Chapter - 3

1. Introduction to Honey Bee

Honey Bee are **social insects** that live in highly organized colonies. They play a vital role in **pollination**, **honey production**, and maintaining **ecological balance**.
• Class: *Insecta* | Order: *Hymenoptera*
• Colonies exhibit a well-defined **division of labor**
• Show **eusocial behavior**, the highest level of social organization among animals

📌 *Interesting Fact:* Fossil evidence suggests honey bees have existed for over **30 million years**.

2. Apiculture and Its Importance

➤ What is Apiculture?

Apiculture refers to the **rearing and management of honey bees** for obtaining honey, wax, and pollination services.

☑ Importance of Apiculture

- Provides economic benefits through the sale of honey and wax
- Enhances **agricultural productivity** through pollination
- Creates **employment opportunities**, especially in rural areas
- Supports **sustainable and eco-friendly agriculture**

3. Structure of Honey Bees

The body of a honey bee is divided into three main parts:

1. **Head** – Contains compound eyes, antennae, and mouthparts for sensing and feeding
2. **Thorax** – Bears **three pairs of legs** and **two pairs of wings**
3. **Abdomen** – Houses the digestive and reproductive systems

4. Types of Honey Bees in a Colony

Type of Bee	Number	Lifespan	Function
Queen Bee	1	2–5 years	Lays eggs and secretes pheromones
Drone Bees	~100	Few weeks	Fertilize the queen during mating
Worker Bees	Thousands	5–6 weeks	Perform all other tasks in the colony

📌 *Memory Tip:* **Q–D–W** = Queen (reproduction), Drone (fertilization), Worker (maintenance and foraging)

5. Life Cycle of Honey Bee

Honey bees undergo **complete metamorphosis** consisting of four stages:
Egg → Larva → Pupa → Adult

1. Egg 🥚

• Laid by the queen bee into a cell of the honeycomb
• Small, elongated, and white in color
• Hatches within approximately **3 days**

2. Larva 🐛

• White, legless, and worm-like stage
• Fed by worker bees with **royal jelly**, a nutrient-rich substance

🔸 What is Royal Jelly?

A protein-rich secretion produced by glands in worker bees.
• All larvae are fed royal jelly for the first 3 days
• Larvae destined to become queens continue receiving royal jelly throughout the larval stage

3. Pupa 🐞

• The larva spins a cocoon and undergoes transformation
• Development of legs, wings, eyes, and other adult features
• Pupal stage duration varies by caste:
– Queen: ~7 days
– Worker: ~12 days
– Drone: ~14 days

4. Adult 🐝

• Emerges by chewing through the wax cap of the cell
• Takes on a specific role depending on caste (queen, drone, or worker)
• Starts performing colony-specific tasks

6. Division of Labour in Honey Bees

Worker bees perform age-based duties in the colony – a phenomenon known as **age-related polyethism**.

Age (Days)	Task Performed
1–3	Cleaning hive cells
4–6	Feeding larvae
7–10	Producing royal jelly
11–18	Building comb and guarding the hive
19+	Foraging for nectar and pollen

📌 *Interesting Fact:* Each task transition is triggered by hormonal changes and colony needs.

7. Method of Honey Production

1. **Forager bees** collect nectar from flowers using their proboscis
2. Nectar is stored in a special stomach called the **honey sac**
3. It is mixed with **digestive enzymes** and brought back to the hive
4. Bees deposit nectar into honeycomb cells
5. Moisture is reduced by **wing fanning**, converting nectar into honey
6. Finally, cells are sealed with a wax cap to preserve the honey

8. Major Uses of Honey Bees

☑ **Honey** – Used as a natural sweetener and in traditional medicine
☑ **Beeswax** – Essential for making candles, cosmetics, and polishes
☑ **Pollination** – Increases productivity of fruits, vegetables, and oilseeds
☑ **Royal Jelly** – Used in health supplements for its nutritional properties
☑ **Propolis** – Resin-like substance used in folk medicine for its antimicrobial qualities

📌 *Interesting Fact:* About **one-third** of the world's food production depends on bee pollination.

Interesting Facts about Honey Bees

- Honey bees can flap their wings up to **200 times per second**
- A single bee produces approximately **1/12 teaspoon** of honey in its lifetime
- Honey is naturally **antimicrobial** and does not spoil
- A queen bee can lay **up to 2,000 eggs** per day during peak season

Quick Revision Summary

- Honey bees are eusocial insects with a defined caste system
- **Apiculture** is the practice of beekeeping for honey and pollination
- Life cycle: **Egg → Larva → Pupa → Adult** (complete metamorphosis)
- **Worker bees** change roles with age (age-related polyethism)
- Honey is produced from nectar using enzymes and evaporation
- Honey bees support both the **economy** and the **environment**

Common Mistakes to Avoid

- Assuming all bees can lay eggs – only the **queen** can
- Confusing the roles of **drone** and **worker** bees
- Forgetting the function of **royal jelly** in queen development
- Mixing up the **larval** and **pupal** stages