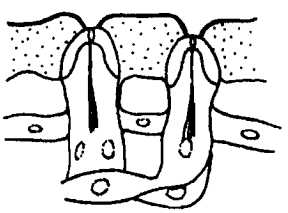
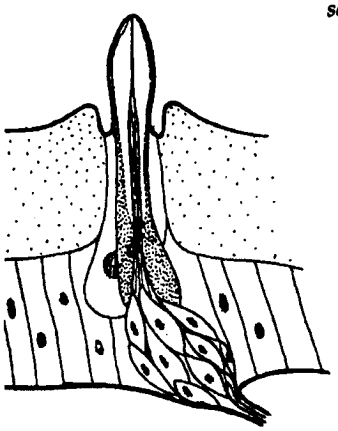
are built on the same plan as the hair sensors, except that instead of one neuron being involved there are several. The major receptors for smell are the plate organs, sensilla placodea, which are situated on the final eight subsegments of the antennae in considerable number (see OLFACTORY SENSE). Each plate is served by 18-20 neurons, some of which deal with a single scent, others with a class of scents. Sensilla basiconica, or peg organs, are similar in construction to the touch organs, but the hair is replaced by a short conical peg, which varies in size and shape in different types of the organ and which has pores on its surface. Each peg is served by three or four neurons, and they are present on the antennae, the mouthparts, inside the mouth and on the legs, and are the sensory endings for taste (see TASTE IN THE HONEY BEE), and possibly for the common chemical sense which detects deleterious chemicals and irritants, and promotes avoidance. The sensilla coeloconica, or sunken peg organs, in which the peg is sunk in a hollow cavity opening by a round pore on to the surface of the cuticle, are also found on the antennae, and some deal with the measurement of relative humidity — the bee can detect changes of about 5-10 per cent — some are involved in the measurement of carbon dioxide concentration in their vicinity, and some are possibly involved in temperature discrimination.

The eyes and the ocelli are constructed in a totally different way, and are described under VISION OF THE HONEY BEE.

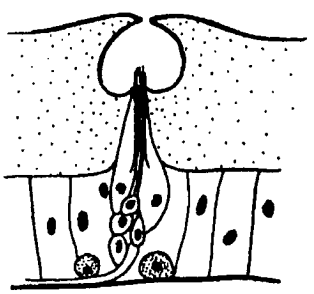
See also EXTERNAL ANATOMY.



sensilla campaniformia



sensillum basiconicum, 'peg organ'



sensillum coeloconicum, 'sunken peg organ'

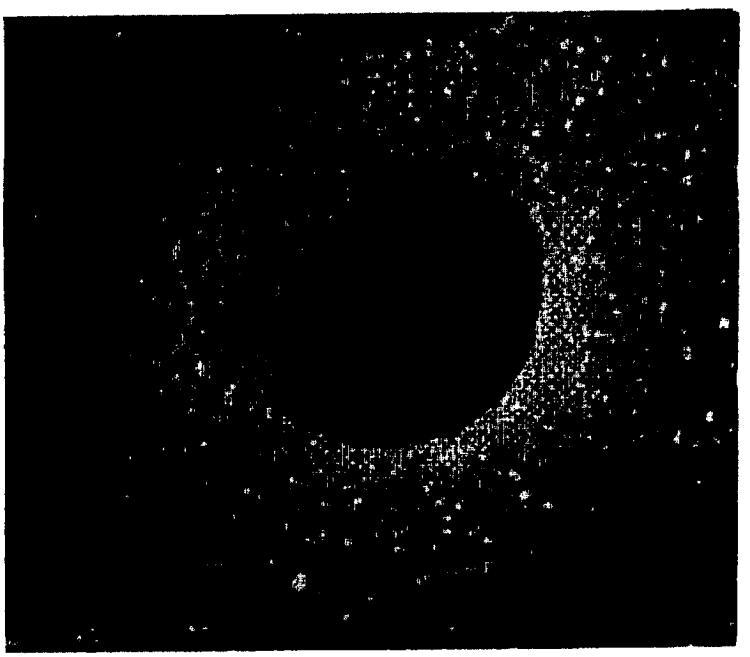
Sex determination in the honey bee Before 1845 nature's way of deciding the sex of a bee was a complete mystery. In that year the Reverend Johannes Dzierzon presented the theory that a queen honey bee controls the fertilization of her eggs. He claimed that after mating, a queen stores sperm cells in the spermatheca and that egg fertilization depends on whether or not a queen releases sperm from the spermatheca to fertilize the egg that is about to be laid. He concluded that the fertilized eggs develop into females (workers or queens) and the unfertilized eggs develop into males.

Dzierzon's theory prompted L.L. Langstroth to say, 'his discovery must certainly be ranked among the most astonishing facts in all the range of animated nature'. Although Langstroth accepted Dzierzon's theory, many beekeepers and scientists of the time actively opposed it and many years passed before it was widely accepted.

While nearly correct, Dzierzon's theory has one flaw. Unfertilized eggs do develop into males, but fertilized eggs are not always females; they are sometimes males. These males, called diploid males, are not found in a colony because they never reach adulthood — adults have only been produced in the laboratory. In colonies, the worker bees destroy all diploid males a few hours after egg hatch. Consequently, a colony with a high proportion of diploid males a few hours after the eggs hatch.

What, then, determines the sex of a fertilized egg? Sex is determined by a gene at one location, or locus,

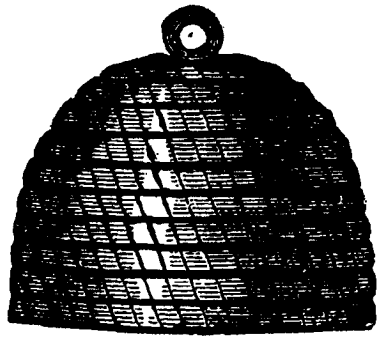
The surface of a sunken peg organ. Notice the heavy ribbing on the peg, x15,000.



The last known cloomed wicker skeps to be photographed in use in Britain, c.1880. The separate straw hackles are to shoot the rain off.

on a honey bee chromosome, and it has been estimated that there are about 12 different forms of this gene (each called a sex allele) that can exist at that particular locus. Although different from one another, the sex alleles themselves are equal with regard to sex; it is not that some are male and others female. Every unfertilized egg has one of the possible sex alleles and so does every sperm cell. When the egg is fertilized it suddenly has 2 sex alleles, one from the egg and one from the sperm. The egg is male if the two alleles are the same; it is female if the alleles are different. JRH

See also GENETIC PROBLEMS OF INBREEDING.



straw skep

Skeps Honey bees were first kept in receptacles which were made of any material which was cheap and easily obtained in the district: bark hives in forest areas, in earthenware in the Mediterranean and Egypt, and in wickerwork and straw in Europe, the latter types being called skeps.

The original skep in Britain and most of Europe was a conical structure made of wickerwork in the same way that baskets are made, in fact the word skep can equally well be applied to a basket. The wicker skep was 'cloomed', or plastered over with a mixture of lime and cow dung to exclude both draughts and light, and was often covered on the top by a 'hackle', a large bunch of long straw tied at one end and pushed down over the skep, rather in the way wine bottles were packed at one time. The hackle served to shed the rain and helped to keep the bees warm. This type of hive ceased being used in Britain in about 1885.

Wicker skeps cloomed with clay, in a Romanian museum.