
The
Beekeepers
of Indiana

Introduction to Beekeeping

Honey Bee Facts

- *"Apis mellifera L"* is the scientific name for the Honey Bee
- The study of beekeeping is called "Apiculture"; A Bee Yard is called an "Apiary"
- There can be over 60,000 bees in a single colony (hive)
- Each colony has only 1 adult queen who can live 2-3 years
- The average life of a worker bee is 45 days (during the summer)
- A strong colony can produce 60 pounds of honey in a season
- Every pound of honey produced requires nectar collection from
  - visiting 2 million flowers
  - 25,000 flights = 55,000 flight miles
- Bees produce 1 pound of wax for every 10 pounds of honey

Why are Honey Bees Important?

- 1 out of every 3 bites of food we eat are there because a honey bee pollinated the plant
- Many agricultural crops depend on honey bees for pollination
- Other crops, while not dependent on bees, produce higher yields if honey bees are present
- "the annual value of the increased yield and quality achieved through pollination by honey bees alone … is $14.6 billion…"

Pollination

- The following 19 crops would disappear without bees:
  - Apples
  - Almonds
  - Blueberries
  - Cherries
  - Avocados
  - Cucumbers
  - Onions
  - Grapefruit
  - Oranges
  - Pumpkins
  - Watermelon
  - Peaches
  - Rapeseed (for Canola Oil)
  - Cranberries
  - Blackberries
  - Raspberries
  - Cantaloupe
  - Pears
  - Plums

Honey Bee Products

Besides pollination, honey bees produce:

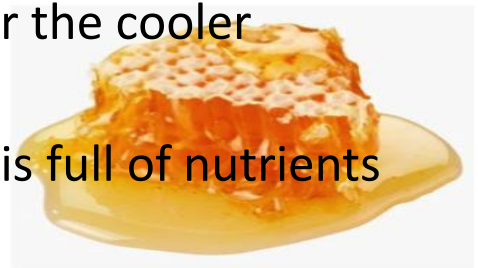
- Honey – nutritional and used as a sugar substitute
- Beesw ducts
- Propo

What is Honey?

- Honey gets its start as flower nectar, which is collected by bees, naturally broken down into simple sugars and stored in honeycombs
- The unique design of the honeycomb, coupled with constant fanning by the bees' wings, causes evaporation to take place, creating the thick, sweet liquid we know as honey
- The color and flavor of honey varies from hive to hive based on the type of flower nectar collected by the bees. For example, honey made from Orange Blossom nectar might be light in color, whereas honey from Avocado or Wildflowers might have a dark amber color.

Why Do Bees Make Honey?

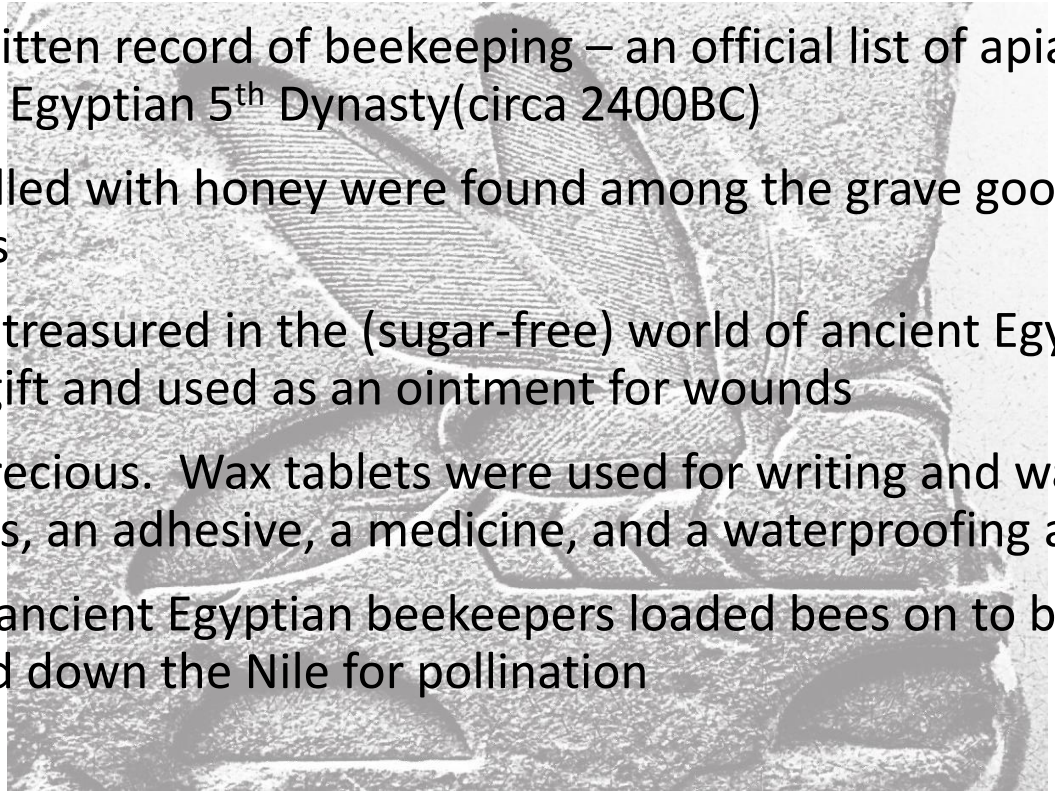
- Honey bees make honey as a way of storing food to eat over the cooler winter period
- Honey is ideal for bees - it is very high in energy, because it is full of nutrients and high in sugars
- Honey bees convert nectar into honey. By allowing the nectar they are storing to concentrate and form into honey, (hence reducing the water content), this prevents bacteria and other fungi from forming in the honeycomb
- Bacteria and fungi cannot multiply in high concentrations of sugar - this is why bees can store it indefinitely, without it going bad



How Do Bees Make Honey?

- Worker Bees use their long tube like tongue (Proboscis) to suck the nectar from a variety of flowers
- The nectar then enters their “honey stomach” When the nectar enters the stomach the sugar from the nectar reacts with enzymes to form two simple sugars.
- Once back at the hive, they regurgitate the nectar into the cells or they pass it to other bees who put it into the cells. All the bees fan the nectar with their wings, which creates a draft and helps the excess water to evaporate
- The nectar thus becomes thicker, and the high sugar concentration prevents fermentation
- They continue until the cells are full and then they put a wax cap over the cells

History of Honey Bees in the World

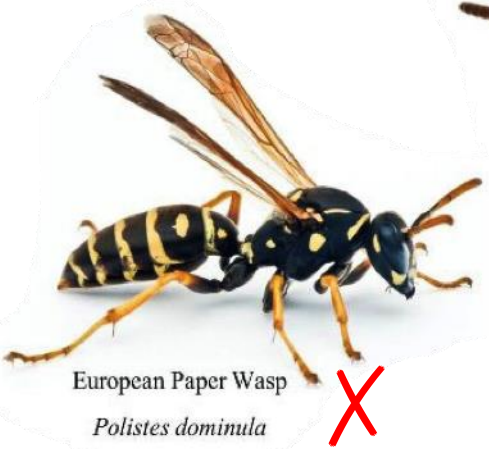


- The first written record of beekeeping – an official list of apiarists - dates back to the Egyptian 5th Dynasty(circa 2400BC)
- Cylinders filled with honey were found among the grave goods discovered in royal tombs
- Honey was treasured in the (sugar-free) world of ancient Egypt. It was given as a fancy gift and used as an ointment for wounds
- Wax was precious. Wax tablets were used for writing and was an ingredient in cosmetics, an adhesive, a medicine, and a waterproofing agent
- Like today, ancient Egyptian beekeepers loaded bees on to boats and rafts, then drifted down the Nile for pollination

History of Honey Bees in America

- Honey bees were brought to America in 1621
- In 1852, L. L. Langstroth, a Congregational minister from Pennsylvania, patented a hive with movable frames that is still used today
- His hive was based on the principle of the space kept open in the hive allows bees passage between and around combs
- This “bee space” is about 3/8” wide

Is That a Honey Bee?



Bees and Wasps

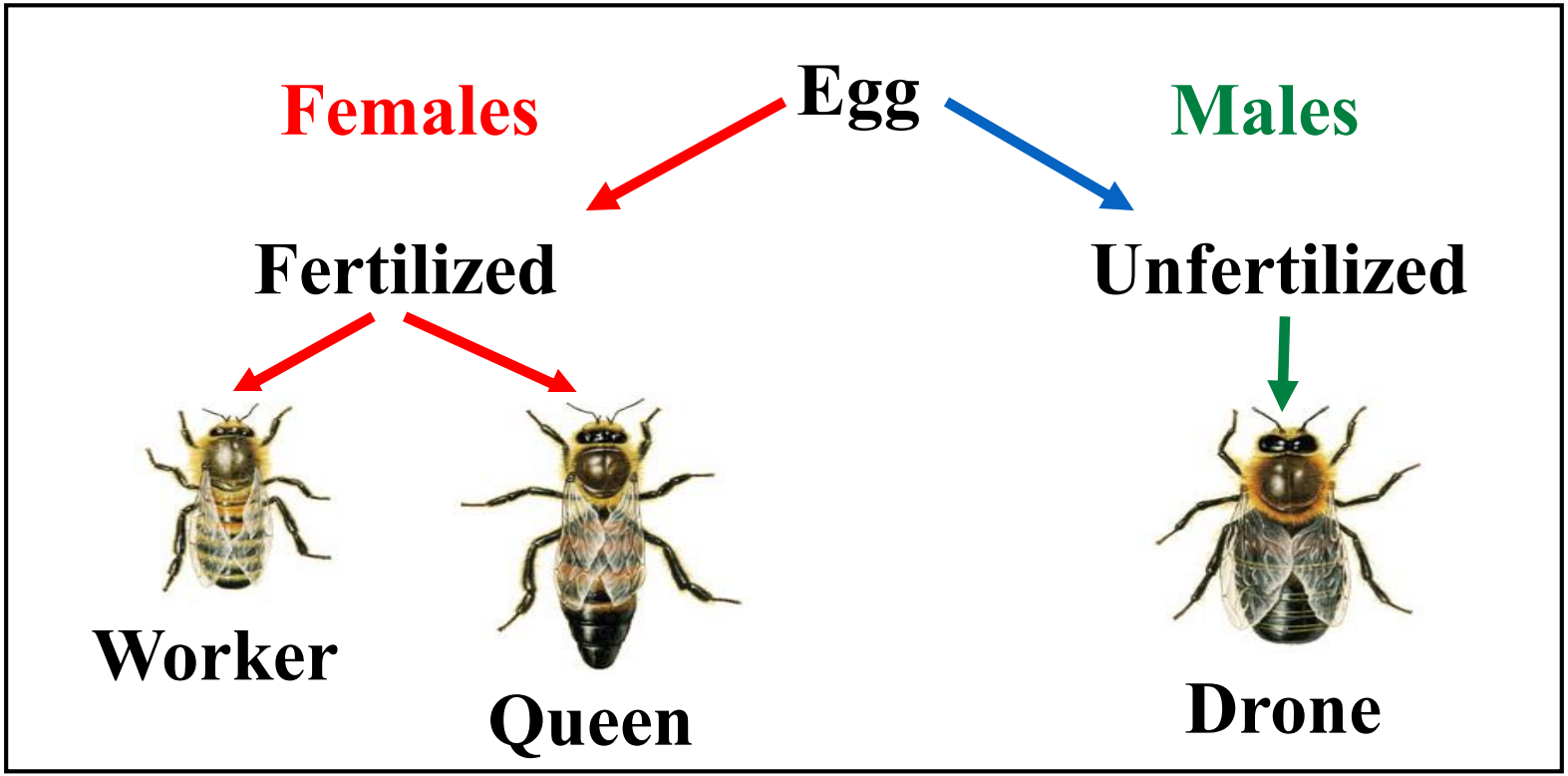
Similarities and Differences:

- Honey bees are herbivores, wasps are carnivores
- Honey bees can only sting once, wasps can sting repeatedly
- They do share common traits in:
  - Individual feeding
  - Communal society
  - Complex communication (including trophallaxus – regurgitating and transmission of food)

Wasp Nests, Colonies and Habits

Wasps	Paper Wasp	Yellowjacket	Hornet
Type of Nest	Open, umbrella-shaped paper comb	Enclosed paper comb	
Nest Location	Suspended from eaves and other protected locations	Usually subterranean, sometimes suspended	Often on trees or shrubs, sometimes eaves
Size of Colony	Usually less than 100	More than 100	
Feeding Habits	Preys on live insects	Scavenges dead insects, sugars	Preys on live insects

Honey Bee Sex Determination



Meet the Queen

- The queen is a mature female
- A queen has the longest live span in the colony living for up to 3 years
- A good queen may lay 1500 - 2000 eggs in a single day
- She can lay over 200,000 eggs during her life time
- She is larger than the other bees in the hive and has a slim torpedo shape
- She does have a stinger, but uses it to kill other queens
- Under normal conditions a hive will have only one queen

Meet the Worker Bee

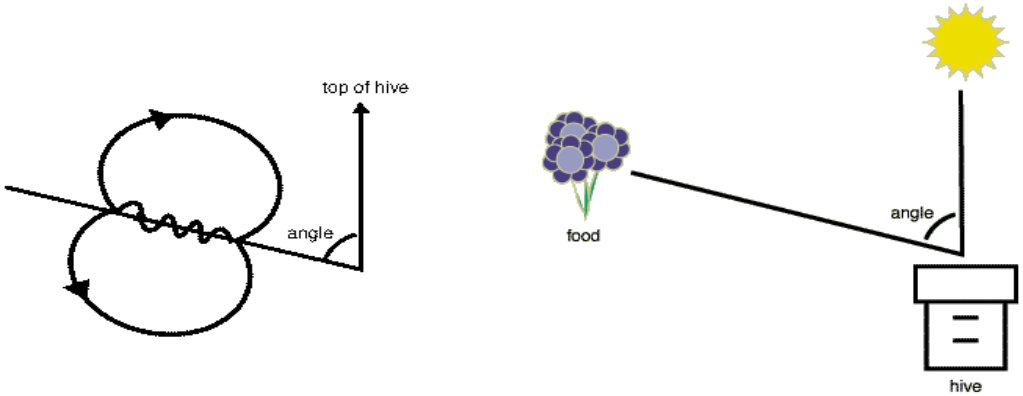
- Worker bees are sexually underdeveloped females
- They may number as many as 60,000 in a colony
- They are called workers because that is what they do:
  - They collect food and water for the colony
  - build wax comb
  - do the housework
  - maintain the interior temperatures of the hive
  - guard the hive against intruders (they can sting, but then they die)
  - Forage for nectar, pollen and water in the later stage of their life
- Female worker bees can lay eggs but because they are not mated, they produce eggs that only develop into drones.

Meet the Drone

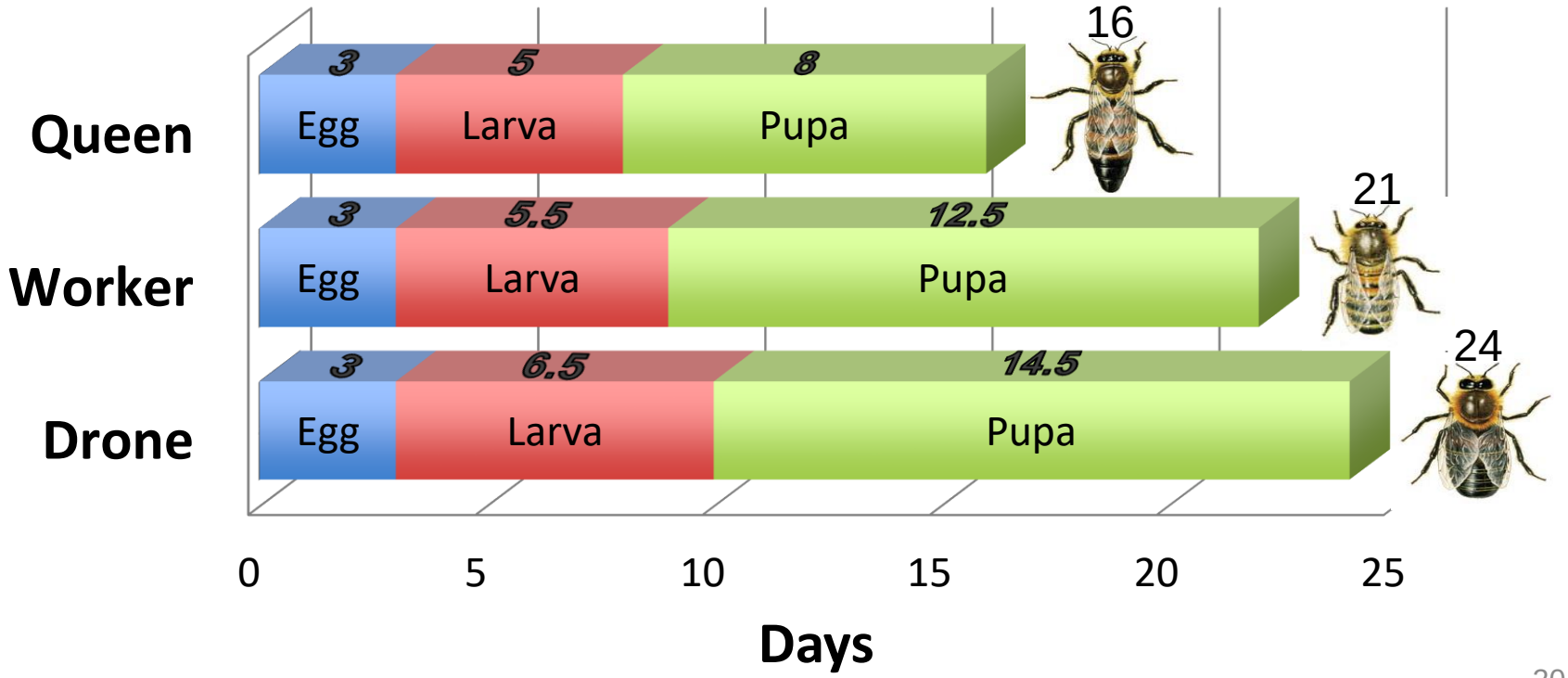
- Drones are the males in the colony
- Note the general shape of the drone
  - the head is large and the eyes predominate the head
  - the rear-end of the drone is rounded
- They have no stinger
- They only have one purpose; contribute to the continuation from one generation to the next generation.

Bee Communications

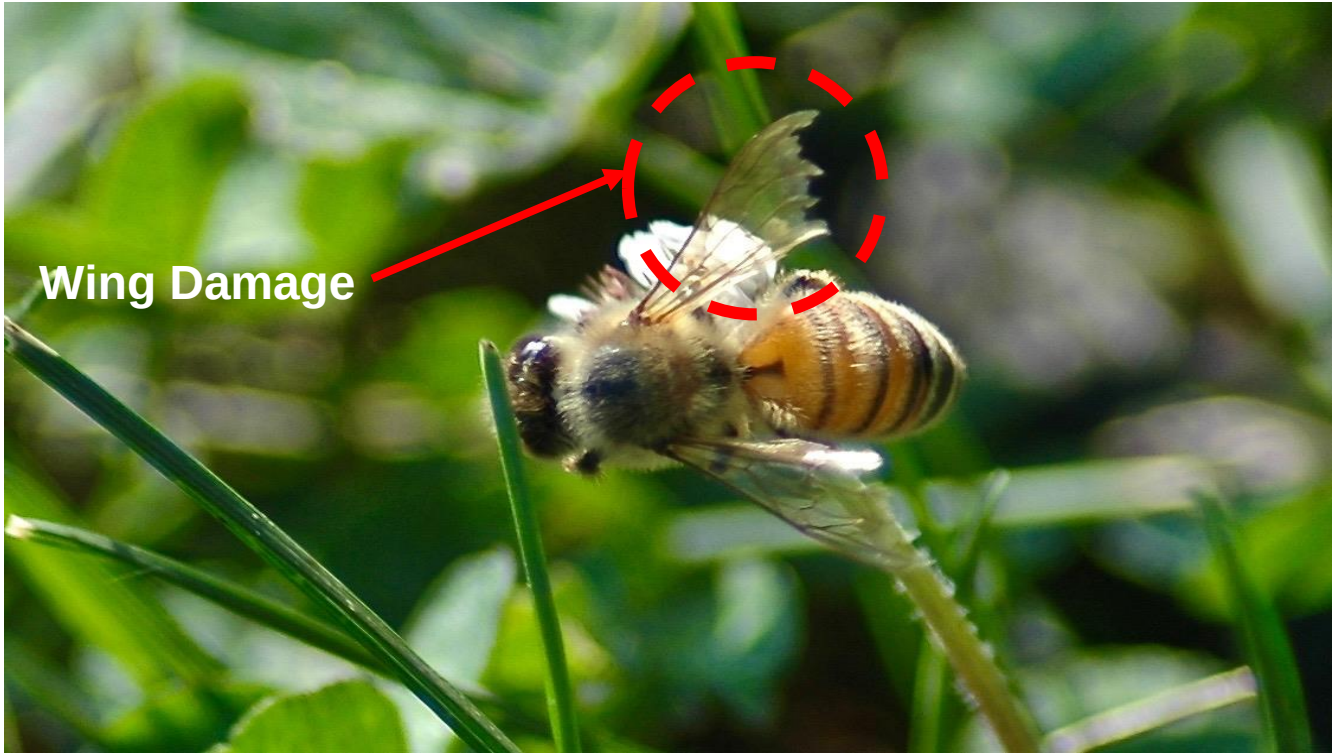
- Honey bees are efficient foragers and have a dance language system to recruit other bees to profitable food sources
- The dances are preformed on the comb in the hive
- The dance language allows bees to provide information on the direction and distance of food sources to other hive members



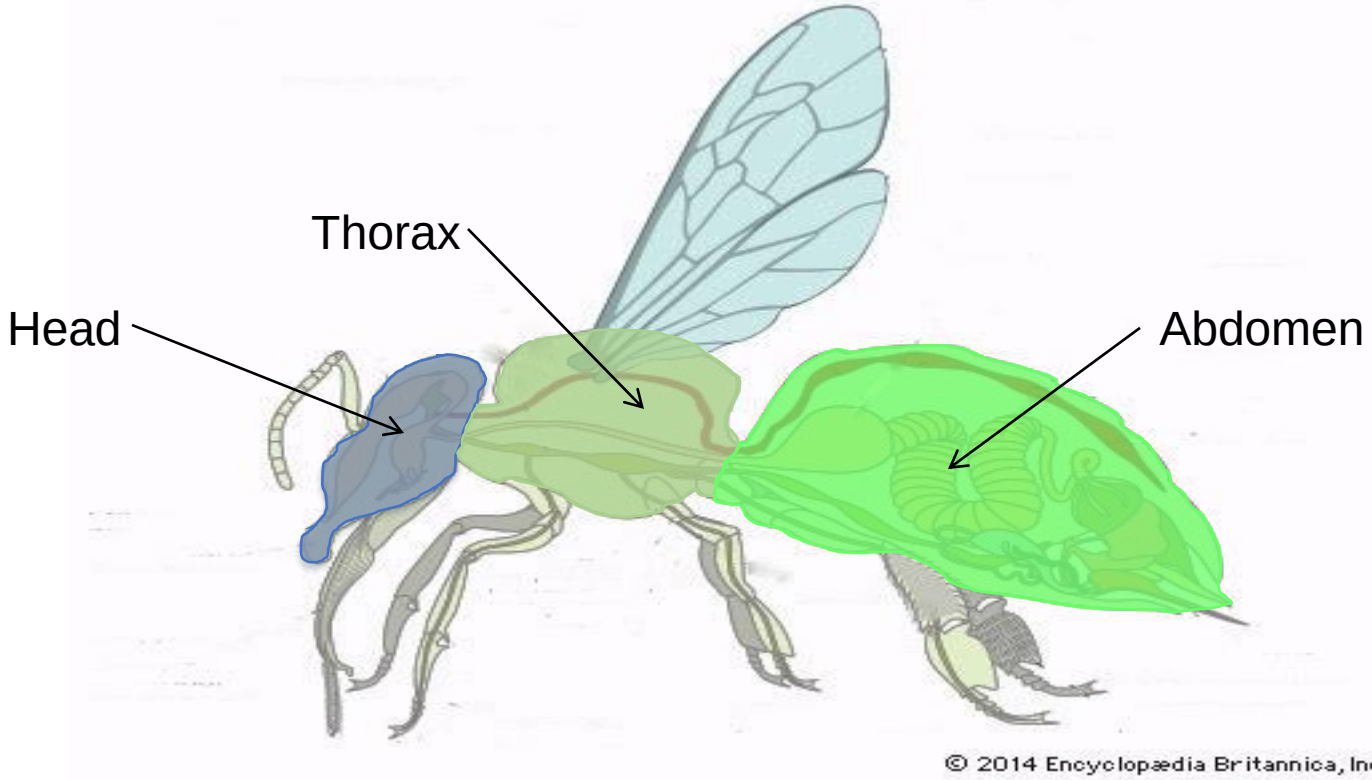
Days From Egg to Adult



After 45 Days…



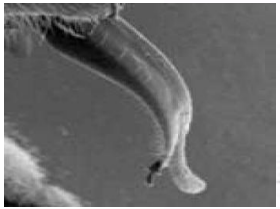
Anatomy of a Worker Honeybee



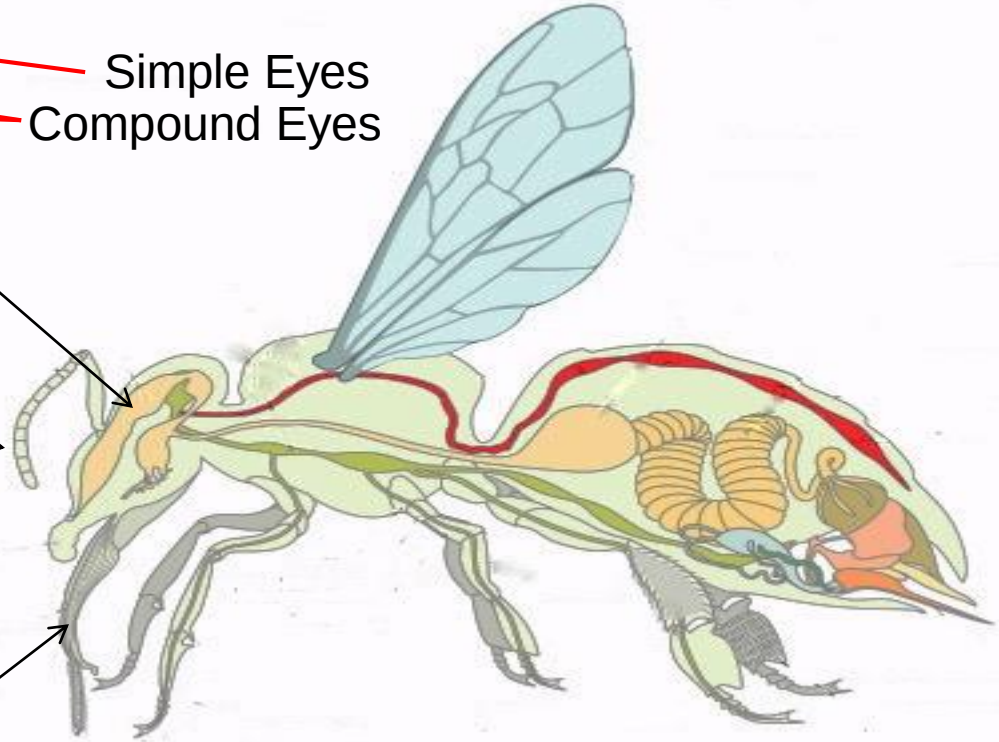
Honeybee Anatomy - Head

Simple Eyes
Compound Eyes

Antennae



Proboscis

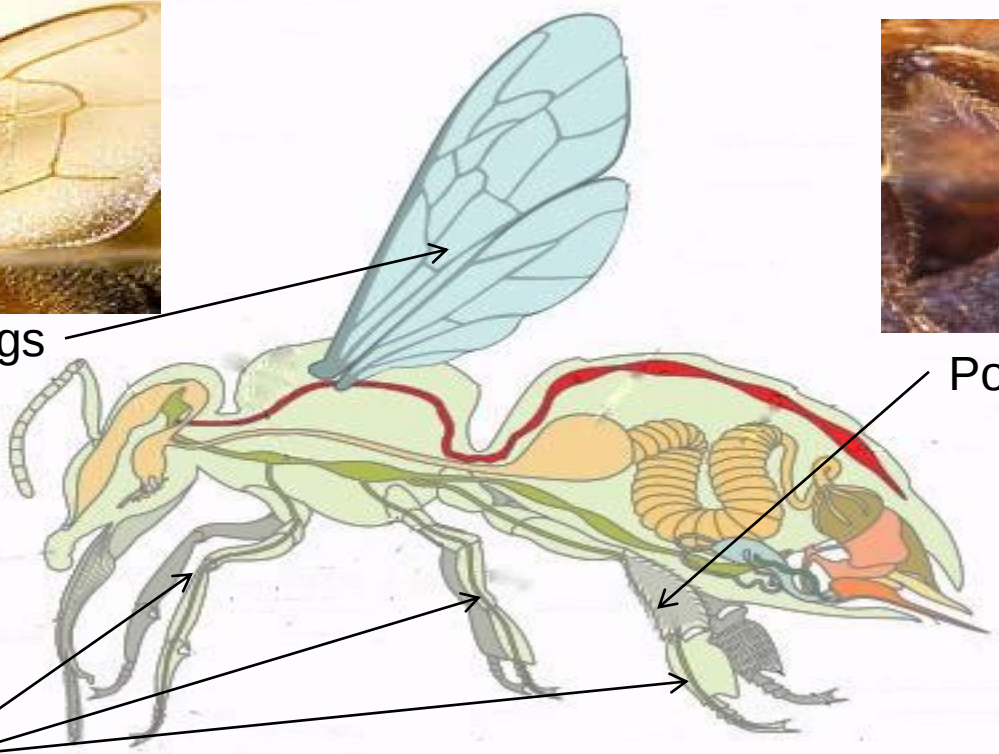


Honeybee Anatomy - Thorax

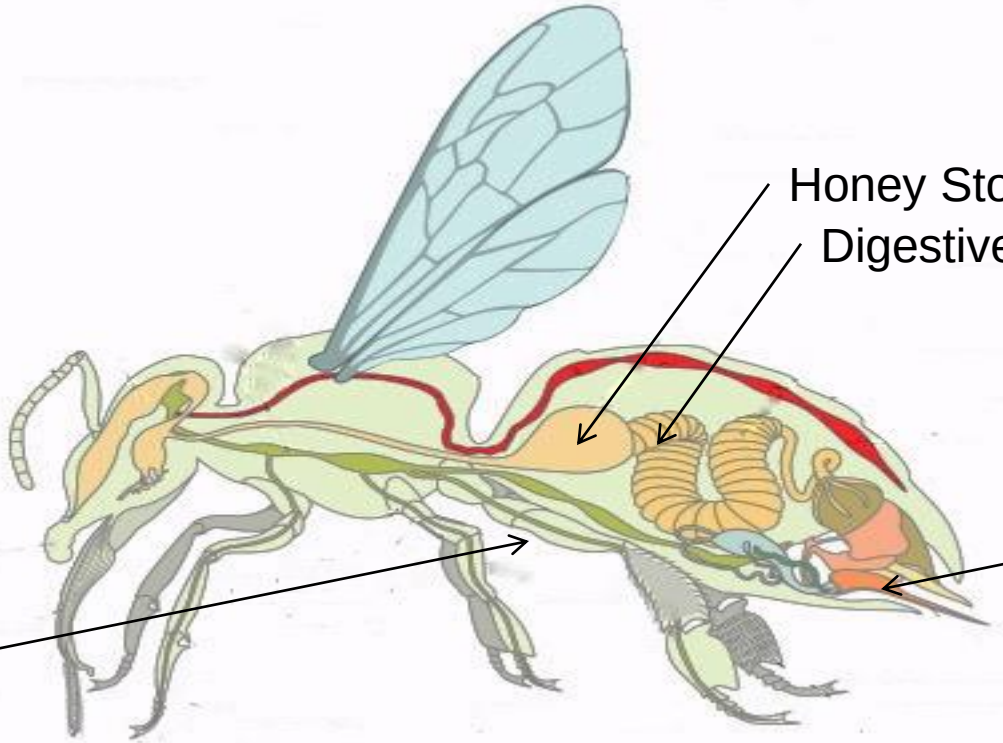
Wings

Pollen Basket

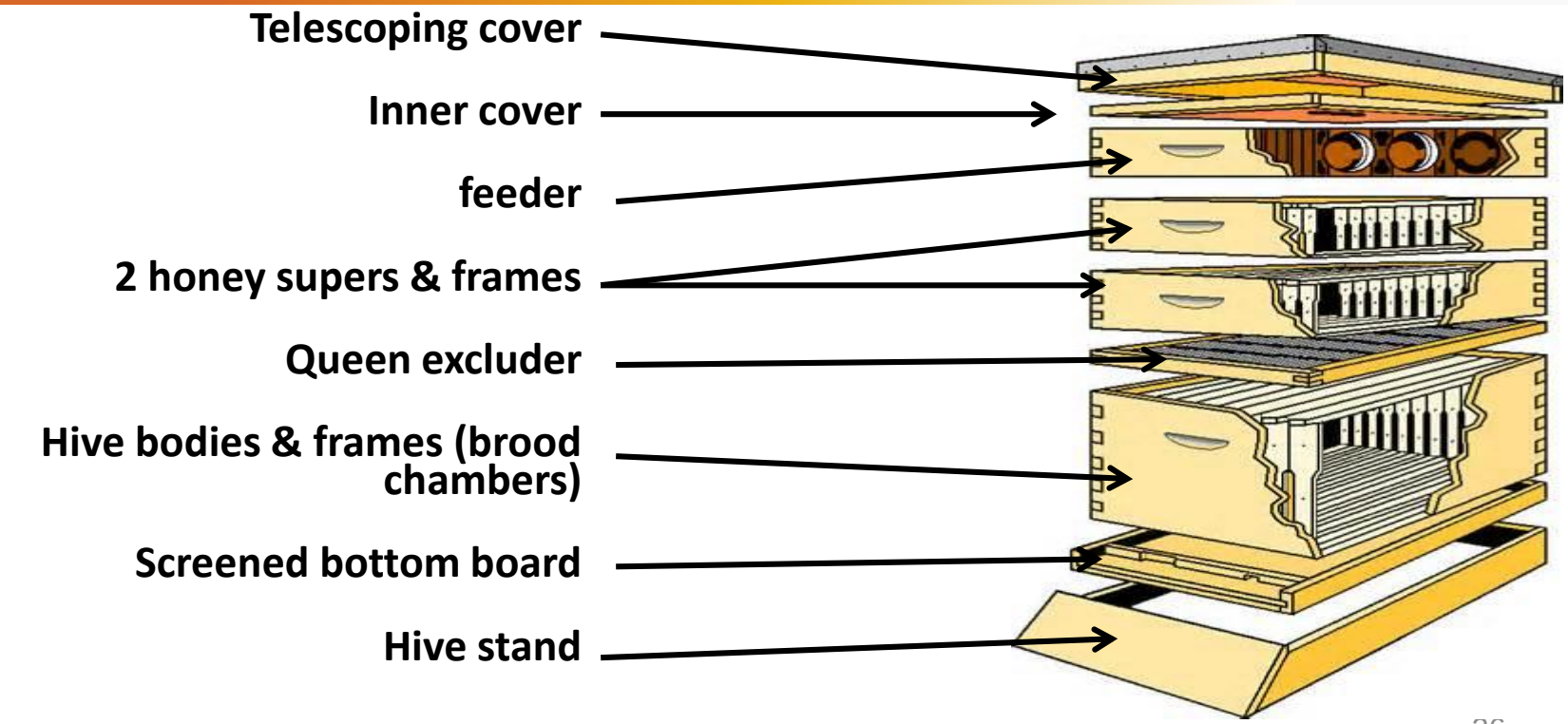
Legs



Honeybee Anatomy - Abdomen



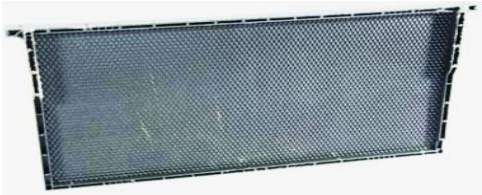
Equipment – Basic Hive



Frames & Foundation

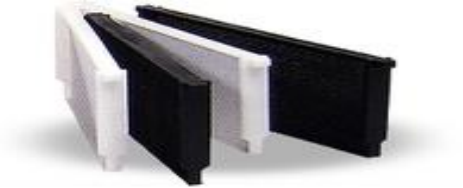
Frames

- Wooden – most common, cheapest
- Plastic – durability



Foundation

- Wax sheet – natural beeswax
- Wax coated plastic - reusable



Beekeepers Tools & Accessories

- Hive tool – never go to the bee yard without it!

- Smoker & fuel

- Bee brush

- Feeder – water and sugar

Protective Clothing

What to Wear

- Hat and veil – ***Always Wear a Veil!***
- Bee suit or jacket
- Light color clothing
- Gloves
- Leg straps
- High top shoes

What Not to Wear!

Do Not Wear

- Dark clothing
- Wool
- Jewelry & watches
- Perfume
- Avoid eating or wearing anything that smells like bananas
  - same sent as alarm pheromone

Hive Placement

- Face hives south, southeast or east
- Elevate on boards or blocks and tilt slightly forward
- Bees need a nearby water source
- Shade in the summer – full sun in the winter
- Winter windbreak
- Understand local & state regulations
- Watch insecticides

Where Do I Get Bees?

- **Locally raised are preferred**
  - Splits
  - Swarms

- **Packages and Queens**
- **Nucleus (Nuc)**
  - small hives with 4 or 5 frames

Startup Costs (New Equipment)

Component	First Hive Cost	Second Hive Cost
Full Hive Kit	$250	$163
Full Bee Suite (Jacket)	$150	$115
Smoker	$35	
Gloves	$20	$20
Hive Tool	$15	
Bee Brush	$10	
Bees (box or Nuc)	$135	$135
Total	**$615**	**$433**

- *Typical startup costs run between $1,000 - $1,200*

When to Work with Bees

Best to work them during:

- Mid morning to early evening
- Warm sunny days
- Calm days
- Strong nectar flow

Avoid working them during:

- Rainy or cloudy days
- Windy days
- Early morning, late evening or after dark

Will I Get Stung?

- ***If you work with bees you will probably get stung..***
- **Allergies can range from mild to severe**
  - Mild means swelling in localized area of sting
  - Severe means anaphylactic shock (tongue or throat swells, trouble breathing, etc..)
- **The best precaution is an Epi (Epinephrine) Pen**
  - Available in both adult and child dosage

- **A simple blood test is available if you're concerned**

Spring Time Activities

- **The Bees**
  - The queen increases egg production
  - Virgin queens take mating flights
  - Drone production begins
  - Foragers bring nectar and pollen to hive
- **The Beekeeper**
  - Prepare equipment and feed the bees
  - Inspect hives when temperatures are above 55° and the bees are flying

Summer Time Activities

- **The Bees**
  - The queen lays 1500 eggs/day
  - The Hive should be at full strength – 50,000+
  - Comb building is in full swing; nectar is being converted into honey

- **The Beekeeper**
  - Insect every 2 weeks
  - Insure queen is productive; replace if not
  - Add honey supers and watch for swarming

Fall Time Activities

- **The Bees**
  - The queen decreases egg production
  - The total numbers will start do decrease
  - Drones are evicted by the workers

- **The Beekeeper**
  - Remove and process honey
  - Prepare hives for colder weather

Winter Time Activities

- **The Bees**
  - The queen stops laying eggs
  - The colony will form a cluster around the queen
    - They do not hibernate like other bees
- **The Beekeeper**
  - Prepare and paint equipment
  - Monitor hives externally (do not open)
    - Thermal imaging

Colony Collapse Disorder (CCD)

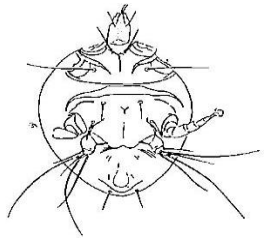
Colony Collapse Disorder (CCD)

- In October 2006, U.S. beekeepers began reporting losses of 30-90% of their hives
- Some colony losses are expected during winter weather but the magnitude of those reported were highly unusual
- Symptoms
  - Honey is usually present
  - The queen is alive and still laying eggs
  - Only very young worker bees of insufficient numbers present
  - No dead bees found in or in front of the hives

CCD Potential Causes

Parasites & Virus

- **Varroa destructor mites** infect and feed on honey bee larvae in the brood cells.
- Mites of the species ***Nosema apis and Nosema ceranae*** infect the digestive tract of honey bees.



- **Tracheal mites (*Acarapis woodi*)** invade and reproduce in the airways of mature honey bees blocking the tubes and leading to asphyxiation.
- **Israeli Acute Paralysis Virus (IAPV)** Was first identified in Israel in 2004. This virus causes bees to develop shivering wings eventually leading to paralysis and death outside the hive.

Honey Bees Need Our Help

- Since the late 1940's, the Honey Bee population has reduced by over 50%
- Current agriculture practices and pests threaten to reduce the population even further
- Scientists are looking at what has caused this dilemma and how can it be reversed

Plant a Bee Friendly Garden

- **Honey Bee Friendly Plants**
  - *Planting wild flowers, including asters, goldenrod, sunflowers, even dandelions will provide food for the hives, and the native bee population as well*

- **Plant Long Blooming Flowers**
  - *or a variety of plants that will bloom at different times throughout the spring and fall. Try to group at least ten bee plants in a bunch or grouping*

- **Honey Bees Need Water**
  - *Provide a pond, a fountain, or some other fresh water source*

- **Refrain from using Pesticides or Herbicides**
  - *Some of them are toxic to bees and many of them will leave a toxic residue for days or weeks.*

Bee Friendly Annuals

Asters

Calliopsis

Clover

Dandelions

Marigolds

Poppies

Sunflowers

Zinnias

Bee Friendly Perennials


Buttercups


Clematis


Cosmos


Crocuses


Dahlias


Echinacea


English Ivy


Foxglove


Geranium


Germander


Globe Thistle


Hollyhocks


Hyacinth


Rock Cress


Roses


Sedum


Snowdrops


Squills


Yellow Hyssop

Bee Friendly Garden Plants

Blackberries

Cantaloupe

Cucumbers

Gourds

Peppers

Pumpkins

Raspberries

Squash

Strawberries

Watermelons

Wild Garlic

Bee Friendly Garden Herbs

Bee Balm

Borage

Catnip

Coriander

Fennel

Lavender

Mint

Rosemary

Sage

Thyme

Bee Friendly Trees


Alder


American Holly


Basswood


Black Gum


Black Locust


Buckeye


Catalpa


Eastern Redbud


Crabapple


Golden Rain


Hawthorn


Hazel


Linden


Magnolia


Maple


Ash


Sycamore


Tulip


Poplar


Willow

Bee Friendly Shrubs

Blueberry

Butterfly Bush

Button Bush

Honeysuckle

Indigo

Privet