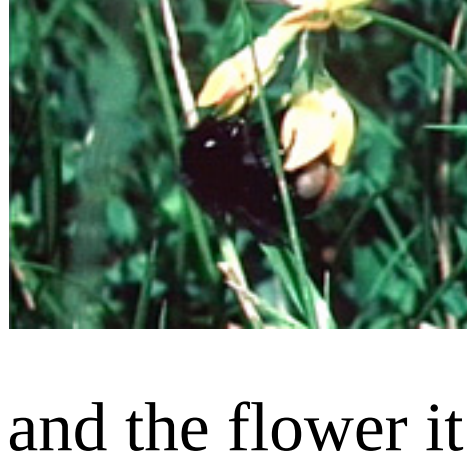


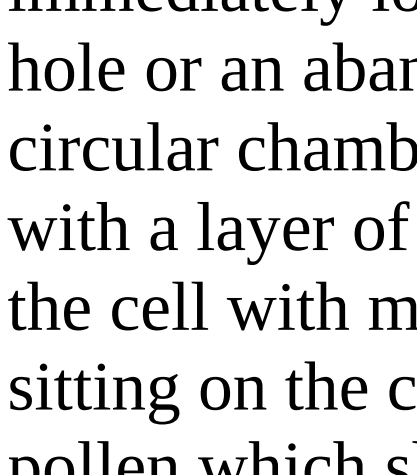
BEES, WASPS, GALLS,

BEES



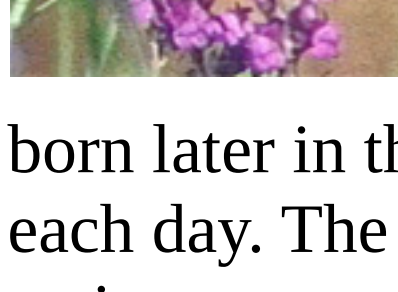
There are 250 species of be in the UK, ranging from solitary to highly specialised social bees, bumble bees and honey bees. Bees feed from flower nectar and the length of a species tongue and the flower it feeds from have evolved together, the plant needing the bees as a vehicle for pollination. In social bees the queen starts the nest in the soil and lays her eggs. The bees hatching a few weeks later are all female, who enlarge the nest, building cells for the queen to lay more eggs , to hatch into more worker females. In late summer eggs laid, which hatch as males and females, are well fed and grow large, to become, after mating, the females that overwinter to become next years queens. Solitary bees, like the mason and leaf cutter bees, make their nests in holes in wood and gaps in walls. Leaf cutters cut pieces of rose leaf, which they collect in their mandibles and fly away with the leaf tucked beneath their body. They place a supply of honey and pollen on the leaf before laying a single egg. Mason bees build their nests from mud in the gaps in walls.

BUMBLE BEE



Social animals living in colonies, built each year in spring and dying with all the worker bees in autumn. The young mated queens hibernate overwinter a few inches below the surface of the soil to emerge in the spring. She immediately looks for a suitable site to nest, a leaf filled hole or an abandoned mouse nest. She then builds a circular chamber, 3 cms in diameter, lines the chamber with a layer of wax and lays ten or more eggs and seals the cell with more wax. She then incubates her eggs, sitting on the cell to keep it warm and bringing nectar and pollen which she stores for when the eggs hatch. The eggs hatch after 5 days to feed from the stored pollen, growing quickly, moulting several times, then spinning silken cocoons around themselves and pupate inside them. The queen then removes the wax around the cocoons and starts to build new cells. After 2 weeks the young bees know their way out of the cocoons, all female, worker bees who will keep the queen supplied with food as she lays more eggs. Bees collect food by pushing their long tongues deep inside flowers gathering the flower's nectar, their wings beating at 130-240 times a second, giving a familiar humming sound, while the hairs on their bodies brush masses of pollen from the flower stamens. The pollen is held on the bees back, carrying 20 percent of its own weight, pushed back and stored in a basket one of the hind legs. As the bee moves from plant to plant pollen is deposited on the visited plants starting the reproductive process. Nectar is held in the bees stomach. Nectar and pollen is brought back to the hive to feed the queen. The colony grows over the summer to several hundred worker bees. Towards the end of the summer the queen a number of unfertilised eggs which develop into drones who will mate with the queens, whose eggs develop into new queens, up to 200 in a large nest. The young queens and drones disperse in late summer to mate with bees from other colonies, when the new fertilised queens will go into hibernation to the following spring. The old queen and all her worker bees die with the winter.

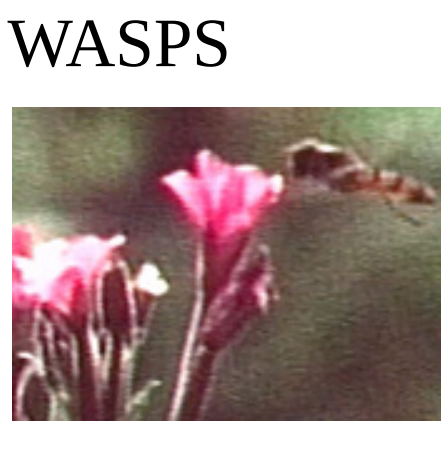
HONEY BEE



Social insects living in colonies of around 80,000 individuals, headed by a fertilised queen. All the bees are her offspring, most female worker bees, and a few male bees born later in the year. The queen lays eggs, over 1000 each day. The workers do the nest building and maintenance, food collection and looking after the young. The male drones mate with new queens in the autumn.. The nest is built in a hollow tree or a cave, made of wax produced by the workers. Combs are constructed within the nest. vertical sheets, covered on both sides with hexagonal cells stored with larvae and honey. The queen drops a single egg into each cell. Egg laying starts in spring, eggs hatching after three days and then given constant attention by the worker bees, receiving 30 feeds of royal jelly, a protein rich fatty material, a day. Larvae destined to become future queens are fed this mix for 5 days, the diet of larvae that will become workers is changed to honey and pollen after 3 days. After 5 days the cells are capped with a brownish wax, in which the larvae pupate for another 8 days, the workers emerging to take their place in the work chain, building cells, feeding young, foraging for food. Chemical messages are passed through the colony through the transmission of pheromones. The queen produces pheromones through glands around her mouth, which she transmits to taken the workers who follow and feed her, and to the newly emerged laval bees, to go out and forage. Worker bees indicate to each other where the best places are to forage. They do this by dances, the round dance, turning clockwise and anticlockwise , to indicate a food source near the nest, and the waggle dance, a figure of eight dance followed by a straight run to indicate a food source further away. The direction of the straight run and its length tell the direction of the food and how far away it is.

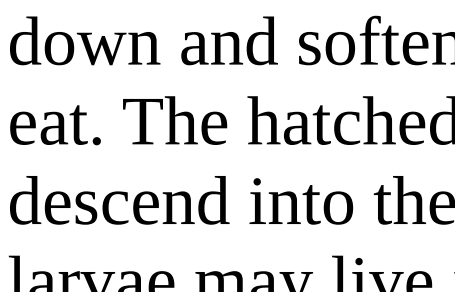
The colony is permanent, numbers increasing in in summer and falling in autumn. Workers born in the spring and summer live for a month, Those born in autumn live through the winter. Queens head the colony for 2 or 3 years. When the queen is ageing preparations are made to form a new colony. The workers first build several special cells, from one of which the new queen will emerge. The old queen flies off with a group of workers to find a suitable place for a new hive. They form a swarm while workers search for the prospective site. Once found the swarm moves in, and builds a new colony led by a new queen. In the meantime the old colony will have been taken over by a new queen who will have been inseminated by the several male drones in the short flight she takes away from the nest, fertilising thousands of eggs she will lay over the next few years.

WASPS



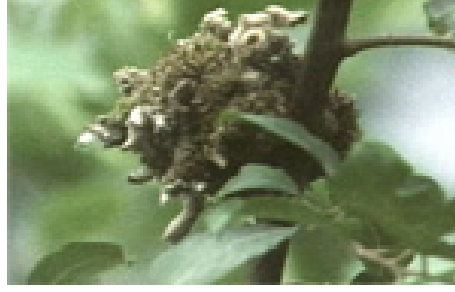
Social wasps live in annual colonies headed by a fertilised queen. They find different spaces to build their nests, depending on the species, in hollow trees, on bushes and underground attached to roots. The fertile queen wakes from overwinter hibernation in early spring to seek out a site to build her nest, laying her eggs as she constructs her nest. The eggs hatch 5-6 days later with the queen bringing nectar to feed the larvae. After 2 weeks, the larvae now fully grown, spin a silk roof and lining to the nest. The pupae emerge as adult wasp after another 10 days, all females, who take on the task of constructing cells for the queen to continue laying eggs. The nest will grow to 25 cms in diameter housing 10,000 cells. In late summer the wasps build larger cones at the bottom of the nest to house the new queens. These are fed with larger amount of more nutritious food, chewed insects and fruit, nectar from flowers, honeydew from aphids. Males are born at the same time who will mate with the queens as they emerge in late August. The pregnant queen looks for a safe, insulated place to hibernate. With the dispersal of the new queens the old nest begins to disintegrate. the old queen dies and the worker fly away.

WOOD WASP



Unlike wasps wood wasps do not sting or bite. They are in flight from July to September, seeking out a mate and laying their eggs. They inject their eggs into the trunk of trees. A fungus injected with the eggs breaks down and softens the surrounding wood for the larvae to eat. The hatched larvae eat the soft wood and then descend into the tree to feed from the harder wood. The larvae may live in the tree for up to two years before spinning a silken cocoon near the bark of the tree to guarantee an easy exit when it emerges as an adult.

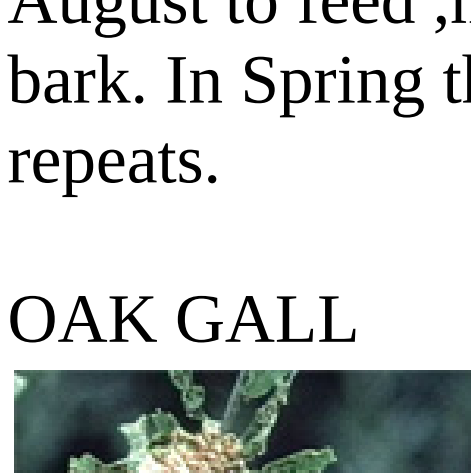
GALLS



A gall is a growth of plant tissue that develops in reaction to the fluid protecting the eggs injected into the plant by an insect usually a wasp, sawfly or aphid. The gall provides a safe place for the eggs to hatch and the larvae to feed and pupate. There are a variety of galls. The pincushion gall containing as many as 60 larvae, each protected in its own chamber. Bean galls, 1cm long on the surface of willow leaves, laid by a sawfly. Midges lay their eggs on bramble and hawthorn buds, the eggs developing into lumpy swellings on the leaves. The hatched larvae feed on a fungus laid with the eggs, overwintering in the gall to emerge the following spring. Fruit flies lay their eggs on the stems of creeping thistles, the galls becoming hard and woody in autumn as the larvae pupate inside.

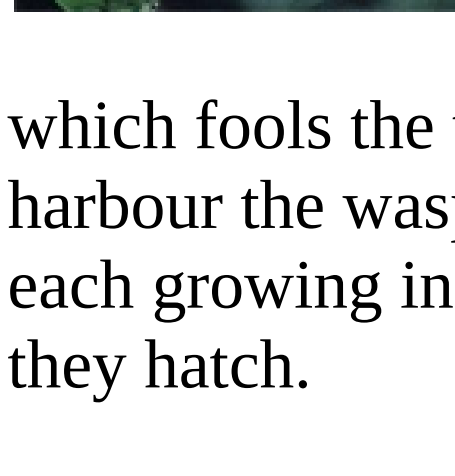
Aphids have a complex life cycle. In spring newly hatched female aphids pierce the leaf stalk of a poplar tree to feed on the sap. The plant cells grow to enclose the insect in a pouch like gall, in which the aphid lays her eggs. Her offspring, more female aphids, leave the gall in August to feed ,mate and lay their eggs in the poplars bark. In Spring the midges emerge and the process repeats.

OAK GALL



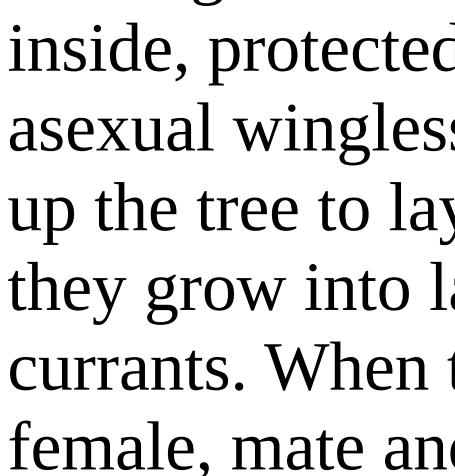
30 different species of wasp lay their eggs on the oak tree, producing different shaped growths known as galls. Eggs are laid on bud or leaf, along with a fluid imitating the oaks own growth hormone which fools the tree to expand and multiply cells to harbour the wasp eggs. The eggs develop into larvae, each growing in a separate chamber within the gall, until they hatch.

SPANGLED GALLS



Galls that resemble red currants appear in spring on oak catkins. In June winged male and female wasps emerge from the galls and mate, with the female then laying eggs on the underside of the oak leaf, each egg forming a spangled gall, as many as 50 on one leaf. These galls fall to the ground and the grubs overwinter inside, protected by layers of dead leaves, to emerge as asexual wingless females next spring. The females crawl up the tree to lay their eggs in the oak catkins which when they grow into larvae develop the galls that look like red currants. When these larva hatch they emerge as male and female, mate and lay their eggs, producing the spangled galls, repeating the cycle.

OAK APPLE



After mating in summer the winged cynipid wasp burrows down to the roots of the oak to lay her eggs. The larvae do not mature until the autumn or winter of the following year, when asexual wingless female wasps emerge to climb up the tree to lay eggs in the dormant buds. The buds containing the galls swell up in spring to produce soft spongy oak galls, containing chambers where the wasp larvae develop to emerge as adult wasps in late summer.