. Abdomen with black hair in male, brown in female. Lasioglossum calceatum. One of the earliest spring species - on blackthorn, dandelions, and sallows. Female has white face: male has pale brown face and yellowish tip to abdomen. N & C.

**A. hattorfiana**, 2 sub-marginals. Tongue short and pointed. Abdomen with white pollen brush on hind legs. 3-5 and sometimes again 7-8: mainly on cineraria. Male has white pollen brush on hind legs. 0.5 male has paler hair on thorax. S & C.

**A. pilipes**, 2 sub-marginals. Tongue short and pointed. Female has white pollen brush on hind legs. 3-5 and sometimes again 7-8: mainly on cineraria. Male has paler hair on thorax. S & C.

**A. florea**, 2 sub-marginals. Tongue short and pointed. Male has white hair on thorax.

**A. hylaeus**, 3 sub-marginal cells. Tongue short and pointed. A cuckoo bee, laying eggs in nests of Lasioglossum xanthogrammum. Body a hairless, for it collects no pollen. One of several similar species, some with dark wings and almost all with entirely black antennae. Flies late summer: mated females again in spring with host. S & C.

**A. marginata**, 3 sub-marginal cells. Tongue short and pointed. Male narrow, with more red on abdomen. Both sexes often with tufts of white hair. Usually nests in steep banks. S & C. L. malchearus resembles xanthogrammum but has paler hair. S & C. L. smeathmanellum is metallic bronze or bluish green: male has less bright abdomen. This genus is ground-nesting, with flight times as in Halictus. Some species are sub-social, like some Halictus species.

**Sphexodes spinulosus**, 3 sub-marginal cells. Tongue short and pointed. A cuckoo bee, laying eggs in nests of Lasioglossum xanthogrammum. Body a hairless, for it collects no pollen. One of several similar species, some with dark wings and almost all with entirely black antennae. Flies late summer: mated females again in spring with host. S & C.
**Anthidium florentinum** Megachilidae. 2 sub-marginals. Tongue long and slender. Distinctive from most of its relatives by yellow or brick-red thoracic borders. Flies all summer and nests in holes in ground, trees or walls. Nest lined with hairs plucked from plants. In all members of this genus, males are noticeably larger than females. S. & C. (Southern).

A. manicatum has thorax almost entirely black; 6-6. Nests in pre-existing holes in tim­ber or masonry; lined with plant hairs carried back in a ball under the body.

A. variegatum has thorax bordered with yellow and legs entirely yellow. Nests like *manicatum*, S. & C. (Southern). There are about 30 similar species in Europe, some using plant hairs to line their nests and some using resin from conifers. Only *manicatum* occurs in B.

**Stelis punctulatissima**. 2 sub-marginals. Tongue long and slender. A cuckoo species, with very little hair. Invades nests of *Osmia* and *Anthidium* species. Pale rear margins of abdominal segments distinguish it from the very similar *S. phaeoptera*.

**Chelostoma campanularum**. 2 sub-marginals. Tongue long and slender. A very slender, fly-like bee specialising in Campanula flowers. Female has dense orange pollen brush on underside of body. Nests in woodworm holes and other minute holes. Cannot turn round in burrows; backs in to off-load pollen but enters head-first to diggigage nectar. 6-6.

C. floriscens is larger and female has creamy pollen brush. Male face with long pale hairs. Feeds mainly at burdock; 6-6. Often nests in hollow stems, including straw and reeds of thatch. Males of both species often curl up in flowers at night.

**Osmia rufa**. 2 sub-marginals. Tongue long and slender. Male much smaller than female but with much longer antennae. Male face clothed with pale hairs. Female face has black hair and a pair of short horns below antennae. Abdominal hairs denser in both sexes, often in walls. Cells made with mud. There are many similar species.

**Hoplitis spinosa**. Resembles *Osmia* species, but thoracic punctures are elongate instead of round (not easy to see). Female has brick-red pollen brush under abdomen. Nests in empty snail shells, using dung for cell partitions. 4-7. S. & C.

**Chalicodoma parietina**. 2 sub-marginals. Tongue long and slender. Male has broader body and lacks dark wing colour; 4-6. Building small clay nests attached to stones, sometimes in large groups. S. & C. There are several similar species, some building clay chambers in hollow stems.

**Macrospora europaea**. 2 sub-marginals. Tongue short and pointed. Thorax bordered by longer hairs in male, which also has long, curved hind legs; female hind tibiae with pale yellow pollen brush. 7-8. Feeding mainly on yellow loosestrife. Nests in ground and lines burrows with sticky sap of food-plant.

**Megachile maritima**. 2 sub-marginals. Tongue long and slender. Head relatively broad. Front of abdomen scopped out on dorsal surface; each segment with an entire pale terminal band. Female less brightly coloured and without dilated front leg; she has a dense pollen brush under abdomen – white at front and orange to black at rear. One of several species known as leaf-cutter bees because females cut oval and semi-circular pieces from leaves and use them to form sausage-shaped nest cells in plant stems and other crevices. 6-8. Mainly coastal.

M. centuncularis female has a bright orange pollen brush under abdomen. Commonest of the leaf-cutters, it often attacks garden roses. 5-8. Usually nests in wood.

**Dasypoda alteroctor** Melitididae. 2 sub-marginals. Tongue pointed. Hind legs with conspicuous golden tuffs in female; male legs all clothed with dense yellow hair. Male also has thick yellow hair on face. Abdominal hair yellower than in female. 6-8, nesting in sandy soil. Mainly coastal in B.

**Melitta haemorrhoidalis**. 3 sub-marginals. Tongue pointed. Male with longer and paler hairs on both thorax and abdomen. Resembles *Andrena* (p. 244) but tongue somewhat longer, 6-6, mainly on clover or grass. Very common feeding at harelips. There are several similar species.

**Coelioxys inermis**. 2 sub-marginals. Tongue long and slender. One of several similar species with tip of abdomen pointed in female and spongy in male; no pale band on hind margin of 6th abdominal segment in this species. A cuckoo species laying eggs in nests of *Megachile* species. Coelioxys egg hatches first and grub destroys rightful egg. 8-8.
Nomada fulvicornis. Anthophoridae. 3 sub-marginals. Tongue very long and slender. Male antennae very long and slender. Extreme sexual dimorphism: female is jet black except for rust-coloured pollen brushes on hind leg, while male is brownish-black. Male has prominent fans of hairs on middle leg. Resembles bumble bees (p. 250), but eye reaches down to meet the jaw (left). Much quicker in flight than bumble bees, with much higher-pitched flight tone. Hovers well. 3-6. Very common in gardens, where food of long- and other tubular spring flowers. Nests in ground and in soft mortar of walls. There are several similar species. A. retusa has only basal part of abdomen clothed with brown hair on male, and no fans of hair on middle leg. A. i.abantia flies 1-3 in SW, nesting in sandy ground.

Melecta luctuosa. 3 sub-marginals. Tongue long and slender. 4-6, breeding as cuckoo in nests of Anthophora species. Absent from far north and possibly extinct in B. A. albifrons is very similar but has much smaller pale spots on abdomen and brownish hairs on thorax. It is also a cuckoo in the nests of Anthophora species.

Tetralonia salicina. 3 sub-marginals. Tongue long and slender. Male antennae very long, as in Eucera. 3-6, feeding mainly at flowers of purple loosestrife, occasionally at viper's bugloss and wild thyme. Loc. in S & C.

Xylocopa violacea. Xylocopidae. Readily identified by its colour, this handsome bee flies in summer and autumn and again in spring after hibernation. Hind tarsus especially hairy in female; male has brush-like tuft on front tarsus. Fast flying, but not aggressive and rarely stings. It nests in dead wood, hence its common name of carpenter bees. The cell partitions are made of chewed wood fragments. S & C: vagrant to B.

Honey Bee. Apis mellifera. Apidae. 3 sub-marginals. Apical cell slender and very long, reaching almost to wing-tip. Tongue long and slender. A social bee living in permanent colonies of perhaps 50,000 individuals. Native of southern Asia, but long established in Europe - in the wild as well as in domestic hives. The queen, who rules the colony, is rarely found outside the nest except when on her mating flight or when the bees are swarming, and in the latter instance she is completely surrounded by a mass of workers. The latter make up the bulk of the colony and forage from early spring to autumn. Drones (males) are plumper and appear mainly in early summer. There are several distinct strains or races of honey bees, some almost black and some with an extensive orange patch at the base of the abdomen. The Italian race, now common all over Europe, has a very marked orange patch. The strains hybridise very easily, however, and wild bees combine the features of many different strains. Wild colonies usually build in hollow trees and similarly protected situations, but occasionally build in the open. The nest consists of several wax combs, suspended vertically - not horizontally like the wasps' combs - and without a protective envelope. Each comb consists of hundreds of 6-sided cells that are used for rearing the brood and for storing honey and pollen. New queens are reared when the old queen gets too old for the job and also when the colony becomes overcrowded. In the latter instance, the old queen flies off with a swarm of workers to start a new colony. The workers fall behind and enlarge selected cells on the comb and, by special feeding of the young grubs already in those cells, they produce new queens, one of which will eventually take control of the colony.
BUMBLE BEES

**Apidae.** Relatively large and very hairy social bees of the genus *Bombus,* readily distinguished from *Anthophora* because the eyes do not reach down to the jaws (p. 240). The bees form annual colonies, with only mated queens surviving the winter to start new colonies in the spring. The nest may be under the ground—often in an old mouse hole—or among the bases of tall grasses, especially on sunny banks. The nest is essentially a ball of grass and moss with wax cells inside it. The young are reared on pollen and nectar, the pollen being carried home in large pollen baskets on the back legs.

Some early spring workers are very small and it is hard to believe that they belong to the same species as the queens, but later workers are much larger as a result of better food supplies. Males, recognizable by their longer antennae, appear in summer. The bees illustrated here are all queens; workers and males are basically similar unless otherwise stated but the identification of all castes is complicated by marked regional colour variations. Some northern species produce very few workers—e.g., none at all in the Arctic—because the short summer season in the far north simply does not allow time to build up a colony.

*B. lapponicus.* Very variable, with several sub-species. May have greyish yellow collar and scutellum. Abdomen almost entirely reddish, but yellow hairs often mingle with the red ones towards the rear. Nests on or just under the ground; few workers. Confin ed to northern Scandinavia, where often the dominant species, and high mountains.

*B. saundersi.* Typical sub-species (B. s. saundersi) has collar and 2nd abdominal segment yellowish and tail white. Male has 1st abdominal segment yellowish as well. Nests underground. The subspecies B. saundersi, not found in B. s. lapponicus, is all black with an orange tail. Both subspecies are widely distributed on the continent, where they overlap and interbreed to produce numerous colour varieties.

*B. jonellus.* Generally has yellow hairs on top of head. Collar, scutellum, and 1st abdominal segment yellowish; tail white. Pollen basket reddish. Like a small *B. hortorum* but face is shorter and rounder. Mainly on coasts and heatherland.

*B. monticola.* A relatively large bee with collar, scutellum, and 1st abdominal segment yellow: tail white. A rather 'scruffy' species with long hair. Pollen baskets black. Abundant everywhere; especially common in gardens. Usually nests on or just under the ground.

*B. ruderatus.* Often similar to *B. lapponicus,* but yellow bands often narrower and darker and sometimes absent altogether. 1st abdominal band commonly broken. Hair generally shorter than in *B. lapponicus.* Wings sometimes very dark. Nests underground. Much rarer than *B. lapponicus* and absent from far north.

*B. hypnorum.* Identifiable by entirely rich brown thorax and white tail. Front of abdomen may be black. Nests in hollow trees and other cavities above ground. In wooded areas in most parts of Europe.

*B. subterraneus.* A large, short-haired bee with a dull yellow collar and very narrow yellow band on scutellum: both bands may be much reduced. Tail off-white. Rear edges of abdominal segments often with brown fringes. Males largely greenish brown, or brownish yellow with black bands. Nests below ground. Believed recently extinct in B. hypnorum.

*B. lucorum.* Collar and 2nd abdominal segment lemon yellow: tail white. Male may have yellow scutellum as well, and other yellow bands may be extensive. A very early bee, abundant almost everywhere. Nests below ground.

*B. terrestris.* Collar and 2nd abdominal segment orange yellow: tail white. Male may have yellow scutellum as well, and other yellow bands may be extensive. A very early bee, abundant almost everywhere. Nests below ground.

*B. pratorum.* A relatively small bee with collar and 2nd abdominal segment yellow (sometimes interrupted): tail orange-red. Coat rather shaggy. Worker may lack yellow on abdomen. Male has wide yellow collar and more yellow on abdomen. An early bee. Colonies often finished by end of July, although sometimes a 2nd brood. May nest well above ground—in birds' nests and nest-boxes, for example.

*B. monticola.* Collar and scutellum usually pale yellow, but scutellum may be black; thorax occasionally black. Abdomen largely red, becoming more orange towards the rear. Mountain and moorland mainly northern.

*B. confusus.* Short-haired with ovate or hummed thorax. Tail red and rather pointed. Male has very large eyes and greyish hairs on prothorax. S & C.

*B. pomorum.* Red tail has pinkish tinge. Male has yellowish grey collar and scutellum, with abdomen mainly red. Sandy areas.