

Honey Bee Anatomy & Biology

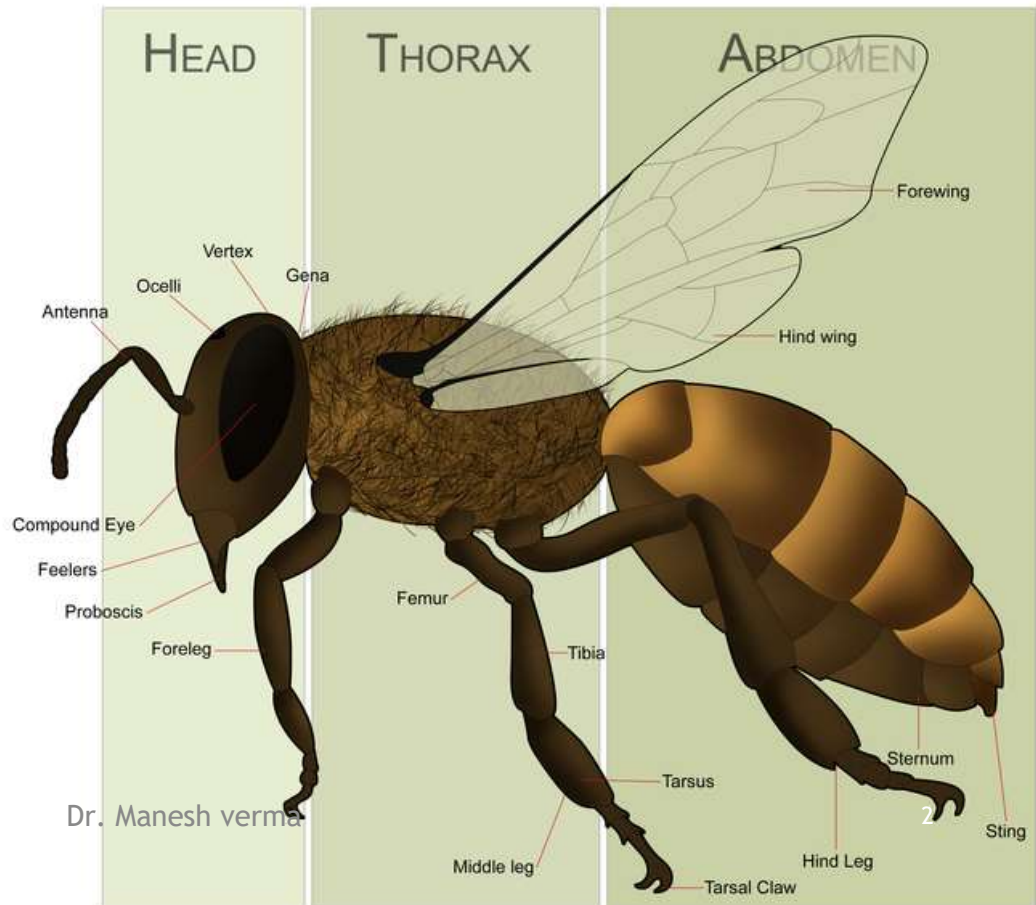


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Honey Bee External Anatomy

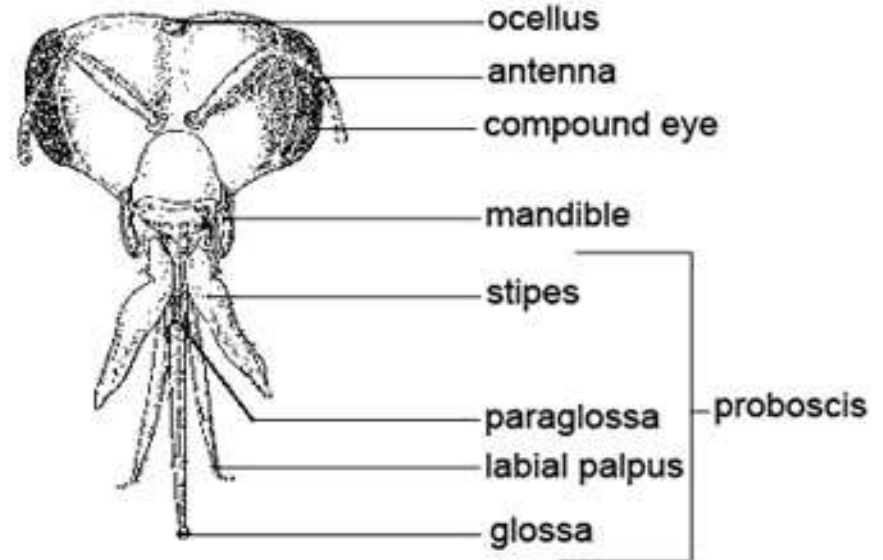
Body is divided into three Regions

- Head
- Thorax, and
- Abdomen

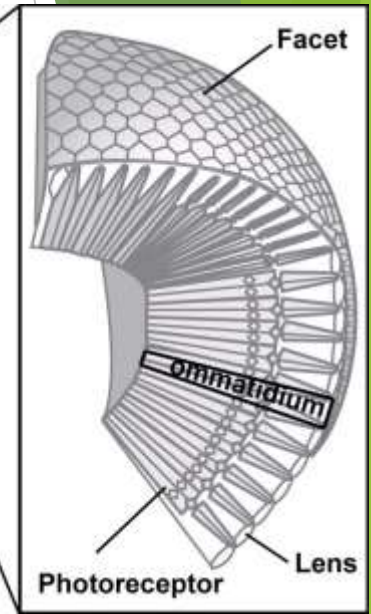
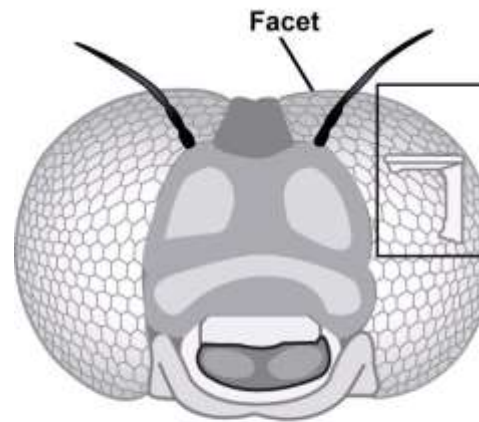
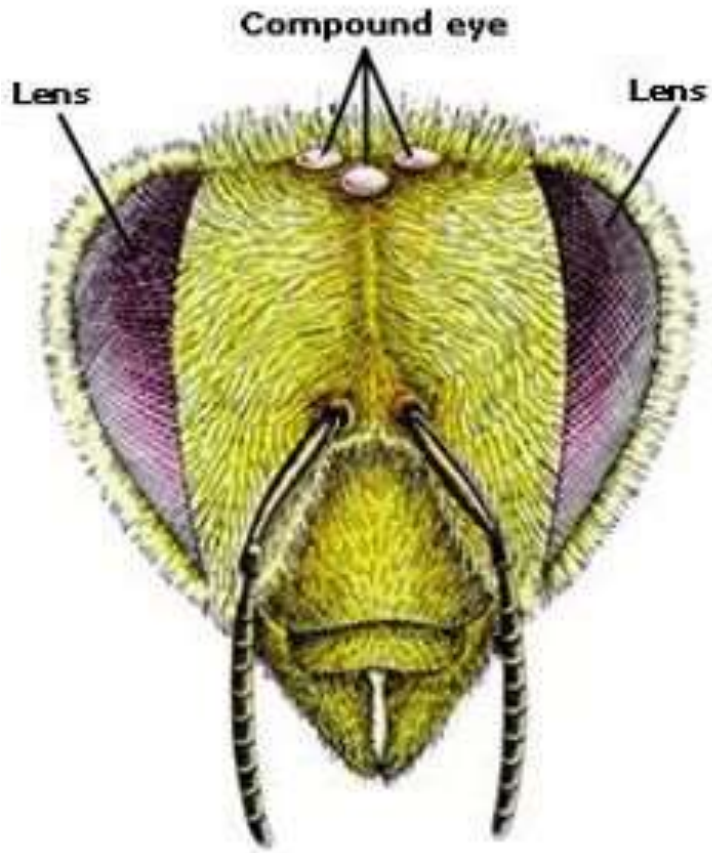


Head

- Compound Eyes
- Three Ocelli
 - Simple Eyes
- Antennae
 - Respond to Touch & Odor
- Mandibles
- Proboscis
 - Lapping up Nectar & Other Fine Particles



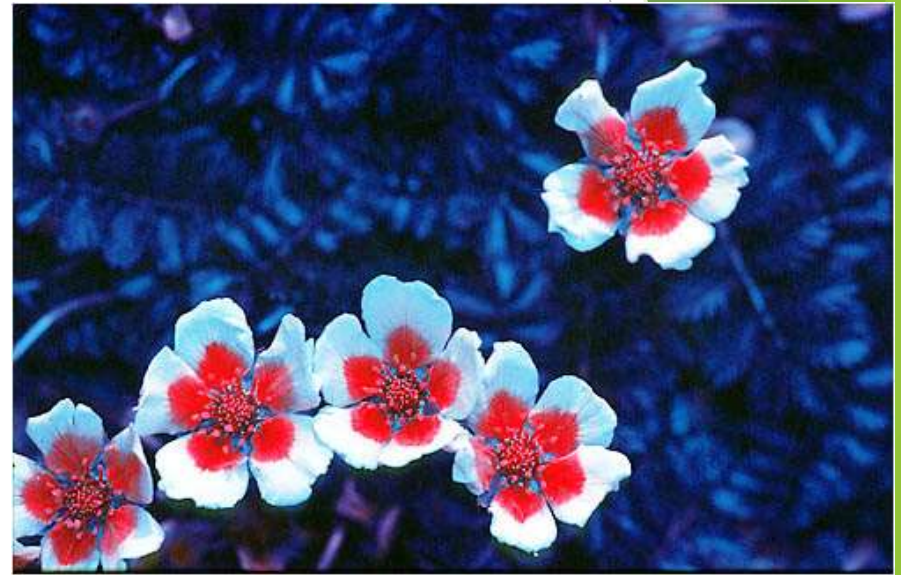
Compound eye



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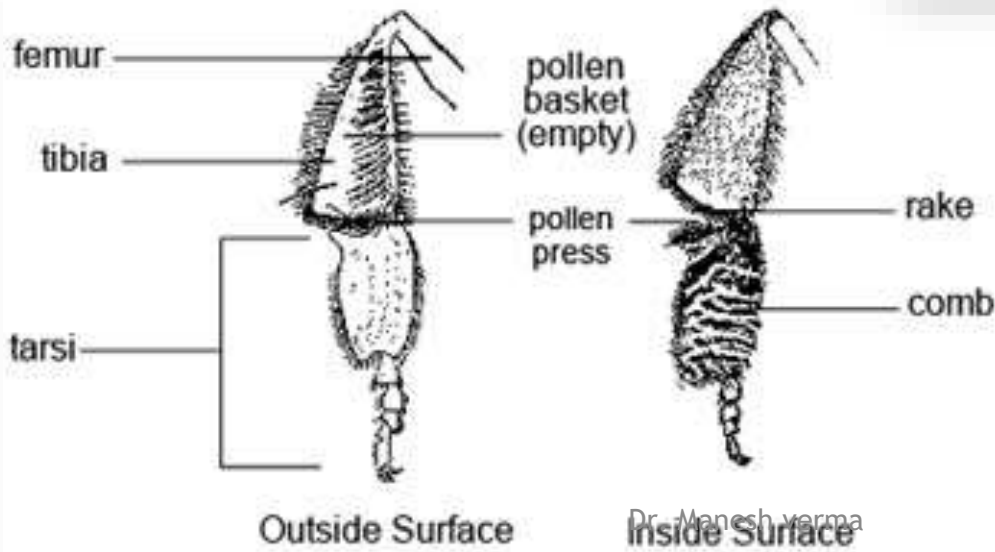
Mosaic picture

Also in UV



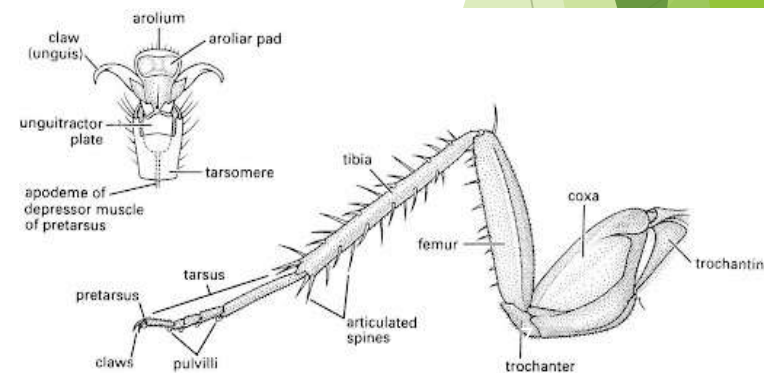
Thorax

- Point of Attachment for
- Six Legs
- Two Pairs of Wings



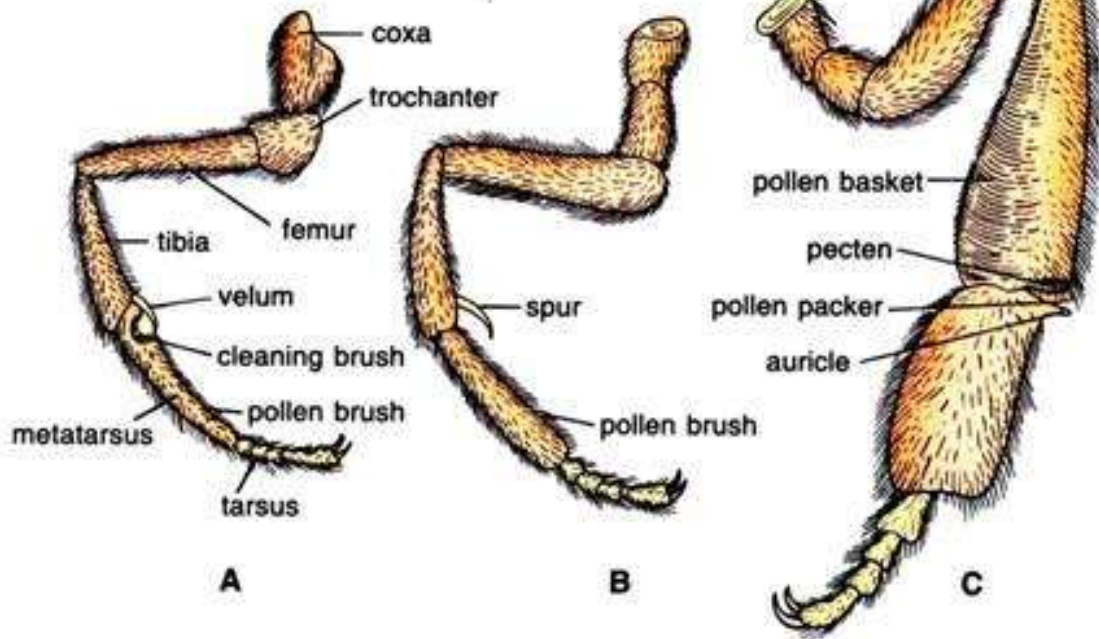
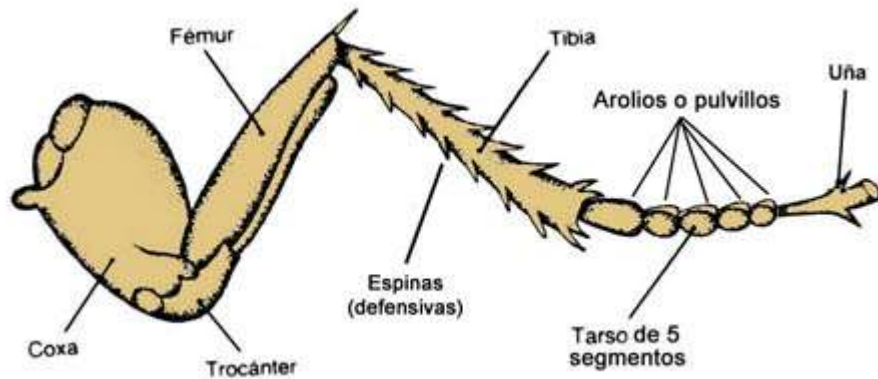
Structure of typical insect legs

- Consist of 5 segments namely **Coxa** , **trochanter**, **femur** , **tibia** and **tarsus** .
- Tarsus consist of 1-5 small segments called **tarsomeres**.
- Last tarsomere bears a pair of **claws**
- A pad between the claws is called **Arolium**
- Pads at the base of claws are called **pulvilli**



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BEE LEG



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Fig. 77.5. Honeybee. Legs. A—Prothoracic leg; B—Mesothoracic leg; C—Metathoracic leg.

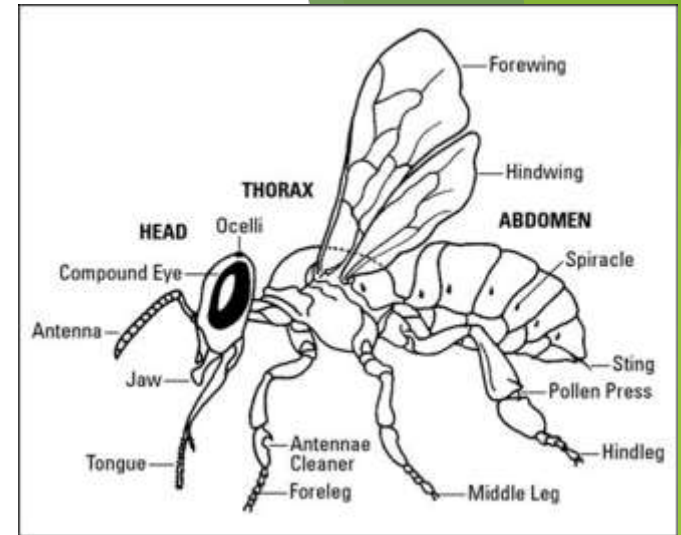
Pollen Baskets



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Abdomen

- **Spiracles for Breathing**
- **Stinger/Ovipositor (Workers & Queen)**
- **Male Bees (Drones) do not have a stinger**



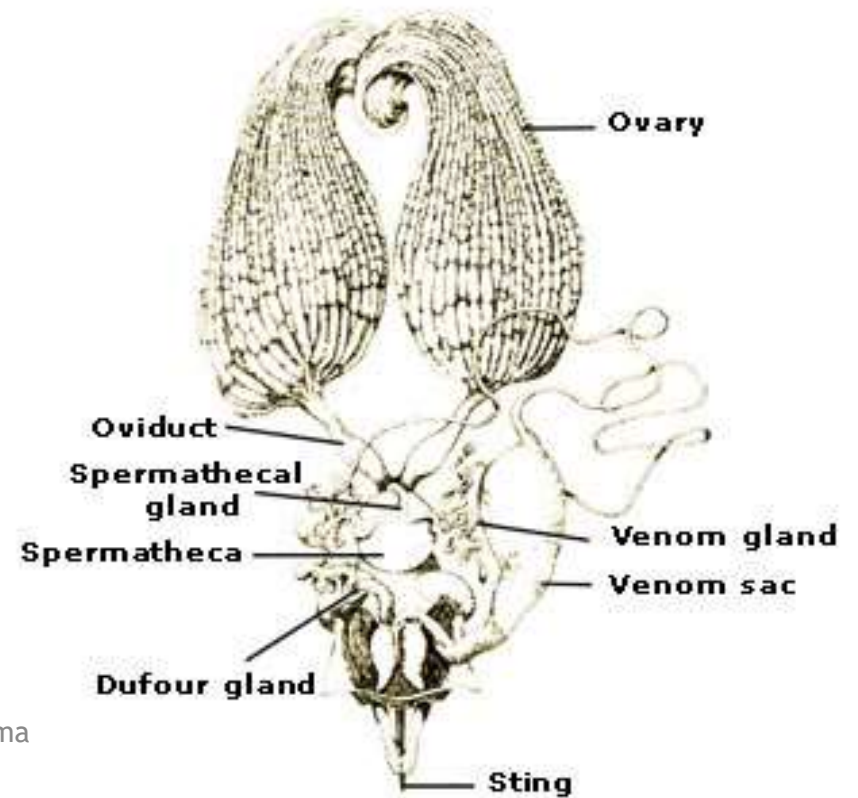
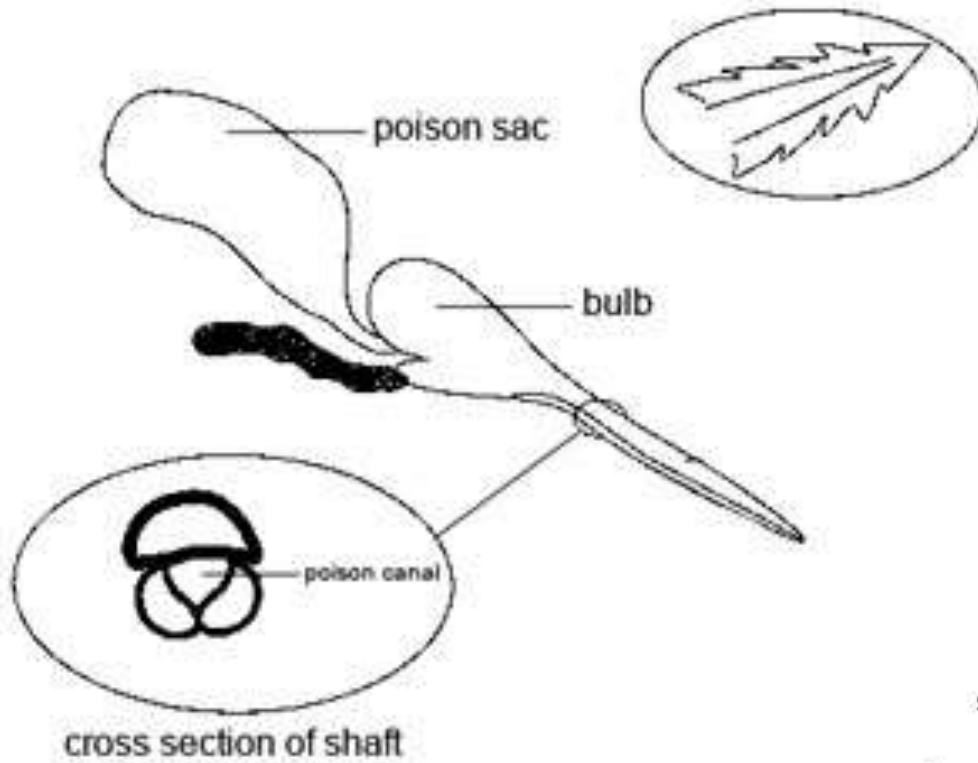
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Venom gland

- The venom gland consists of a pair of long, slender, convoluted tubules which float freely within the hemolymph of the **posterior** part of the abdomen .
- Secretory cells occur along the length of the tubules, their small ducts opening into a common, chitin-lined duct.
- Each tubule ends with a small glandular enlargement, and the two tubules unite in a short common duct.
- The duct opens into the anterior end of the **venom sac**
- The stinging apparatus is a **modified ovipositor**.

Stinger



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Venom gland cont.

- The venom injected into the victim when a worker stings, is a mixture of toxic **proteins and peptides**, the major component being a protein called **melittin**(toxic) .
- Venom contains other compounds such as **Apimin**: toxic peptide that damages nerve cells hyaluronidase, phospholipase , acid phosphatase and histamine.
- The poison sac walls have no muscles, and the venom therefore is not expelled by contraction of the sac; it is driven through the canal of the sting by the action of the sting lancets and their valves

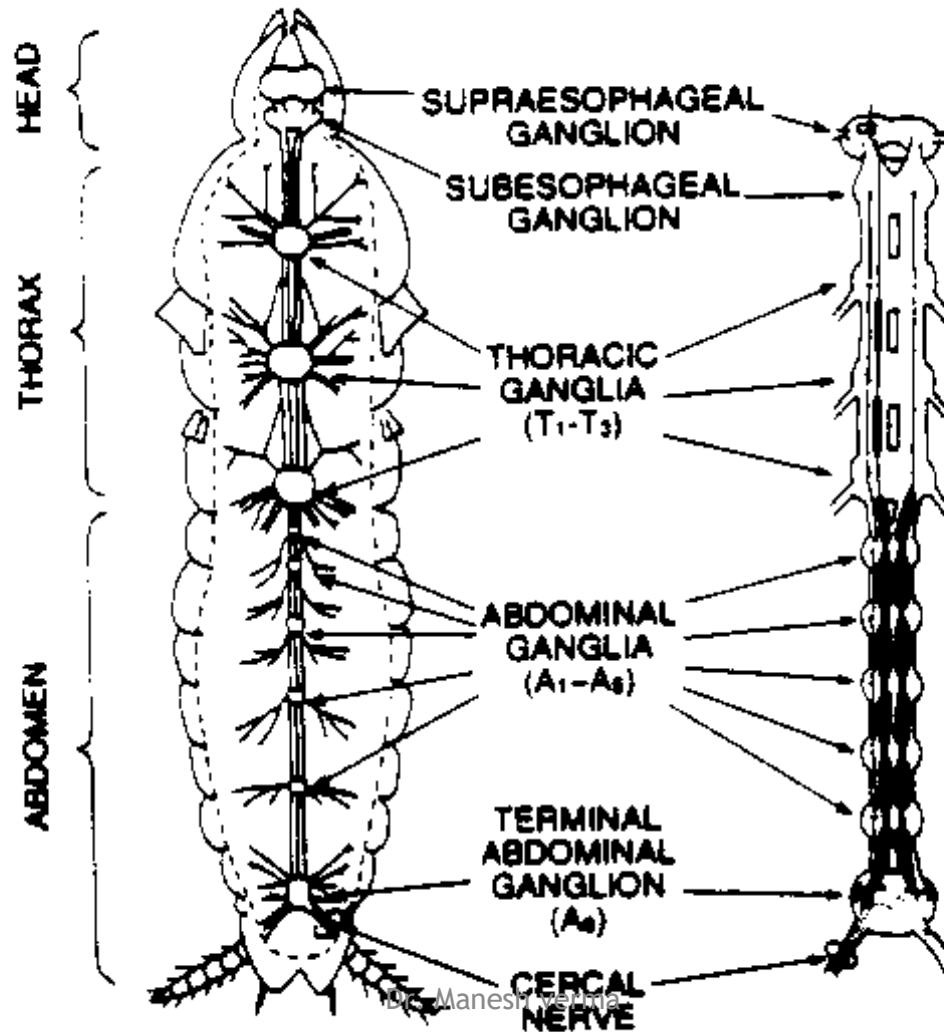
Venom gland cont.

- The venom gland is present in both the worker and the queen castes, but queens have significantly larger glands than the workers and produce more venom.
- Queens use venom during fights with other rival queens, an event that occurs as soon as the imago (mature adult stage) emerges, while **fertilized queens** rarely use venom. by the time queens are one to two years of age their venom has become essentially inactive .
- Queen venom is **more lethal** toward other honey bees than is worker venom.

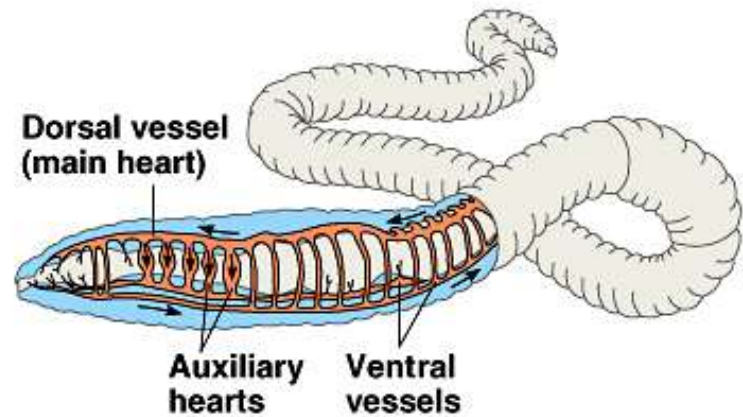
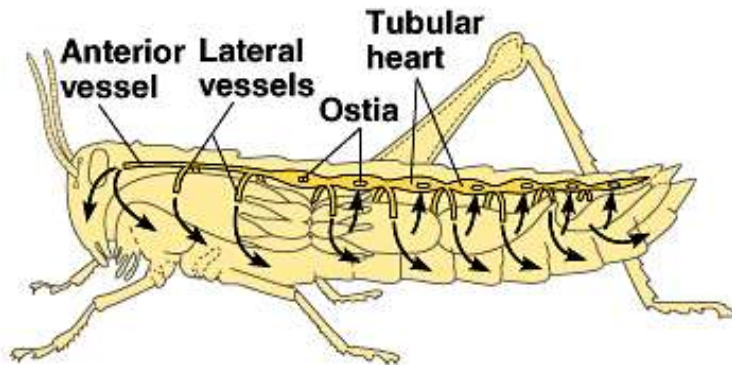
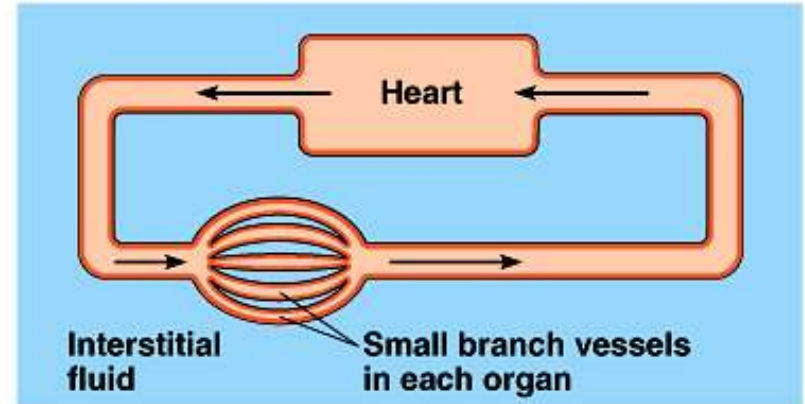
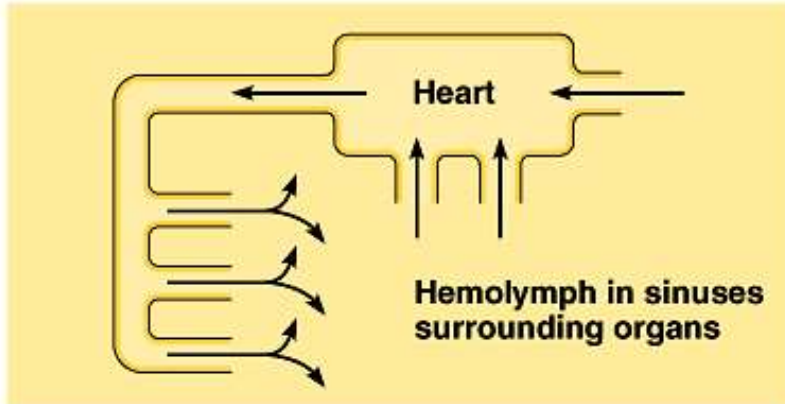
Internal Anatomy



Nervous System



Circulatory System



(a) Open circulatory system

(b) Closed circulatory system

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Nasonov Gland



- Nasonov's gland produces a pheromone used in **recruitment** in worker honeybees.
- The pheromone can serve the purposes of attracting workers to a **settled swarm** and draw bees who have lost their way back to the hive.
- It is used to recruit workers to food that lacks a characteristic scent and lead bees to water sources.
- Released by Worker Bees to **Signal** entrance of hive or mark flowers

Wax Gland

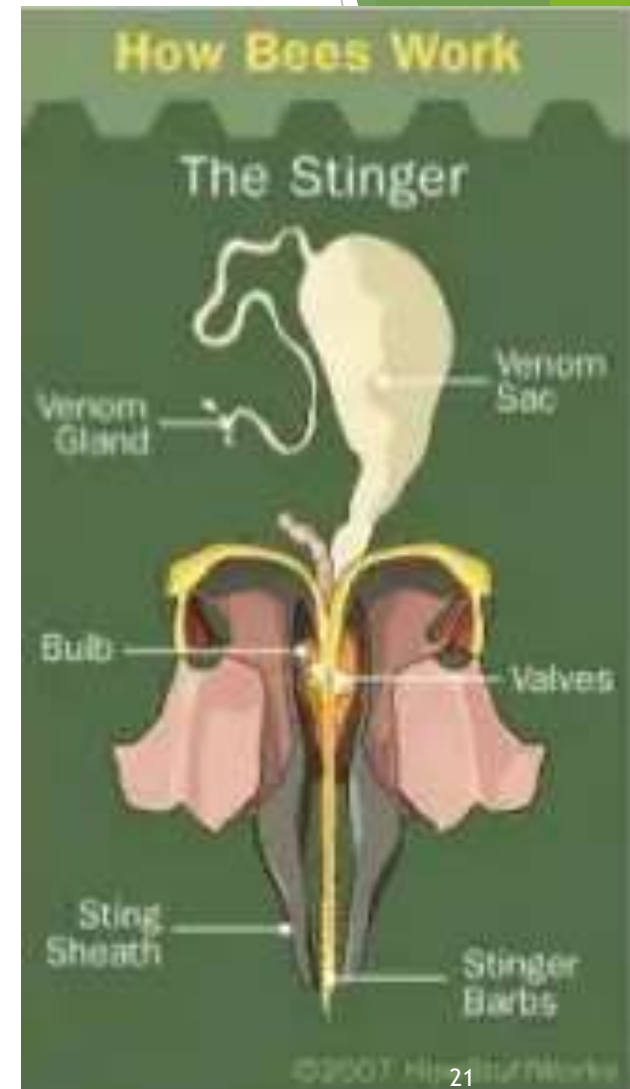
- **Wax Gland(s):** **Four pairs** of glands, sometimes called mirrors, are specialized parts of the body wall.
- During the wax forming period in the life of a worker, the glands greatly thicken and take on their glandular structure.
- The wax is **discharged as a liquid**, hardens to small **flakes or scales**, and sits in wax pockets.
- The wax scale is then transferred to the **mandibles** where it is chewed into a **compact, pliant mass**.
- After the worker bee outgrows the wax forming period, the glands degenerate and become a flat layer of cells.

Wax Gland Contd.



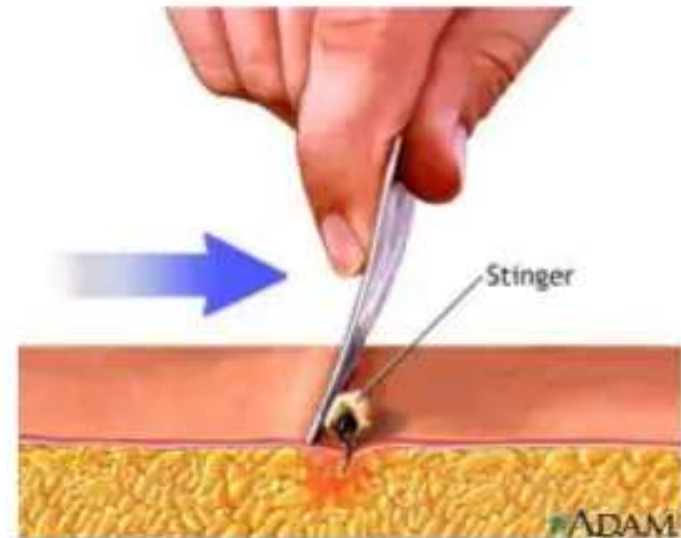
BEE STING

- **Stinger** – a modified ovipositor used for defense (males do not have a stinger)
- **Venom Gland** – contains proteins and enzymes that can be used in defense against attack
- **Barbed stinger** – makes removal of stinger difficult, and ensures venom sac will continue to inject venom once the bee detaches



Stinger Removal

- Be calm, and don't squeeze! ▪
- Squeezing the bee could squeeze the contents of the venom sac into you all at once ▪
- You should scrape off the stinger as close to the skin as possible ▪
- The quicker the stinger is removed, the less venom that will get injected



Review

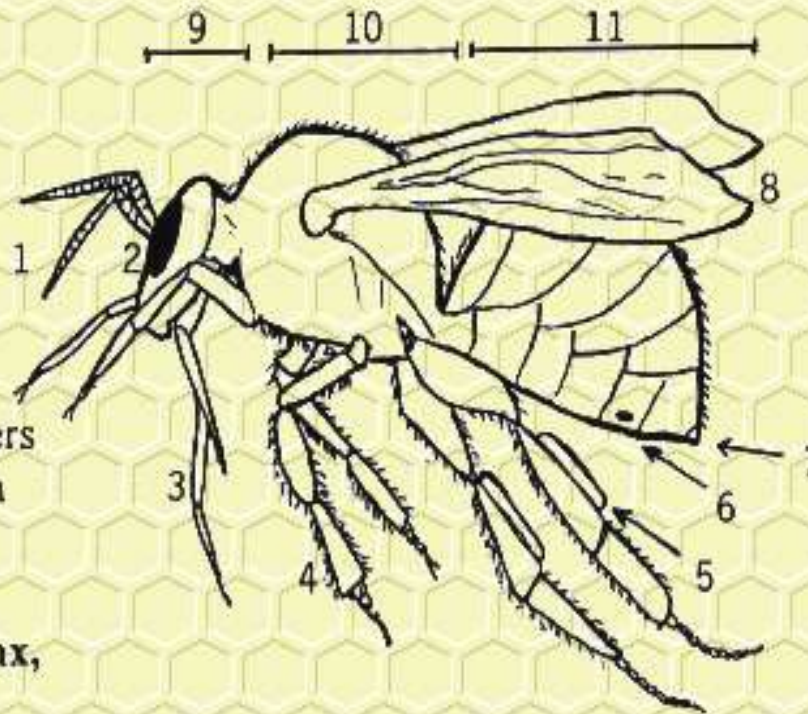
1. **Three members of the colony**
 - a) Worker
 - b) Queen
 - c) Drone

2. **Development timeline of a Honey Bee and their lifetime functions**
 - a) Egg (Eggs)
 - b) Larva (Larvae – “lar-vee” or “lar-vie”)
 - c) Pupa (Pupae – “pew-pee” or “pew-pie”)
 - d) Adult (Adults)
 - e) Job responsibilities

3. **Anatomy: Three major sections of the bee and several parts of each**
 - a) Head
 - b) Thorax
 - c) Abdomen

Parts on body (Quick Revision)

Bee on Hive



1. Feelers (Antennae)
2. Compound eyes
3. Tongue (Probosis)
4. Fore legs
5. Pollen Sacs
6. Wax Glands
7. Stinger
8. Wings
9. Head
10. Thorax
11. Abdomen

Match these words with the numbers on the picture. Write the words on the correct line to the side.

Abdomen, Eyes, Feelers, Head, Legs, Pollen Sacs, Stinger, Thorax, Tongue, Wax Glands, Wings