

## ***Lecture-1-***

**Apiculture:-**Is the management and study of honey bees, derived from the honey bees, Latin name *Apis mellifera*, meaning honey gatherer.

### **What are the Honey Bees?**

Honey bees are social insects that live in colonies. Honey bee colonies are consists of a single queen, hundreds of males (drones) and 20,000 to 80,000 female (workers).

### **Classification of Honey bees:-**

Kingdom: Animalia

Phylum: Arthropoda

Sub phylum: Mandibulata

Class: insecta (hexapoda )

Sub class: Pterygota

Division: Endopterygota

Order: Hymenoptera

Sub order: Apocrita

Super family: Apoidia

Family: Apidae

Sub Family: Apinae

Genus: *Apis*

Species: **1-laboriosa 2- dorsata 3- cerana (indica) 4- floria 5- mellifera.**

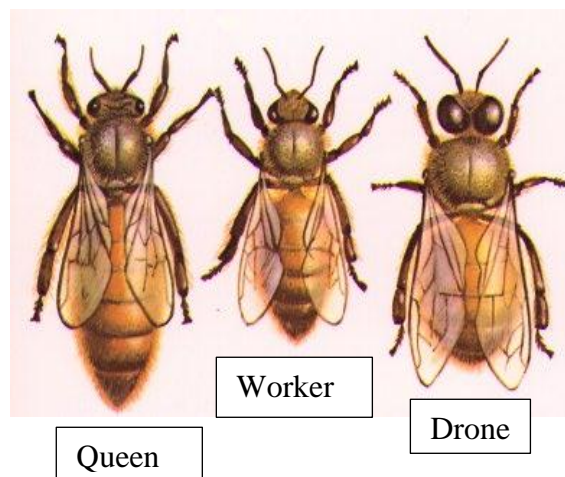
## The castes of honey bees:-

There are three types of individuals or castes in honey bee colony, the female queen, workers and drones.

1-Queen

2-Worker

3-Drone



## Life cycle of honey bee castes:-

Development of the queen and worker castes and the drones in honeybees is a transition through four stages: egg, larva, pupa and adult (table 1). From the queen laid eggs, which are pearly white, cylindrical and elongate-oval and between 1.3 and 1.8 mm long, workers or drones can develop, depending on whether the eggs are fertilized or not. After 3 days a larva emerges from the egg, which will be fed progressively by nurse bees, during the first 3 days with royal jelly, and afterwards with a mixture of honey and pollen. Only larvae of queen brood receive royal jelly during the complete larval stage. At the end of this stage, during which cells are uncapped, the larvae spin a cocoon and change into pupae after adult workers have capped the cells. During the pupal stage, the cuticle becomes darker gradually, and internally muscles and organs change into their adult forms, before the final moult to the adult stage takes place.

Finally the adult begins to remove the cell capping from the inside out by using their mandibles and emerges from the cell, unfolds its wings and antennae, and begins its activities. The metamorphosis from egg to adult is shortest for the queens, taking as little as 16 days in *Apis mellifera*, and longest for drones with a duration of 24 days. For workers it takes about 21 days to

develop from egg into adult. The exact duration may vary with temperature, nutrition, and bee specie and race (Winston 1987).

Table 1- Developmental stages from egg to adult in queen, worker and drone

| Developmental stage | Queen   | worker  | Drone   |
|---------------------|---------|---------|---------|
| Egg                 | 3 days  | 3 days  | 3 days  |
| Larvae              | 6 days  | 6 days  | 7 days  |
| Pupa                | 7 days  | 12 days | 14 days |
| Adult               | 16 days | 21 days | 24 days |

### **The characters and functions of each caste:-**

**A- Queen:** There is only one queen in the colony. She is the mother of the all individuals in the colony.

#### **Characters and functions of the queen:**

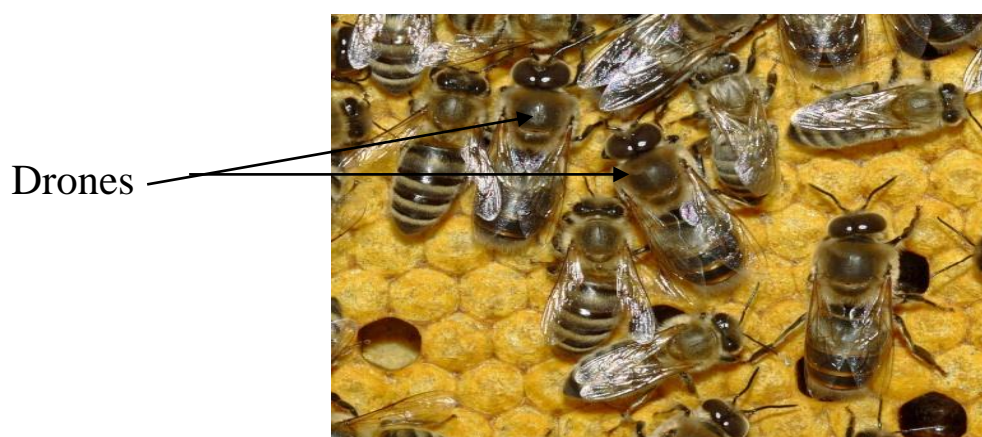
- 1- Dark or red color depends on races rather pointed abdomen.
- 2-Wings are shorter than her abdomen.
- 3- Larger and longer than the workers and longer than the drones.
- 4-She is only perfectly developed female.
- 5-She owns short proboscis and unable to collect nectar.
- 6-The wax glands, hypopharyngeal glands and pollen basket are absent.
- 7-She possesses sting organs without barbs and only uses it to kill rival queens.
- 8-Function laying eggs she can lay 1000-1500eggs/day in active season, and laying 2 types of eggs according to the colonies needed fertilized and unfertilized eggs.
- 9-She has some developed glands such as mandibular glands for secretion queen substance to guide the workers and regulating the work in the hive.



## **B- Drone: The characters of drone.**

- 1- Is produced from unfertilized egg.
- 2- Sexually mature at 2 week after his exit from pupa.
- 3- Larger than workers and generally blackish brown in color.
- 4- Big eyes and his wings are covering all body.
- 5- One functions in life-mate with virgin queen and die after mating.
- 6- Have very short proboscis, unable to collect nectar.
- 7- Pollen basket, sting organ, wax glands and hypopharyngeal glands are absent.

**Note:** Removed from the hive by the worker in late fall and die.



**The function of drone:** Mating. Have one function in life-mate with virgin queen and die after mating.

## **C- Worker: The characters of worker:-**

- 1-Produced from fertilized eggs.
- 2-Female but not fertile normally does not lay eggs if she does, they will be drones.
- 3-They are smallest individual in the colony.
- 4-Worker`s wing covered all its abdomen.

5-Sting organ have barbs used to defend the hive and her.

6-Workers possess long proboscis used for collecting nectar and water.

7-Mandibular, hypopharyngeal, wax and nasonov glands are present.

8-Lives about 4-6 weeks in the spring and summer but in winter lives about 3-4 months.

### **The functions of worker:-**

Workers do the work inside and outside the colony except egg laying. Their jobs are based on the age of the worker bees and the needs of the colony. During first three weeks of its life the worker attends to indoor work, after three weeks it attends outdoor work.

- Nurse Bees (1 – 12 days old).
  - ✓ Clean own cell and others.
  - ✓ Feeding broods (larvae).
  - ✓ Feeding queen.
- House Bees (10 – 20 days old).
  - ✓ Comb building.
  - ✓ Housekeeping.
  - ✓ Ripening honey.
  - ✓ Climate control.
  - ✓ Secreting/molding wax into cells.
  - ✓ Accept and store pollen and nectar from foragers.
  - ✓ Undertaker bees clean the hive of carcasses.
- House Security bees (20-21old days)
  - ✓ Guard hive and its entrance (some say only about 5% of bees perform this job).
  - ✓ Orientation flights to learn surroundings.
- Forager bees (21old days to death).

- ✓ Collecting pollen and nectar.
- ✓ Collecting propolis and water for the hive.



Worker collect pollen



Worker clean the cell



Worker collect water



Worker collect nectar