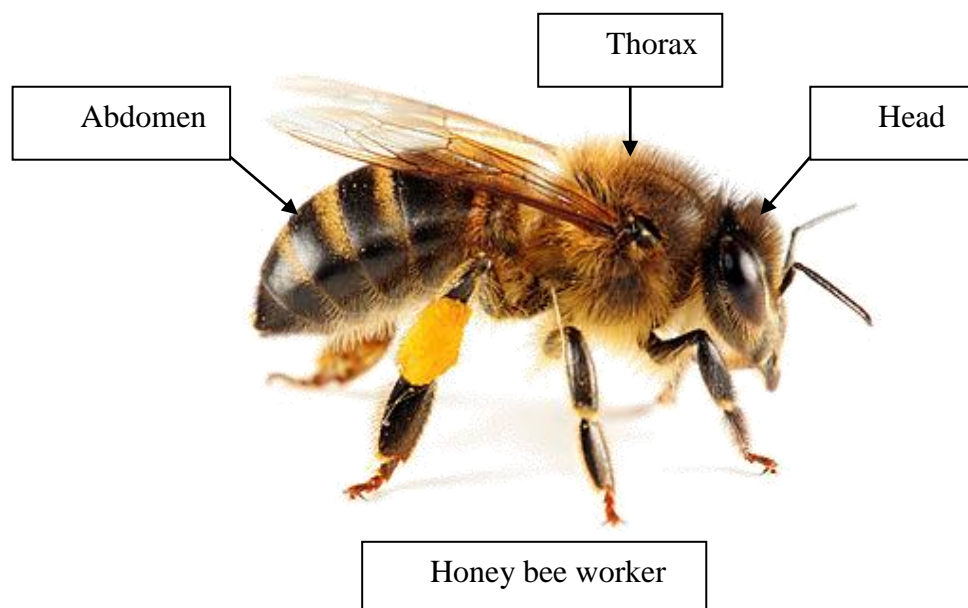


Lecture-2-

The external and internal anatomy of honey bees:-

The body of the honey bees is divided into 3 regions, the head, thorax and abdomen.



I. The head: The head is triangular in shape, larger or wider on the upper side and it contains:-

A- Eyes: The bees possess 2 types of eyes:-

1-Ocelli also called (simple eyes) because each eye has just one lens, but with many sensory cells. Three in number and located on the vertex in the queen and worker, but in front side in the drones. These eyes are sensitive to light and used by bees for orientation according to the position of the sun.

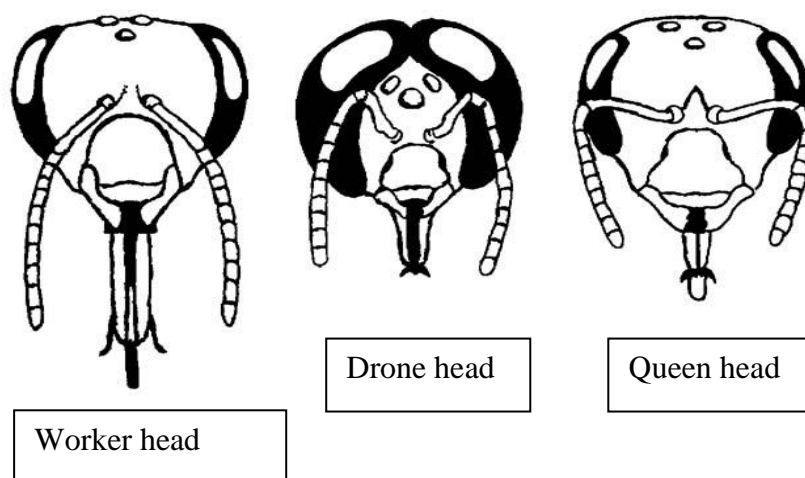
2-Compound eyes are two in number and placed on each side of the head. They are largest in drone and smallest in the worker are made

up of many hexagonal facets united together they can easily see all around them (above, below, side to side and forwards).

B-Antennae: The head also bears 1 pair of antennae, geniculate type. and consist of three parts scape, pedicel and flagellum. Flagellum consists of ten segments and contains over 300 taste sensors on the tips of it. It can be moved to any direction and it use especially to stimuli of touch and oder.

C- Mouth parts: Are chewing–lapping type.

Consist of labrum, mandible, maxilla, labial palp and glossa (Proboscis).

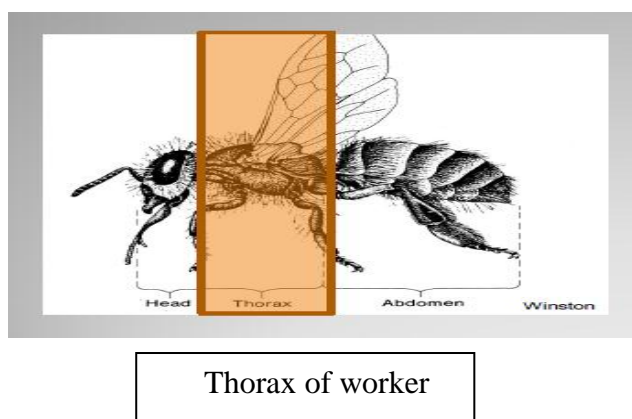


II. Thorax: It is the second part of the body of the honey bee and divided into 3 segments:-

1-Prothorax: it carries the first pair of legs.

2-Mesothorax: it carries the second pair of legs and the first pair of wings.

3-Metathorax: it carries the third pair of legs and second pair of wings and it has the first segment of abdomen also fused with it called as propodeum. The thorax is fully covered with hair in the worker and thin in the drone while in the queen little or hairless.



The thorax appendages:-

1-The Legs: There are 3 pairs of legs, one pair in each thoracic segment. Each leg is divided into six principal parts or segments (Coxa, Trochanter, Femur, Tibia, Tarsus and Pretarsus). The tarsus however is subdivided into several small parts or tarsomeres. The pretarsus is a very small but it carries a pair of lateral claws and a median lobe termed as arolium.

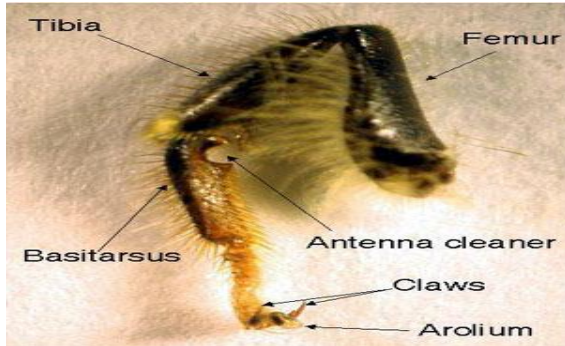
The modification of legs:-

a-The first legs carry the antennae cleaner.

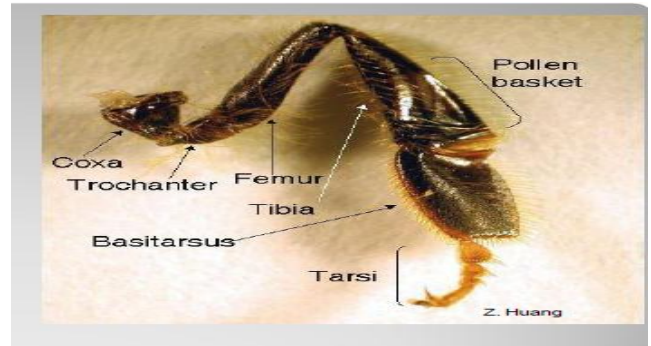
b-The medium legs have no modified, except a long spur helps the hind legs to get rid of the pollen from pollen basket in to the cells.

c-The hind legs are highly modified for the pollen and propolis transporting functions. The most prominent structure is the pollen basket or corbiculum which are very essential for collecting pollen

from the flowers. All these legs are fully covered with hairs which are useful in collecting and brushing the pollen.



First leg of worker



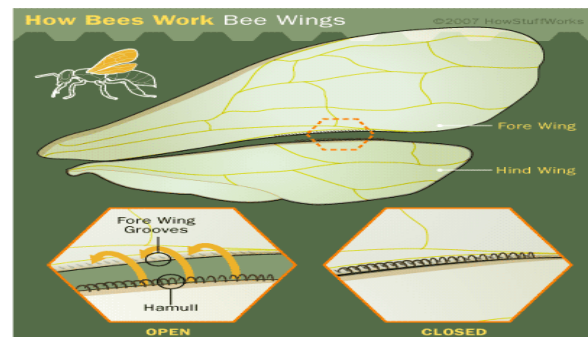
Hind leg of worker

2- The Wings: Type of it is Membranous. There are 2 pairs of wings in a honey bee:-

The first pair (anterior pair) is located on the mesothorax and bigger than the second pair are called posterior wings and located on the metathorax. The posterior pair has a number of wing hooks or hamuli, when the bee takes a flight, the fore wings are drawn over the hind wings and the hooks are automatically catch in the marginal folds of the fore wings. This called wing coupling (Hamulate type).



Worker wing coupling



First and second wings of worker

III. The Abdomen: This is the last part of bee body. Many important organs are located inside it.

-It is made of chitin and joined with the thorax by a short tube.

-The abdomen is enclosed by ten round segments, inserted into one another, each of them is made of 2 plates, on the back are called as dorsal plates or tergal plates and on the lower side or beneath the abdomen are ventral or sternal plates.

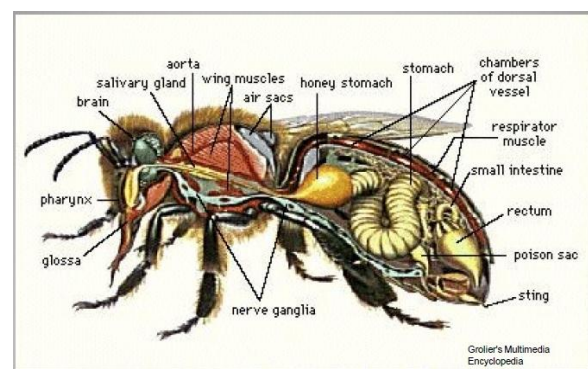
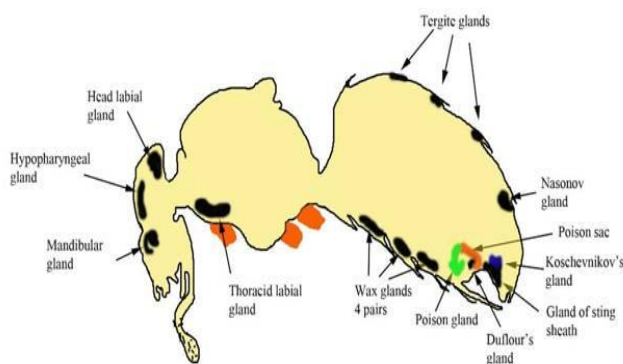
-The first segment is omitted or deleted in the thorax and the last 3 segments are also omitted and they are so inserted in the sixth segment. Thus only 6 segments remain visible to us in the queen and worker and 7 in the drone.

Internally the abdomen contains most of the organ systems and some glands:

1- Digestive system 2- Reproductive system (queen and drone).

3- Circulatory system 4-Respiratory system. 5- Nervous System

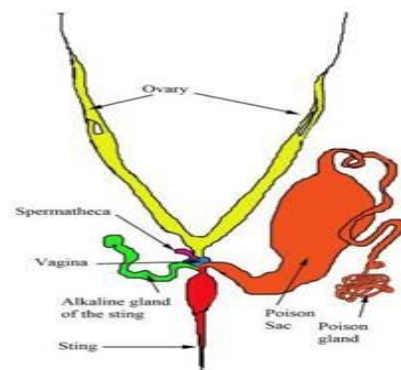
6- Sting organs. The sting organs are an elaborated ovipositor modified as an instrument of defense, when supplies with venom become a sting.



Worker glands

Sting organ: The sting organs are an elaborated ovipositor modified as an instrument of defense, when supplies with venom become a sting. The stinger has two components or parts, the poison gland and the alkaline gland together with the stinger. Each sting contains 150mg of venom.

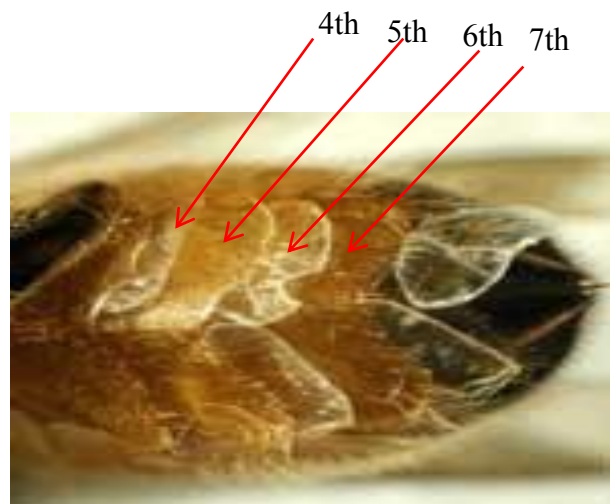
Note. Bees die after using the stinger as the organ is left in the victim.



Sting organ

Glands: Honey bee worker contains several glands.

- **Wax gland:** This produce or secretion the wax from 4, 5, 6 and 7 sternal segments in the workers.

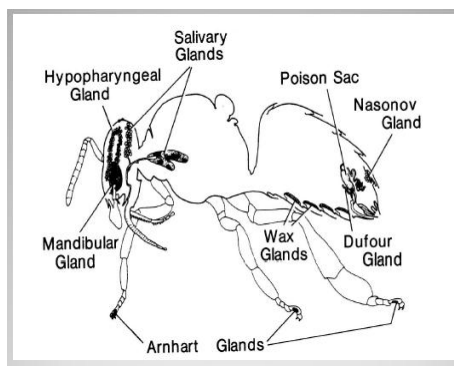


Honey bee wax gland

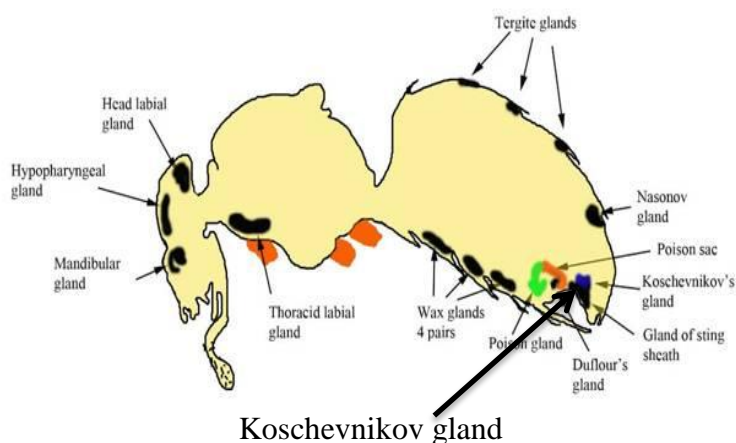
Nasanov gland: This produces a variety of chemicals which the bee uses to assist identification of the entrance of the hive.



Nasonov gland



Koschevnikov gland: This releases alarm pheromone – attracts other bees to attack and sting the same part of the body of the offending or attacker animal. In the queen this gland products are responsible for the formation of the clusters of court bees that surround the queen.



Koschevnikov gland