

# Honey Bee Anatomy 101

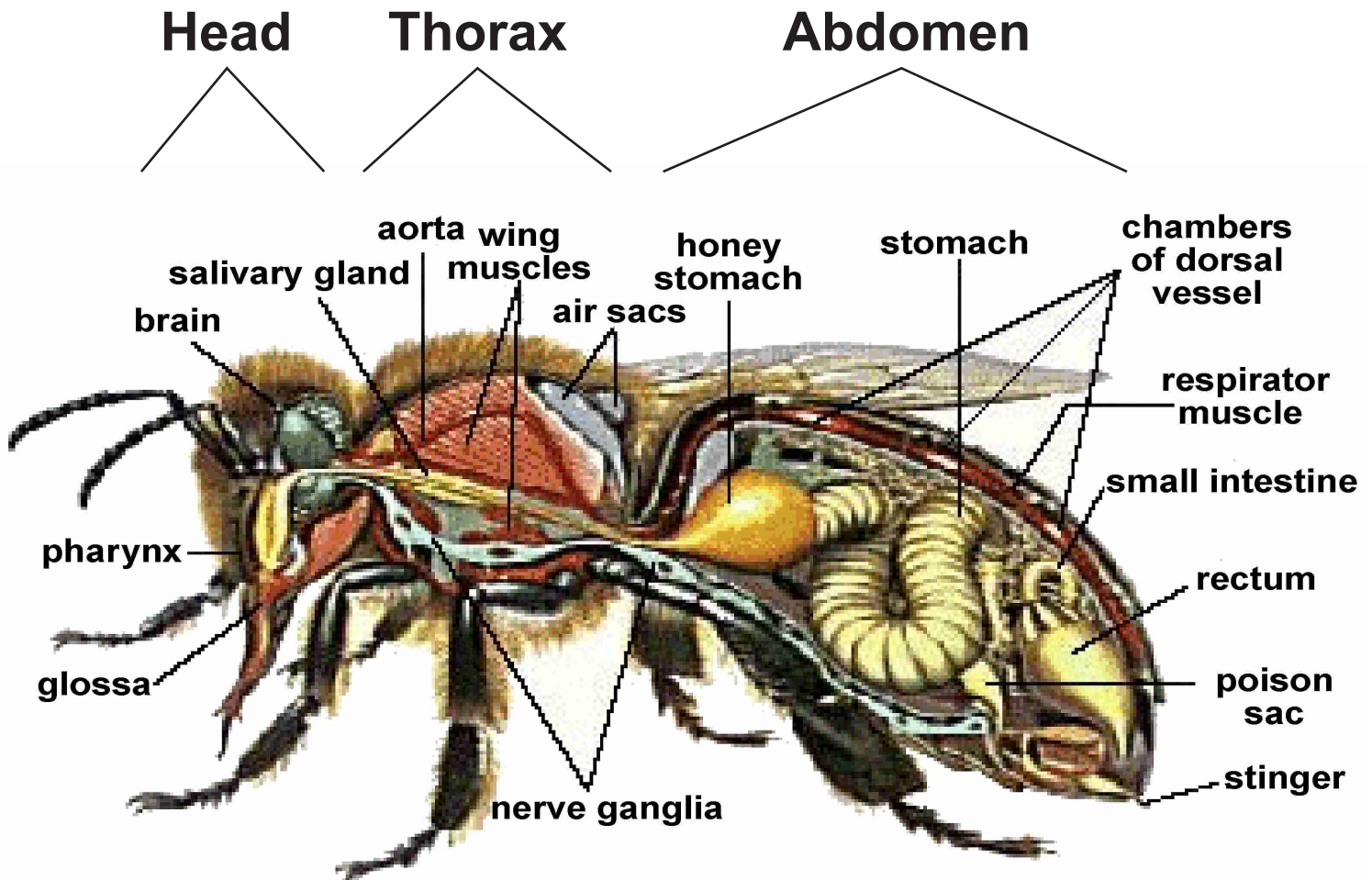


## Class Insecta: Three major body regions in honey bees

**Head:** Houses large share of sensory organs - eyes, antennae, mouth parts

**Thorax:** Consist mainly of locomotory appendages - legs, wings and muscles for powering them

**Abdomen:** Chiefly consists of body organs - for digestion, waste removal, reproduction organs, and stinging system



The honey bee is part of a group of insects that engage in complete *metamorphosis*, with 4 developmental stages:



**Egg** *Egg is sausage-shaped  
1/16 inch long (queen rearing stage)  
Hatches after 3 days  
Should stand on end at bottom of cell*



**Larva** *Starts as a bright white grub  
Larva adopts a C-shaped posture  
Elongates to prepupa - heads up  
Workers cap over cell*

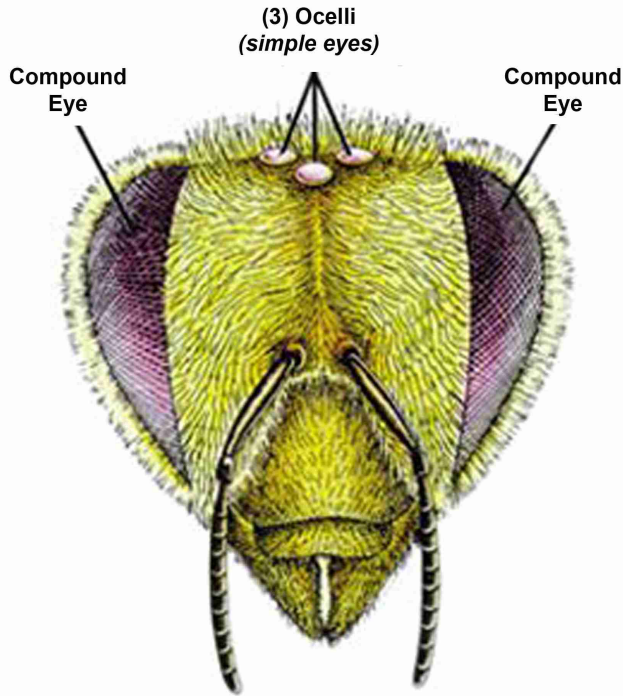


**Pupa** *Changes to likeness of adult bee  
Body regions become apparent  
From no pigmentation to darkening  
Hair and wings develop*



**Adult** *Chew out through cell capping  
Immediately starts cleaning out cell  
Begins housekeeping & feeding brood  
10-15 days average before flying or  
wax production*

# Honey Bees Have 5 Eyes

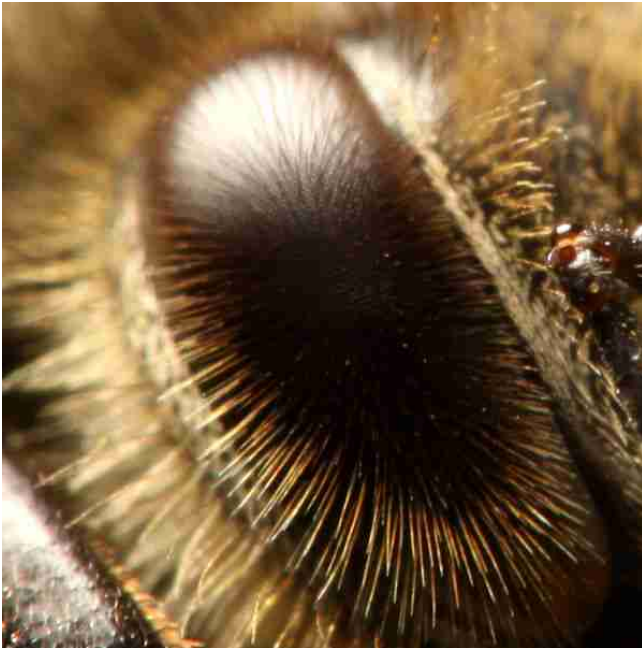


## Two Hairy Compound Eyes

- Large eyes that are on either side of the head are made up of hundreds individual eye units that point in different directions but work as a unit.
- Hair sticking out of each the eye unit are used to measure wind direction and flight speed of the bee.
- These eyes *lock-on* to movement. When a honey bee sees a fast-moving object, it's attention is "caught" and an alarm goes off in the honey bees' colony protective instincts. ***Hence, the importance of slow and careful movements by the beekeeper in the apiary.***
- Honey bees have the ability to see hotter colors, ultra-violet through orange.

## Three Simple Eyes

- The ocelli are used for navigation and for maintaining stability in flight.
- The ocelli see ultraviolet light. (UV light penetrates cloud cover, so bees can use this benefit any day)
- Ocelli's UV vision capabilities help the bees to detect flowers whose *iridescent* nectar guides can ONLY be seen in Ultra violet light!
- *Symbiotic Relationship* between some flowers and insect pollinators. For the plant to continue to reproduce, they provide specialized guides to the bees to partake of it's nectar and pollen while the bees inadvertently provide pollination service.



# What They See

## Compound Eye Composite



## Iridescent Nectar Guides



## Bees Do Not See Red Looks Black



# What They Taste



## The Probocis (Tongue)

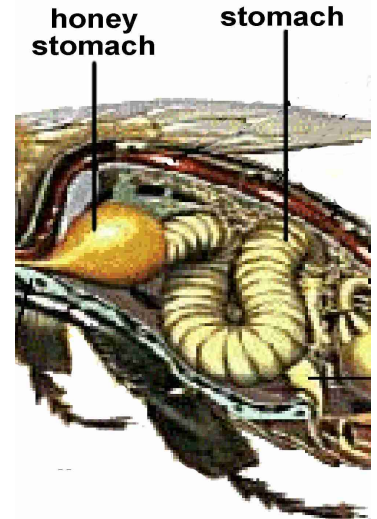
- The tongue of a bee works just like how we use a beverage straw when drinking out of a glass, but with multiple tubes.
- To suck up the tiny droplets of nectar inside a flower, the honey bee has another tube on the inside of the long tube that is used to drink water.
- This delicate tube has a spoon-like lobe and mop-like attachments at it's end that are used to help soak up nectar in miniscule quantities.
- The tongue of a honey bee is about 1/4" long. In proportion to its body length, it would be like a human tongue as long as your arm.
- The tongue of the honey bee is stored in a rolled up ball (like party favors when not in use).
- A honey bee can taste through it's probocis and is believed to have specific memory of the nectar of good flowers for up to 12 days.



# Honey Stomach

## The Two Stomachs

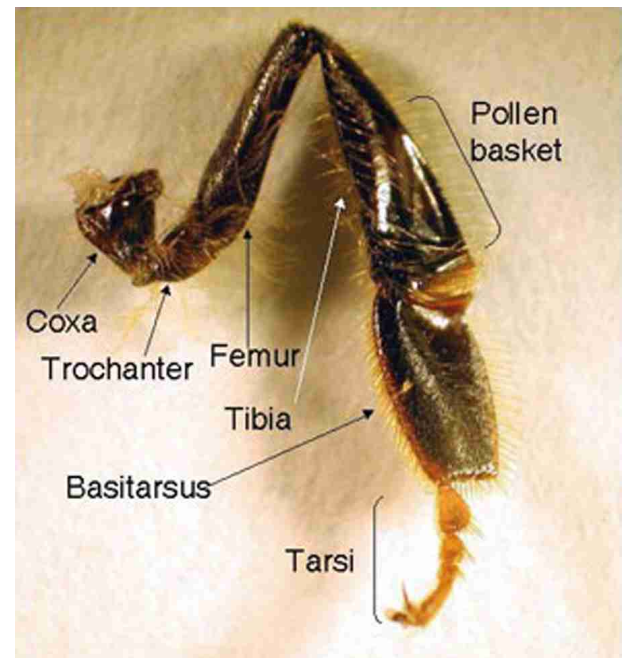
- Raw nectar in a flower is about 80% water with some complex sugars. Bees do not eat raw nectar.
- Forage bees use their long, tube-like tongues to suck nectar out of flowers and then store it in their "honey stomachs" to bring back to hive.
- Bees actually have two stomachs:
  - Honey Stomach for nectar carrying
  - Regular Stomach for nutrition intake
- The honey stomach holds almost 70 mg of nectar and weighs almost as much as the bee does when full.
- Honey bees visit between 100 and 1500 flowers daily to fill their honey stomach.
- Forage bees bring back nectar to hive and house bees suck the nectar out of their mouths.
- House bees chew on nectar for about 1/2 hour, adding enzymes (hydrogen peroxide) that breaks down complex sugars to simple sugars.
- House bees regurgitate nectar and spread it out into honeycomb - it's not vomit!
- Bees dehumidify the stored nectar until thick and gooey, then cover with wax to store and eat at a later time.
- Simple sugars are easier for bees to digest, less chance of spoilage in storage.



# Bees Knees

## The Legs

- Three pair of segmented legs.
- The forelegs contain antennae cleaners.
- A honey bee moistens the forelegs with its tongue and brushes the pollen that has collected on its head, body and forward appendages to the hind legs.
- The corbicula or pollen basket is a polished cavity surrounded by a fringe of hairs.
- The pollen is transferred to the pollen comb on the hind legs and then combed, pressed, compacted into a ball.
- The tarsi on the end of the foot contains a gland that release footprint pheromones which aid in finding nectar.
- The Queen releases a footprint pheromone that can inhibit queen cell production.  
As the Queen ages she releases less of this pheromone from her tarsal glands.





# At the End of It All

- Female workers can sting, and usually dies from struggle to free itself .
- Drones do not have a stinger, but can bite.
- Queens can sting multiple times because they do not have a barbed stinger, but rarely use it.
- The stinger is found in a chamber at the end of the abdomen, from which only the sharp -pointed shaft protrudes.
- It is about 1/8-inch long. When the stinger is not in use, it is retracted within the sting chamber of the abdomen.
- Lots of bee lore about the sting of bees and the honey they produce.



# Time-Table of a Bees Life

## Time from egg to hatching adult

16 Days for Queen Bee

21 Days for Worker Bee

24 Days for Drones

## Period of service as house bee

1 – 2 Cleans cells and warm the brood nest

3 – 5 Feeds older larvae with honey and pollen

6 – 11 Feeds young larvae with royal jelly

12 – 17 Produces wax and constructs comb, ripens honey

18 – 21 Guide the hive entrance and ventilate the hive

## Period of service as field bee

22 - 50 Forage for nectar, pollen, propolis and water

## Period of service for winter bee

3-6 months life span spent mostly in hive