PROJECT: EGGS OF ANT

Project # 3: Finding out how egg is formed in ants from scientific findings, and compare with the way it is described in Jain texts

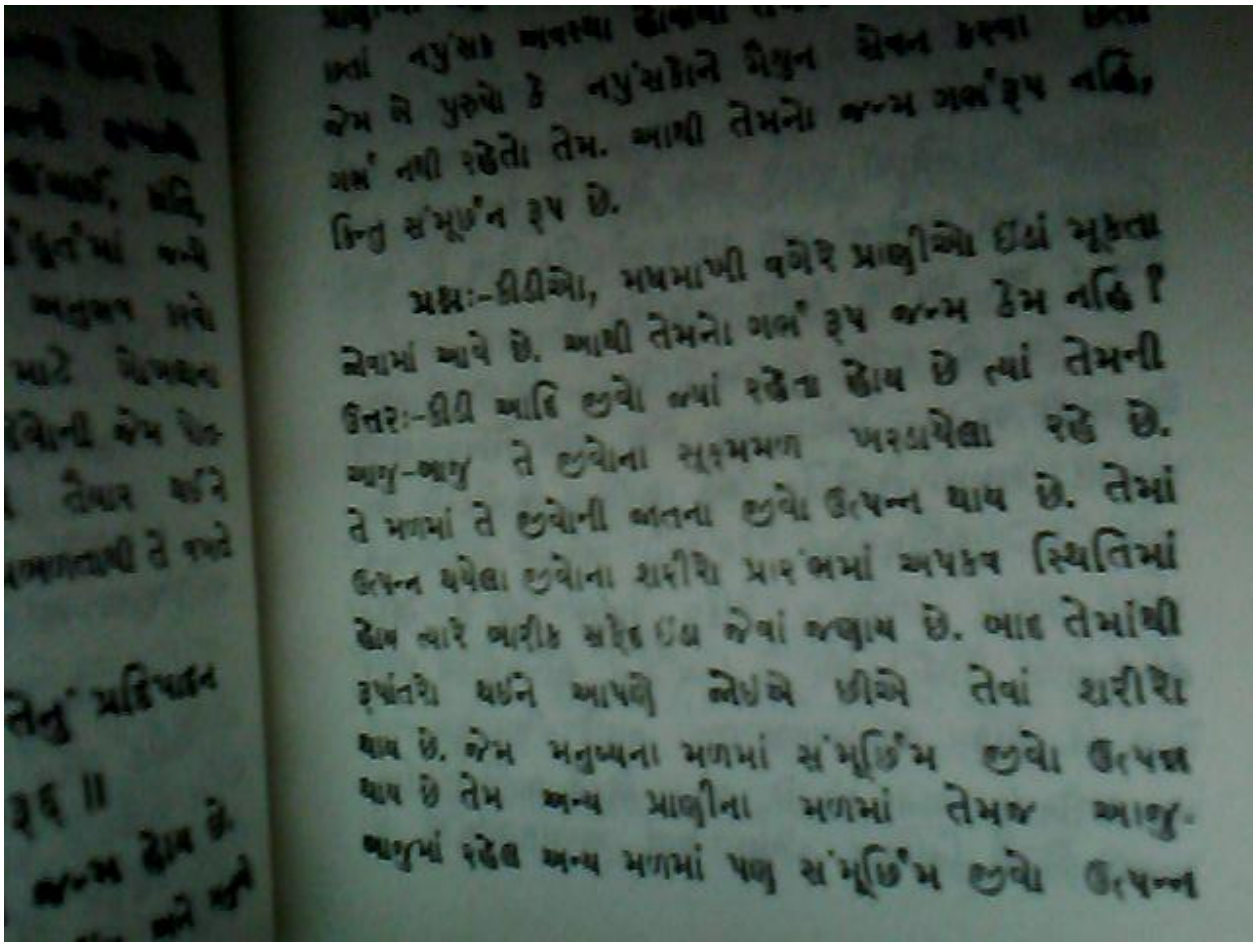
Will be done by Sahil Shah

- ***Reference from Jain Scriptures:***

1. Reference from Shrish Ji:

"चींटी आदि जीवो के अण्डे की उत्पत्ति ग्रभ से नहीं होती, केवल यहां वहां के सडे-गडे पुद्गलो को लेकर विशेष स्थानो में रख लेती है। कालान्तर में वे ही पुदगल पिण्ड चींटी आदि के शरीर बन जाते हैं।"

2. Reference from Book "Shree Tatvarthaadhigam Sutra" by "Aacharya RajShekhar Surishavar Ji Ma.Sa.":



- ***What Science says?***

-about ants and about reproduction

-pictures

-about metamorphosis, extra material and reference material

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ANTS

Ants are one of the most organized animals. They live in colonies made up of at least one queen, female workers, eggs, larvae, pupae and drones. Every individual has a very specialized function. Adult ants are queens, workers and drones.

THE QUEEN

The main function of a queen is to lay the fertilized eggs, millions of eggs. We could say that the queen is the mother of all the ants in the colony.

THE WORKERS

Worker ants are infertile females. They are the majority of individuals in the colony. They perform specialized and different chores. Some of the different chores to be carried out in a colony are: Gathering of food, cleaning and caring for the eggs, cleaning and feeding of the larvae and the queen, defending the colony, processing and storing of food, and making new tunnels and chambers.

THE DRONES

The drones are the only male individuals in the colony. They have wings, although unlike the queen, these are permanent. The drones' only function is to mate with the new queens. In the mating time the drones will fly out of the nest first, forming like clouds in the air. The new queens will follow, and they will mate with the drones in the air (nuptial flight). After the mating, the drones will soon die. Their span of adult life is only two or three days.

THE EGGS

The queen is the one that lay eggs. Eggs have a white pearly color. Worker ants keep them in clusters. The workers clean and rotate the eggs for them not to get moldy. Eggs are moved to different chambers in accordance to the temperature of each chamber to accelerate the hatching period.

THE LARVAE

The larvae will hatch from the eggs after a few days. They are pearly white, just as the eggs. Larvae are very voracious (they eat a lot), this means they are all the time hungry. They need to accumulate enough

nutrients for the days that will come, enclosed in a cocoon. The grown up ants feed them with honeydew and small pieces of insects.

THE PUPAE

The larvae eat continuously, growing in size, then one day they start spinning a silky thread. They wave this thread around and around their bodies until they are totally covered. This silky cover is called a cocoon. The larvae now have started their pupa stage. During this period, dramatic changes take place in the larvae body. This is called metamorphosis (which comes from the Greek, and means something like transformation into something else). When the ants break free from the cocoon they will, like magic, be fully grown ants.

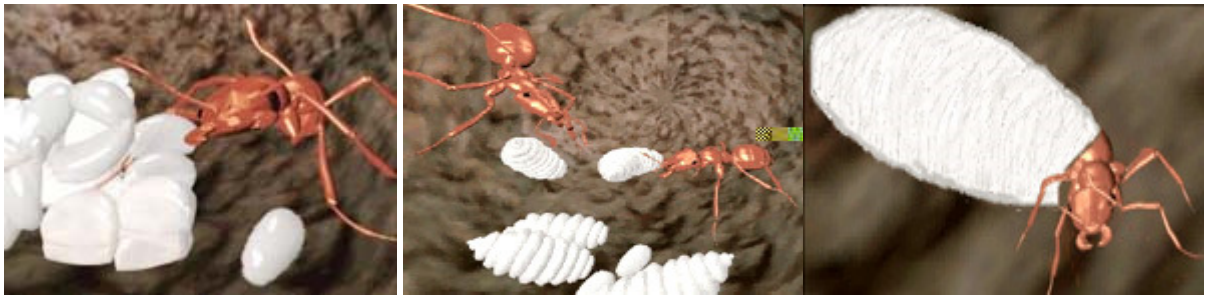
REPRODUCTIVE CYCLE

All ants have a four stage reproduction cycle: Eggs, larvae, pupae and adult.

In spring, summer, and autumn you can see swarming clouds of drones and queens mating. They look like small little flies, but if you look up closely you will see they are ants.

They mate in the air. After this, the queen falls to the ground and looks for a place where to start the new nest. While doing so she reaps off her wings because they would not be of any use in her underground home.

If the mating takes place in the autumn the queen would hibernate until spring. Otherwise, it will start laying eggs right away. After few days, the eggs will hatch into small larvae. The larvae will spun and close itself inside a cocoon. Inside the cocoon the larvae, as many other insects, will go through very important changes to become an adult ant. These changes are called metamorphosis.



Ants – Mating and Reproduction

Ants undergo complete metamorphosis—from egg, to larva, to pupa, to adult. Each ant colony begins with, and centers on, the queen, whose sole purpose is to reproduce. Although the queen may copulate with several males during her brief mating period, she never mates again. She stores sperm in an

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internal pouch, the spermatheca, near the tip of her abdomen, where sperm remain immobile until she opens a valve that allows them to enter her reproductive tract to fertilize the eggs.

The queen controls the sex of her offspring. Fertilized eggs produce females (either wingless worker seldom capable of reproduction, or reproductive virgin queens). Unfertilized eggs develop into winged males who do not work, and exist solely to fertilize a virgin queen. The queen produces myriads of workers by secreting a chemical that retards wing growth and ovary development in the female larvae. Virgin queens are produced only when there are sufficient workers to allow for the expansion of the colony.

The first phase of colony development is the founding stage, beginning with mating, when winged males and virgin queens leave the nest in massive swarms called nuptial flights, searching out a mate from another colony.

After mating, queen ants lose their wings. The queen scurries off in search of a site to start her new nest. If she survives, she digs a nest, lays eggs, and single-handedly raises her first brood that consists entirely of workers. The workers enlarge the nest, excavate elaborate tunnel systems, and transport new eggs into special hatching chambers. Hatchling larvae are fed and cleaned, and pupated larvae in cocoons are protected until the young adults emerge to become workers themselves.

A young (female) flying up for mating:

The young female loses her wings and makes a nest:

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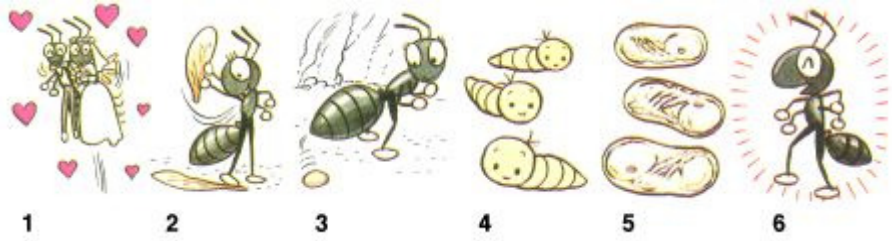
From the mating ceremony until the birth of workers



1. Mating. (early summer).
2. Wings of a young female fall off.
3. She creeps into the soil to lay eggs.
4. The eggs change to larvae within about 25 days.
5. After 10 to 15 days, the larvae form cocoons.
6. One month later. Worker are born.

- ***Extra Material:***

- **Metamorphosis: a remarkable change**

Metamorphosis refers to a major change of form or structure during development. One of the most dramatic forms of metamorphosis is the change from the immature insect into the adult form.

Most of the major insect orders have a typical life cycle which consists of an egg, which hatches into a larva which feeds, moults and grows larger, pupates, then emerges as an adult insect that looks very different from the larva. These insects are often called 'holometabolous', meaning they undergo a complete (*holo* = total) change (*metabolous* = metamorphosis or change). Those which have immature stages similar in shape to the adult minus the wings are called 'hemimetabolous', meaning they undergo partial or incomplete (*hemi* = part) change.

Holometabolous (complete metamophosis) Hemimetabolous (incomplete metamorphosis)

- **What's the Difference between Fertilized and Unfertilized Eggs?** By Michele Foley

The difference between fertilized and unfertilized eggs comes down to whether a rooster has been involved or not. Hens do not need a rooster to lay an egg; they do so (almost daily) on their own simply according to light patterns. However, if a rooster does mate with a hen, the eggs she produces are

fertilized and, under the right incubation conditions, can bear chicks. No rooster means zero possibility of the egg ever becoming anything more than that.

- **INTERESTING FACTS ABOUT ANTS**

- There are over 10000 known species of ants. The average life expectancy of an ant is 45-60 days.
- Ants use their antennae not only for touch, but also for their sense of smell. The head of the ant has a pair of large, strong jaws. The jaws open and shut sideways like a pair of scissors.
- Adult ants cannot chew and swallow solid food. Instead they swallow the juice which they squeeze from pieces of food. They throw away the dry part that is left over.
- The ant has two eyes; each eye is made of many smaller eyes.
- The abdomen of the ant contains two stomachs. One stomach holds the food for itself and second stomach is for food to be shared with other ants.
- The job of the queen is to lay eggs which the worker ants look after. Worker ants are sterile; they look for food, look after the young, and defend the nest from unwanted visitors.
- At night the worker ants move the eggs and larvae deep into the nest to protect them from the cold. During the daytime, the worker ants move the eggs and larvae of the colony to the top of the nest so that they can be warmer.
- Ants are clean and tidy insects. Some worker ants are given the job of taking the rubbish from the nest and putting it outside in a special rubbish dump!

➢ ***Reference Material:***

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