

# ECONOMIC ZOOLOGY

## ① Apiculture:

• It is the domestication of honey bees for collecting honey, bees wax, pollen etc.

• Honey bees: Phylum : Arthropoda  
Class : Insecta  
Genus : Apis

• Habit and Habitat: Found all over the world.

- Active throughout the year but perform little work in winter.
- Exhibit polymorphism & good division of labour.
- Communicates through 'waggle dance' called 'language of the bees'.

• Species:

1. Apis dorsata : (Rock bee)

- largest bee
- Yields maximum amount of honey - 40-60 kg per year
- Difficult to domesticate due to its specific hive and migratory habit.

2. Apis indica : (Indian bee)

- Prefer to live in dark spaces.
- Construct several parallel combs.
- Easy to domesticate due to its gentle nature.
- Smaller than rock bee.
- Annual yield : 4-5 kg per hive.

3. Apis florea : (Little bee)

- Smaller than *A. indica*
- Very little yield of honey.
- Combs can be easily removed for honey extraction due to its docile nature.

#### 4. Apis mellifera: (European bee)

- Lesser yield but considered best for commercial point of view.
- Docile nature - easy to domesticate
- Can be improved by breeding for several hundred years.

#### Organisation of honey bees:

- Highly organised division of labour.
- Well developed colony has - 40-50 thousand individuals.
- 3 Classes:

##### 1. Queen:

- Well developed fertile female, with immensely developed ovaries.
- One queen per hive & feeds on royal jelly.
- Mother of the colony guarded by attendants.
- No duty except for laying of eggs, which is her sole function.
- 15-20 mm in length.
- Distinguishing feature:
  - a) long tapering abdomen
  - b) short legs & wings.
- Unable to produce wax as honey bee or collect nectar structurally.
- Mated only once in life & very less often twice.

##### 2. Drone

- King of the colony.
- Absence of sting & wax glands.
- Well developed re-productive system.
- Reared from unfertile egg in large Drone cells.
- Totally dependent on workers.
- Sole duty is to fertilize virgin queen.
- Dies after copulation during swarming.

##### 3. Worker

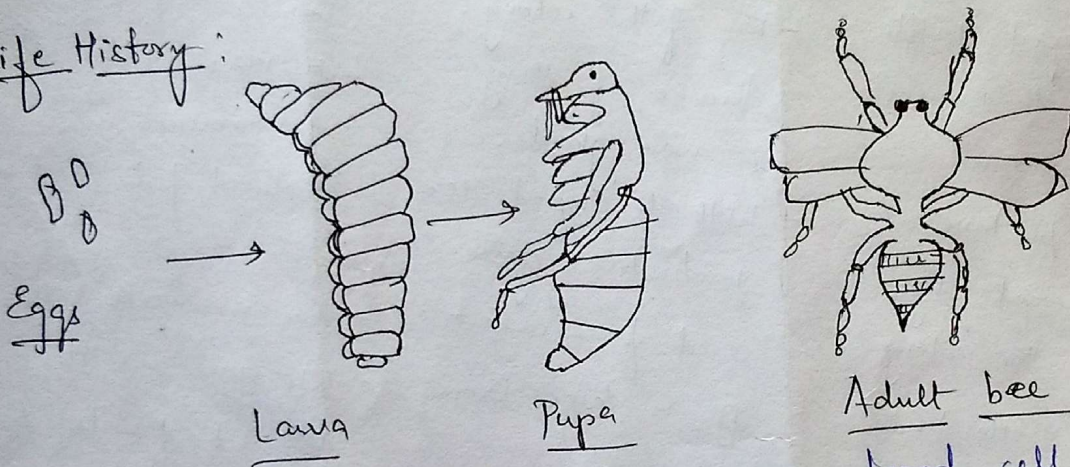
- Smallest of the colony but main pillar of the community.
- Produced from fertile eggs.
- Live in 'worker cell'.
- Life span - 6 weeks.
- Atrophied female & sacrifice themselves for the well being of colony.
- Performs all indoor & outdoor activities.
- Thus provided with special structures:
  - a) Long proboscis - for sucking nectar
  - b) Strong wings - for fanning
  - c) Pollen baskets
  - d) Powerful sting - to defend colony
  - e) Wax gland.

- 1500-2000 eggs/day,
- thus more than a million in her lifetime,
- when queen looses its egg laying capacity another worker feeds on royal jelly & develops into new queen.

- indoor workers are further sub-grouped for specific duties:

  - Nursery bee
  - Builders
  - Repairers,
  - Cleaners
  - Fanners.

### • Life History:



- After mating - queen lays one egg in one brood cell.
- Eggs - pinkish, elongated with cylindrical body,
- Larva emerges from both fertilized & unfertilized eggs, from drones, while worker from unfertilized eggs.
- After 5 days feeding - cell is sealed and larvae undergoes pupation.
- Development takes around 3 weeks.

### Other stages during life cycle:

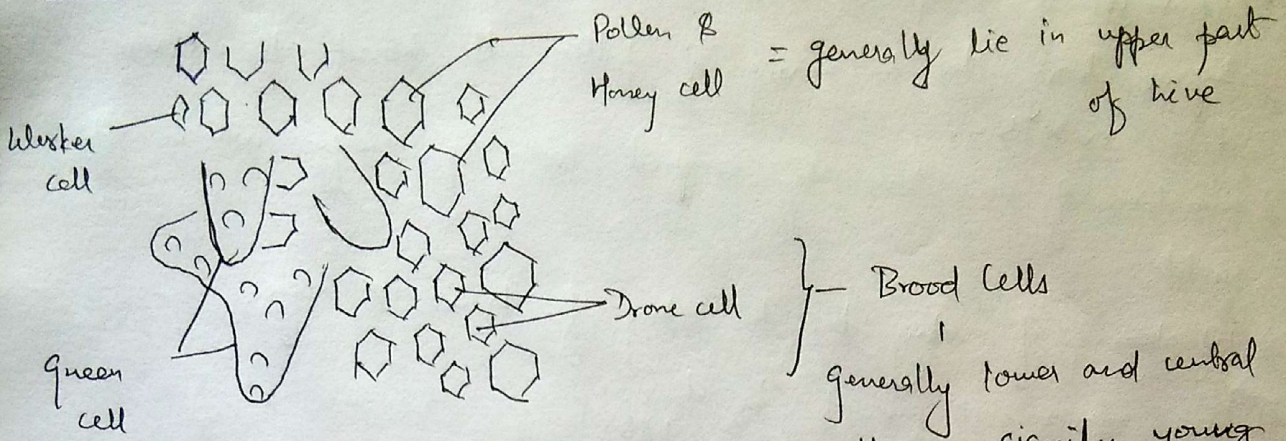
1) Swarming: Process of leaving off the colony by queen.

- Usually in early summer.

2) Supersedure: Replacement of old queen by new & vigorous queen.

3) Abandoning: Migration of complete colony from one place to another due to unfavourable conditions.

• Hive :



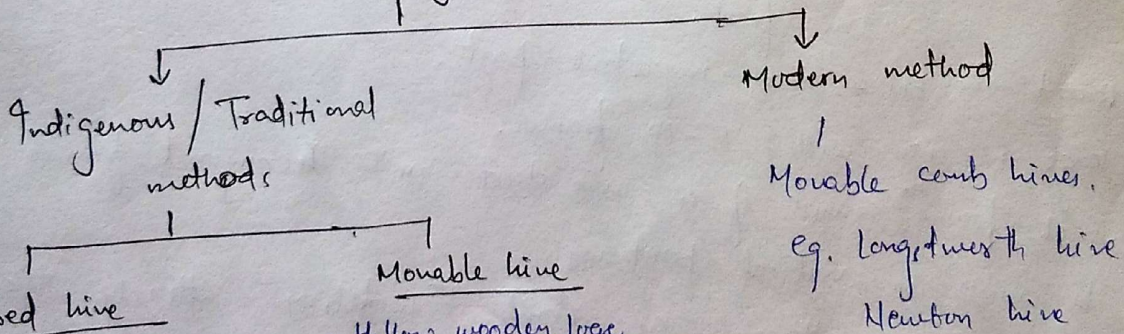
• Criteria for selection of bees :

- 1) Gentle temperament
- 2) Capacity to construct strong colony.
- 3) Ability to protect from enemies.
- 4) Energetic
- 5) Ease of making comb at any place.

- 6) High production of honey
- 7) Disease resistance.

In India, *Apis Indica* is considered best for the purpose.

Beekkeeping Methods



- ① Fixed hive
- Purely natural type comb.
  - Opening on one side.

- Movable hive
- Hollow wooden logs, empty boxes, pot hives etc.
  - 2 holes - one for entrance & other for exit.

② Extraction : fire brought near hive, bees killed or escaped, & hive is cut to get honey.

## • Drawbacks of Indigenous hive :

- 1) Impure honey due to mixing of pollen cells, brood cells, larvae while extraction.
- 2) Formation of new hive by escaped bee req. energy which effects yield.
- 3) Weakening of colony due to killing of larvae & eggs.
- 4) Race improvement cannot be done.
- 5) Inhumane approach towards the <sup>little</sup> animals.
- 6) Not easy to control swarming.

## • Modern method :

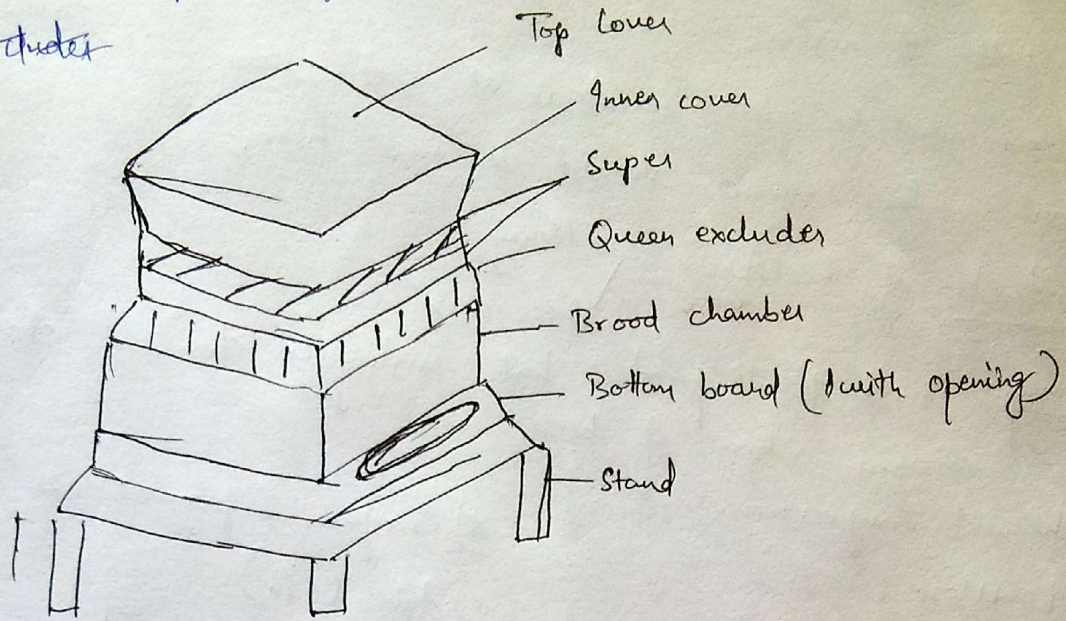
### ① Required appliances :

- a. Typical movable hive : Variable no. of size according to need.
  - Small space provided to permit entrance & exit of workers & drones.
- Parts of hive :
  - i) Stand - Basal part
  - ii) Bottom board - above the stand, forms proper base with 2 gates in front.
  - iii) Brood chamber - most important part.
    - large in size with 5-10 frames.
    - Each frame consist of a wax sheet with hexagonal frames help by wires in vertical position.
    - Sheet of wax known as Comb Foundation - attracts the bees and provides base for combs preparation on both sides.
    - Comb foundation helps obtain regular strong worker brood cell comb which can be used repeatedly.
  - iv) Super : without cover & base.
    - contains frames with comb foundation to provide additional space for expansion of hive.

v) Inner Cover: to cover super.

vii) Top cover: To protect from rains.

vi) Queen excluder



### Movable Hive

b) Queen Excluder: Permits workers to pass through it but keeps the queen.

c) Honey extractor: on principle of centrifugal force.

d) Uncapping knife: to remove wax seal of combs before placing it in honey extractor.

### Steps:

- 1) A wooden box with required specifications is constructed to act as bee colony.
- 2) Bees are introduced in this wooden box for colonization.
- 3) Queen bee introduced in the colony.
- 4) Colony expands & bees start foraging & building combs in movable frames.
- 5) Activities of colony regularly monitored to know status of brood, queen & honey.
- 6) Once sufficient honey is available, honey is extracted using modern methods without damaging honey combs.
- 7) Honey combs are replaced & cycle continues.

## • Precautions:

- 1) Hive should be within half a mile range of place of collection of pollen & nectar.
- 2) Boxes must be placed in shade at cool places.
- 3) Fresh water reservoir should be near hive.

## • Products of beekeeping

Honey  
Bees wax

• Honey: Direct plant product but undergoes chemical changes by enzyme action of bees.

### - Chemical composition:

a) Levulose (28%)

b) Dextrose (22%)

c) Maltose (8%)

d) Enzyme & pigment (22%)

e) Ash (1%)

f) Water (17%)

### • Economic importance of honey:

1) Food value - as 200 gm of honey  $\approx$  12 Hr of milk in nourishment.

2) Medicinal value - as laxative, antiseptic & sedative.

- Help in Hb production, fighting cold & cough, blood purifier & curing GI ulcers.

### 3) Other uses -

- As Tastemaker in food products

- Alcoholic drink production

- Poultry & fishing

- Growing lab plants & bacterial culture.