Morphology

of

Honey Bees

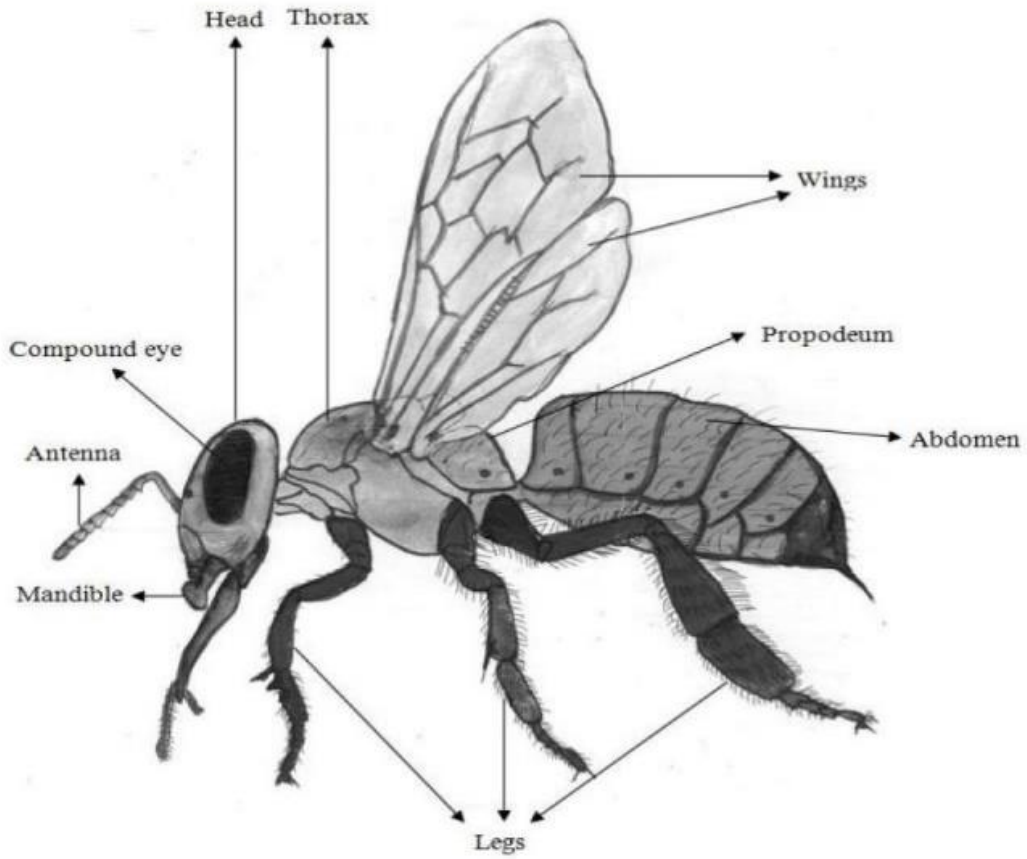
GENERAL MORPHOLOGY

- In honey bees, body parts are modified as per their food habits and social life
- Like any insect, body of honey bee can be distinguished in to three parts

  a. Head

  b. Thorax

  c. Abdomen



General morphology of a worker honey bee

HEAD

Antenna

- Head Bears a pair of geniculate antennae (elbow-like)

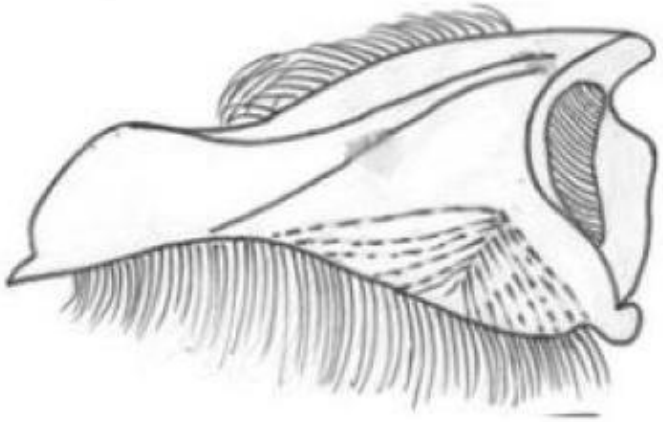
Eyes

- Two compound eyes on lateral side of head.
- Bees can distinguish different colors but are red blind and can perceive ultraviolet rays
- Head bears 3 ocelli (simple eyes) on top portion which perceive degree of light

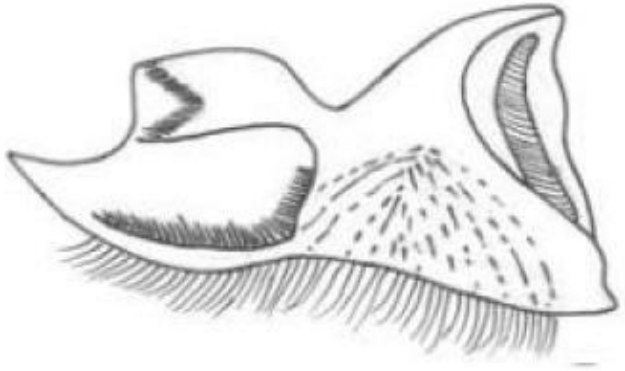
Mouthparts

- Two mandibles are attached to ventro-lateral part of head capsule.
- Mandibles differ in shape in three castes
- Workers use mandibles for grasping and scrapping pollen from anthers, feeding of pollen and in manipulation of wax scales during comb building

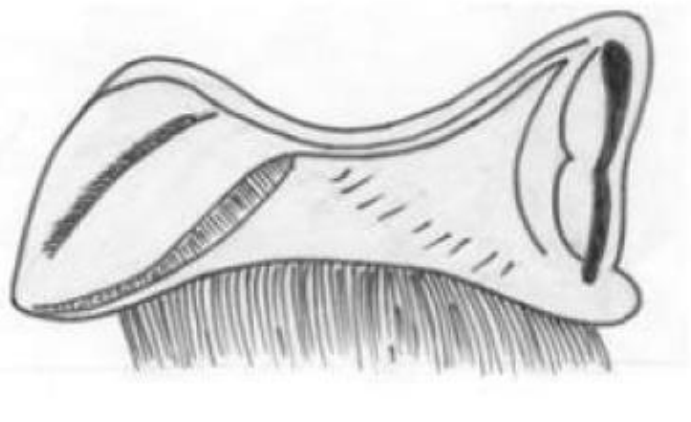
Mandibles of different casts of honey bees



Mandible of drone



Mandible of queen



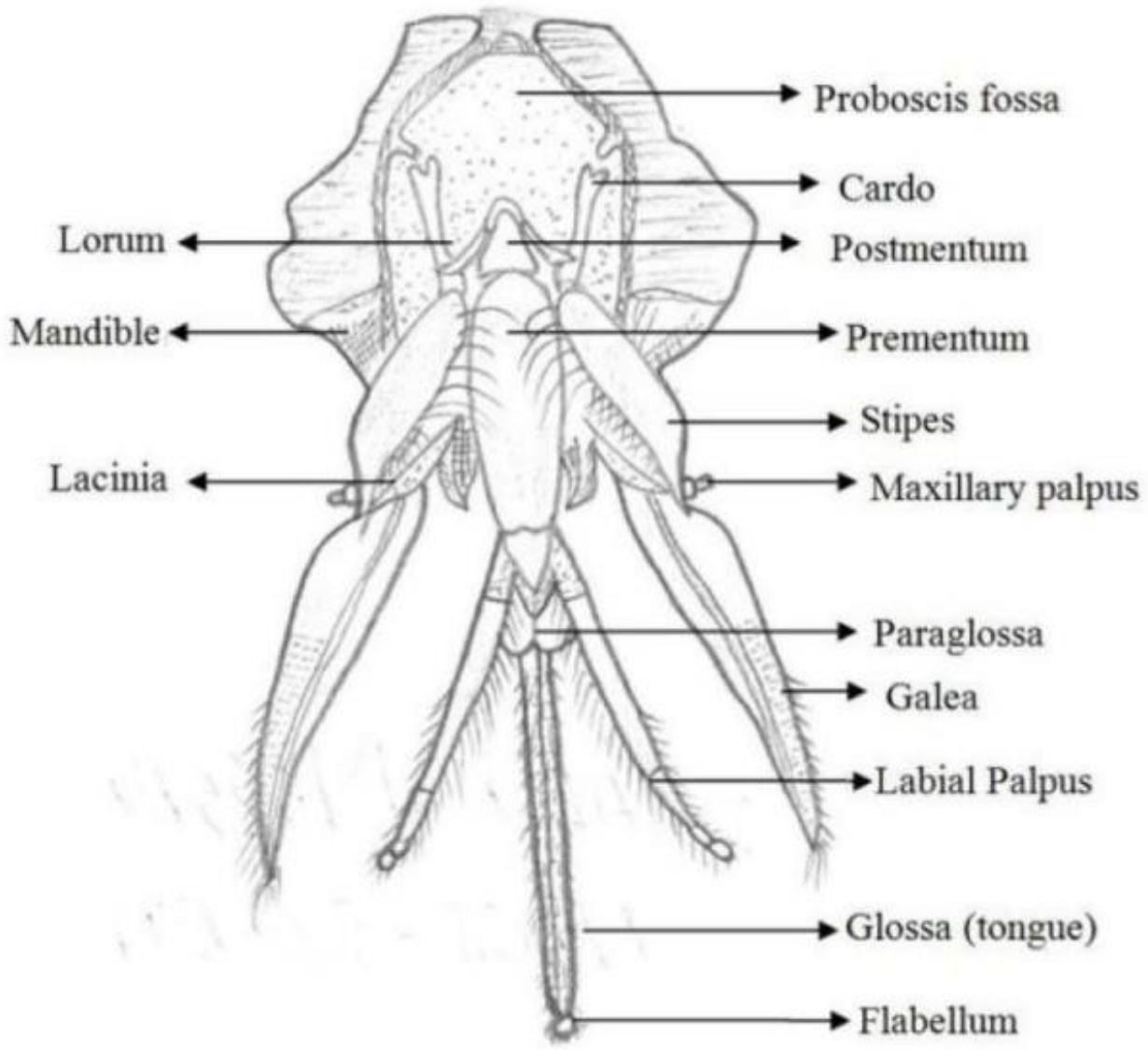
Mandible of worker

HEAD

Mouthparts

- Mouth parts of worker bees are modified for **sucking and lapping**
- Tongue or proboscis (formed by medium labium and two lateral maxillae) is used for ingesting liquids.
- Labium has long median **glossa** and spoon shaped lobe (**flabellum**) at the end
- Inside the head there are long coiled strings of small lobes known as **hypopharyngeal glands**
- These glands secrete glandular food known as **royal jelly** that is fed to queen and young larvae

Mouthparts of a worker honey bee



THORAX

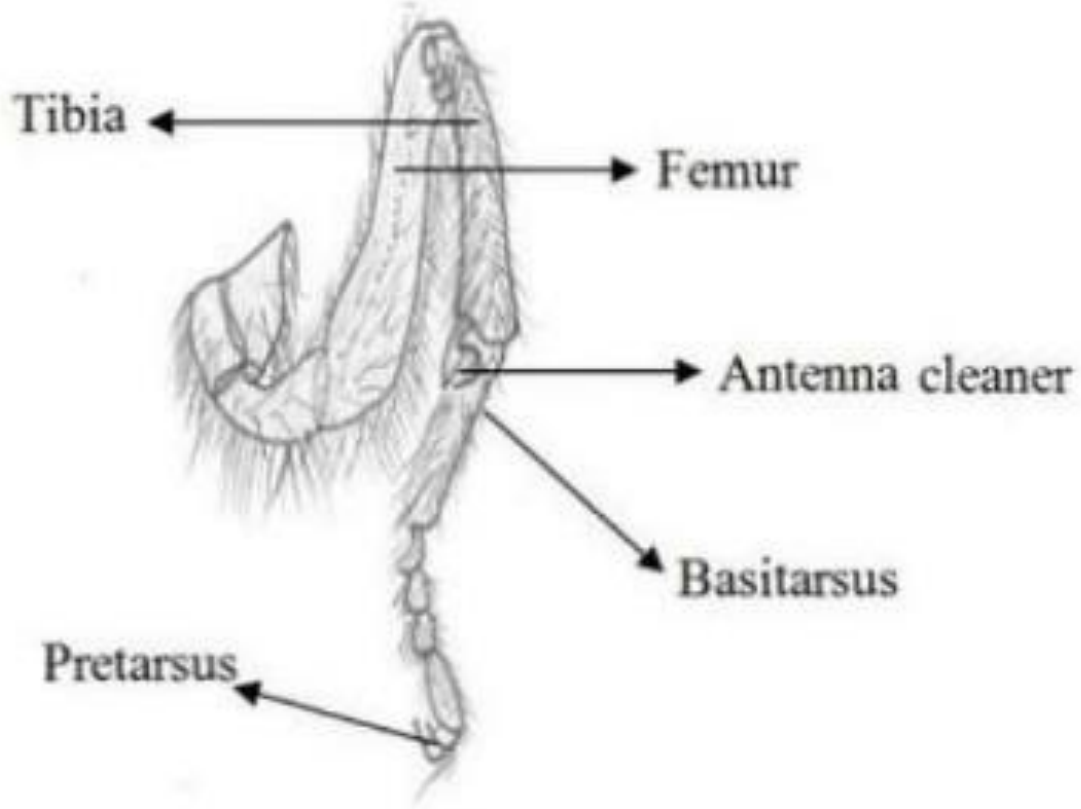
- It consists of three segments:
  a) Prothorax
  b) Mesothorax
  c) Metathorax

- Each bears a pair of legs
- Meso and metathorax, each bears a pair of wings
- Legs and wings are locomotory organs
- In addition to locomotion legs in honey bees are also modified to perform different functions

THORAX

1. Prothoracic leg

- Prothoracic legs serve as **antenna cleaner**
- Basal part of basitarsus has a notch and a small lobe projects from distal end of tibia (**tibial spur**).
- It is found in all the three castes.

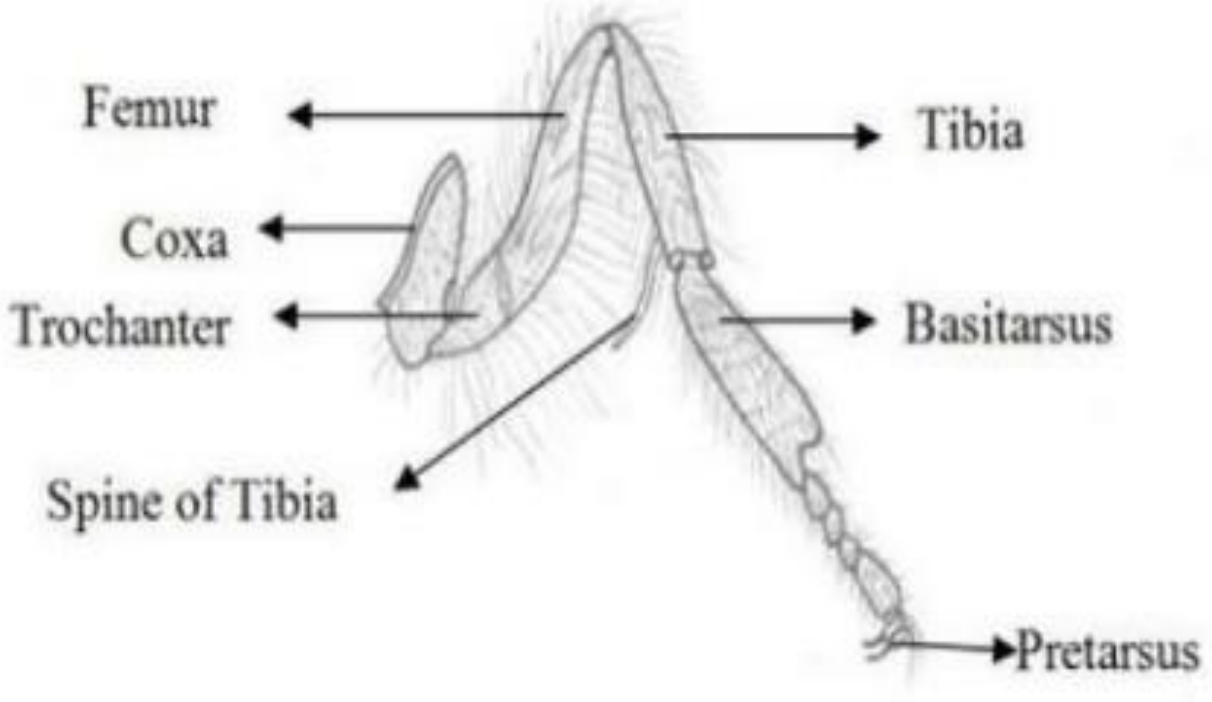


Prothoracic leg (First leg)

THORAX

2. Mesothoracic leg

- On mesothoracic legs, bushy tarsi serve as brushes for **cleaning of thorax**
- Long spine at end of middle tibia is used for loosening pellets of pollen from pollen basket of hind leg and also for cleaning wings and spiracles.
- Wax scales are also removed from wax pockets of abdomen by these legs.



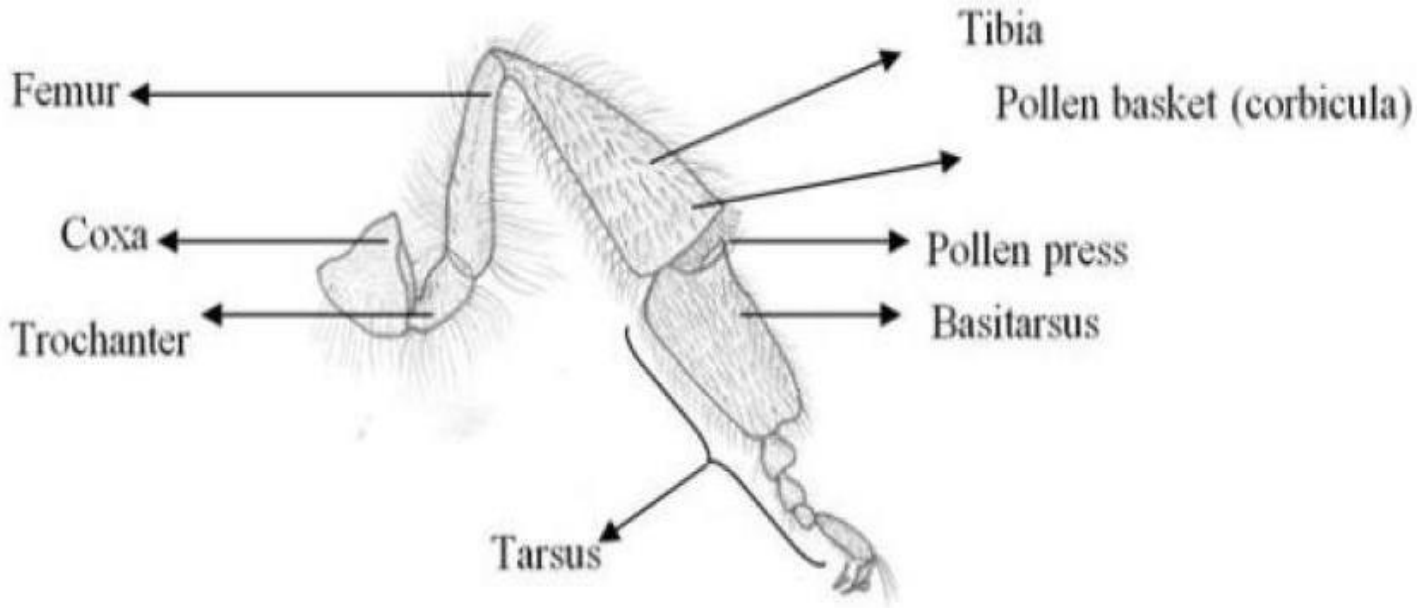
Mesothoracic leg (middle leg)

THORAX

3. Metathoracic leg

- In worker bees, smooth somewhat concave outer surface of hind tibia is fringed with long curved hairs and forms pollen basket or **corbicula**

- Hind or metathoracic legs differ from other legs in being:
  a) larger in size
  b) and with broad flattened form of tibia and basitarsus

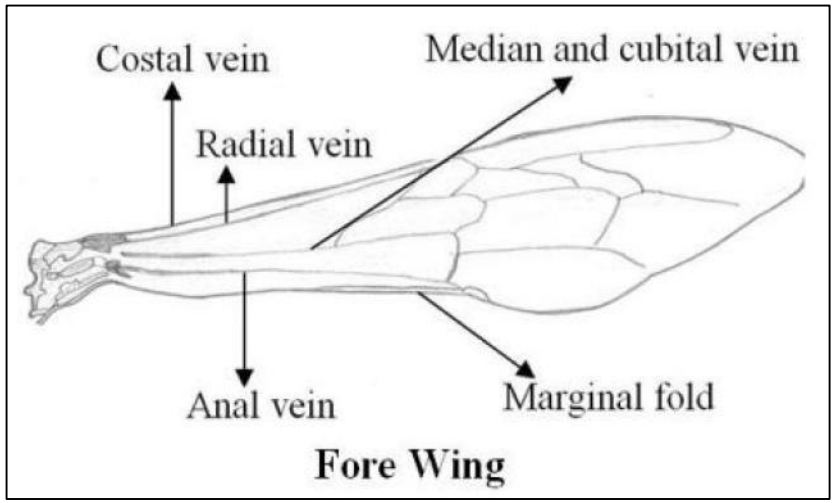


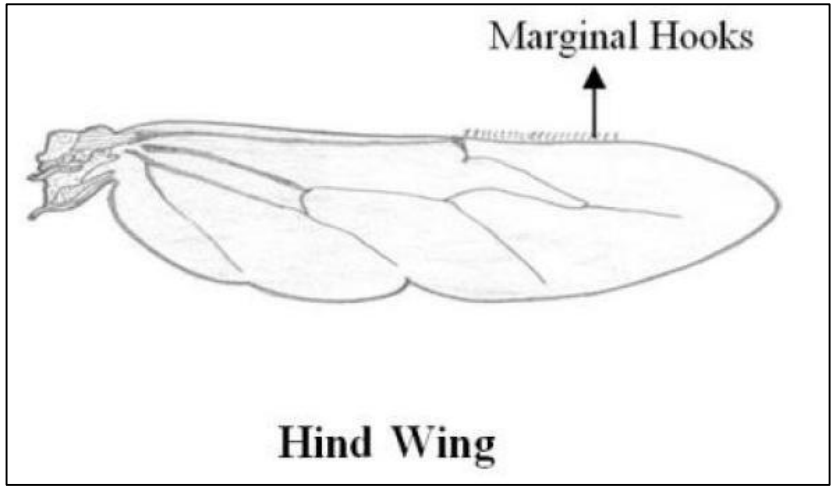
Metathoracic leg (hind Leg)

THORAX

Wings

- Two pairs of wings arise from sides of meso and metathorax
- Forewings are stronger than hind wings
- Decurved fold on rear margin of forewing works as coupling apparatus for holding hamuli and this result in unity of action of the wings in flight
- Series of upturned hooks (**hamuli**) are present on front margin of each hind wing



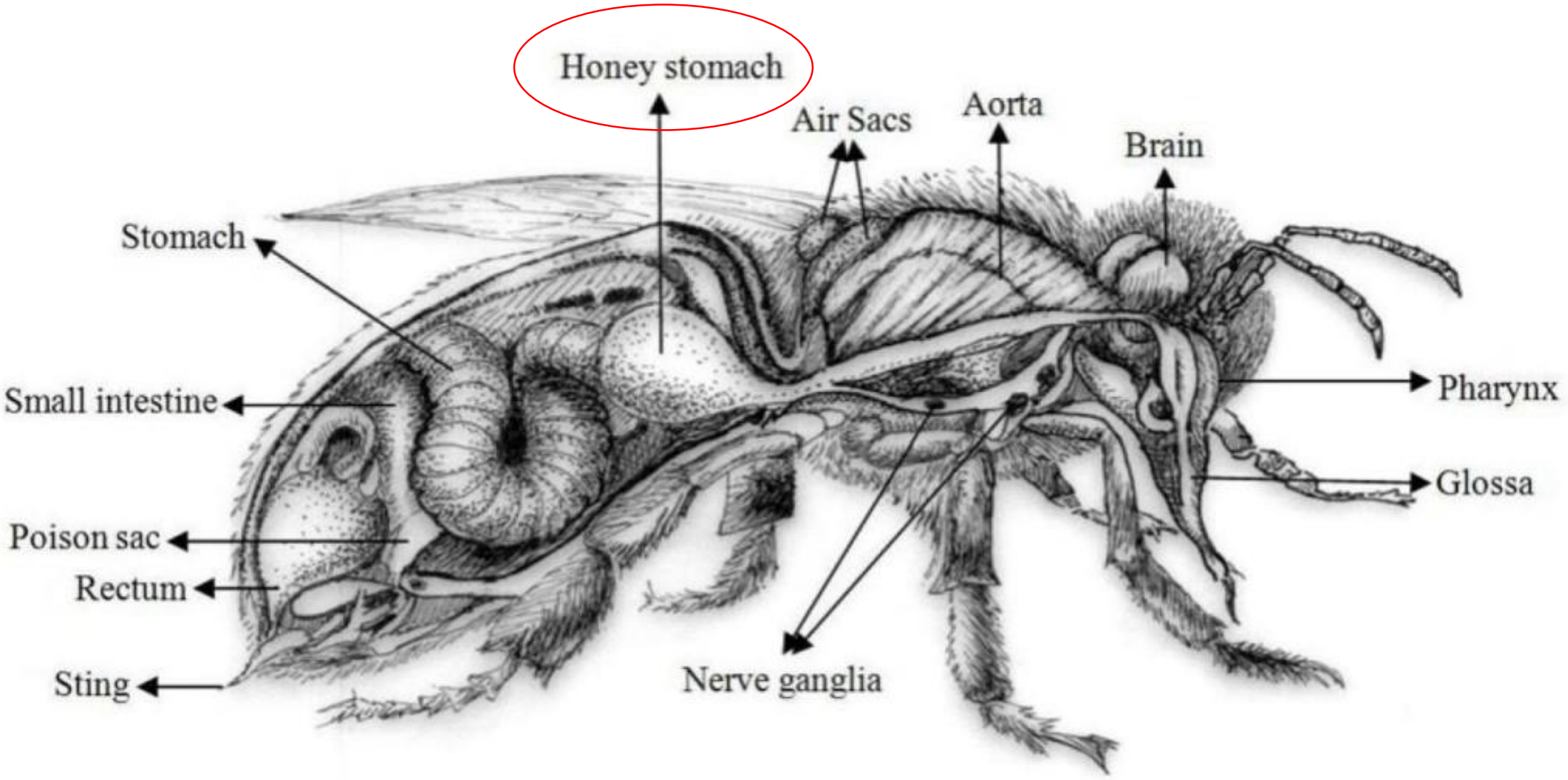


ABDOMEN

- First abdominal segment is united with the metathorax and forms anatomically a part of thorax known as **propodeum**
- Bee larva has 10 abdominal segments
- But in adult workers abdomen appears 6 segmented;
- segments 8-10 are reduced in size and first segment (propodeum) is transferred to thorax during pupal stage
- Abdomen bears sting, wax glands, scent glands and genitalia
- In workers egg laying apparatus (ovipositor) is modified into sting
- Queen uses ovipositor for egg laying and for stinging rival queen.

Important anatomical features

- Digestive system is unique in having oesophagus with expanded **honey stomach** which stores the collected nectar
- From honey stomach food goes to ventriculus through X shaped opening known as **proventriculus**.
- It removes pollen from nectar and nectar is retained in honey sac and pollen passes to ventriculus.
- Nectar is regurgitated in the comb cells for conversion into honey
- Reproductive organs are fully developed in queen and drone but greatly reduced in worker.
- Sperms are stored in the queen in a sac like structure known as **spermatheca**.
- The stored sperms are utilized by queen throughout her lifetime as she does not go for mating once starts egg laying



Anatomy of a worker bee