



Erasmus+

# Bees anatomy



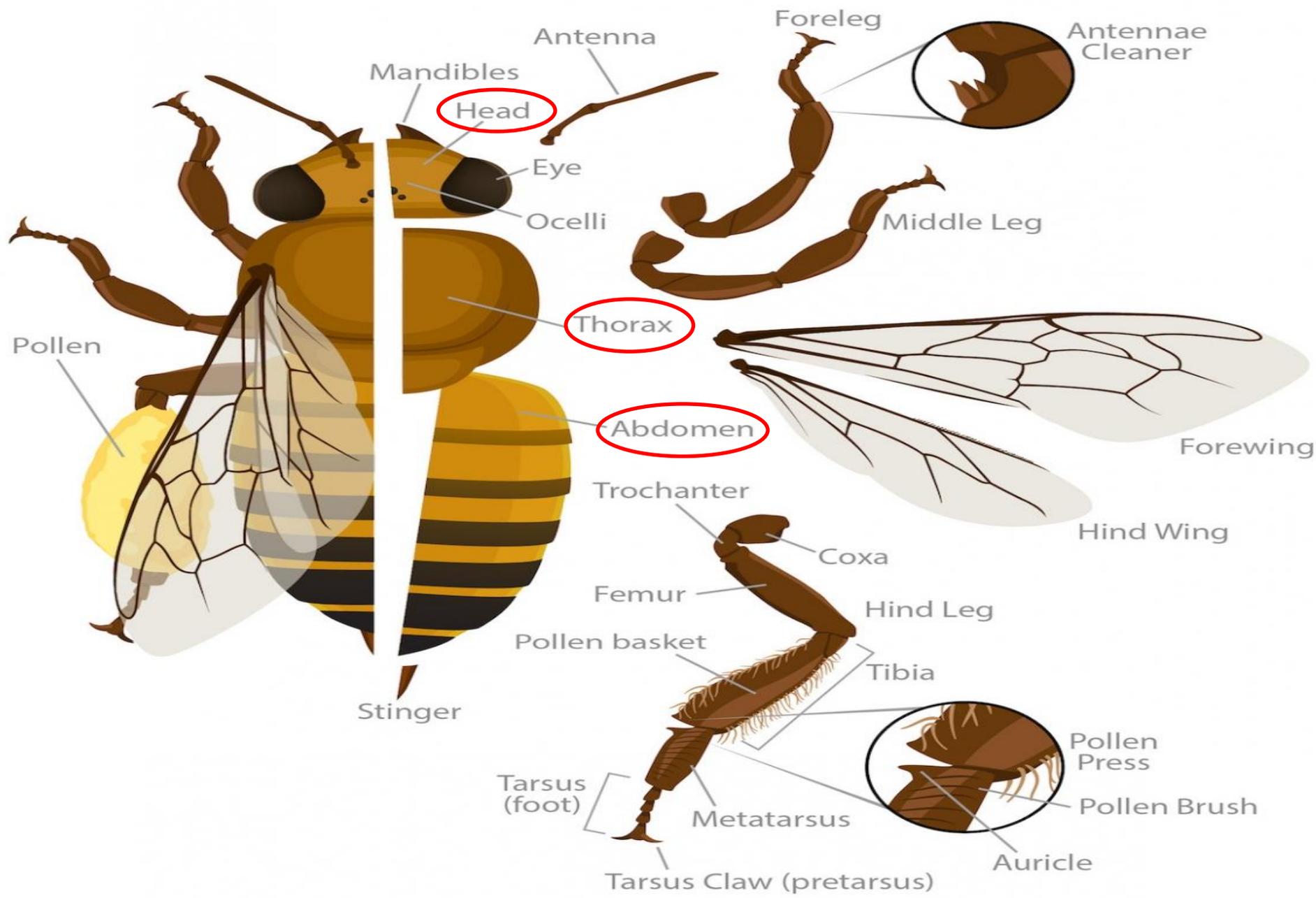
**Secondary school Bedekovcina, Croatia**

**B.E.E.C.O.M.E - January 2019**

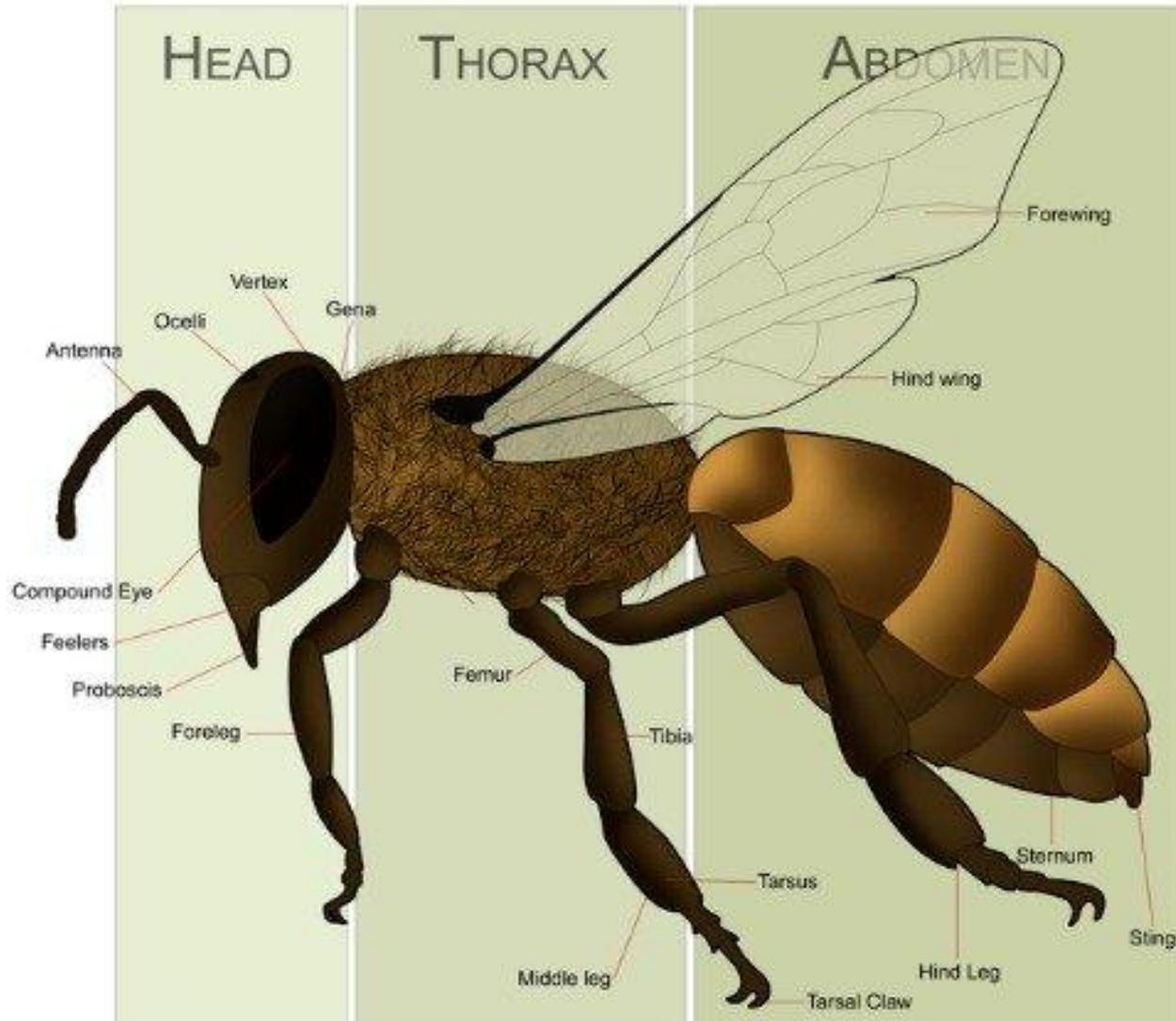
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## Honey bees are insects and have five characteristics that are common to most insects.

-  They have a hard **outer shell** called an **exoskeleton**.
-  They have three main body parts: **head, thorax, and abdomen**.
-  They have a pair of **antennae** that are attached to their head.
-  They have **three pairs of legs** used for walking.
-  They have **two pairs** of wings.



# Three main body parts :



# Head

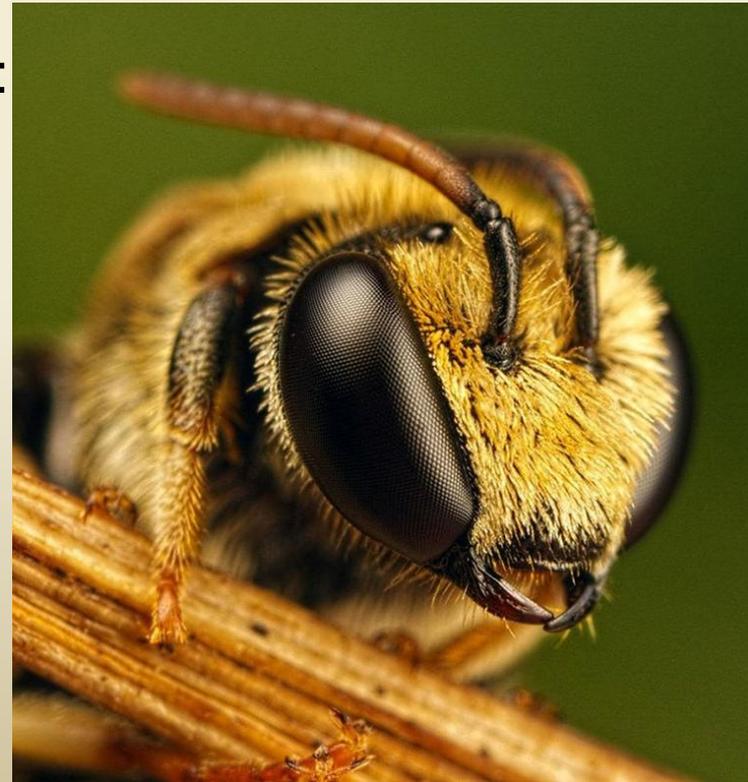


The head is the center of information gathering. It is here that the visual, gustatory and olfactory inputs are received and processed. Of course, food input also starts here.



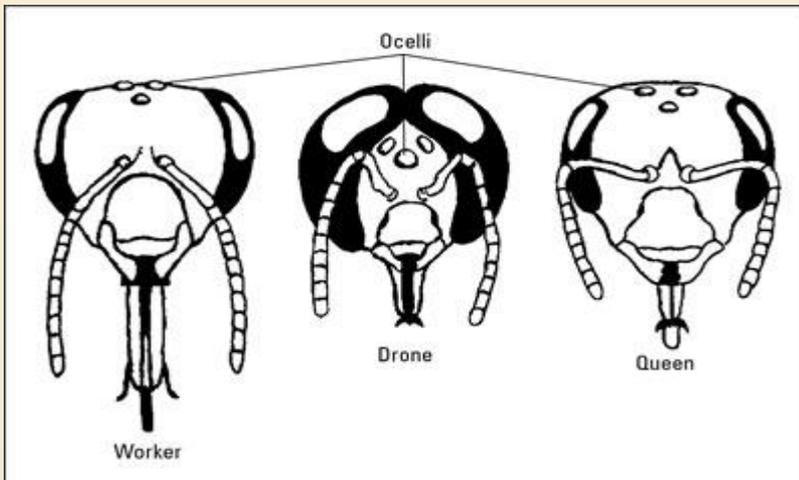
Important organs on or inside the head:

1. Eyes,
2. Antennae,
3. Mouth parts,
4. Internal structures.

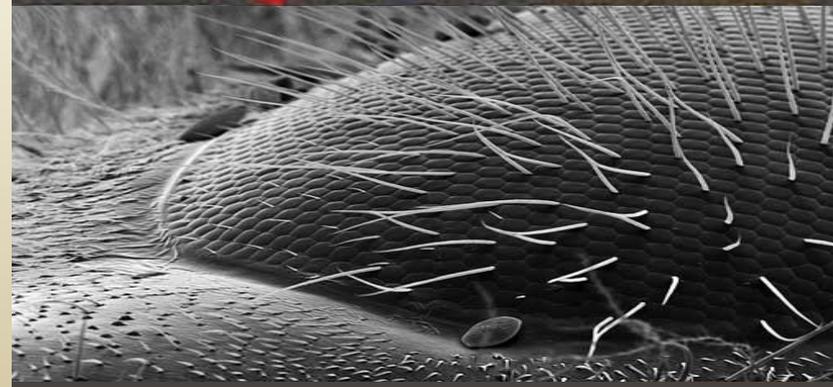


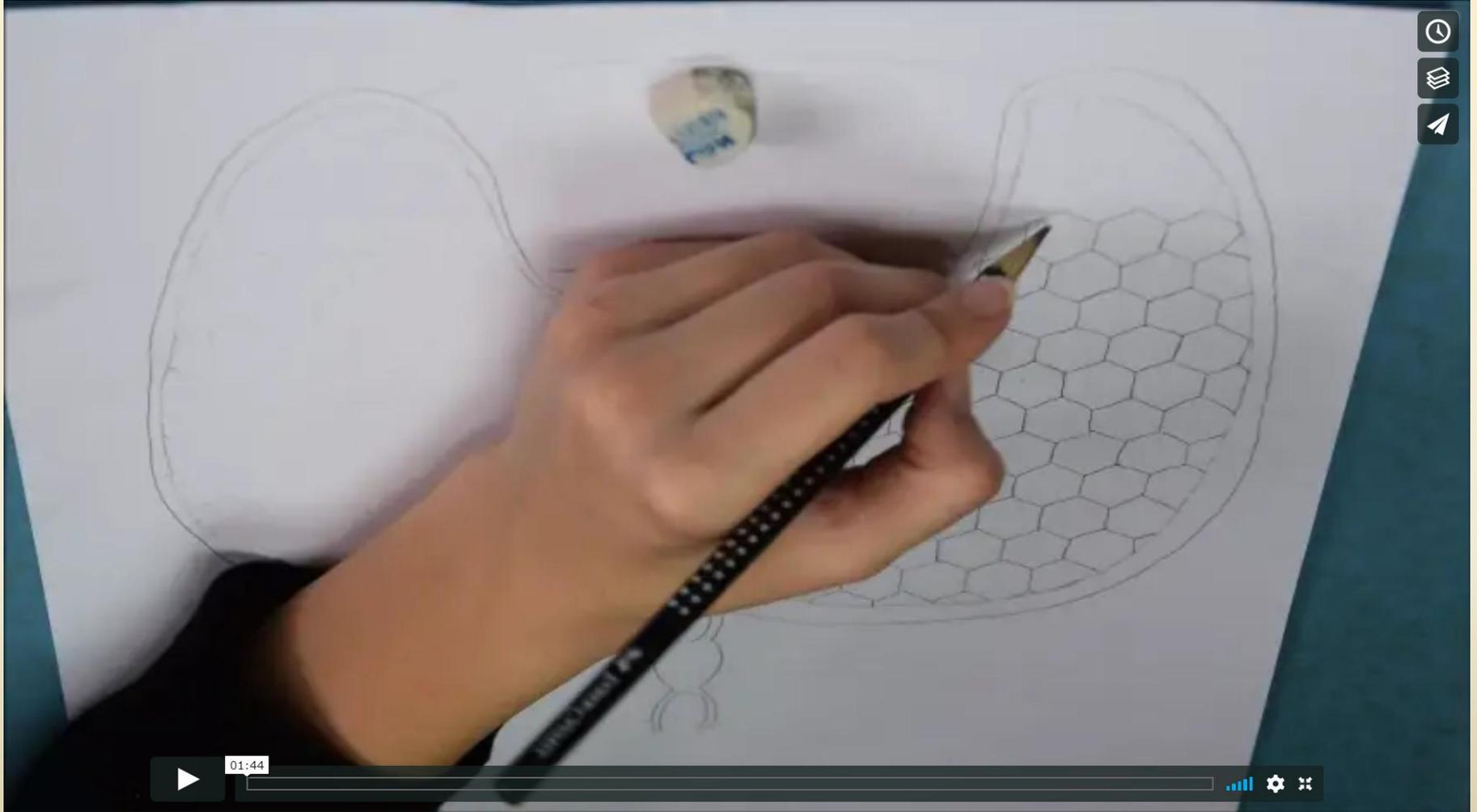
# Ocelli and eye

 One of two types of insect eyes used to detect motion.



 The second type of eyes made of many light detectors called ommatidia.





# Mouth

 Honey bees have a combined mouth parts that can both chew and suck (whereas grasshoppers can chew and moth can suck, but not both).

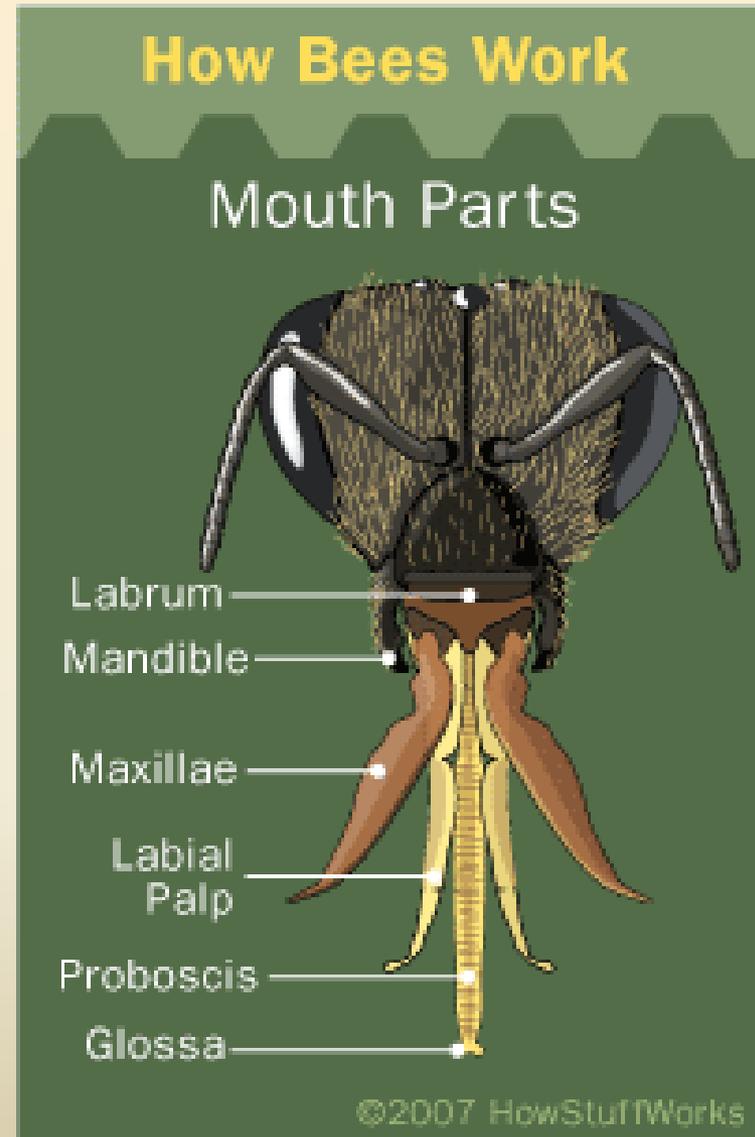
 This is accomplished by having both mandibles and a proboscis.



# Mouth parts

 The mandibles are paired "teeth" that can be open and closed to chew wood, manipulate wax, clean other bees, and bit other workers or pests (mites).

 The proboscis is mainly used for sucking in liquids such as nectar, water and honey inside the hive





# Internal organs

The main internal organs in the head are:

-  the brain - a collection of about 950,000 neurons,
-  subesophageal ganglion, the main component of the nervous system.

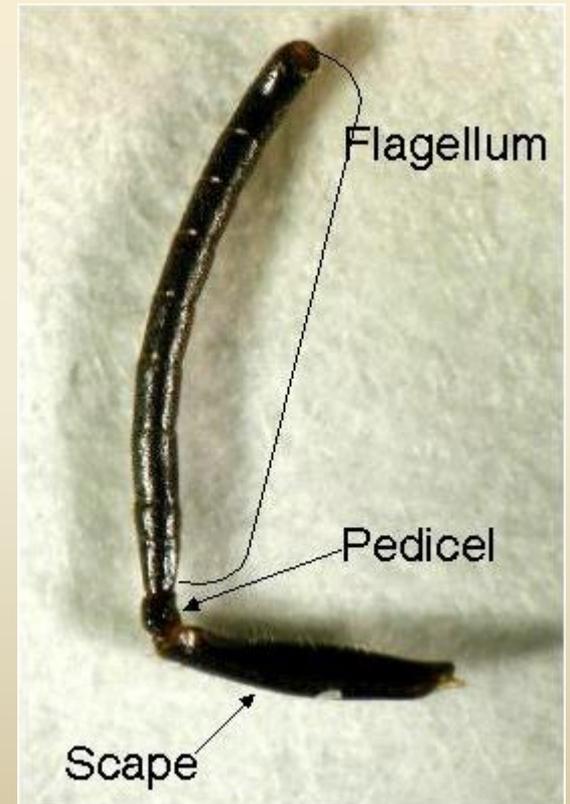
The brain has a large area for receiving inputs from the two compound eyes, called optic lobes. The next largest input are from the antenna (antenna lobes).



# Antenna(e)

 Since honey bees live inside tree cavities (natural) or hives (man-made), smell and touch are more important for them than visual when inside the colony.

 The honey bee antennae (one on each side) house thousands of sensory organs, some are specialized for touch (mechanoreceptors), some for smell (odor receptors), and others for taste (gustatory receptors).



# Thorax

-  The thorax is the centre for locomotion and has three segments, each with a pair of spiracles for letting the air in.
-  Bees have 2 pairs of wings and three pairs of legs.

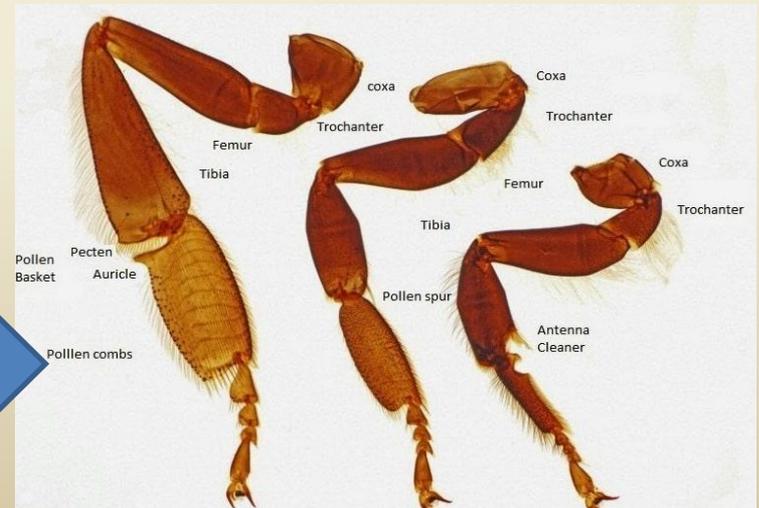


# Bees have 3 pairs of legs

1. Forelegs - Legs closest to the head.

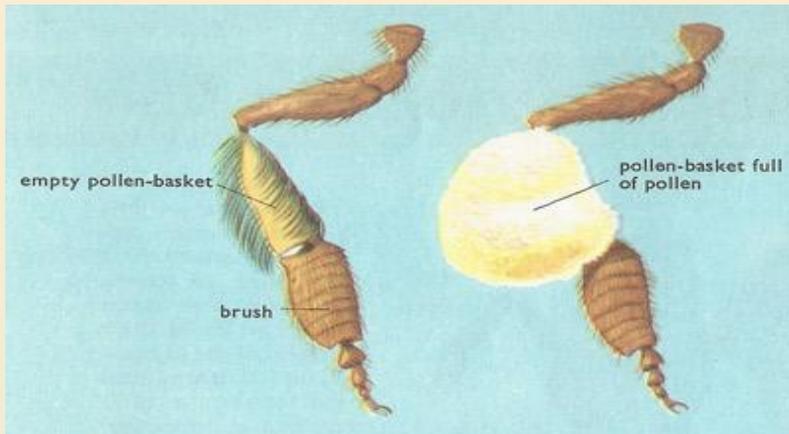
 Antennae cleaners - Notches filled with stiff hairs that help bees clean their antennae. There is one on each foreleg.

2. Middle legs - Legs located between the forelegs and hind legs.



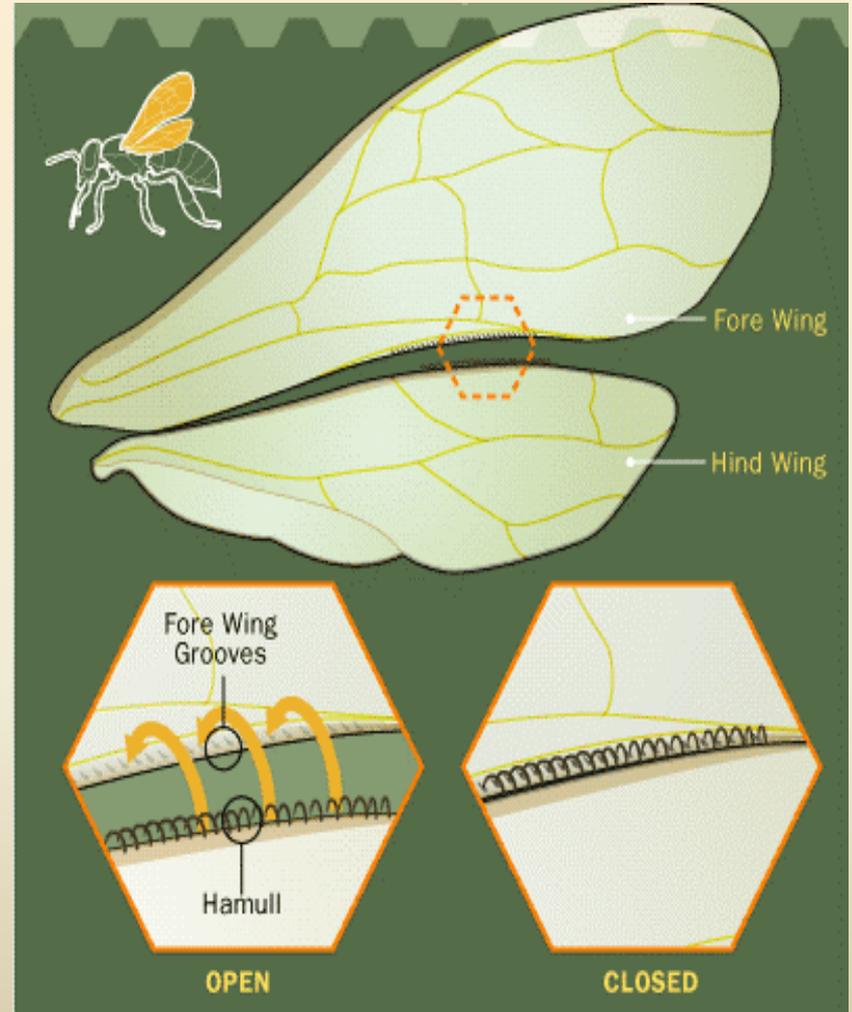
### 3. Hind legs - Legs farthest from the head

 In workers, these legs have a unique set of tools used to collect and carry pollen called the press, brush, and auricle.



# Wings

-  The front wings are larger than the hind wings.
-  The two are synchronized in flight with a row of wing hooks (humuli, singular: humulus) on the hind wing that would hitch into a fold on the rear edge of the front wing.

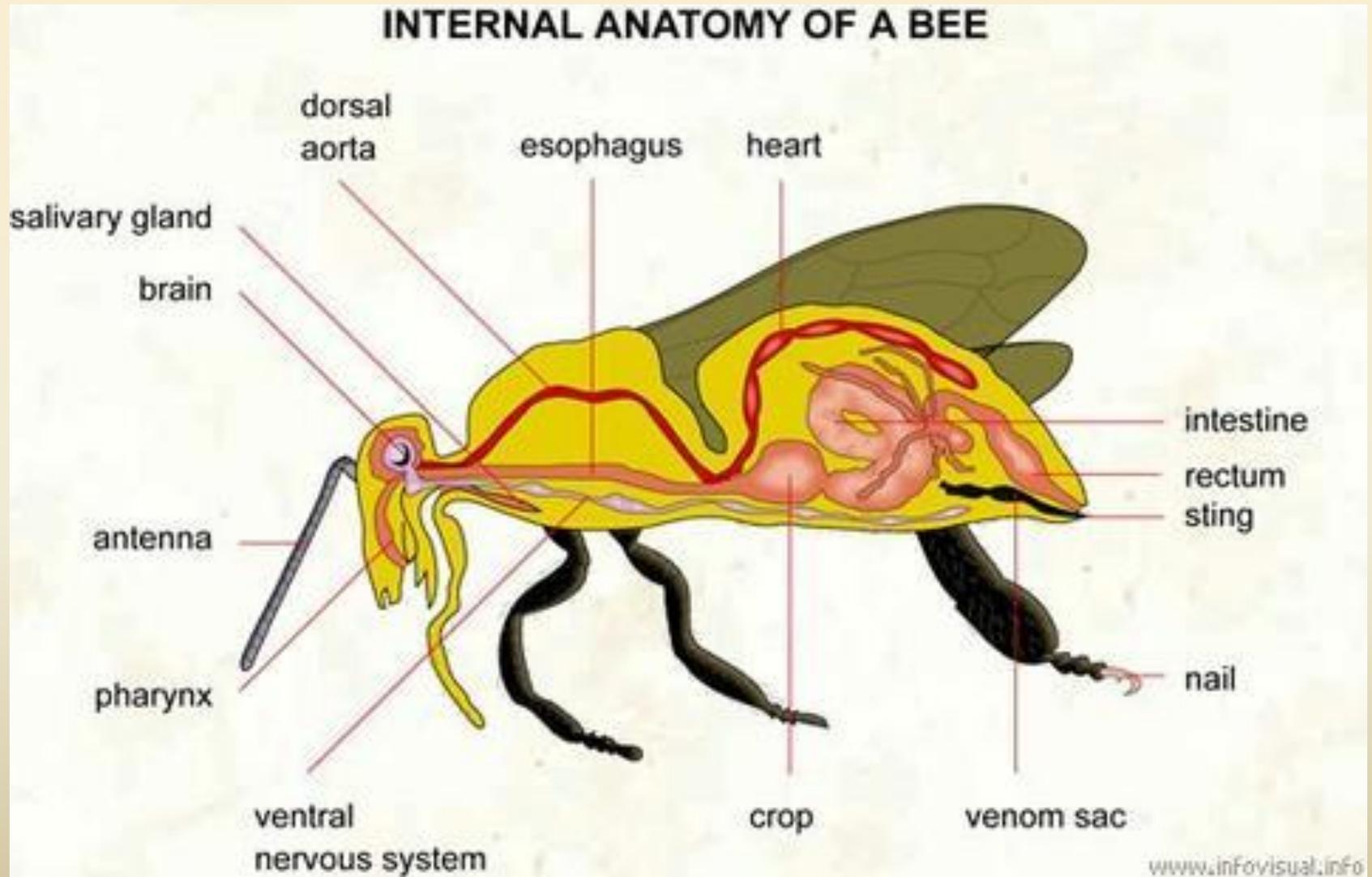


# ABDOMEN

-  A worker, a drone, and a queen can be distinguished by the size and shape of their abdomen.
-  Worker's abdomen is small, queen's is roundish and wide, while a drone has the biggest, long abdomen.

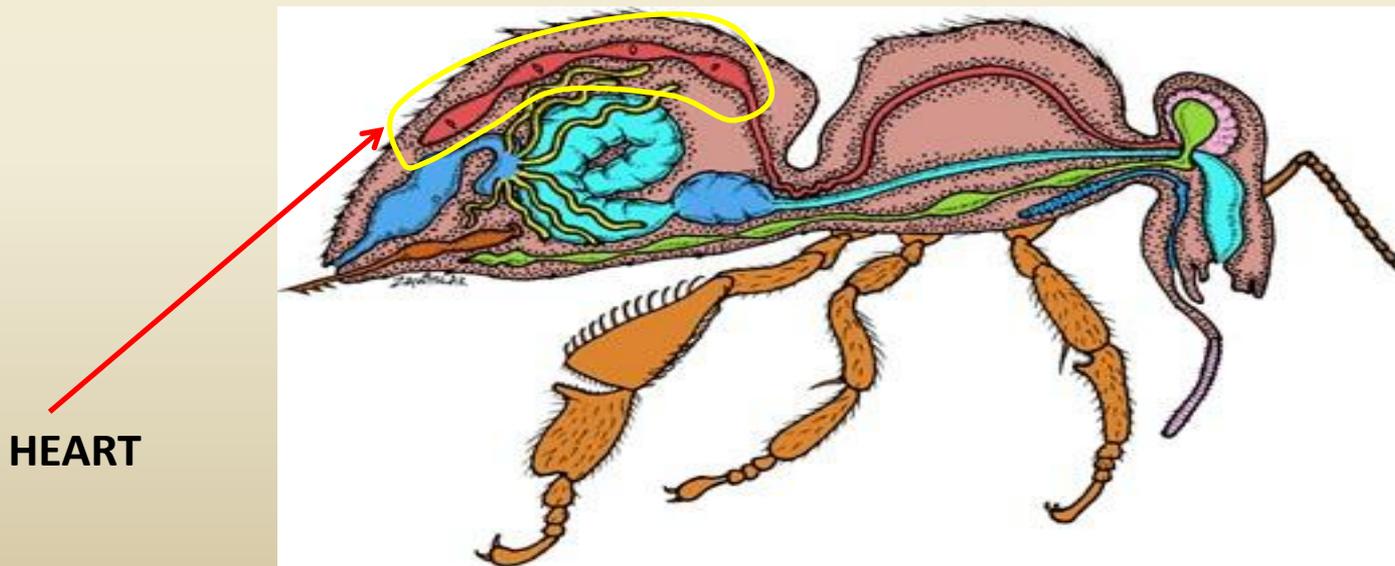


- The abdomen has almost no appendages, but it houses nearly all of the bee's internal organs.

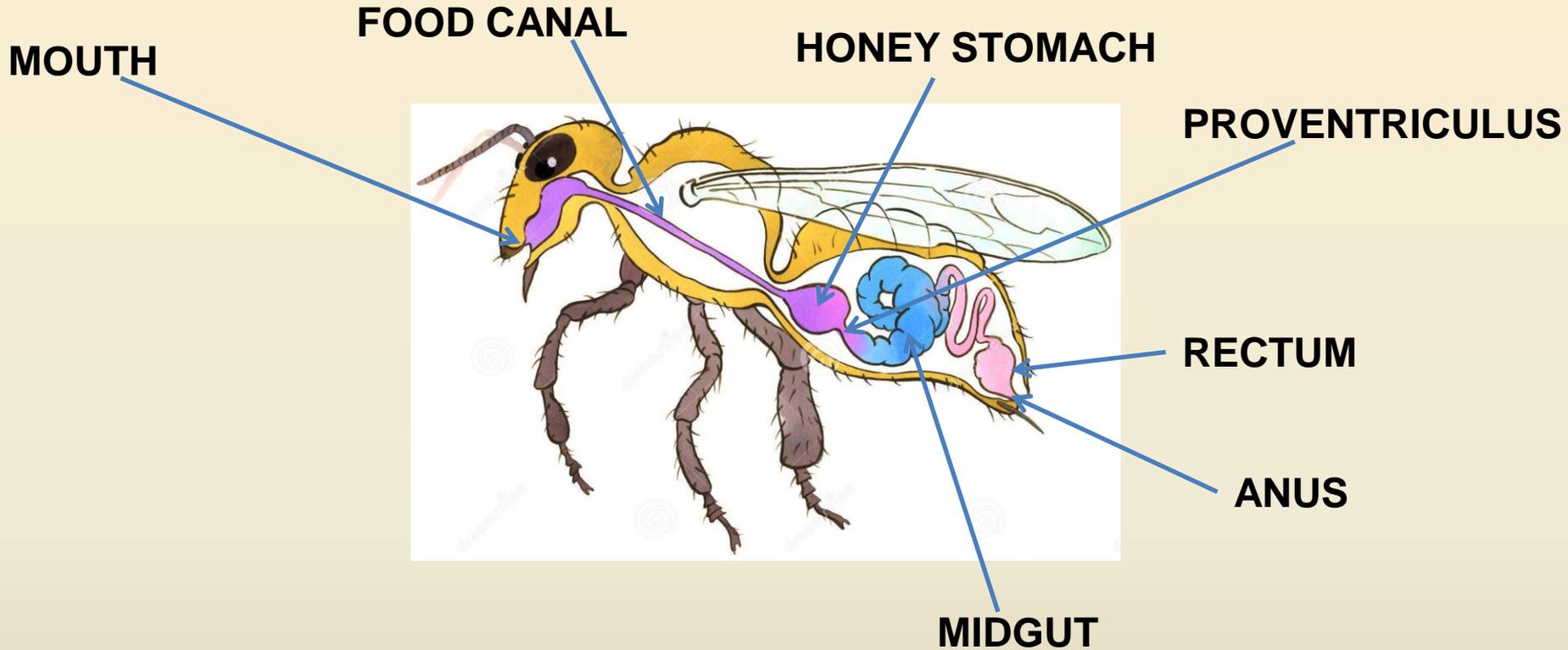


# Heart

-  Unlike in mammals, honey bees and insects, have an open circulatory system, meaning that their blood is not contained within tubes like veins or arteries.
-  The blood, or hemolymph, in insects **is free – flowing** throughout the body cavity and is pumped via the heart.
-  The heart is the structure in red, and acts like a pumping leaky tube to help move the hemolymph throughout the body.



# Digestive system



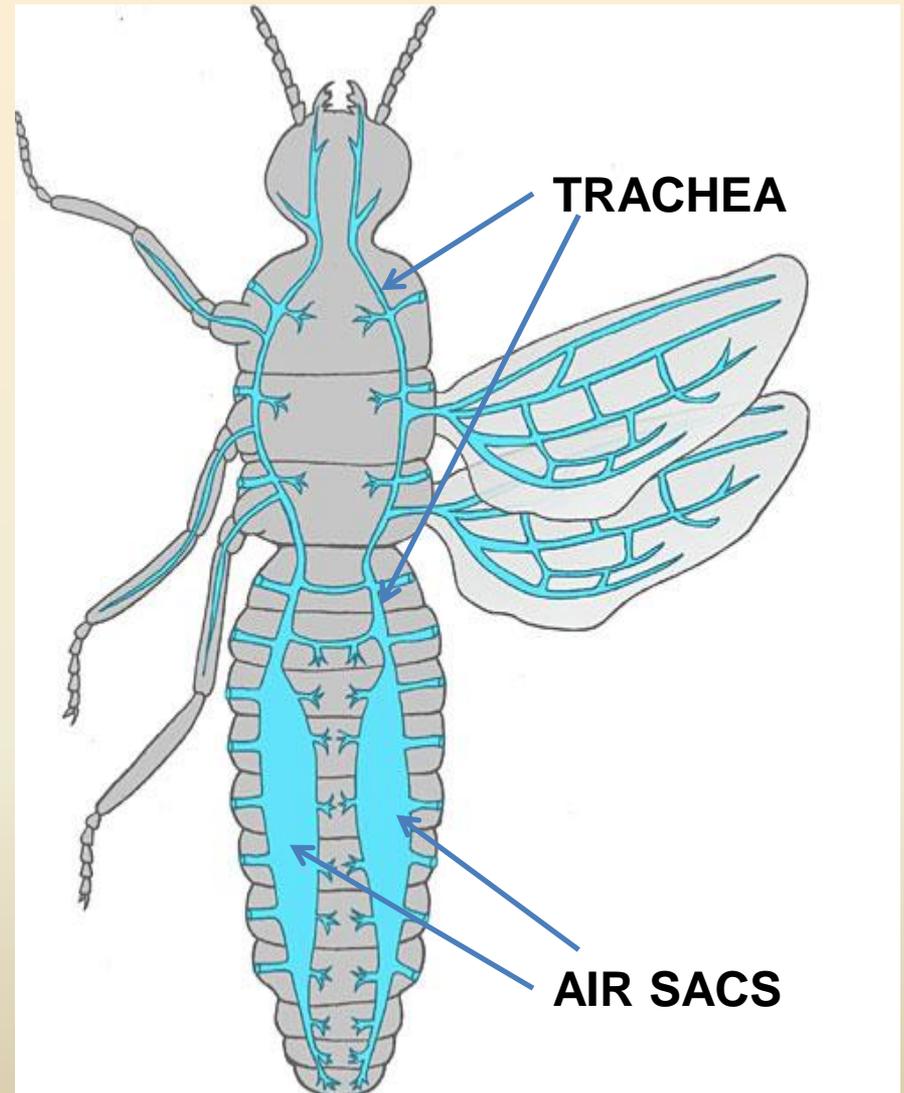
# Respiratory system

 Opening of Spiracle - the respiratory system in insects is a series of hollow tubes connected to **air sacs** in the body.

 The openings of these hollow tubes are called **spiracles**.

 The tubes are **called trachea** which provide oxygen and gas exchange to all tissues in the body.

 **Air sac** - Air filled sacs used as reservoirs of air in the insect body.



# Stinger system

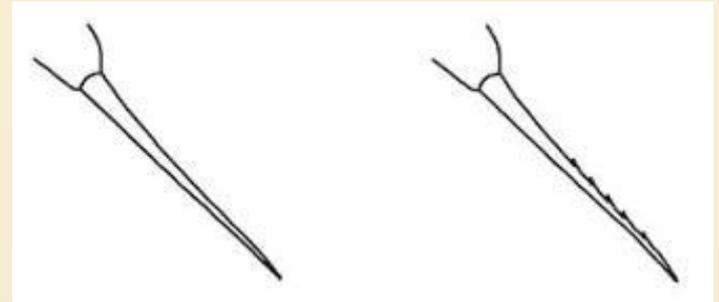
 **Stinger** – Also called „sting“ is used to puncture the skin and pump venom into the wound. Once pushed into the skin the stinger remains in the victim. Queen bees have a longer and unbarbed stinger.

Drones (males) do not have a stinger.

 **Stinger sheath** – the hardened tube, from which the stinger can slide in and out.

 **Sting canal** – The sting is hollow, allowing venom to pass through the stinger. This is also the canal via which an egg is passed, when the queen lays an egg.

WORKING  
BEES



QUEEN  
BEES





**Honey Bee**  
from Daniela



01:56



vimeo

- Made by students from Secondary school Bedekovčina
- January, 2019