Species, castes and biology of honey bees

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Intoduction

- Honey bees, along with wasps and ants, live in highly structured colonies, in the case of Honey Bees, all sisters and brothers, from a single queen bee.
- The honey bee serves an important part in pollinating flowers, especially the flowers that produce our fruits and vegetables while collecting the nectar from the plants.
- They also provide us with honey to eat.
- Today there is quite a fascination with the honey bee.

Importance of honey bees

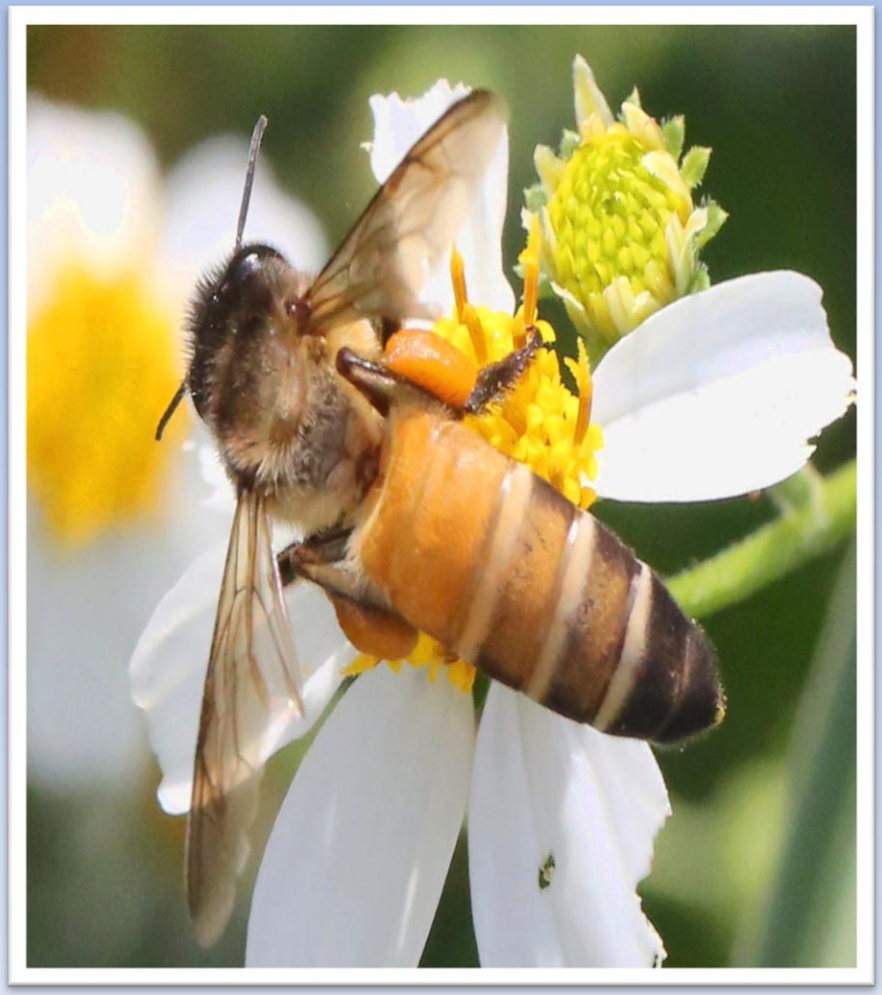
- Honey bees are the greatest pollinators
- They provide high-quality food—honey, royal jelly and pollen — and other products such as beeswax, propolis and honey bee venom.
- Beekeeping also provides an important source of income for many rural livelihoods.
- According to bee experts at the Food and Agriculture Organization (FAO) of the United Nations, a third of the world's food production depends on bees.

Species of honey bees

1. The rock bee or giant bee, *Apis dorsata*

- It is largest of the honey bees and measuring about **20 mm in length.**
- It construct single comb of huge size in open area.
- The comb is fully exposed and hung from inaccessible branches of trees, sides of steep rocks and even from the walls, rafters and other parts of buildings.
- It produces plenty of honey i.e. **37 Kg honey /comb/year.**
- Rock bees are irritable and ferocious in nature and difficult to rear.
- They shift the place of the colony often. In winter, they migrate to plains and come back to hills during summer season.

The rock bee or giant bee, *Apis dorsata*



2. **Indian bee, *Apis cerana indica***

- It is common Indian bee found in both forest as well as in plains throughout country.
- They make **multiple parallel combs on trees, cavities, caves in darkness and such other hidden sites.**
- It is mild and capable of being domesticated and is commonly reared in south India.
- They are more prone to swarming and absconding.
- They produce about **5 - 10 Kg of honey/year/colony .**

Indian bee, *Apis cerana indica*

3. **The little bee, *Apis florea***

- It is known as the little bee since it is smallest of the four species of *Apis.*
- It is seen only in the plains and not in hills
- It does not like darkness therefore forms its comb in the open place e.g. bushes, hedges, buildings, empty cases etc.
- It builds a single comb which is very small and produces about 0**.5 to 1 kg honey/year/hive and so it is not domesticated and reared.**
- They are not rearable as they frequently change their place

The little bee, *Apis florea*

4. European bee or Italian bee, *Apis mellifera*

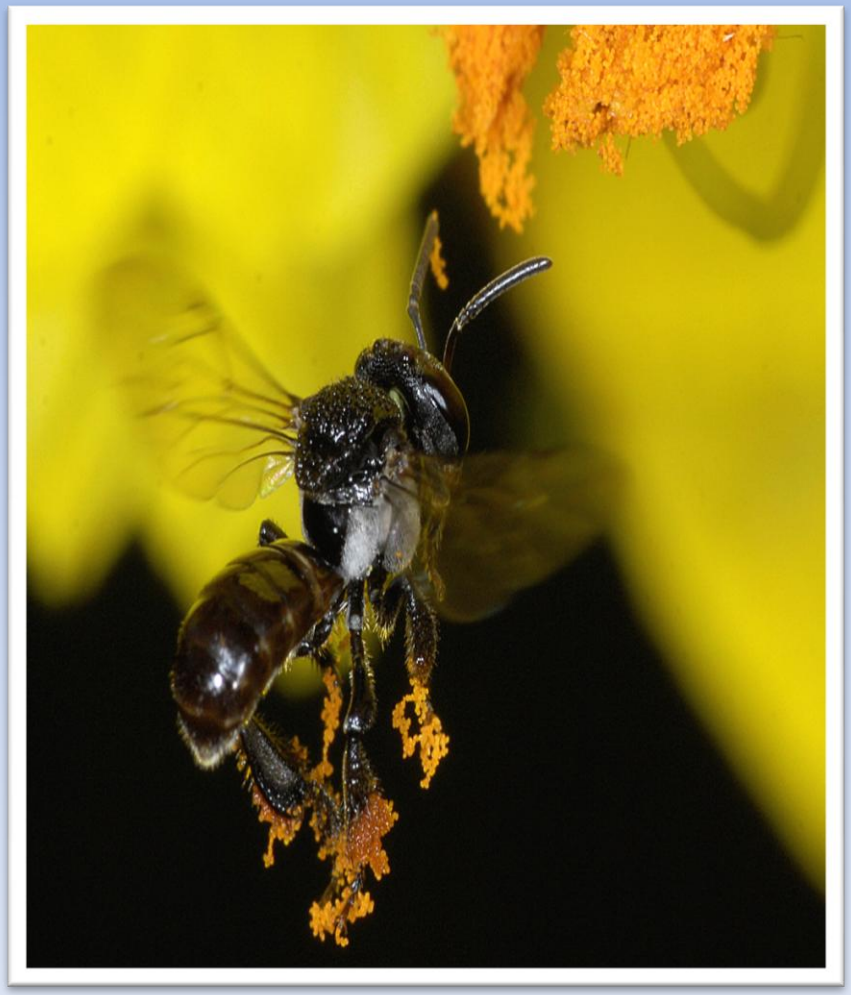
- It is extensively reared in Europe, America and India.
- The behaviour and appearance of *A. mellifera is similar to A. cerana.*
- It makes its nest in enclosed space (in darkness) in **multiple parallel combs , swarms less, gentle tempered so, domesticable, good honey gatherers and can guard its nest against enemies.**
- They yield on an average **35-45 Kg honey/hive/year**
- They are larger than Indian bees but smaller than Rock bees.

European bee or Italian bee, *Apis mellifera*

5. Dammer bee or stingless bee, *Trigona irridipennis*

- This is the smallest species and differs from other bees in its appearance and habitats.
- They do not have sting *i.e., stingless.*
- They built their comb in hollow walls or tree trunks
- They construct their comb with a dark material called "**Cerumen" which is a mixture of earth and wax or resin collected from plants as they do not secrete wax to build combs.**
- It is very poor honey gatherers and yields only **60-180 ml/colony/year.**
- Its honey is used in ***Ayurvedic medicine.***

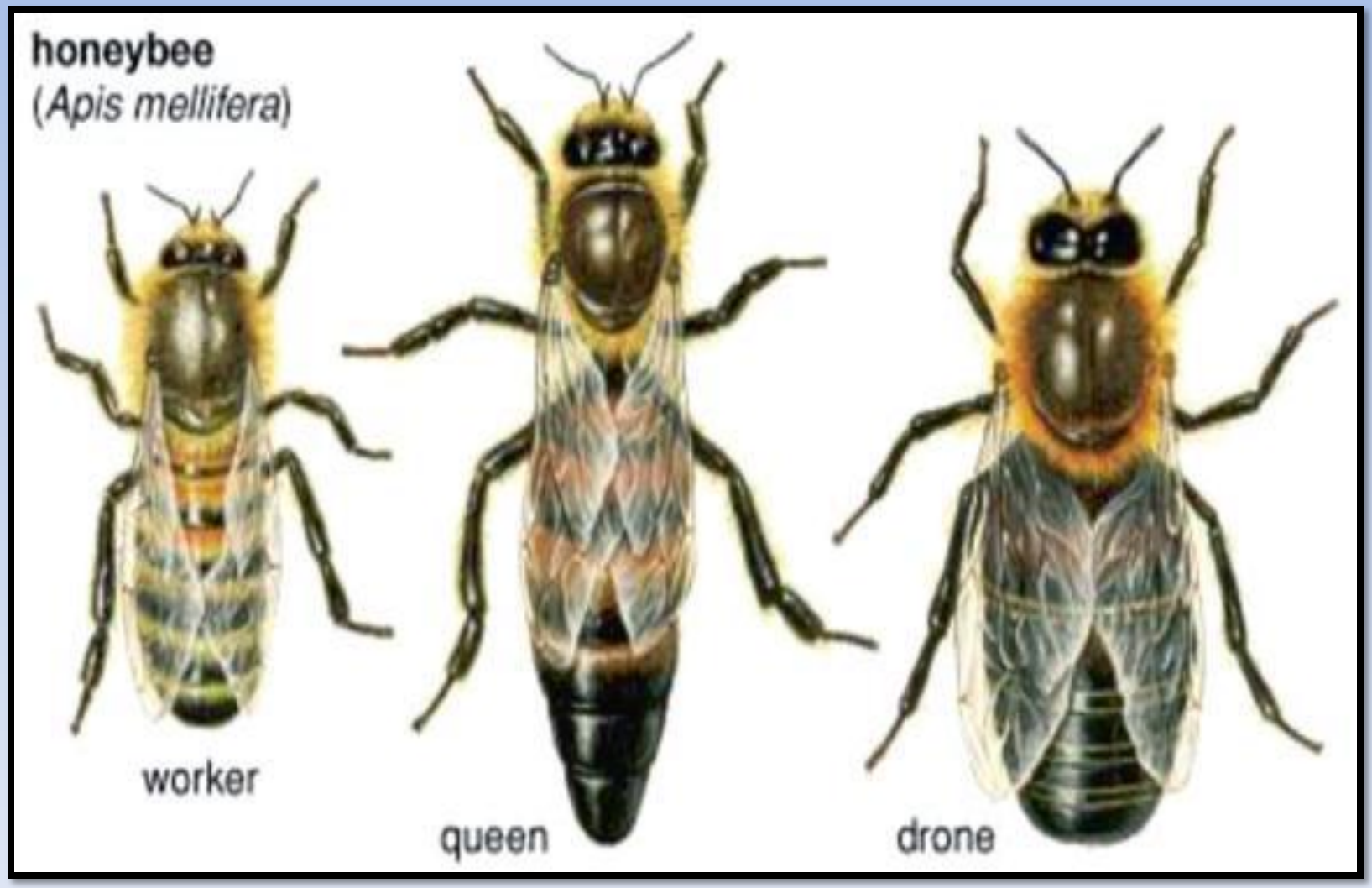
Dammer bee or stingless bee, *Trigona irridipennis*



Castes of honey bees

- The honeybee is a social insect and lives in colonies with a highly organized system of division of labour.
- Honey bees having three castes: queen (fertile female), drones (males) and workers (sterile females).
- Each caste has its special function in the colony.
- The workers are undeveloped females, the drones are known as males and the queen is the fully developed female.
- Every honey bee colony comprises of 35000 to 70,000 members includes a queen, 200-300 drones.

Castes of honey bees



1. Queen

- Queen is the only female that is completely developed sexually from **fertilized egg**. This is a result of a total diet of **royal jelly** during the developmental period.
- The only individual which lays eggs in a colony (**Mother of all bees).**
- Lays upto 2000 eggs/day in *Apis mellifera.*
- Five to ten days after emergence, she mates with drones in one or more nuptial flights.
- She lives for 3 years and when it is weak or unable to lay eggs it is replaced by one of the daughter queen.
- The queen can lay either fertilized or sterile eggs depending on the requirement.
- The secretion from mandibular gland of the queen is called **queen's substance.**

2. Drone

- Drones, the functional males of the colony are produced from unfertilized eggs, and are larger and darker than the worker.
- Drones are not a permanent member of colony.
- The end of the abdomen is blunt and is covered with a tuft of small hairs.
- Drones cannot sting.
- They also do not have any of the structures necessary to collect nectar and pollen.
- Their important duty is to fertilize the queen.
- They also help in maintenance of hive temperature.

Workers

- Workers are **sexually sterile female caste**
- On ventral side of the abdomen, **wax glands are present**
- Hind legs are modified for **pollen collection.** They do the work of the colony and maintain it in good condition. Workers have special structures and organs which are associated with the duties they perform re modified for **pollen collection.**

Duties of workers

Their adult life span of around 6 weeks can be divided into:

- (i) First three weeks- house hold duty.
- (ii) Rest of the life- out door duty.

[i] House hold duty includes:

- Build comb with wax secretion from wax glands.
- Feed the young larvae with **royal jelly secreted from hypopharyngeal gland.**
- Feed older larvae with bee-bread (pollen+ honey).
- Feeding and attending queen.
- Feeding drones.
- Cleaning, ventilating and cooling the hive. g. Guarding the hive.
- Evaporating nectar and storing honey.

[ii] Outdoor duty includes:

- Collecting nectar, pollen, propolis and water.
- Ripening honey in honey stomach.

Biology/ Life history of Honey bee:

1. Eggs:

- Eggs are laid by queen and when a colony wants to produces a new queen, the special cell is constructed at the lower border of the brood comb.
- On these cells, singles egg is laid by the queen in each cell which hatched after 3 days.
- The newly hatched grubs are provided with royal jelly.
- The grub is fully developed in 5 or 6 days and then queen cell is capped where grub changes into pupa and after a week adults come out by biting the cap of queen cell.
- The adult who comes out earlier become the daughter queen and it kills the remaining pupae before their emergence.

2. Grub

- From the fertilized eggs the queen and worker are developed, while from the unfertilized eggs drones are developed.
- They fed with the royal jelly for 2-3 days after that they are provided with honey and nectar, etc.
- The grub period lasts for about 5-6 days.
- Workers receive the royal jelly only during the first 3 days as compared to future queens, who are fed with royal jelly throughout their larval life.
- The developing queen larva is always surrounded by royal jelly, a special highly nutritious food produced by head glands of the workers. This feeding scheme, called massive provisioning is unique to the queen and continues throughout her entire developmental period.

3. Pupa

- Full grown grub forms a cocoon and pupates insides the cell.
- The pupal periods lasts for about 7-14 days depending upon the type of adult to be produced.

Adult	Eggs	Grub	Pupa	Total
Queen	3 days	6.5 days	6.5 days	16 days
Worker	3 days	8.0 days	10.0 days	21 days
Drone	3 days	9.5 days	11.5 days	24 days

4. Adult

- The adult life span of queen is 3 years.
- The adult life span of drone is maximally 60 days.
- The adult life span of workers is about six weeks to six months
- The adult life span of drones is about 2-6 months.

Thank You.....