

information on the environment  
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## Honeybees: Interesting facts

Briefing Sheet 32

☞ The Honeybee belongs to the insect order Hymenoptera, which order contains many thousands of species of bees, wasps, ants and many groups of parasitic insects. ☞

The bee has been known to the human race for many thousands of years. There is a very old educational painting in a rock shelter in Spain depicting bees. Stone Age man ate honey which he stole from the nests of wild bees. Bees were first kept by man in hollow logs with sticks to support the honey combs. Later man kept bees in straw baskets called 'skeps' and today, bees are kept in standard hives. There are about 10,000 species of bees which roughly are divided into two main groups: Social Bees that live in colonies and Solitary Bees that live alone.

**Honeybees** are social insects. They live and work together in large groups. They form a colony (group) which consists of:

- A **QUEEN** (the reproductive female)
- The **WORKERS** (infertile females) numbering about 10,000 in winter and increasing to about 60,000 in mid summer
- **DRONES** (male bees) numbering 200 - 1,000 approximately and are present in the colony mainly during the summer months.

The **QUEEN** honeybee lays the eggs that hatch into thousands of young bees. Laying eggs is the queen's only function, she does not gather food or build



Worker



Drone



Queen

Three kinds of bees make up a honey bee colony. The colony consists of thousands of workers, one queen and a few hundred drones

honeycomb. Queens can live for 3 - 4 years and may lay up to 2,000 eggs per day at a peak time. The queen has a smooth curved sting which she uses only to kill rival queens.

The **WORKERS** do all the work in the colony. They live for about 6 weeks in summer and up to 6 months in winter and early spring. All worker bees are females (infertile) and are smaller than the queen. The young worker bees remain in the hive for two weeks where they are involved in cleaning empty cells, caring for the young, building comb and processing the incoming nectar. When the worker is 10 - 14 days old, it flies to the field where it forages, collecting nectar, pollen and water and then returns to the hive. Some worker bees perform guard duty at the hive entrance defending the hive against strangers; other workers at the entrance fan fresh air into the hive and force out stale air. The movement of the workers' wings help to produce enough heat to keep the colony of bees at an even temperature. The sting of a worker bee is straight, with barks or hooks on it. Bees depend on their sting as their only means of self defence and will only sting when they feel they are under threat.

**DRONES** are the male honeybees and are large burly clumsy creatures with hairy bodies and large eyes. They develop from unfertilized eggs and their only function is to mate with young queens. After mating the drones die. They have no sting and are unable to defend themselves against workers who ruthlessly force them out of the hive when there is a scarcity of food and at the start of the winter period.

### ☞ BEE LARVAE ☞

Bees like other insects are produced from eggs. The queen lays one egg in each cell of the comb. The eggs are very small, pearly white, visible to the naked eye. After three days a tiny wormlike larva hatches from each egg. It is fed for three days on food produced from the head glands of the worker bees. When the larva is three days old, it is fed a mixture of honey and pollen. Five days after the larvae hatches, the worker bee builds a wax cap over the cell. In it's sealed cell the larvae changes into a pupa, then the pupa develops into an adult bee. The adult worker bee bites it's way out of the cell 21 days after the egg is laid. The drone takes 24 days and the queen 16 days.

## ☞ HONEY - WHAT IS IT ☞ AND HOW IS IT MADE?

From the human point of view, honey is the prime product of the honeybee. Honey is a foodstuff, which is produced by the honeybee from the nectar of blossoms, which bees collect, transform, combine with specific substances of their own, and store and leave in honeycombs. Bees use the honey to feed the larvae during the winter. Flowers have special glands called nectaries that produce nectar. Nectar is the sweet liquid which plants produce to attract insects for pollination. It consists of sugars dissolved in water. Honeybees suck up nectar from the nectaries of the flower with their long tongues and store it in their honey sacs. When the honeybee has filled its honey sac with nectar, it returns to the hive. In the hive the bee regurgitates the nectar and passes it to the other bees who put it in an empty cell in the hive for use as needed. While the nectar is in the bee's honey sac, it combines with enzymes. In the honey comb the water evaporates and the chemicals from the bee change the nectar into honey. When the honey is ripe the bees seal it into the cells by putting wax caps on the honey filled cells.

Honey is presented in many forms:

- **LIQUID HONEY:** this honey is extracted from the combs and is sold in glass jars. It is available in many different colours depending on the flowers used by the bee.
- **COMB HONEY:** is honey stored by bees in the cells of freshly built comb and is sold as sections or pieces of cut comb in plastic containers.
- **CHUNK HONEY:** is liquid honey with one or more pieces of comb honey and is sold in glass jars.
- **CREAMED HONEY:** all honeys granulate or crystallise with time. When the rate of crystallisation is controlled, a creamed honey is obtained. Creamed honey is suitable as a spread.

Nectar is an essential food for bees and can be used immediately to feed bees. If it is not used at once the bees will store nectar as honey for use later. If the bees have more honey than they need, the beekeeper will remove the surplus honey for his own use.

## ☞ BY-PRODUCTS OF THE HIVE ☞

### Propolis

Propolis is a by-product of the hive. It is a sticky substance collected by the worker bees from the buds of various plants and trees e.g. chestnut, laurels, etc. They carry it back to the hive on their hind legs. It is not a food, but a building material. It is used as a type of 'cement' to seal any cracks or crevices in the hive. It is also used in the construction of combs to give added strength. The bees will use propolis to encase and seal any unwanted objects in the hive too heavy for the bees to remove e.g. a mouse. The propolis prevents the

mouse from rotting and creating a nasty smell. There is considerable evidence that propolis contains antibiotic properties and is said to have beneficial effects in cases of sore throats, infectious wounds and in relieving many human complaints and sicknesses.

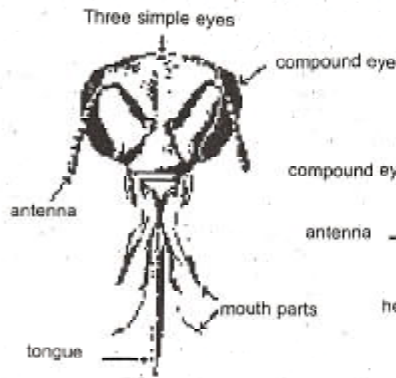
### Beeswax

Beeswax is a by-product of beekeeping and is a highly valuable product. It has many uses e.g. candle making, polishes, art, cosmetics. It is used in beekeeping as foundation in frames to encourage bees to build comb. Beeswax is produced by bees from their own bodies. Worker bees have four pairs of wax glands on the underside of their abdomens. The wax oozes through these glands and forms tiny flakes or scales on the outside of the abdomen. The flakes are then passed to the bee's jaws. The flakes are then chewed and other materials may be added to them. When they are soft, the bee puts the wax on the part of the comb that it is constructing. Wax is produced usually by young worker bees about 10 to 16 days old, but in an emergency older bees can also do the work. The bees produce wax only when it is needed to build the honeycomb. Wax can only be made if the bees are very warm. In order to obtain this warmth, the bees cluster together on the comb they are building. The hexagonal shape of the honey comb cells constructed with remarkable precision and regularity ensures the least waste of space and material. A honeycomb has walls that are only one eightieth of an inch thick, but can support 30 times their own weight. When the beekeeper uncaps honeycombs to recover honey, he collects the wax cappings and any other unusable comb. These he heats in water and the wax rises to the surface. After it cools and hardens, the cake of wax is removed and refined for re-use.

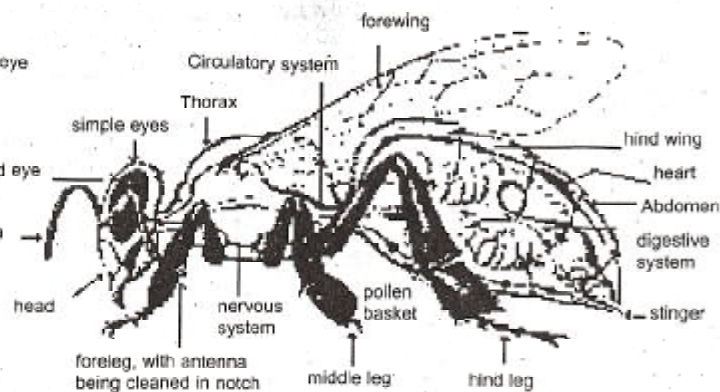
## ☞ PLANT POLLINATION ☞

The greatest value of honeybees is in their service as pollinators which far outweigh their value as honey producers. Pollination is the term used to describe the transfer of pollen from the male element of the flower to the female element of the same flower, or to other flowers of the same species. Many plants are air pollinated and have no need of insects e.g. coniferous trees, grasses and most cereals. Fruit trees and soft fruit require special pollinators i.e. insect pollination. It has been proven that apples, pears, plums and other hardy fruits and soft fruits will yield a much heavier crop and a better shaped fruit when pollinated by the honeybee. The bee's food consists of pollen and nectar. In order to obtain these the bee flies from flower to flower collecting them. In doing so, the flowers are pollinated. The bee also plays an important part in the pollination of ornamental plants and flowers. The destruction of many of the old and established hedges which were the natural habitat of wild insects and wild bees, who played an important part in pollination, has increased the need for honeybees.

## The Head of a Worker Bee



## The Body of a Worker Bee



### THE EXTERNAL FEATURES OF THE ADULT BEE

Honeybees vary in colour from black to yellow. The honeybee, like many other insects, has a body that is divided into three sections: the head, the thorax and the abdomen.

The head of the bee has five eyes: three small ones in a triangle on top of its head and a large compound eye on each side of its head. The three small eyes or ocelli are simple eyes and have very limited vision. They are not capable of forming any image on a retina and it is thought that their function is to determine light from darkness and possibly to see which way is 'up'. The compound eyes are extremely complicated. Each compound eye consists of a great number of facets, each of which function as a single lens. The number of facets varies from 3,000 to 6,000 in the queen and worker and as many as 13,000 in the drone. Behind each facet is a lens reaching down to the retina. Because of its construction, the retina cannot form an image but receives a mosaic of dots of varying intensities. Vision by human standards is poor, but detection of movement is excellent. Bees cannot focus their eyes because the eyes have no pupils. Bees can distinguish colours, their best vision is at the ultra violet end of the spectrum.

The head also has two long feelers or antennae with which the bee can sense, touch, taste and smell. The bees tongue is a flexible tube which it uses to suck water and nectar into its mouth.

The Thorax carries two pairs of wings. The front pair is bigger than the hind pair and the two wings of each side are hooked together. The bee has three pairs of legs. Part of its hind legs are used for carrying pollen and propolis. This area is known as the pollen basket. The sting is situated at the tip of the abdomen.

### BEESTINGS

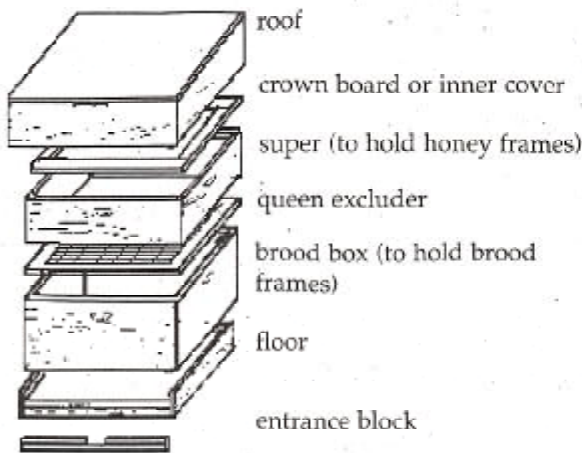
Most bees depend on their sting as their only means of self-defence. The glands attached to the sting contain venom or poison that is mainly formic acid. The sting

of the worker bee is straight and barbed. When the bee thrusts the sting into the flesh, it is unable to withdraw the sting because of the barbs and the sting is torn from the bee's body. It remains in the flesh with its muscles pumping more venom into the flesh. To prevent this the sting should be scraped loose at once. You should never squeeze the sting when removing it as this will force more venom into the wound. A sting will cause sudden pain at the site of the sting and swelling of the affected area may follow. Some people may develop allergic reactions to stings such as difficulty in breathing, blotched skin and in more severe cases, anaphylactic shock. This type of reaction usually develops in less than an hour and those affected should seek immediate medical assistance. The worker bee dies within a few hours of stinging. The queen bee has a smooth curved sting which she uses only to kill other queens. She is able to withdraw the sting after use and therefore does not die after using it. Drones do not possess a sting.

### WHY KEEP BEES?

A lot of people keep bees because they produce honey, one of the healthiest and most natural foods which has been valued by man since prehistory, as a sweetener. Many people also keep bees because they are interested in the study of bees and of their habits. Bees are fascinating creatures and there is always something new to learn about them. Beekeeping is an enjoyable open air hobby bringing you in contact with people from all walks of life. Bees can be kept by almost everyone except a small minority who are allergic to bee stings. Bees are kept not only in the countryside but also in back yards, gardens and even on flat roof buildings in the centre of large towns and cities. Ireland has a long tradition of beekeeping. Legend tells us that 'The First Beekeeper in Ireland' was St. Modomnoc who lived in the sixth century. He brought bees to Ireland from Wales. Honeybees and beekeeping played a very important part in society in ancient Ireland. Bees were kept in the gardens of abbeys and monasteries and honey, wax and mead were all very valuable commodities. Mead, which is made from honey, was a very important beverage which was served in many of the great monasteries

and at many of the great feasts in the homes of the ancient kings of Ireland. Beeswax was in great demand for candle making for use in the churches of the great abbeys and monasteries.



**Parts of a typical modern hive**

Today beekeeping is practised in all parts of Ireland. There are in excess of 2,000 beekeepers in the Republic of Ireland keeping 22,000 colonies of bees. Irish beekeepers are organised in local associations and the Federation of Irish Beekeepers Associations (F.I.B.K.A) is the representative body of these associations. Anyone intending to take up the craft of beekeeping is advised to join their nearest association which will provide help and guidance including classes and courses on beekeeping. The F.I.B.K.A. organise a week long summer course on beekeeping each year at the Franciscan College Gormanstown, Co. Meath. It is held during the last week of July.

This course comprises a series of lectures designed to suit all levels of expertise including practical demonstrations. The Irish National Honey Show is held during this course and in successive years recently, winners at this Show have gone on to take the Supreme Award and many other awards at the London International Honey Show. The F.I.B.K.A. maintain a large library of bee books which are available to members. It publishes a monthly journal 'An Beachaire' devoted to beekeeping. It holds examinations to help to improve beekeeping standards and it maintains a panel of excellent lecturers to talk to beekeeping associations. It also runs a labelling scheme to identify 'Pure Irish Honey'. If you are thinking of taking up beekeeping or want further information on beekeeping, contact the following:

Mr. Michael G. Gleeson (Hon. Secretary)  
Ballinakill, Enfield, Co. Meath. Tel: 0405-41433

Mr. Michael Woulfe (Summer Course Convener)  
Railway House, Midleton, Co. Cork. Tel: 021 631011

Mr. D. J. Deasy (Public Relations Officer)  
45 Waltham Tce, Blackrock, Co. Dublin Tel: 01 2889085

#### ☞ FURTHER READING ☞

**Profitable Honey Production**, published by Teagasc

**Guide to Bees and Honey**, by Ted Hooper  
Published by Marston House, UK.

**Bees at the bottom of the Garden**  
by Alan Campion & Gay Hodgson  
Published by Adam & Charles Black,  
London

This leaflet is based on an information leaflet by Mr. Michael Gleeson, Federation of Irish Beekeepers Association, with assistance from Dr. Martin Speight, National Parks and Wildlife Service.  
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