SOCIAL LIFE IN TERMITES

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SOCIAL LIFE IN TERMITES

- The Termites are commonly known as **white ants.**
- They belong to Class- Insecta, Order- Isoptera and are widely distributed in tropical, subtropical and temperate regions of the world.
- These are small, hemimetabolous, soft bodied, cellulose eating, nocturnal, social and polymorphic insects having two pairs of similar wings.
- These are usually light coloured and are different from ants. Ants are hard bodied and dark coloured, with a constriction between thorax and abdomen.
- Ecologically, termites are good decomposers of dead wood and vegetable products and aid in agriculture by enriching the soil with their fecal matter and by making the soil permeable to air and moisture, like earthworms.

- These are very significant pests damaging wooden structures.
- They live together in **very large colonies or communities.**
- There are more than 1,700 species of termites and a few hundreds to as many as 70 lakhs individuals of same species form a colony.
- The colonies are matriarch. A colony's population is initiated and maintained by a queen that may live for as many as 50 years in some species.
- All members of a colony are the offspring of a single female and hence all have similar genotype.
- The colony reaches its maximum size in approximately 4 to 5 years.

Colony Structure and Polymorphism in Termites

- A termite community includes two forms :
  (i) Reproductive form or Fertile Caste
  (ii) Sterile form or Caste

1. Reproductive or Fertile Castes -

There are three types of reproductive castes which are fertile males and females. These are as follows:

(A) Macropterous forms or Winged forms or First Reproductive Caste -

These are sexually perfect males and females. They are ancestors of the community from which other forms have bee derived.

- They have two pairs of large, equal-sized wings which project beyond the abdomen at rest.

- Body is chitinised and dark brown. Compound eyes are well developed and there is a pair of ocelli. Brain and sex organs are larger than in others.

- Males and females leave the nest at maturity, lead a brief aerial life, shed their wings at the basal sutures, then they come together in pairs and mate.

- After that they find a proper place for a new nest.

- Each pair is a dealated **King and Queen or Primary Royal Pair.** They have stumps of shed wings and they are monogamous. The king and queen are permanently associated.

- The queen becomes large by growth of its abdomen. The head and thorax resemble a normal termite but her abdomen is hugely distended, bulbous, long and white. She produces up to 2,000 eggs per day.

- A royal couple can live up to 50 years in some species.

(B) Brachypterous forms or Short winged forms or Second Reproductive caste- These are sexually mature males and females but they are nymphal in appearance.

- Body is less chitinised, pale coloured and have short wing buds only. The brain and sex organs are smaller in size and compound eyes are not dark.

- They do not leave the nest.

- If the primary king or queen dies, its place is taken by brachypterous individuals forming several **substitute or complemental king or queen,** which are polygamous.

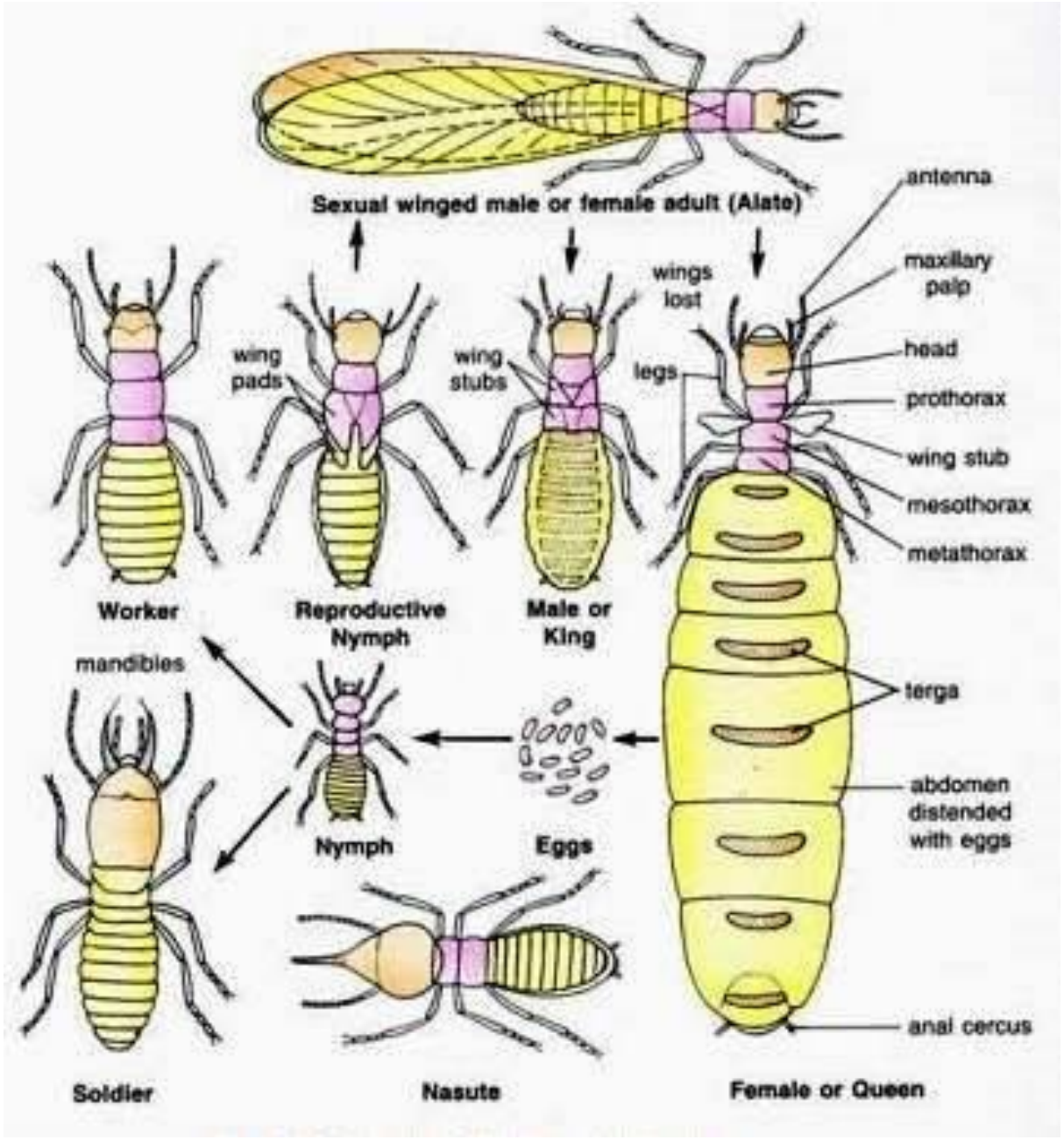
- Such queens produce fewer eggs.

(C) Apterous or Wingless forms or Third Reproductive caste -

These are rare, found in lower termites only. They have both males and females. These look like nymphal workers.

- They have no wings, cuticle is colourless, compound eyes are vestigial and ocelli are absent.

- They are known as **Ergatoid Kings and Queens**. They may be several in the colony.



Castes and Life Cycle of Termites

2. Sterile forms or Castes –

There are two types of wingless (apterous) , sterile castes. These are male and females in which sex organs are rudimentary and non-functional. These are of two types:

(A**) Sterile Workers –** These are the smallest in size, look like nymphs, their body is pale coloured and their integument is less chitinised.

- Compound eyes and ocelli are absent and the head is wide, pointing downwards.

- The number of workers in a community is very large, about 60,000 to 2,00,000. They mature within a year and live from 3 to 5 years.

- With the exception of reproduction and defense, they perform all the duties of the colony.

- Their **main duties** are looking after the eggs and the young, finding food, planting and cultivating fungi, making nests and feeding the queen and soldiers. They also lick and groom each other.

- They have gnawing habit. The workers destroy crops, wood and human belongings and cause tremendous loss to man.

- They are **xylophagous**, feeding on wood. They can digest cellulose with the help of intestinal symbiotic flagellates –*Trichonympha,* which are passed on from generation to generation.

(B) Sterile Soldiers – These are apterous males and females with no sex organs. They are less numerous in the colony than workers.

- A soldier has a large, dark coloured, chitinous head and big mandibles. The colour of the body is pale. They must be fed by the workers because they cannot feed themselves.

- Soldiers are of two types :
  (i) **Mandibulate soldiers** – have large powerful mandibles but no frontal rostrum.
  (ii**) Nasute soldiers** – have small mandibles and median frontal rostrum on the head.

- They defend the community. The mandibulate soldiers with their mandibles and nasute soldiers by exuding a viscid repellent fluid through the frontal rostrum. At times they plug the opening of the burrow with their heads.

Termite Nest or Termitarium –

- The worker termites construct elaborate **nests**, the **termitaria**, for protection, storage of food and maintenance of broods.

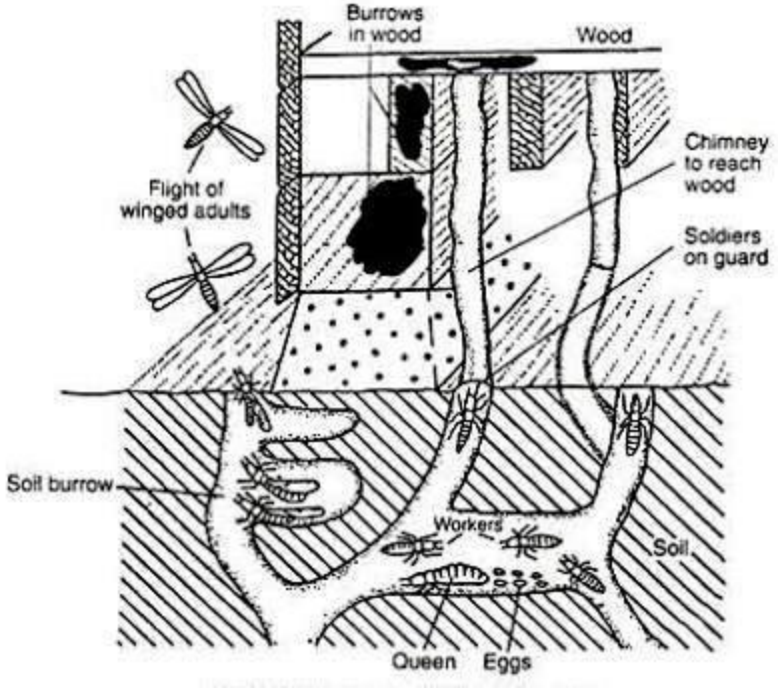
- The termite nests vary from simple cavities in soil or wood to vast subterranean complex or elaborate structures that project well above the ground , known as **mounds.**

- The mounds can be up to 6 meters high and are made of excavated mud wood and excreta mixed with saliva. Their walls become hard as rocks.

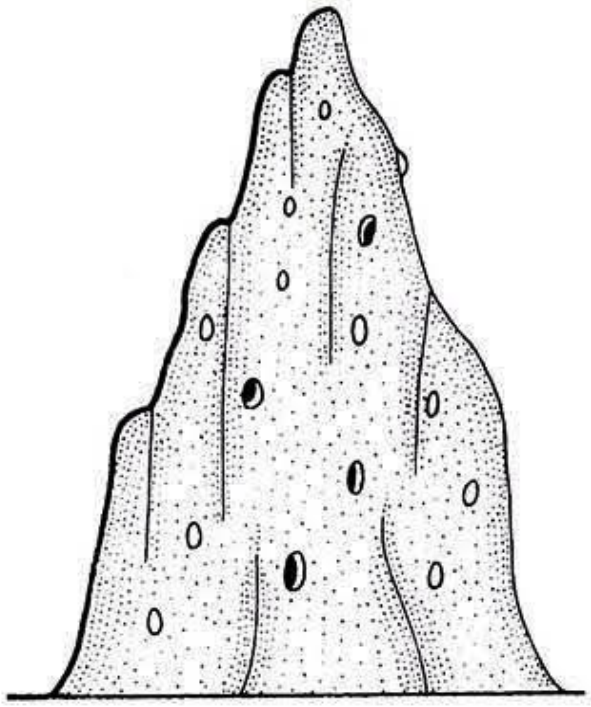
- The mounds and termitaria have a maze of passages, chambers and special cells for storing food or cultivating fungus gardens. There are special chambers for the royal couple.

- The termitaria are provided with very elaborate ventilation system and design that provides for maintenance of constant temperature, canopies that deflect rainwater and other structural adaptations.

- Termites are best known nest building insects.



Nest or Termitarium of Termites



Termitarium or Mound of Termites

Other characteristics of Termites-

- Various castes of termites work in **cooperation** and with mutual benefit and live in an integrated manner in the colony.

- **Parental care** is well marked in termites -
  - The eggs and nymphs develop in fungal chambers or nurseries.
  - The queen is fed by workers on saliva and fungal hyphae.
  - The workers tend and feed the nymphs on fungus and vegetable matter which are partly predigested by the workers.
  -Thus, symbiotic flagellates are transferred to nymphs by trophallaxis.

- For **progressive provisioning of food** for the king, queen and nymphs, some worker termites cultivate fungus gardens in chambers located near the center of the nest.

  - These are made of a reddish brown, spongy comb produced by the workers from vegetable matter and excreta.

  - On the comb fungal hyphae grow producing white patches.

- Exchange of food between one insect and the other takes place by mouth- **Trophallaxis.**

  - In termites, trophallaxis plays an important role in the regulation and caste determination through ectohormones, containing inhibitory substances, secreted by the reproductive and soldiers.

Swarming –

- Swarming occurs for feeding, migration and mating. It also occurs as a means of alleviating congestion in the overcrowded colony or as a means of distribution.

- Usually equal number of males and females of macropterous and brachypterous forms leave their nest, in huge numbers or great swarms, after the first showers of rain on the onset of rainy season.

- Swarming may occur at night or even during day time, depending on the species.

- After a short flight they come down to the ground, their wings are shed off and they become dealated.

- One male and a female pair, search for a sheltered place either in wood or on the ground. They are known as **royal couple.**

- After getting a suitable place, these excavate a **nuptial chamber** where copulation takes place.

- These individuals now become the originators of a new colony.

- After copulation, the queen lays clusters of eggs, nearly 4,000 eggs in a day and millions of eggs in her life time.

- From the eggs nymphs are hatched out. These are fed by the queen first.

- These nymphs develop into workers. When the workers are formed in large numbers , they take up different duties like, feeding and attending the royal pair and enlarging the nest.

- After a large number of workers are formed, then the nymphs hatching out of the eggs develop into the soldiers.

- Thus, during the early months of formation of a new colony workers and soldiers are only formed.

- Later on macropterous and brachypterous forms are produced.

- The development of termites is hemimetabolous type having only three stages in life cycle- Egg, Larva (nymph) and adults.

- **Communication in Termites –**

- Termites communicate primarily by secreting chemicals called **pheromones or ectohormones.**

- Each colony develops its own characteristic odour.

- An intruder is instantly recognized and an alarm pheromone is secreted that triggers the soldiers to attack.

- If a worker finds a new source of food, it lays a chemical trail for others to follow.

- The proportion of termites in each caste within the colony is also regulated chemically.

- Nymphs or immatures can develop into workers, soldiers or reproductive adults depending on colony needs.

- **Sound** is other means of communication. The Soldiers and workers may bang their heads against the tunnel creating vibrations perceived by others in the colony and serving to mobilize the colony to defend itself.

- Mutual exchange of foods enhances recognition of the members.