Certificate

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Class : Bsc. IInd Semester

Roll No. :

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This is certified to be the bonafide work of the student in the _____

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Subject of Zoology

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1.	Study of life cycle of silk worm and different types of silk.				
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2.	To study the quatitative analysis of honey				
3.	To study the Construction of Vermicomposting and used for Vermicomposting.				
4.	Study of different between original and artifical hearts				
5.	Exercise based on ethology				
(i)	To study the food preference and response to light in any of the stored insect pest				
(ii)	To study the anetennal gromming in cockroach				
(iii)	Study of chemical communication behaviour in ants/ earthworm				

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S. No.	Name of Experiment	Page No.	Date of Experiment	Date of Submission	Remarks
	SPOTTING				
(i)	Protozoa → Trypanosoma, plasmodium, Giardia				
(ii)	Platyhelminthes – Taenia, fasiola hepatica				
(iii)	Aschelminthes – Ascaris wuchereria				
(iv)	Annelida – Earthworm				
(v)	Arthropoda → Bombyx mori, pediculus, Bed bug, Prawn, spider, Scorpion, Centipede, Earwing, Apis, Mosquito, Julibolium, grasshopper, Cockroach, ants, apidi				
(vi)	Mollusca – Pearl Oyster				
(vii)	Edible fish – Lebeo				

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objective → Study of silkworm their types and life cycles.

Essential equipment → Rearing house, rearing trays, rearing stands, chopping board and knife, chopstict, feathers, cleaning nets, mountage for Cocoon spinning.

Silkworm & family :→

(1) Bombyx cidre →

Bombyx is the genus of tree silk moths or mulberry silk, moths of the family bombycidal, also known as silkworm, which are the larvae or caterpillar of silk.

(2) Saturnidae →

a) Tasar → Tasar cocoons are the largest among all the silk-producing insect in the world and their silk fibre has its own distinctive colour elongation and stress relaxation.

b) Muga → Muga is endemic to Assam and adjoining areas in North-eastern India, and naturally produces golden silk.

c) Eri → Eri silk is a staple fibre, unlike other silks, which are continuous filament. The texture of the fabric is coarse, fine, and dense.

Life cycle of Bombyx Mori →

The life cycle of Bombyx mori, commonly known as the silkworm,

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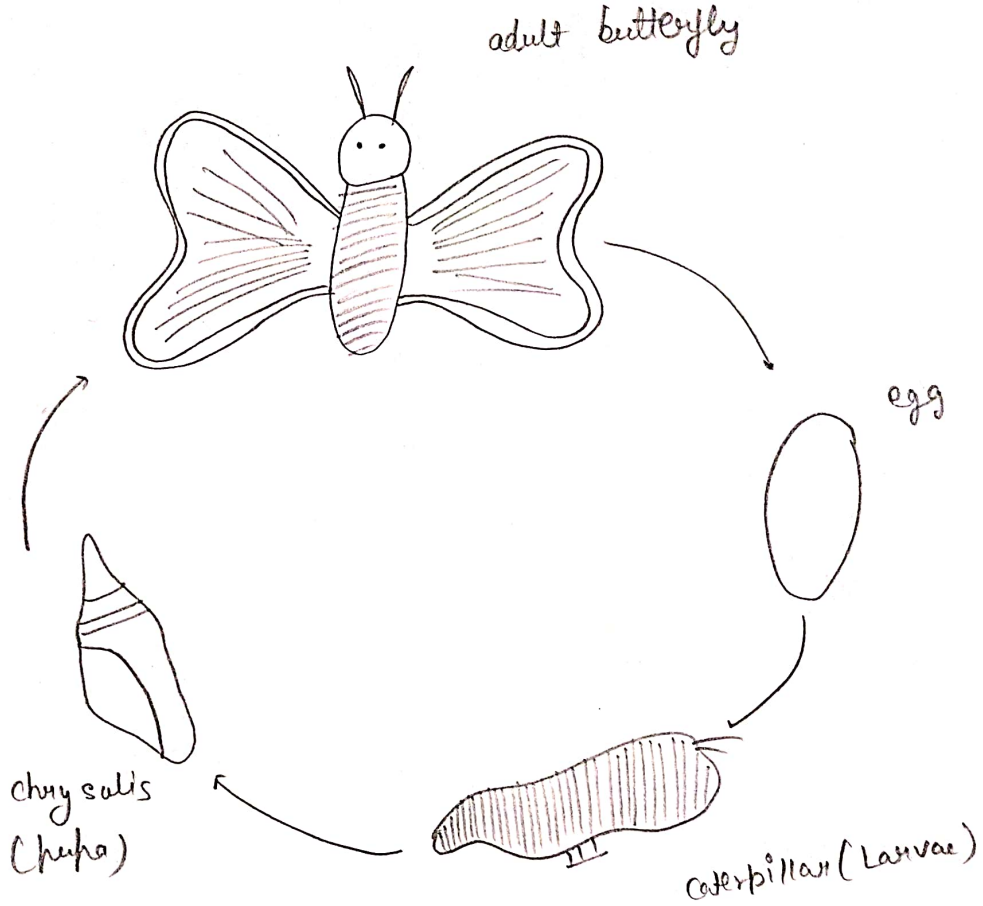
is a fascinating process that includes several distinct stages.

(1) Egg → The female silkworm lay eggs, which are about the size of small dots. The eggs hatch in the spring due to the warmth of the air.

(2) Larvae → The larvae hatches from the egg and feeds on mulberry leaves. It growth the during this stage.

(3) Pupa → The silkworm spines a protective cocoon around itself. The cocoon is made of a single thread.

(4) Moth → The pupa transforms into a silk moth, which completes the life cycle. The adult moth is winged but flightless



Life Cycle Silkworm

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objective → checking the purity of honey.

Essential equipment → honey sample, lighter, Matchbox, Tissue paper, beaker, sipka

1) Flame test →
- Dip a dry match or cotton wick into the honey.
- Shake off any excess honey.
- Try to light the match or wick with a lighter.

2) Dissolving test →
- fill a glass with water :- use a clear glass and fill it with room temp.
- Add a spoonful of honey :- Carefully drops a tablespoon of honey into the glass.
- observe :- without stirring, watch how the honey behaves in the water

3) Swirl test →
- A glass of water and a spoon.
- Place a spoonful of honey into the glass of water
- Gently swirl the water in the glass, observing how the honey behaves

4) Vinegar test →
- A small glass, a teaspoon of honey, a few drops of vinegar and water.
- Put a tablespoon of honey into the glass and add a small of amount of water. Carefully add a few drops of vinegar to the mixture.
- Gently stir and observe if any foaming or bubbling.

5) Thumb test → • Put a tiny amount of honey on your thumb.
- watch how the honey behaves on your thumb.
- If the honey stays in place and feel this it is likely pure.
- If the honey quickly spread or runs off it may be impure.

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observation → Analysing the chemical components of honey packets.

Experiment to detect the presence of Carbohydrates →

(a) Molish test → Test tube, molishs reagent, pipette → Equipments

Process →

- Add 2 ml of the sample to a test tube
- Add 2-3 drops of molischis reagent to the sample & mix
- Slowly add 1 ml of concentrated sulfuric acid down the side of the test tube, without mixing.
- Observe for a purple or purplish - red ring at the interface between the acid and test layers

(b) Benedicts test :- Equipments → Test tube, pipette, Tripod and Bunsen burner, wire gauze, 500 ml beaker, plate ~~etc~~

Process →

- Add 1 milliliter of the sample solution to a clean test tube.
- Add 2 milliliter of Benedicts reagent to the test tube.
- Heat the test tube in a boiling water bath or directly over a flame for 3-5 minutes.
- Observe the colour change.

(c) Barfoed's test :-
Equipments → Test tube, heat source, a dropper, pipette.

Process →

- Dissolve copper acetate in a dilute acetic acid solution.
- Place a few drops of the test solution in a clean test tube.
- Add an equal volume of Barfoedis reagent to the test soln

- Heat the mixture in a boiling water bath for few minutes(3).

(d) Seliwanoff's Test:-

Equipments :→ Anne, a basket, a box and a small object.

Process →

- Take a small volume of the test solution in a clean test tube.
- Add a few drops of seliwanoff's reagent.
- Place the test tube in boiling water bath.
- A rapid development of a deep cherry red colour indicates a positive result.
- Run a parallel test with a known ketose solution as a positive control.

Experiment to detect the process in presence of protein:-

(a) Burette test :-

Equipments → a burete, a pipette, a conical flask, etc.

Process →

- Gather three clean, dry test tubes.
- Add 1-2 ml of the test solution, albumin, and deionized water to each test tube.
- Add 1-2 ml of Biruite reagent to each test tube.
- shake the solution.
- Let the solution gently
- Observe the colour change

(b) Ninhydrin test:-

Equipments:→ Test tube, spatula, warm water etc.

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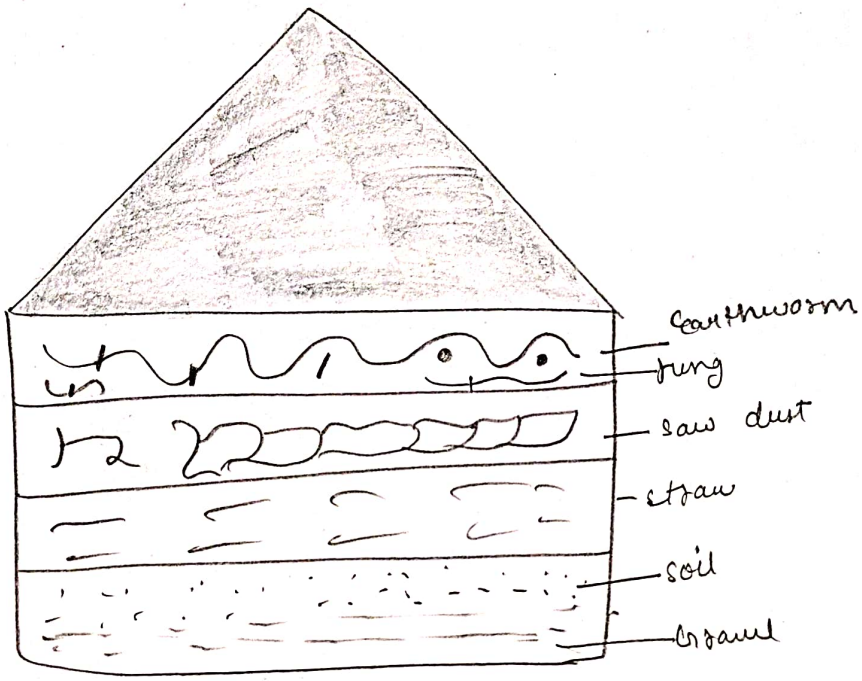
Process →

- Ninhydrin solution (dissolved in solvent like ethanol
- solution containing amino acids, peptides, or proteins.
- Deep blue or purple color.
- Detecting latent finger prints on porous surface.

Result →

A deep blue or purple which colour indicates presence of amino acids, peptides or protein.



Male Vermicompost

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Observation → Vermicompost preparation by earthworms.

Equipment → container, Bedding, worms, food waste, compost starter, scale, Gallon jug, Black plastic, Thatch roof.

Method → Vermicomposting is a method of making organic fertilizer using earthworms to decompose organic waste.

- Create a bed that is 6ft x2 ft x2 ft and add a layer of chopped dried leaves or grasses that is 15-20 Cm thick.
- Release 1500 - 2000 red earthworms on top of the bed.
- Sprinkler water on the bed immediately after adding the worms.
- Maintain moisture by Sprinkling water daily and Covering the bed with gunny bags or polythene.
- After 30 days, turn the bed to promote curation and decomposition.
- After 30 days, spread a 5 Cm layer of digested household organic waste on the compost.
- The compost will be ready in 45-50 days and will be 3/4 of the raw materials used.

Benefits of Vermicompost →

- offers more nutrients, vermicompost has highest value of nitrogen, potassium, and phosphate.
- No leaching
- zero soil pollution
- Improves soil Texture
- Takes less Space
- Ensure zero waste

Species for vermicompost ⟶

About 353 species of earth worms in India with various food and burrowing habits Eisenia fetidae Eudrilus eugeniae, Perionyx excavation are some of the species.

Result ⟶

The result of vermicompost preparation is a nutrient rich, dark, crumbly, and granular material that can be used to improve soil texture.

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Observation → Identifying real pearls and artificial pearl

Principle → Real pearls are cold to touch for the first couple of seconds before warming up against your skin. Fake plastic pearl have the same temperature as the room temp. and you don't feel the coolness when you touch them. Fake ones that are made of glass heads can be cool to touch to start with.

Pearl making → Pearls are formed when a mollusk, such as an oyster or mussel, secretes layers of nacre around an irritant that gets lodged in its shell.

(1) Irritant → A foreign object, such as a parasite or piece of sand, enters the mollusk's shell or body.

(2) Nacre secretion → The mollusk secretes layers of aragonite and conchiolin, which create nacre, also known as mother-of-pearl.

(3) Pearl formation → The nacre layers coat the irritant forming a pearl.

Uses → used to distinguish b/w real and artificial pearls. Some of single observation and testing is listed ~~is~~ in the table.

Symptoms	Real pearl	Artificial pearl
Investigation of minor irregularities	There are small irregularities and streaks on the surface	Look like pearls
Size	Takes less chances to round.	most are round.

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Shape	Tissue-nucleated fresh-water pearl are never spherically round - they usually have an off round shape	Artificial pearls can be made in a variety of shape, including spherical, drop & baroque.
Colour	Real pearls can be many colours, including white, silver, grey, cream, pink, purple, yellow or black.	Artificial pearls can be many colours including:- ruby red, pitch black, lime green, sapphire blue and royal purple.
Weight	The weight of a real pearl is usually measured in carats, grains or momme.	The weight of artificial pearl can depend on its size, a small artifical pearl (around 4 mm)
Hardness	Real pearls are very soft and have hardness of 2.5-4.5 on the Mohs Scale	with a hardness of 6.5-7 mohs & good toughness.
Size check	A real pearl is typically measured in millimeters	Artificial pearl typically range in size from 5mm to 12mm in diam.
Pigmentation test	Real pearl essentially refers to examining the natural colour variation.	Less shine and rough.
Brightness	Real pearl are known for their bright, clear luster, which is a result of the way light reflects and diffract off the pearls translucent layer.	Less shiny.

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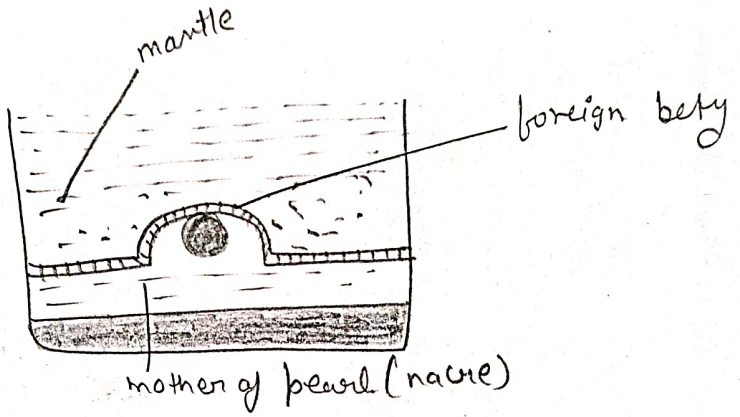
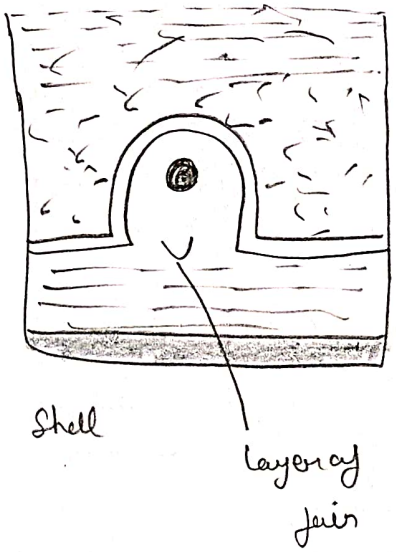
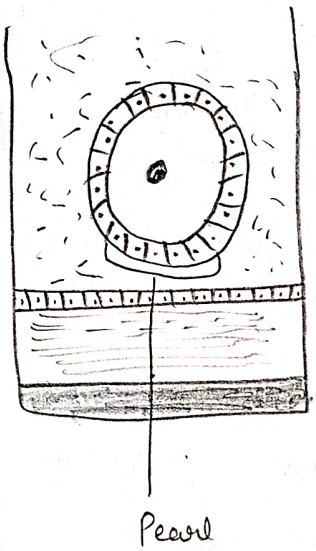

mantle
foreign body
mother of pearl (nacre)


Shell
layer of lair


Pearl

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Pearl dental test	Gently rub the pearl against the biting edge of your teeth feel rough.	Fake pearl will feel smooth. Gently rub the pearl against the biting edge of your teeth feel smooth.
Reform the rub test	when two natural pearls are rubbed together pearl powder is formed.	If there is pearl powder on the pearls and it is clearly visible then it can be told it is fake.
Sound	Real pearls, sound less "Hinny" than fake ones which tend to resonate more hollowly.	Fake pearls tend to sound more like a hollow bead due to their often plastic.

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Response of light to tribolium

Object → To study, response of light to tribolium.

Material Required → Small beaker with 20 tribolium, a rectangular container, paint brush, spirit level, table lamp.

Method →

- Release tribolium in centre of container.
- Place container straight & check accuracy with help of spirit level.
- Keep containely in dinlight & note distribution at interval of 4 hr
- Keep container in total darkness by covering it with black cloth.
- Note, movement of tribolium after 24 hrs.

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Observation ⟶ Study of Tribolium's Food Prefence

Materials → Tribolium insects, a small container for storing dry fruits, paintbrush, semolina, flour, wheat flour.

Procedure ⟶

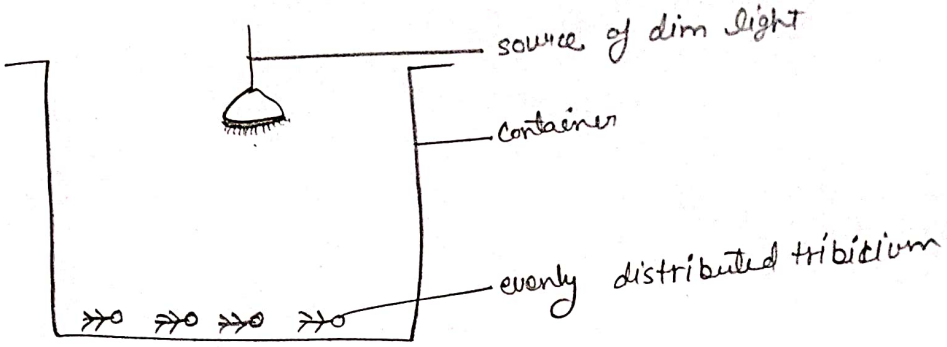
- Take a small container and divide it into four eaual parts (A, B, C and D)
- Place semolina in part A, flour in part B, wheat flour in part C, and wheat flour in part D.
- Carefully place a few Tribolium insects in each part using a paintbrush.
- close the container tightly to prevent the insects from escaping.
- leave the experiment for some time.
- After some time, count the number of insects in each food material. The food material with the highest number of insects will be their preferred food.

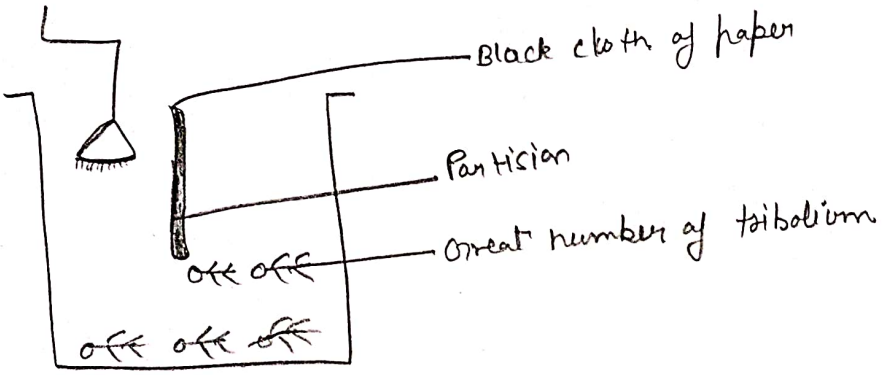
observation Table →

Food material	Number of Tribolium Insects
semolina	6
flour	8
wheat flour	4
wheat flour	2

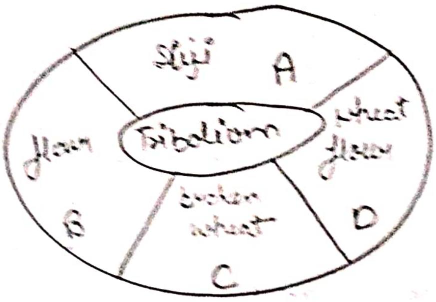
Result ⟶

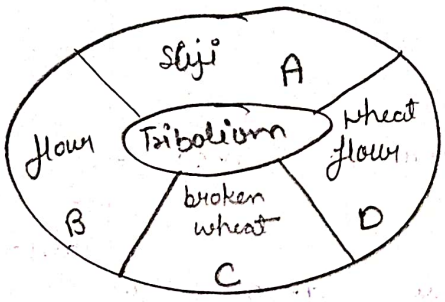
Tribolium insects prefer flour as their food, as the highest number of insects were found on it.





To study the light Response of tribolium


Suji
A
Tribolium
wheat flour
flour
B
broken wheat
C
D


Sooji
A
Flour
Tribolium
Wheat flour
B
broken wheat
D
C

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Ant Social Behavior

Objective → study of social behavior in ants and earthworms.

Materials → • A colony of ants can be obtained from potted plants in your garden.

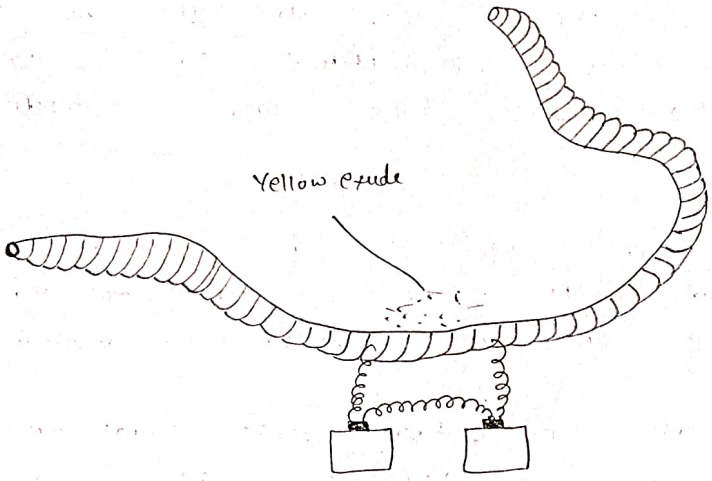
- Examine the plant that has not been watered for a long time, you may find a colony of ants.
- Filter the ants with a sieve and put them in plastic container.
- Take wooden boarder (2×1 feet) half an inch thick and cut it as shown in the figure. Part-B is straight and part-C is funnel shaped.
- This test area is connected to the plastic container so that ants can come this way.
- Provide very small colored beads in the funnel area.
- Cover the plastic container and the wooden test area with glass.

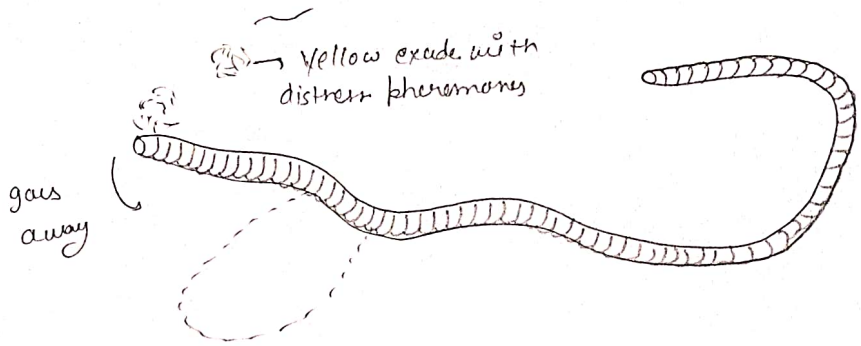
Method →

- After covering each ants with glass, observe the movement of ants from the plastic container to the wooden area patiently.
- observe how the ants themselves find the sugar and tell it to other ants. observe how ants carry sugar grains.
- observe how ants make a protective wall or nest using beads.

Result →

In the experiment, we saw that ants secrete pheromone, due to which other ants also move in the same direction as the intial ants went.





Mild current is given to earthworm → earthworm goes away from distress cheremons

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Introduction → Earthworms do not have eyes or ears, so they cannot receive visual or auditory stimuli. They can only use mechanical stimuli to a limited extent, but only when the worms are close to each other. However, earthworms rely most on chemical communication.

Meterial → forceps, paper towels, scissors, wax paper or polished tiles, a chain of wires connected to two D-size batteries, table salt, and a strong solution of water, live earthworms.

Method → First, cut strips of paper towels. Soak the earthworms in salt solution and arrange them in a square shape on a piece of wax paper. Then place two earthworms in the center of the square and observe their reaction to the wax paper and salt solution.

- Place another earthworm on the wax paper or tile and give it a slight shock with the wire from the two D-size batteries for short time.
- The shock will cause the earthworm to expel a yellow coelomic fluid from the grooves between its segments.
- Remove the earthworm and place another earthworm in this area and observe its reaction to the yellow fluid released by the first earthworm.

observation →

- when the earthworm is shocked, it releases a yellow fluid from its body.
- This fluid contains a chemical that attracts other earthworms.

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- When another earthworm comes in contact with this fluid, it moves towards the source of the fluid.
- This shows that earthworms use chemical communication to attract mates and find food.

Conclusion →

- Earthworms are social creatures that use chemical communication to interact colth each other.
- They release chemicals into the soil that attract other earthworms.
- These chemicals help earthworms to find mates, find food, and avoid predators.

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Objective → To study the cleaning of anntennae in cockroaches.

Material Required → Cockroach, chloroform, Brush, Vaseline

Introduction →

- Cockroaches have a pair of antennae that help them sense the environment and smell around them.
- Therefore, it is essential for the insect to keep these anntennae clean.
- In the laboratory, we study this by artificially dirtying the antennae.

Principle →

Cockroaches clean their antennae with their mouthparts.

Method →

- Catch a cockroach and carefully cut its wings so that it cannot fly.
- Apply vaseline on the feet of the cockroach the prevent it from moving around.
- Dip a brush in chloroform and apply it to the ~~ch~~ cockroach's antennae.

Observation →

We observe that the cockroaches bends its antennae and clans them with its mouthparts.

(i) Rhythmic movements of the mouthparts clean the antennae.
(ii) The head moves up and down.

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(3) The cockroach tries to bend its head towards the anntennae.
(4) The antennae get trapped in the angle formed by the tibia and tarsus and reach the mouthparts.
(5) The cockroach's legs become normal again.
(6) The antennae continuously move with the mouthparts and finally get cleaned completely.

Result →

- The cockroach continuously moves its antennae with its mouthparts and finally clean the antennae completely.

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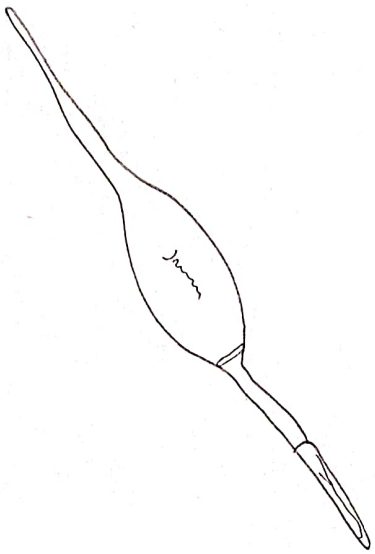

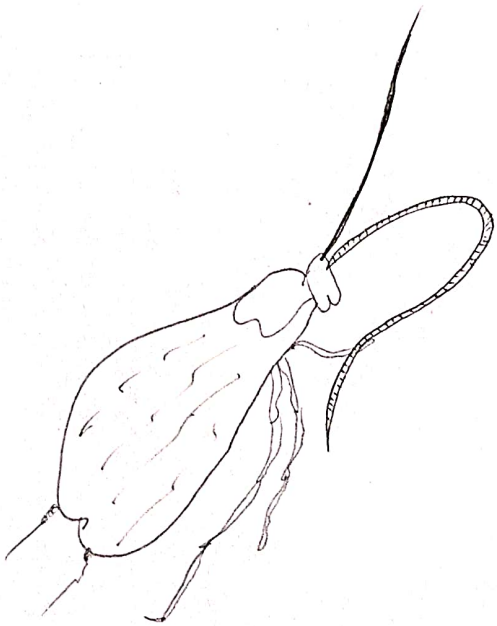

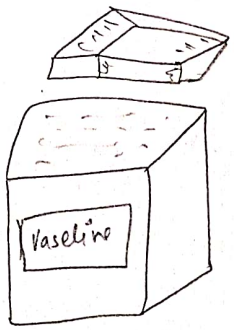

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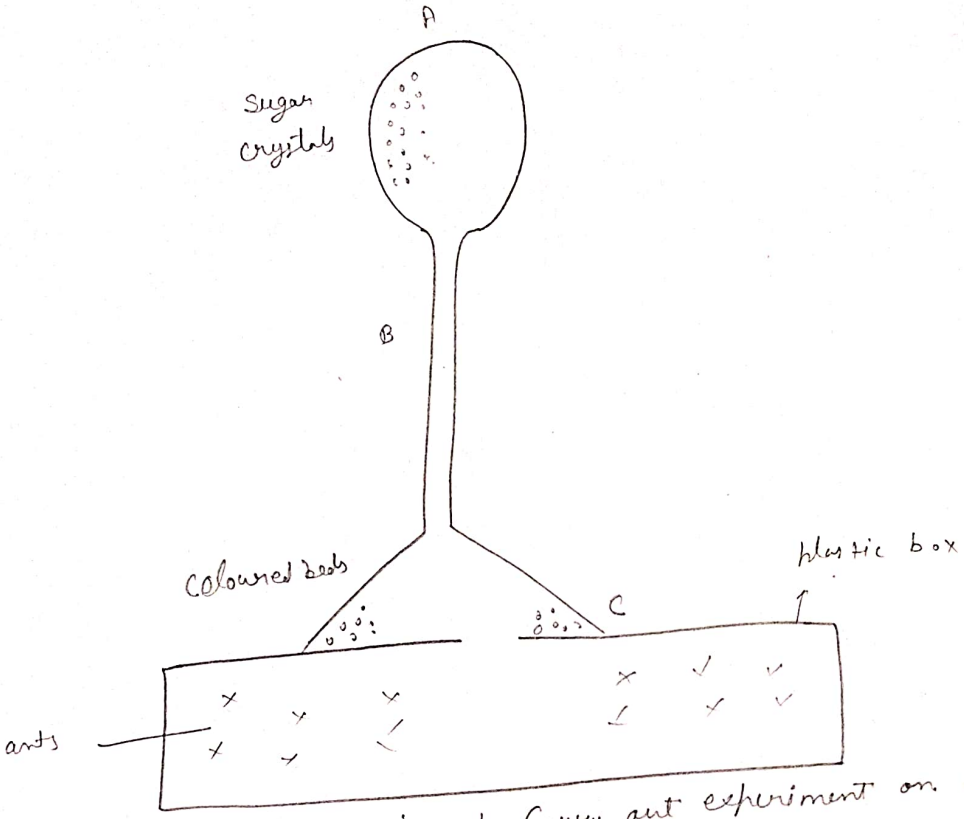
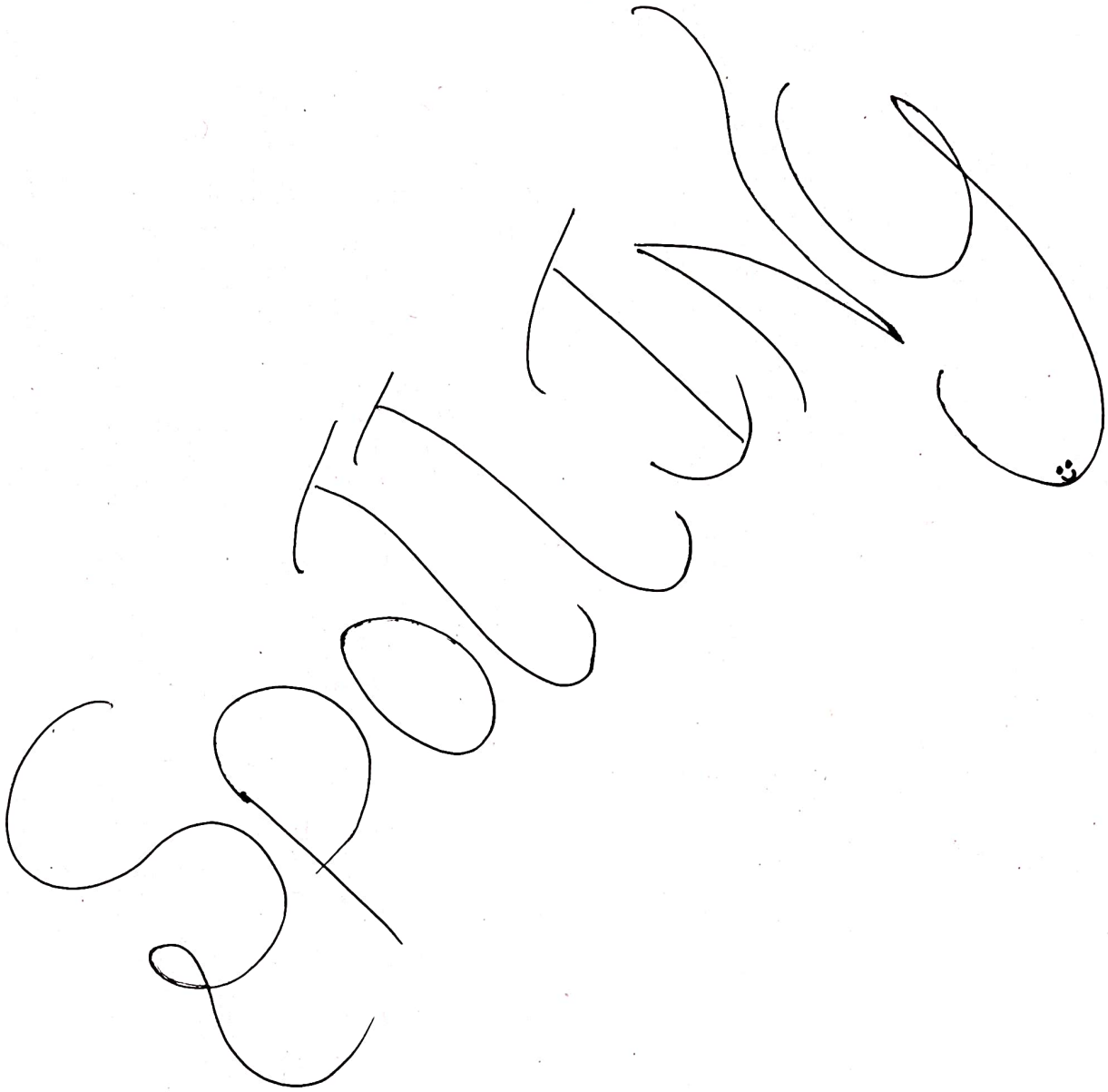
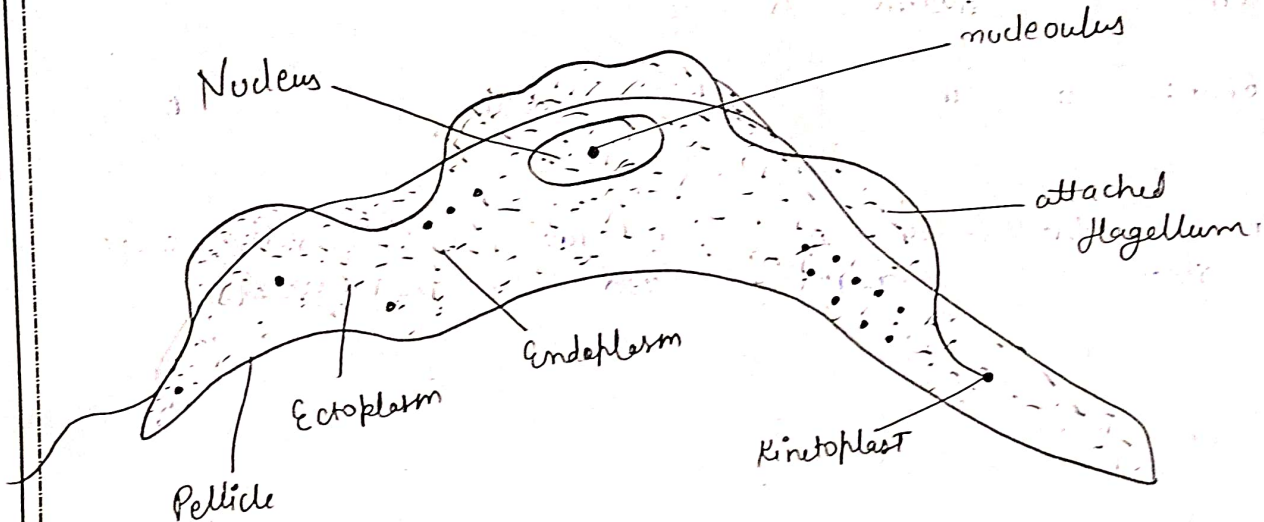


fabricated wooden design to Carry out experiment on ant behaviour





Trypanosoma

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Trypanosoma

character

- Trypanosoma are large, blade-shaped, and have a slender, tapering posterior end.
- Trypanosoma have a single, short flagellum that points anteriorly
- Trypanosoma can take up large amounts of fatty acids, such as palmitic and linoleic acid.
- In a micronutrients, such as thiamine, folic acid, riboflavin, cobalamin, ascorbic acid and nicotinamide.

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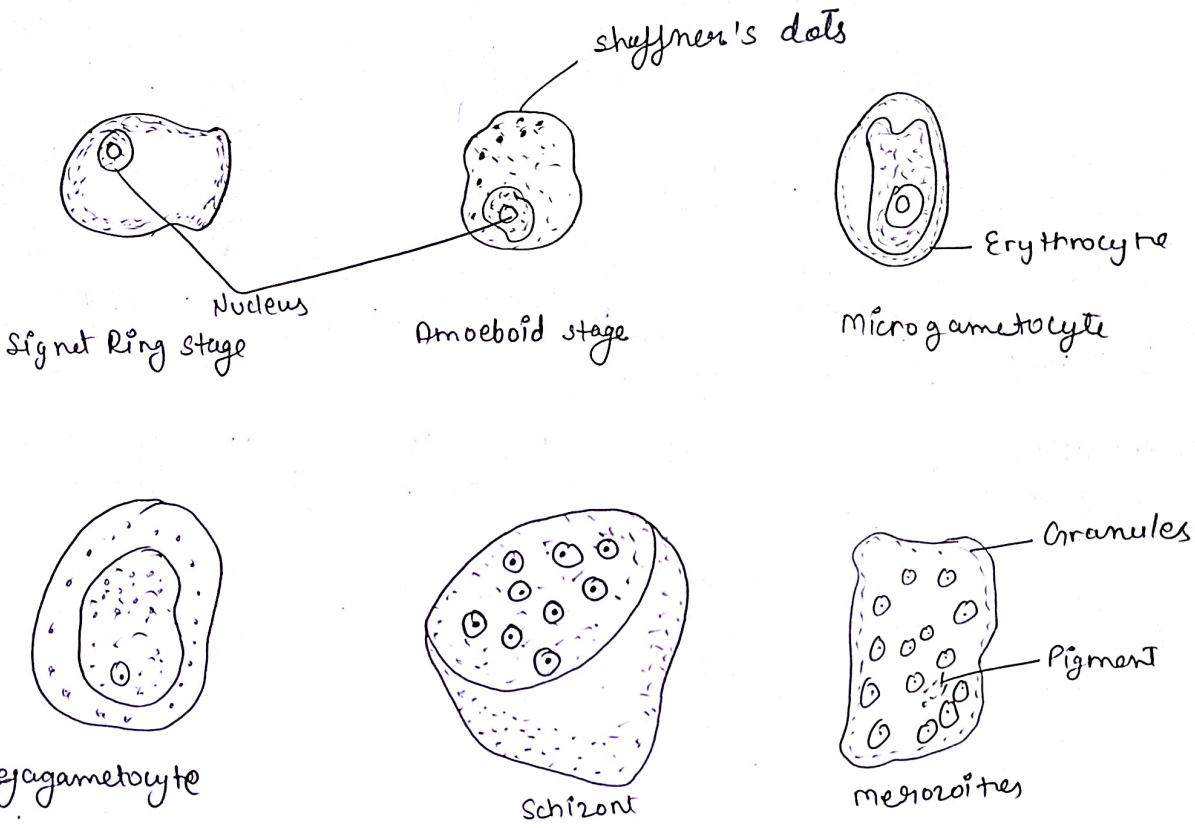
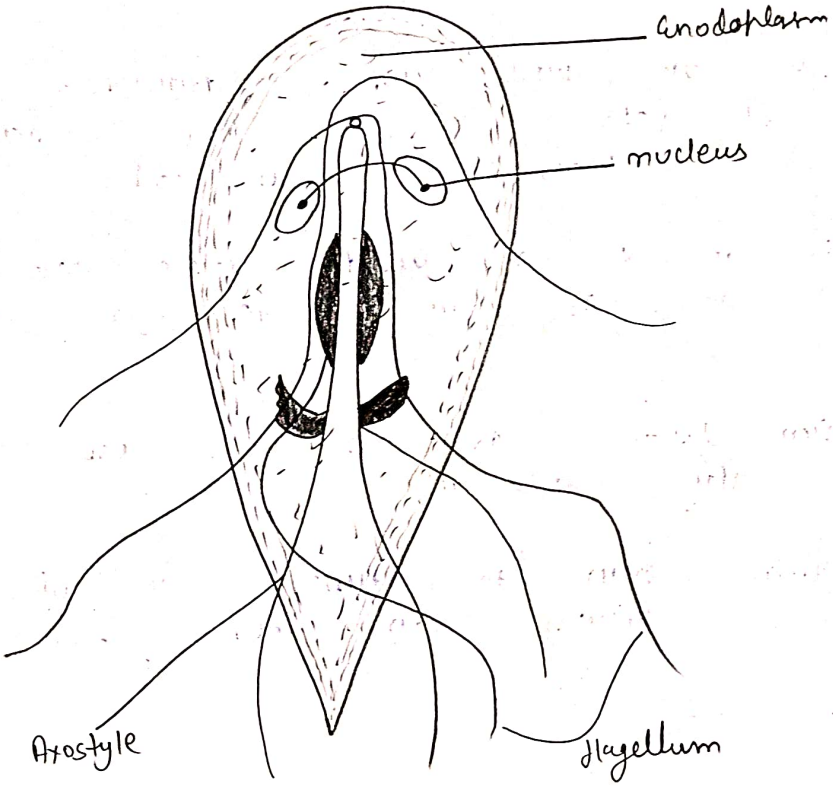
Plasmodium

- Plasmodium is an endoparasite that lives in red blood cells.
- Plasmodium is usually diagonosed in the "signet ring" stage, when it appears as a round body with a large Vacuole inside.
- Plasmodium has several organelles, including rhoptries, microemes, dense granules, mitochondria, and apicoplasts.
- Some species of Plasmodium that Cause malaria include P. flaciparum, P. ovale, P. malariae, and P. vivax.


Schuffner's dots
Nucleus
Signet Ring stage
Amoeboid stage
Erythrocyte
Microgametocyte
Megagametocyte
Schizont
Granules
Pigment
Merozoites

Plasmodium



Giardia

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Giardia

- Giardia has two oval-shaped nuclei, each about 1 micrometer in diameter, located in the anterior half of the cell.
- Giardia has a unique ventral disk that covers the anterior half of the ventral side of the trophozoite.
- Giardia can form cysts, which allow the parasite to survive outside the host.
- Giardia lacks organelles typical of higher eukaryotes, like mitochondria, peroxisomes, and a Golgi apparatus.

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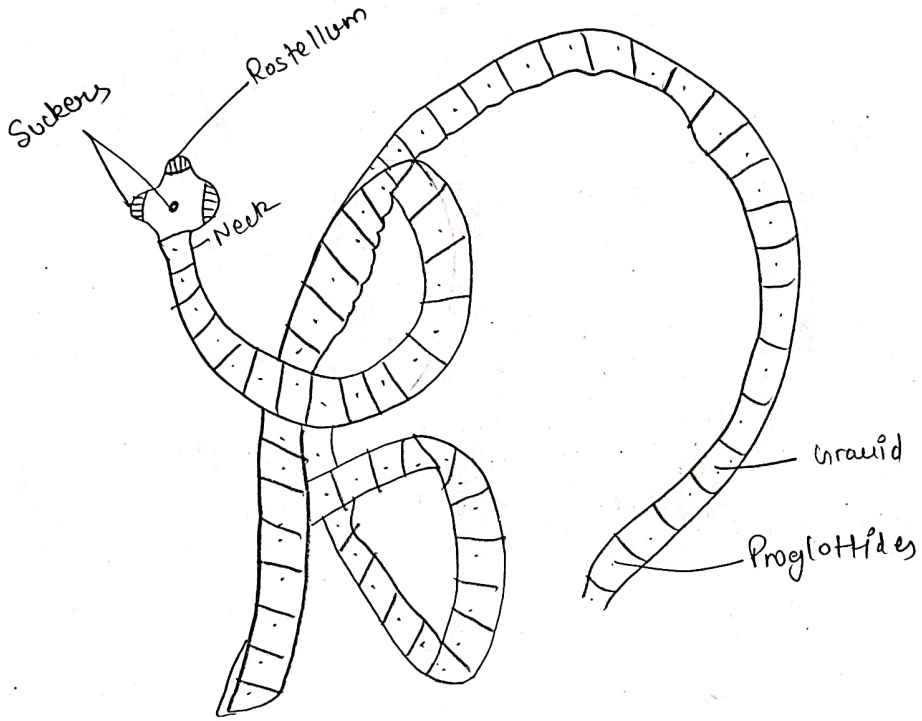
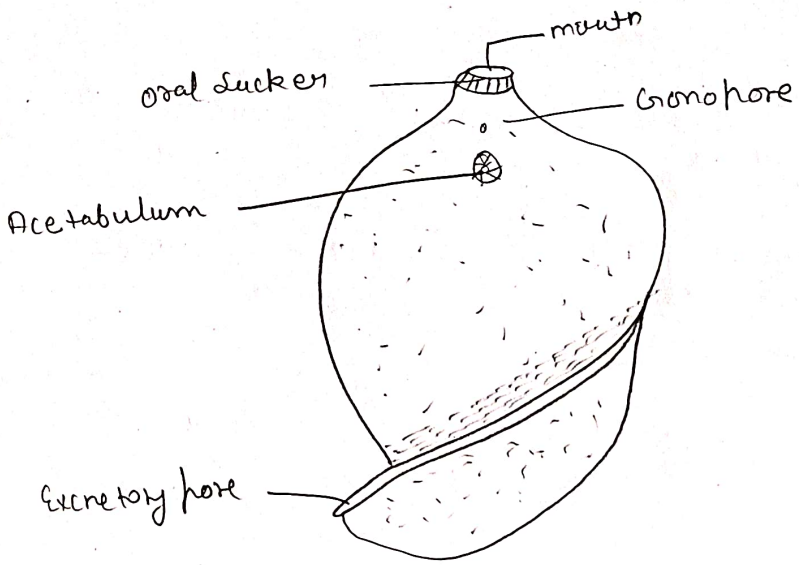
Taenia

- Taenia tapeworms can grow to be 2-8 meters long, but their scolex is only 1-2 millimetres in diameter.
- Taenia tapeworms have a ribbon-like strobila made up of many segments called proglottids.
- Taenia eggs are spherical, 30-48 micrometers in diameter, and have a thick striated wall.
- Taenia tapeworms have three developmental stage → egg, larvae and adults.



Taenia



Fasciola hepatica

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fasciola hepatica

- Adult flukes are large, measuring up to 30 mm long and 15 mm wide.
- The fluke has highly branches testes and intestinal caeca, a short convoluted uterus, and oral ventral suckers of equal size.
- The fluke has a pair of nerve ganlia on either side of the esophagus, connected by a nerve ring.
- The fluke has an indirect life cycle, with aserual reproduction in a snail.

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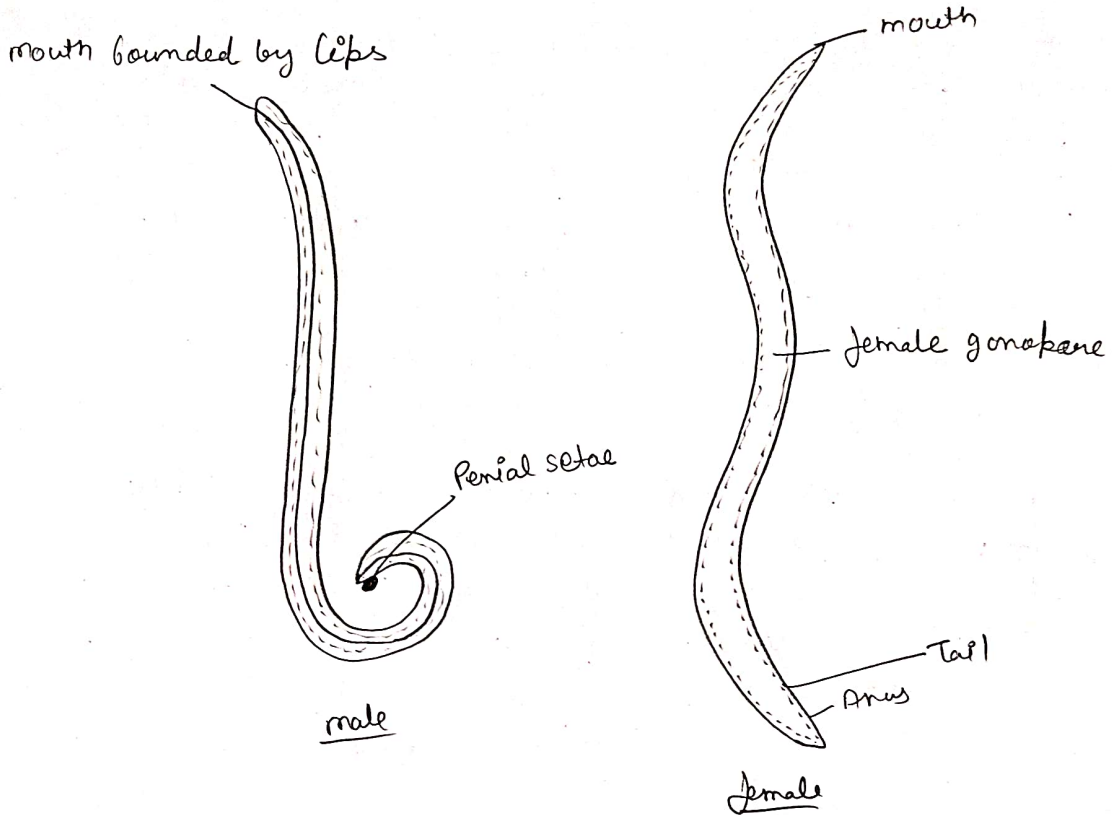
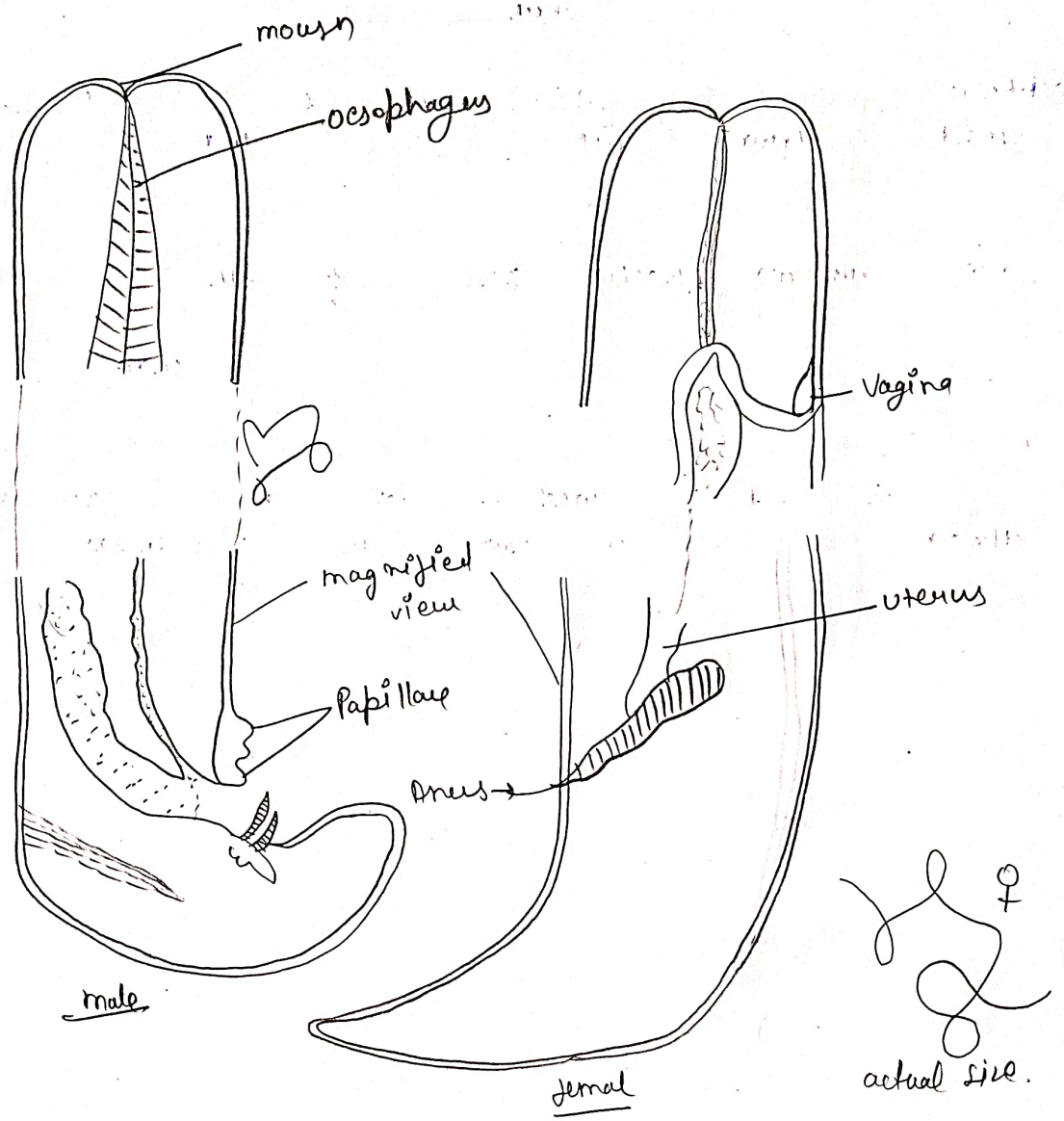
Ascaricis

- Ascaris lumbricoides are large roundworms, with females measuring 20-35 cm long and males measuring 15-31 cm long.
- Ascaris worms have a long, cylindrical body that tapers at both ends.
- The posterior end of the female is straight, while the male's curved.
- Ascaris worms have a non-cellular, highly resistant cover called a cuticle that helps them not get digested in the stomach.


mouth bounded by lips
Penial setae
male
mouth
female gonopore
Tail
Anus
female

Ascaris


mouth
oesophagus
Vagina
magnified view
uterus
Papillae
Anus
male
female
actual size.

Vaucheria

Date
Page

Vaucheria

- Vaucheria is a filamentous algae that forms mats that look like felt.
- It has branched or unbranched filaments that are multinucleate and tubular.
- Vaucheria has a thin outer wall made of pectin and inner layer of cellulose.
- It has a central vacuole in the center of the filament, and a protoplast between the cell the vacuole.

Date
Page

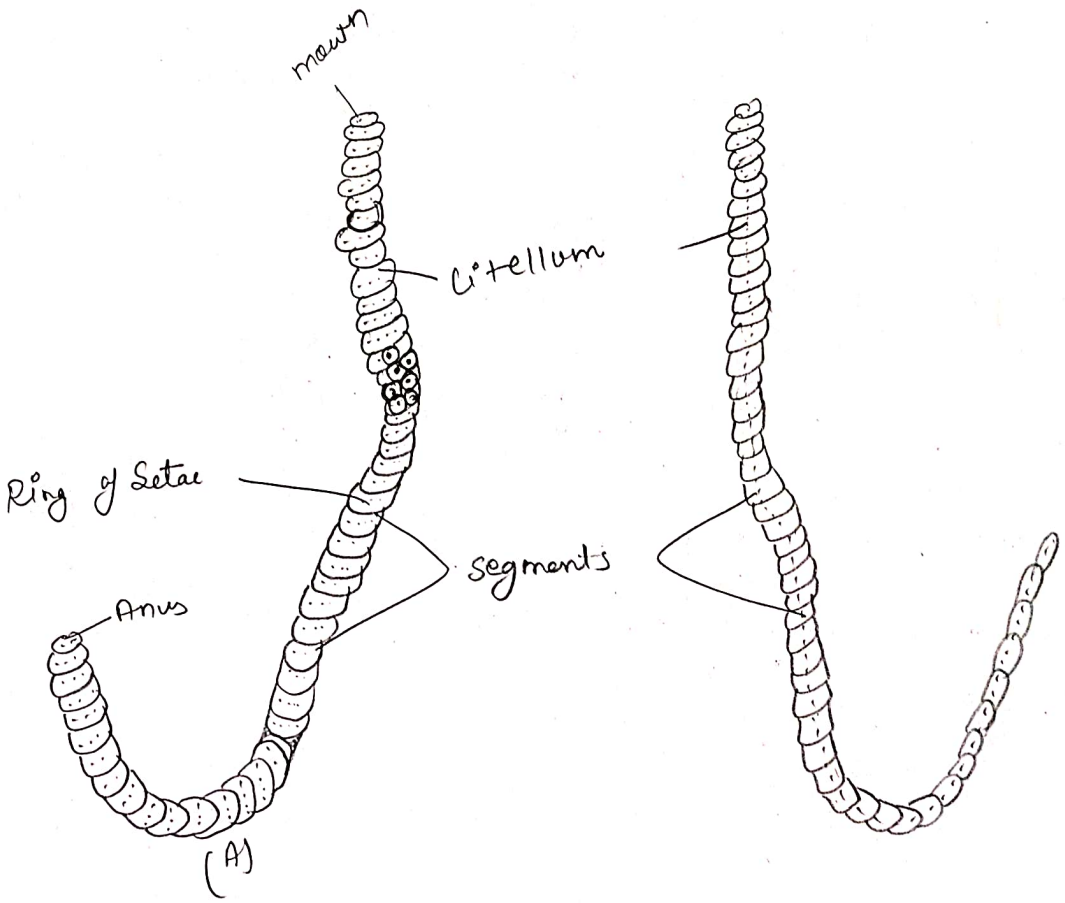
Earthworm

Earthworm has a long, cylindrical, segmented body that is usually reddish-brown in color.

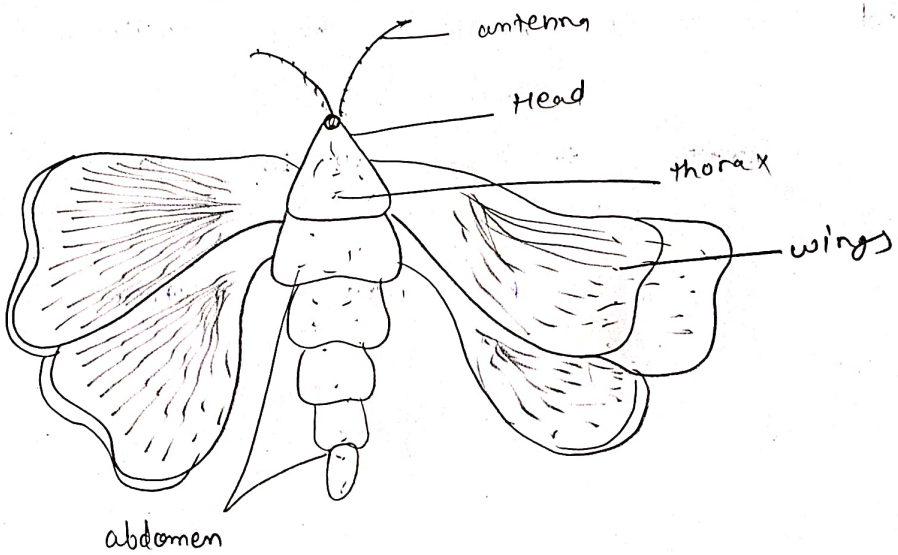
Earthworm have a fluid-filled coelom that acts as a hydrostatic skeleton to maintain their structure.

Earthworm have a central nervous system with two ganglia above their mouth, connected to an axial nerve that runs the length of their body.

Earthworm are sensible to light and touch, but they don't have eyes or ears.



Earthworm



Bombyx Mori

Date
Page

Bombax Mory

- The adult silkworm has a wingspan of about 2 inches and a thick, bristly body.
- The silkworm is typically blond to light brown with thin dark bands across its body.
- The female silkworm secretes pheromones from a gland on the tip of her abdomen.
- The male silkworm respons with a "flutter dance" to find the female.

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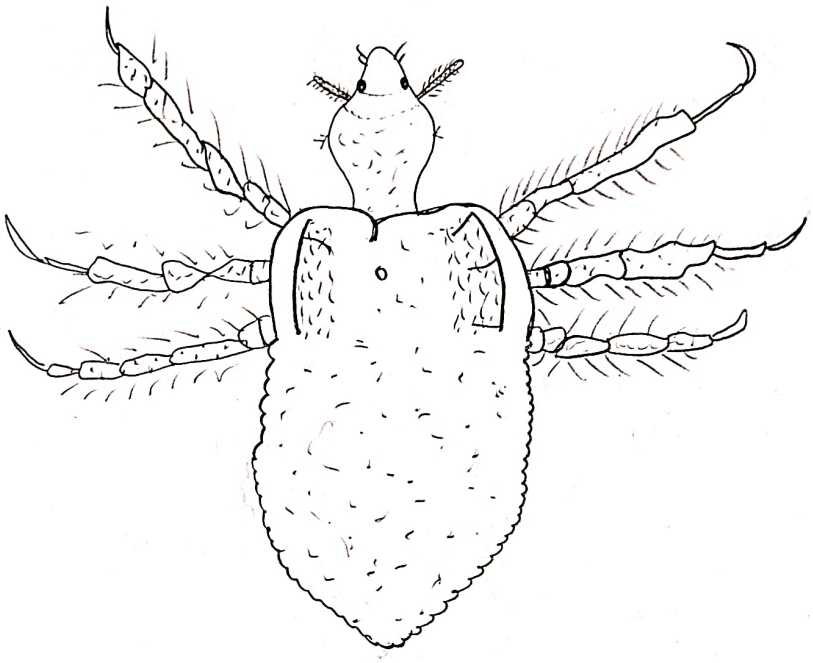
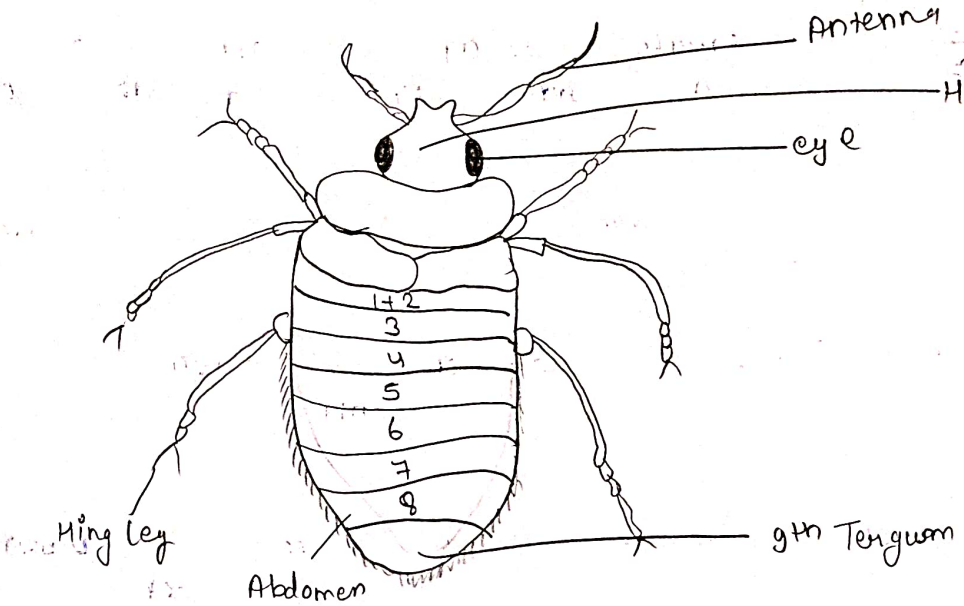
Page

Pediculus

- Have an elongated body, narrow mouthparts, and are smaller and darker than body lice.
- Have a similar appearance to head lice, but ~~by~~ lay their eggs on clothing fibers.
- They have longer antennae than head lice, and longitudinal muscles on their ventral body wall.
- They have raptorial claws on their middle and hind legs that are larger than the claws on their first pair of legs



Pediculus



Bed bug

Date
Page

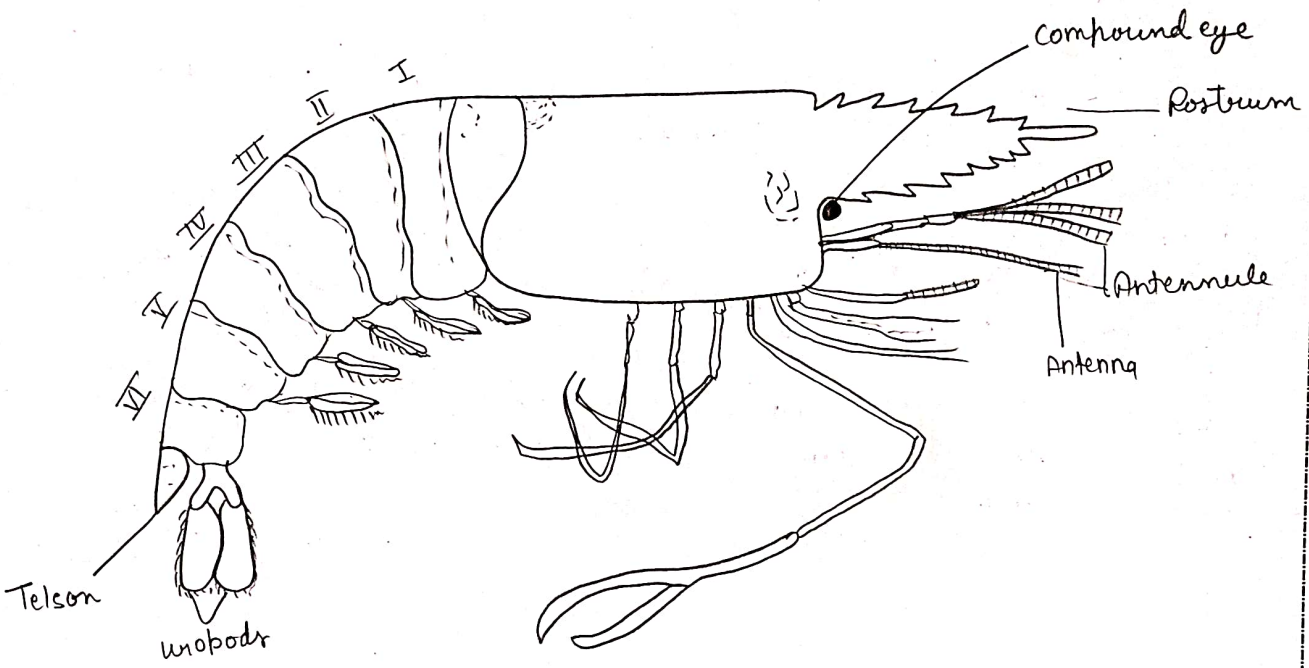
Bed Bug

- Bed bug are small, wingless insects that are about half a centimeter long and have a flat, oval-shaped body.
- Bed bug can survive for months without feeding, and can quickly reproduce.
- Bed bugs leave behind dark brown or rust-colored stains on mattresses, bed sheets, and other materials.
- Their excrement is a liquid that can bead up or be absorbed by the material.

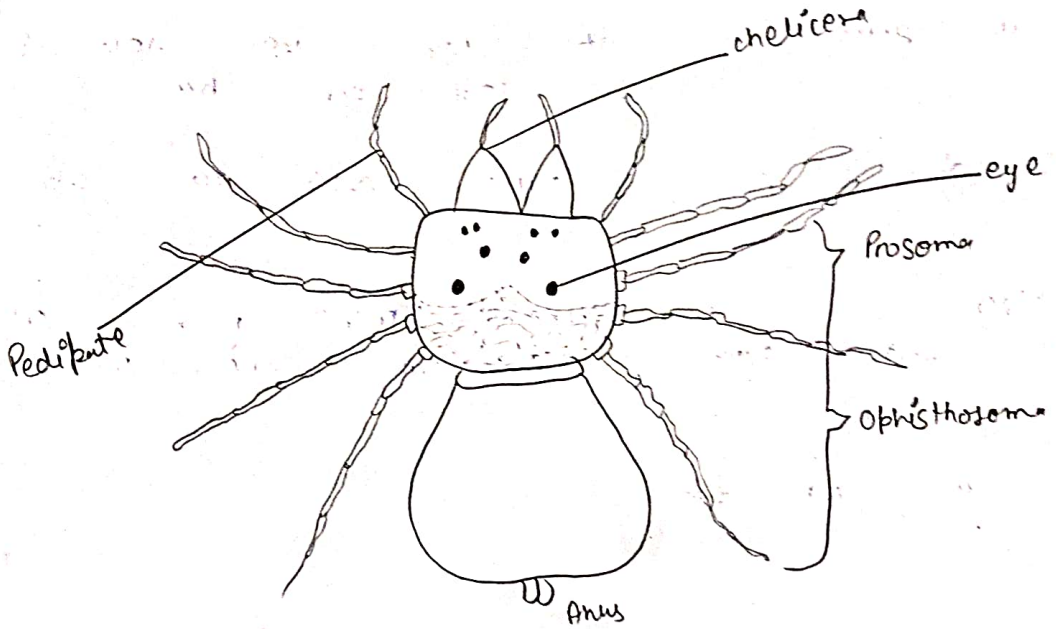
Date
Page

Prawn / Palaemon

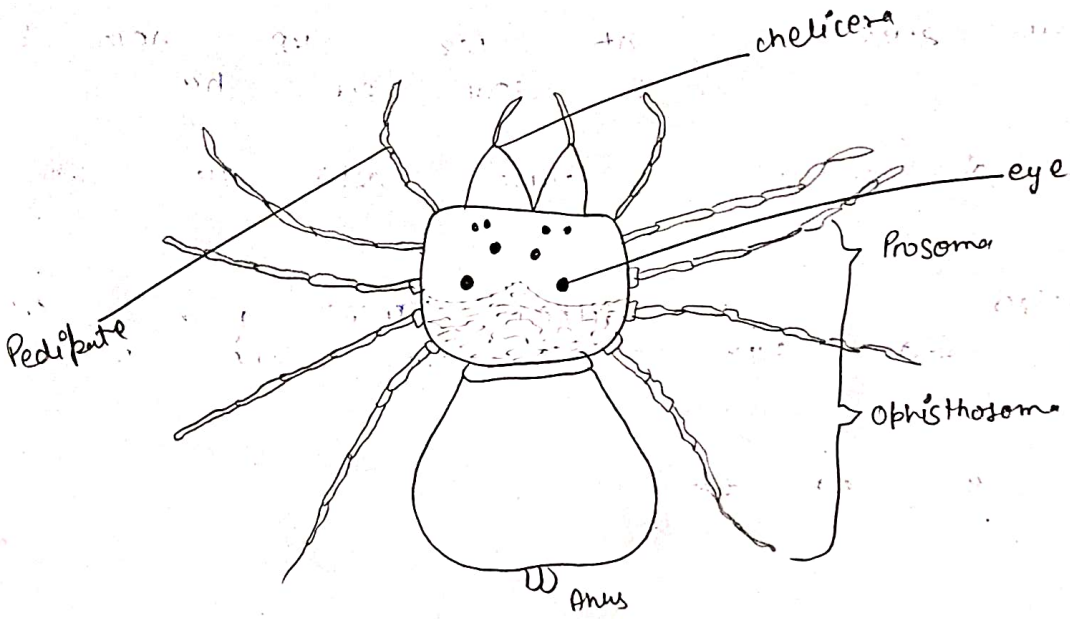
- Prawn are usually 10-20 centimeters long, with a shorter tail than other crustaceans.
- Prawn can be many colors, including brown, gray, pink and white.
- Prawns have five pairs of swimming legs and five pairs of walking legs, three of which have claws
- Prawns live in sandy and rocky habitats in the oceans, from the intertidal zone to 400 meters deep.


compound eye
Rostrum
Antennule
Antenna
I
II
III
IV
V
VI
Telson
Uropods

Prawn



Spider



Spider

Date
Page

Spider

- Spiders are predators with eight legs and six or eight eyes, depending on the species.
- They are known for spinning webs to trap their prey.
- Sensory palps used for sperm transfer, prey manipulation, and detecting smells and vibrations.
- One to two pairs of book-lungs on the underside of the abdomen.

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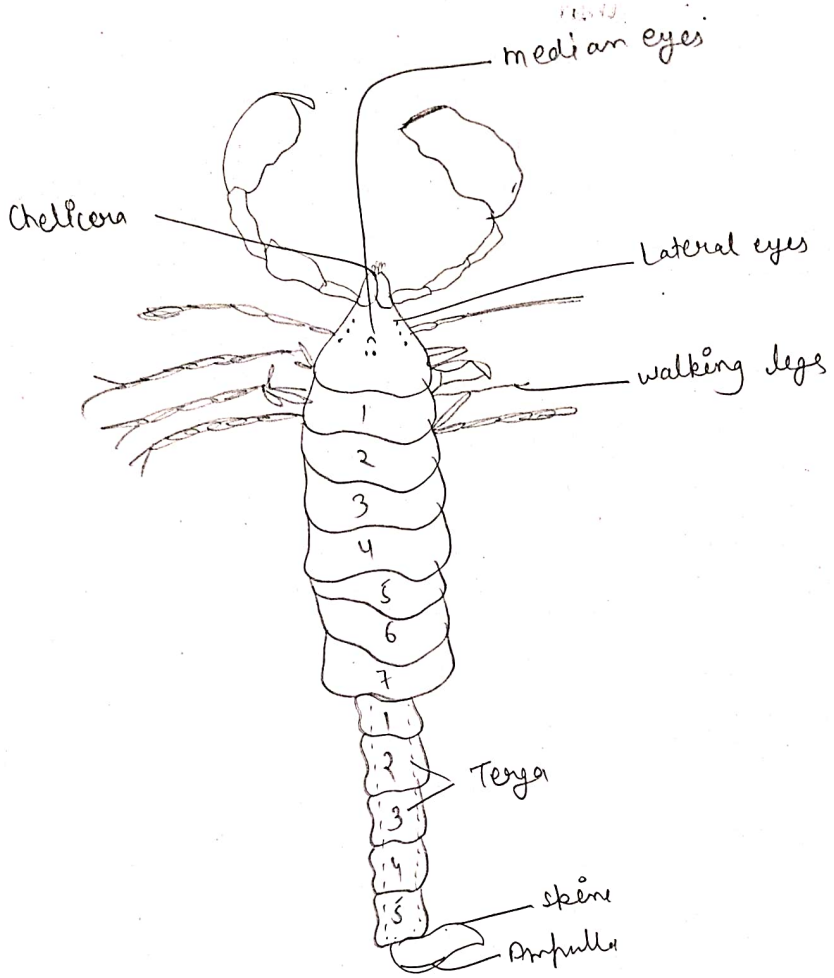
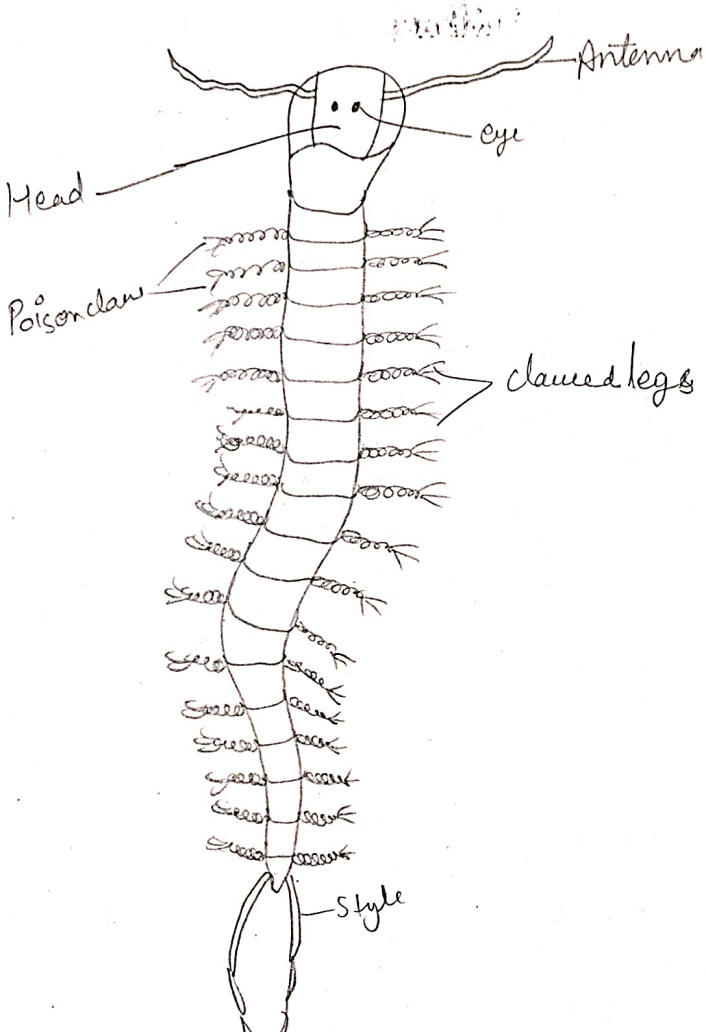
Scorpian

- Scorpios are said to be mysterious, intense, and passionate people.
- They are also known for being intuitive, loyal, and hard-working.
- Some say that Scorpios are magnetic and alluring, and that they are excellent Conversationalists.
- Scorpian is a ninja character in the Mortal Kombat fighting game franchise.


median eyes
Chelicera
Lateral eyes
walking legs
1
2
3
4
5
6
7
1
2
3
4
5
Tergo
spine

Scorpion.



Centipede

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Centipede

- Scolopendra can be very large, with some tropical species growing to over 12 in.
- Scolopendra have hundreads of legs, but most species have 21 pair.
- Scolopendra have modified legs on their first body segment, called forcipoles, that they use to inject venom into their prey.
- Scolopendra primarily eat arachnids like spiders, scorpions, and vinegaroons.

Date
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Ear wing

- Earwings are elongated insects with flattened or cylindrical bodies,
- It included yellow, brown, orange, reddish brown, dark brown, and black Colour.
- The earwings varies from 5 to 50 m m.
- This nocturnal insect is usually herbivorous.

Date
Page

Ear wing

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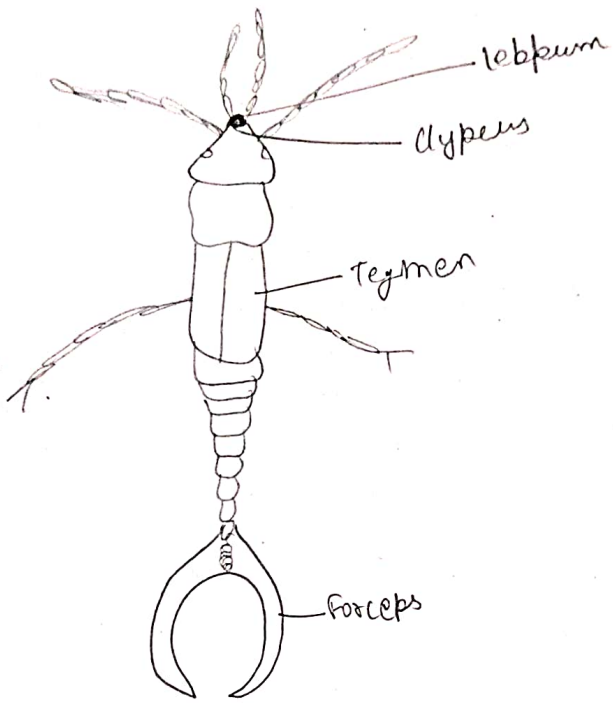
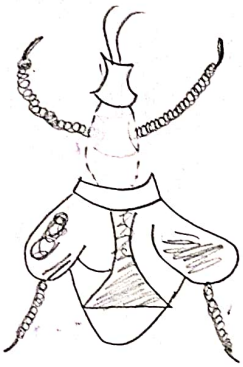
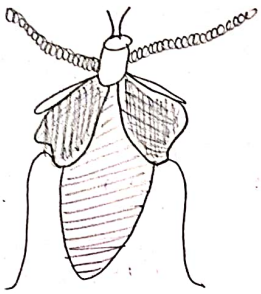


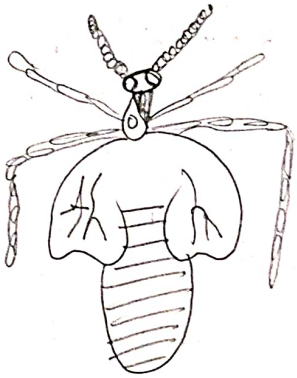
EAR WIG



WORKER



QUEEN



DRONE

APIS

Date
Page

Apis [Honey Bee]

- A Honey bee colony has three Categories:-
  1) Queen
  2) Drones
  3) worker bee
- The queen is the only fertile female and lays eggs, while the drones are male and the workers are sterile females
- Honey bee use chemical cues Called pheromones to Communicate with each other and manage the colony.
- Honey bee are dark brown on the head and thorax, with alternating red - brown and black bands on the abdomen.

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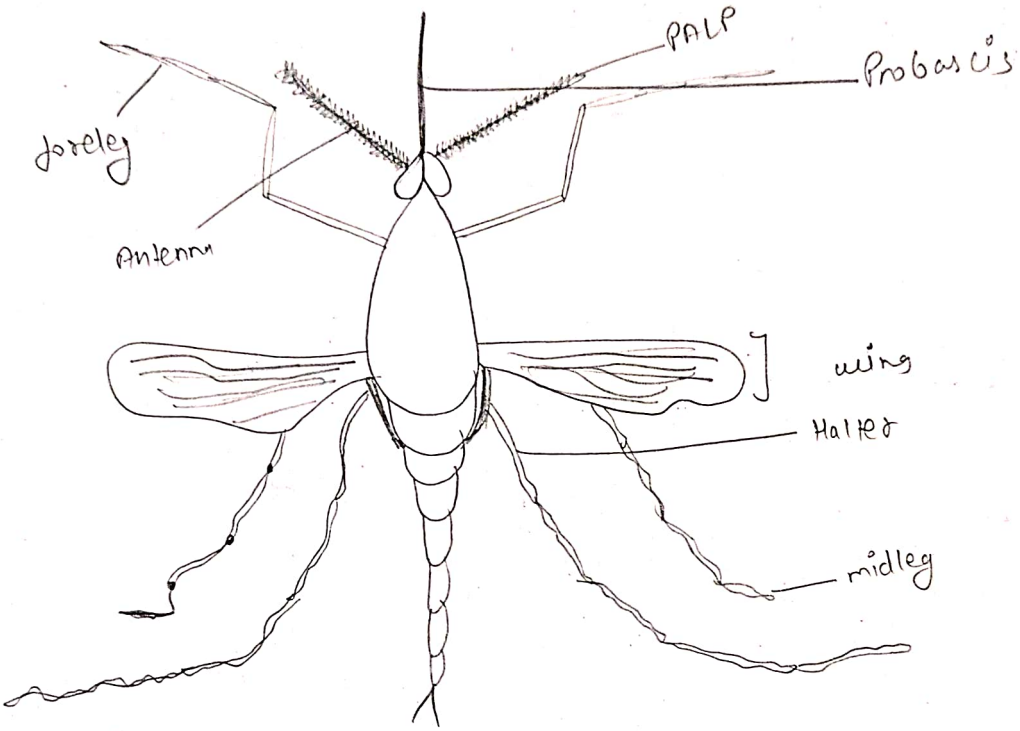
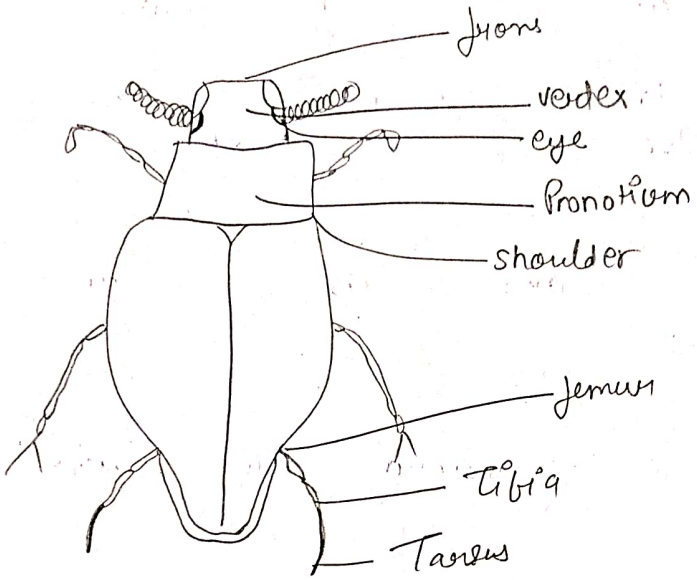
Mosquite

- Mosquitoes have a narrow body with a small head, thin legs, and body, thin wings,
- Mosquitoes have a long, slender mouthpart called a proboscis that they use to feed on blood or nectar.
- Some species of mosquitoes have distinctive markings on their bodies or wings that help identify them.
- In most species, female mosquitoes need the proteins from blood meals to mature their eggs.



Mosquito



TRIBOLIUM

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Page

Tribolium

- Adults are small reddish brown beetle and are about 4 mm long.
- Adults are easily confused with other Tribolium species. Larvae are whitish with brown bands.
- Adult Tribolium are beetles 3-6 mm long and with colours ranging from reddish-brown to black.
- This insects has a world wide distribution and is very abudant in the united states.

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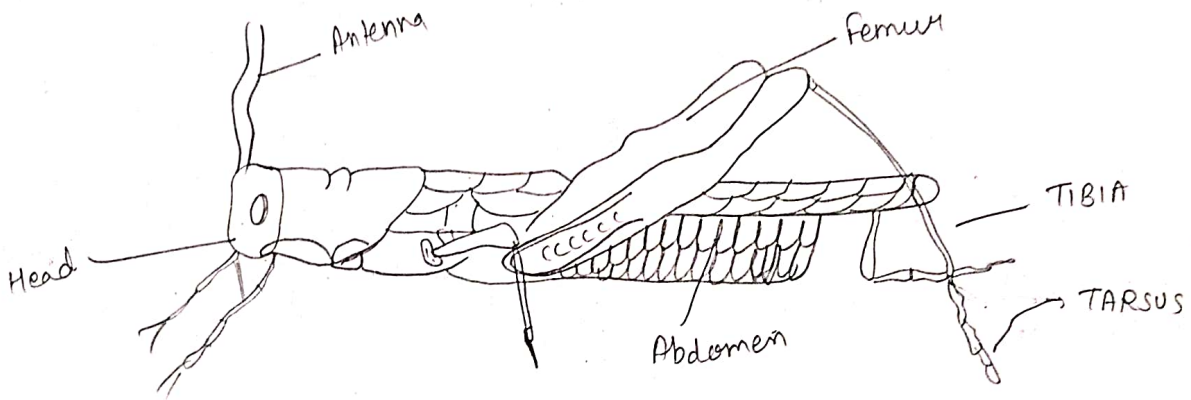
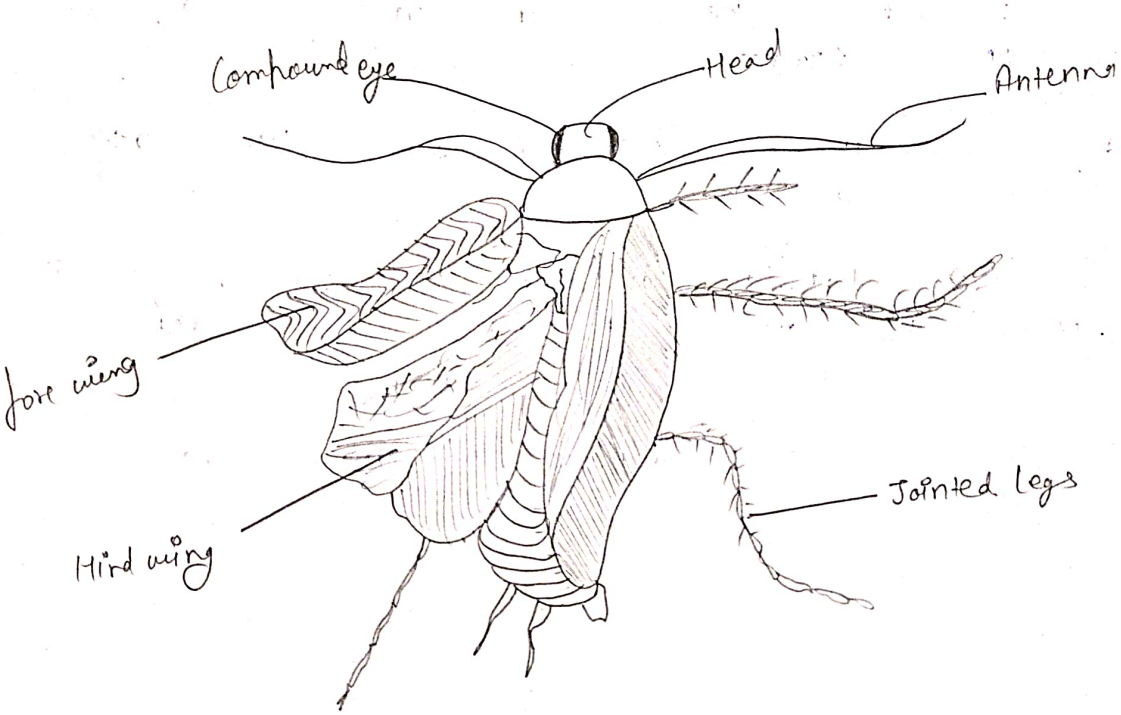
Grasshopper

- Grasshopper are medium to large insects, ranging from 1 to 7 cm in length.
- Grasshopper have a basic insect body with a head, thorax, and abdomen.
- They have a rigid cuticle made of overlapping plates, and their abdomen has 11 segments.
- Grasshopper have a pair of compound eyes that give them all-around vision.



GRASSHOPPER



COCKROACH

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Page

Cockroach

- Cockroaches have oval-shaped, flattened bodies that are divided into three section :- the head, thorax and abdomen.
- Cockroaches can range in size from 1/4 inches to 3 inches.
- Cockroaches are usually brown or black, but some species can be green or have distinctive markings.
- Cockroaches have large compound eyes, but cave-dwelling species may have reduced or absent eyes.

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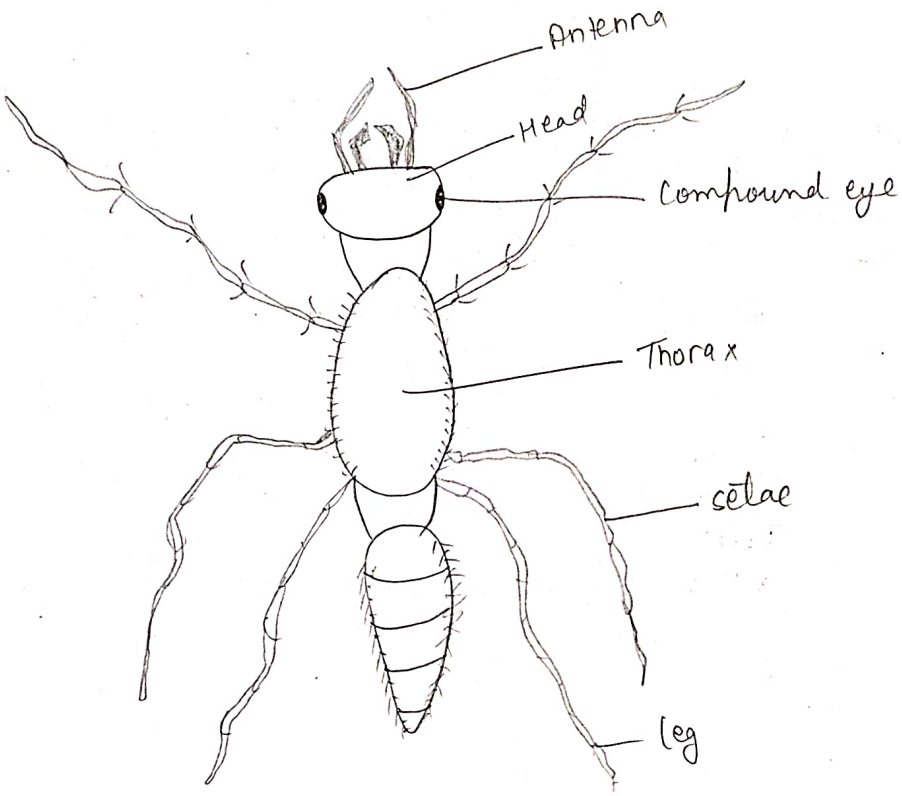
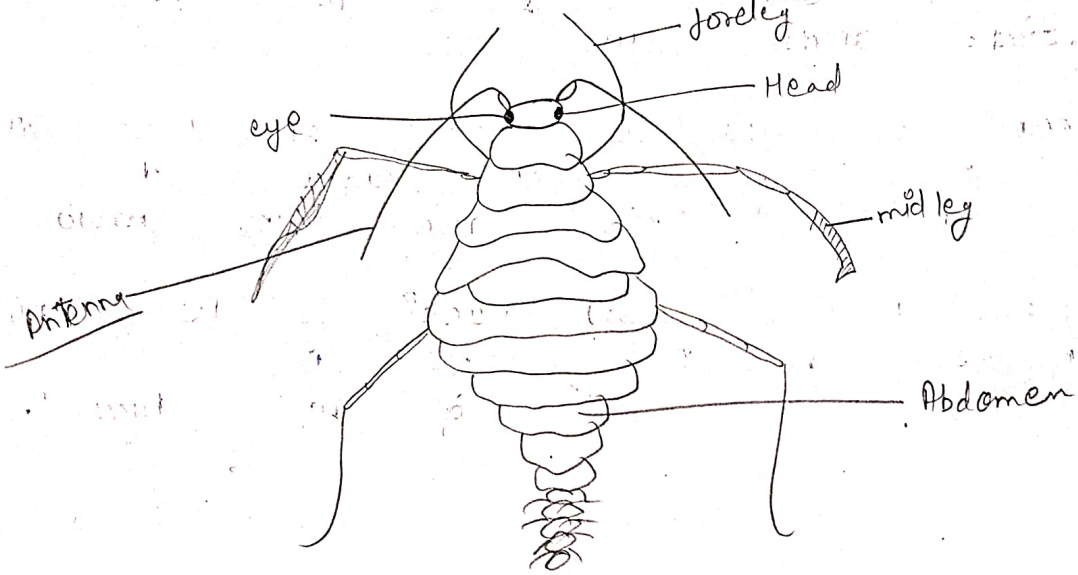
Page

Ants

- Formica rufa, also known as the red wood ant, Southern wood ant, or horse ant, is a boreal member of the formica rufa group of ants, and is the type species for that group, being described already by Linnaeus.
- The F. rufa is widely distributed in Coniferous forests within the temperate zone.
- It has beneficial effects on ecosystem processes and other organisms.



ANT



APHID

Date
Page

Aphid

- Aphids, also known as plant lice are soft-bodies, sucking insects.
- They feed on plants sap and excrete a sugary honeydew that attracts ants and creates the conditions for sooty mold.
- Any of a group of sap-sucking, soft-bodied insects that are about the size of a pinheads, most species of which have a pair of tubelike projections on the abdomen

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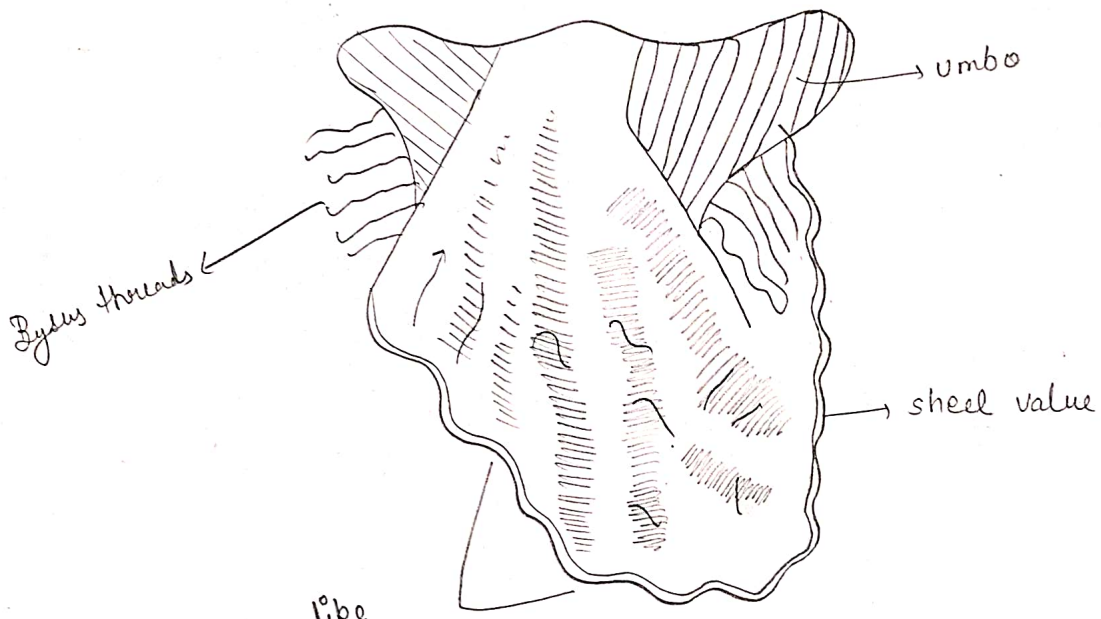
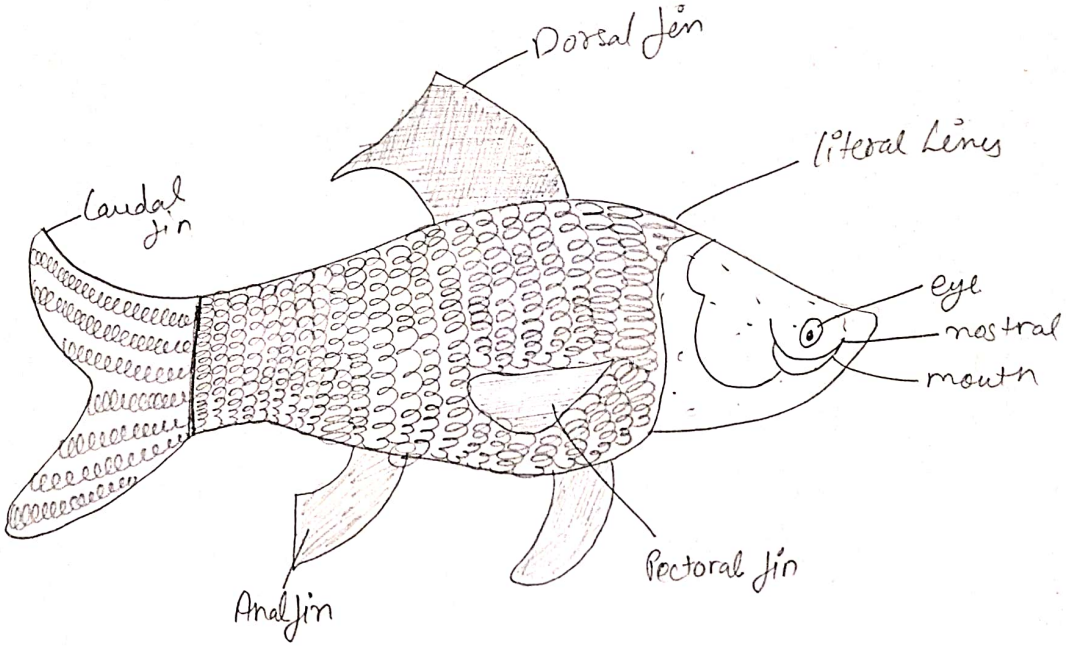
Pearl Oyster

- The shell of a pearl oyster is typically dark grayish-brown with white spots.
- The shell is made up of two valves, with the upper valve being convex and the lower valve being flat and larger.
- The shell of inner layer of a pearl oyster is made up of nacre, also known as "mother of pearl".



Pearls Oysters


Dorsal fin
Lateral Lines
Caudal fin
eye
nostral
mouth
Anal fin
Pectoral fin

Labeo

Date
Page

Labeo

- Labeo fish are a group of freshwater fish from Asia and Africa that are known for their thick lips and sucking mouths.
- Labeo fish have a spindle-shaped body, thick lips, and a pronounced rostral cap that covers the upper lip.
- They have a depressed head with a short, blunt snout, and paired eyes and nostrils.

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Page_____

Date
Page

Q.1 Exercise based on the study of the qualitative analysis of Honey.

Q.2 Exercise based on, To study of Vermicomposting.

Q.3 Ethology - study of any stored Insect pest (food preference and response to light)

Q.4 Spotting (8 spots)

(1) Silk mouth
(2) Earthworm
(3) Honey bee
(4) Cockroach
(5) Taenia solium
(6) Fasciola
(7) Ascaris
(8) Vaucheria

Date
Page

objective → checking the purity of honey.

Essential equipment → honey sample, lighter, Matchbox, Tissue paper, beaker, sticks

1) Flame test →
- Dip a dry match or cotton wick into the honey.
- Shake off any excess honey.
- Try to light the match or wick with a lighter.

2) Dissolving test →
- Fill a glass with water :- use a clear glass and fill it with room temp.
- Add a spoonful of honey :- Carefully drops a tablespoon of honey into the glass.
- observe :- without stirring, watch how the honey behaves in the water

3) Swirl test →
- A glass of water and a spoon.
- Place a spoonful of honey into the glass of water.
- Gently swirl the water in the glass, observing how the honey behaves

4) Vinegar test →
- A small glass, a teaspoon of honey, a few drops of vinegar and water.
- Put a tablespoon of honey into the glass and add a small of amount
- of water. Carefully add a few drops of vinegar to the mixture.
- Gently stir and observe if any foaming or bubbling.

5) Thumb test → • Put a tiny amount of honey on your thumb.
- watch how the honey behaves on your thumb.
- If the honey stays in place and feel thick it is likely pure.
- If the honey quickly spread or runs off it may be impure.

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Page

observation → Analysing the chemical components of honey packets.

Experiment to detect the presence of Carbohydrates →

(a) Molish test → Test tube, molishs reagent, pipette → Equipments

Process →

- Add 2 ml of the sample to a test tube
- Add 2-3 drops of molischis reagent to the sample & mix
- Slowly add 1 ml of concentrated sulfuric acid down the side of the test tube, without mixing.
- Observe for a purple or purplish - red ring at the interface between the acid and test layers

(b) Benedicts test :- Equipments → Test tube, pipette, Tripod and Bunsen burner, wire gauze, 500 ml beaker, plate ~~Equ~~

Process →

- Add 1 milliliter of the sample solution to a clean test tube.
- Add 2 milliliter of Benedicts reagent to the test tube.
- Heat the test tube in a boiling water bath or directly over a flame for 3-5 minutes.
- Observe the colour change.

(c) Barfoed's test :-
Equipments → Test tube, heat source, a dropper, pipette.

Process →

- Dissolve copper acetate in a dilute acetic acid solution.
- Place a few drops of the test solution in a clean test tube.
- Add an equal volume of Barfoed's reagent to the test soln

- Heat the mixture in a boiling water bath for few minutes(3)

(d) Seliwanoff's Test:-
Equipments :→ Anne, a basket, a box and a small object.

Process →
- Take a small volume of the test solution in a clean test tube.
- Add a few drops of seliwanoff's reagent.
- Place the test tube in boiling water bath.
- A rapid development of a deep cherry red colour indicates a positive result.
- Run a parallel test with a known ketose solution as a positive control.

Experiment to detect the process in presence of protein:-

(a) Burette test :-
Equipments → a burete, a pipette, a conical flask, etc.

Process →
- Gather three clean, dry test tubes.
- Add 1-2 ml of the test solution, albumin, and deionized water to each test tube.
- Add 1-2 ml of Biruite reagent to each test tube.
- shake the solution.
- Let the solution gently
- Observe the colour change

(b) Ninhydrin test:-
Equipments:→ Test tube, spatula, warm water etc.

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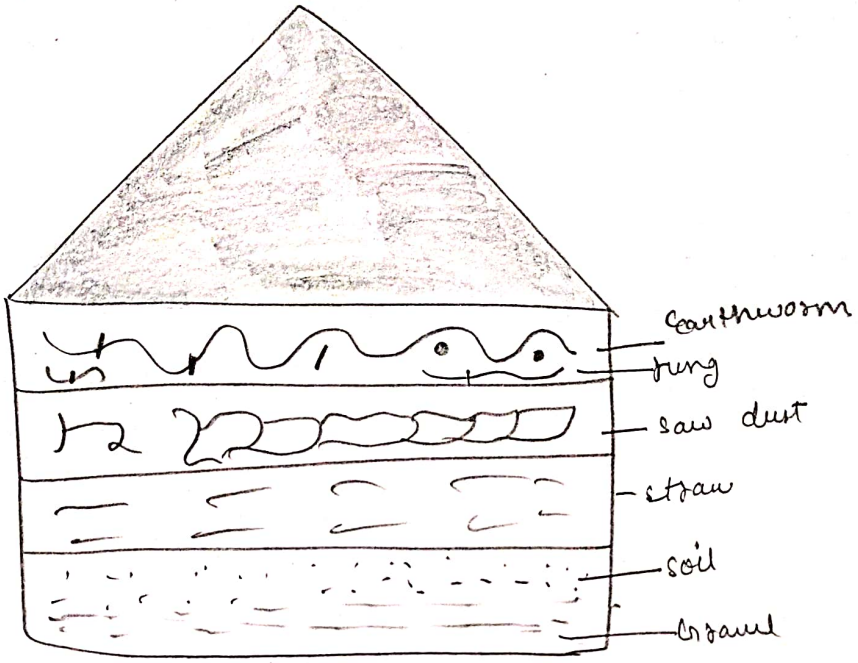
Process →

- Ninhydrin solution (dissolved in solvent like ethanol
- solution containing amino acids, peptids, or proteins.
- Deep blue or purple color.
- Detecting latent finger prints on porous surface.

Result →

A deep blue or purple which colour indicates presence of amino acids, peptides or protein.



Male Vermicompost

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Observation → Vermicompost preparation by earthworms.

Equipment → container, Bedding, worms, food waste, compost starter, scale, Gallon jug, Black plastic, Thatch roof.

Method → Vermicomposting is a method of making organic fertilizer using earthworms to decompose organic waste.

- Create a bed that is 6ft x2 ft x2 ft and add a layer of chopped dried leaves or grasses that is 15-20 cm thick.
- Release 1500 – 2000 red earthworms on top of the bed.
- Sprinkler water on the bed immediately after adding the worms.
- Maintain moisture by Sprinkling water daily and Covering the bed with gunny bags or polythene.
- After 30 days, turn the bed to promote curation and decomposition.
- After 30 days, spread a 5 Cm layer of digested household organic waste on the compost.
- The compost will be ready in 45-50 days and will be 3/4 of the raw materials used.

Benefits of Vermicompost →

- offers more nutrients, vermicompost has highest value of nitrogen, potassium, and phosphate.
- No leaching
- zero soil pollution
- Improves soil Texture
- Takes less Space
- Ensure zero waste

Species for vermicompost ⟶

About 333 species of earth worms in India with various food and burrowing habits Eisenia fetidae Eudrilus eugeniae, Perionyx excavation are some of the species.

Result ⟶

The result of Vermicompost preparation is a nutrient rich, dark, crumbly, and granular material that can be used to improve soil texture.

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Observation ⟶ Study of Tribolium's Food Prefence

Materials → Tribolium insects, a small container for storing dry fruits, painbrush, semolina, flour, wheat flour.

Procedure ⟶

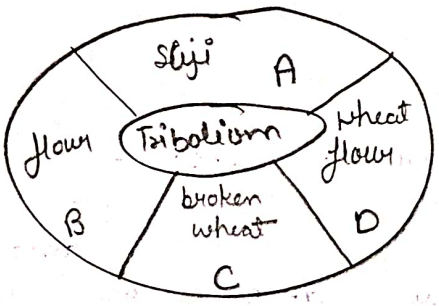
- Take a small container and divide it into four eaval parts (A, B, C and D)
- Place semolina in part A, flour in part B, wheat flour in part C, and wheat flour in part D.
- Carefully place a few Tribolium insects in each part using a painbrush.
- close the container tightly to prevent the insects from escaping.
- leave the experiment for some time.
- After some time, count the number of insects in each food material. The food material with the highest number of insects will be their preferred food.

observation Table →

Food material	Number of Tribolium Insects
semolina	6
flour	8
wheat flour	4
wheat flour	2

Result ⟶

Tribolium insects prefer flour as their food, as the highest number of insects were found on it.


Sooji
A
Flour
Tribolium
Wheat flour
B
broken wheat
D
C

Date
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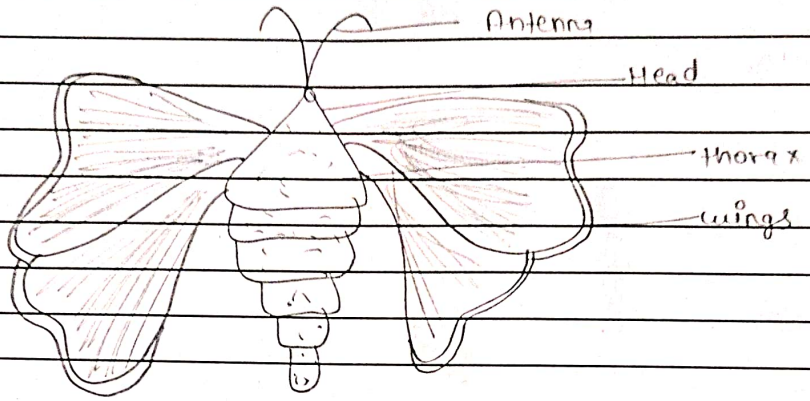
Spotting

(1) Introduction → "Bombyx Mori"

Diagram →



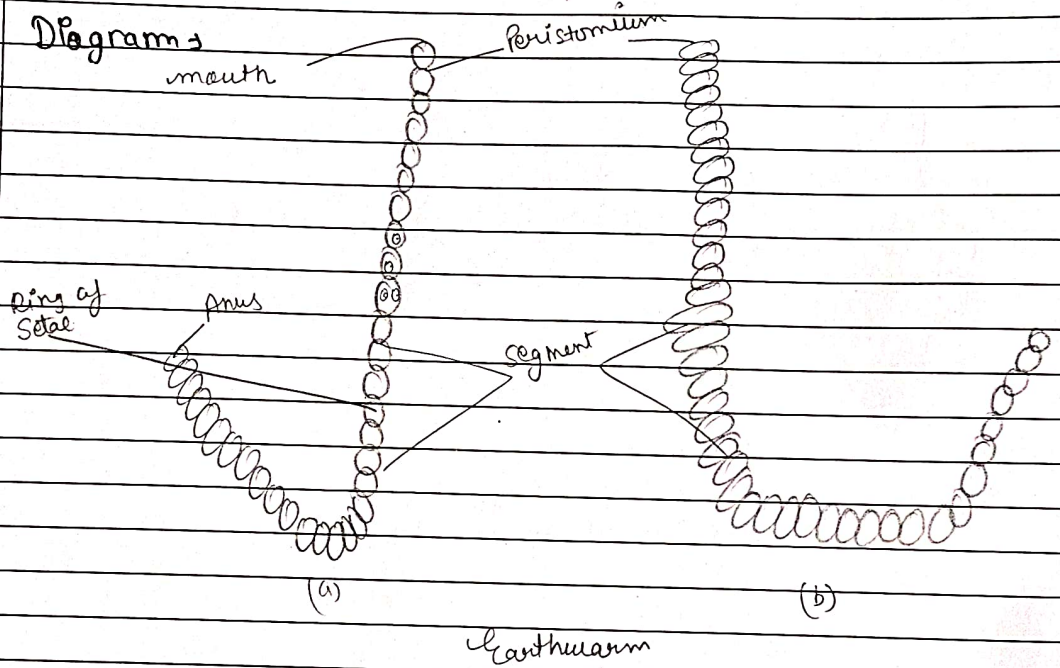
bombyx mori

Character →

1) The wings are cream-colored with dark veins.
2) The silkworm has compound eye.
3) A white, hairy body.
4) Silk moths have a wingspan of 3-5 cm.

(2) Introduction → "Earthworm"

Diagram →



Earthworm

Character →

1) Long, Cylindrical & segmented body.
2) It is a hermaphrodite.
3) The setae present in the epidermal pits help in locomotion.
4) It has a hydrostatic skeleton.

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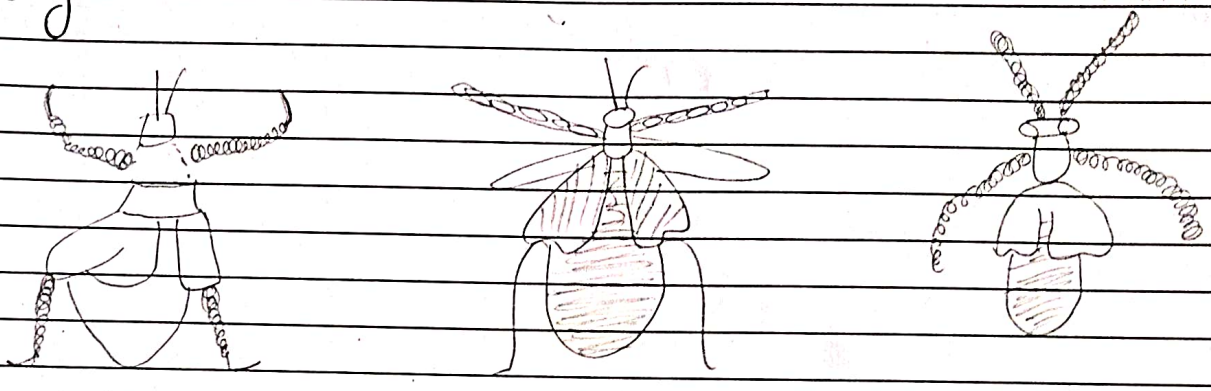
(3) Introduction → "Honey bee"

Diagram →



worker Queen Drone

APIS

character →

1) In this three Category → worker, Queen, drone
2) In a female is sterile
3) The Queen is larger than other bee.
4) Honey bee ~~comm~~ can see ultraviolet light.

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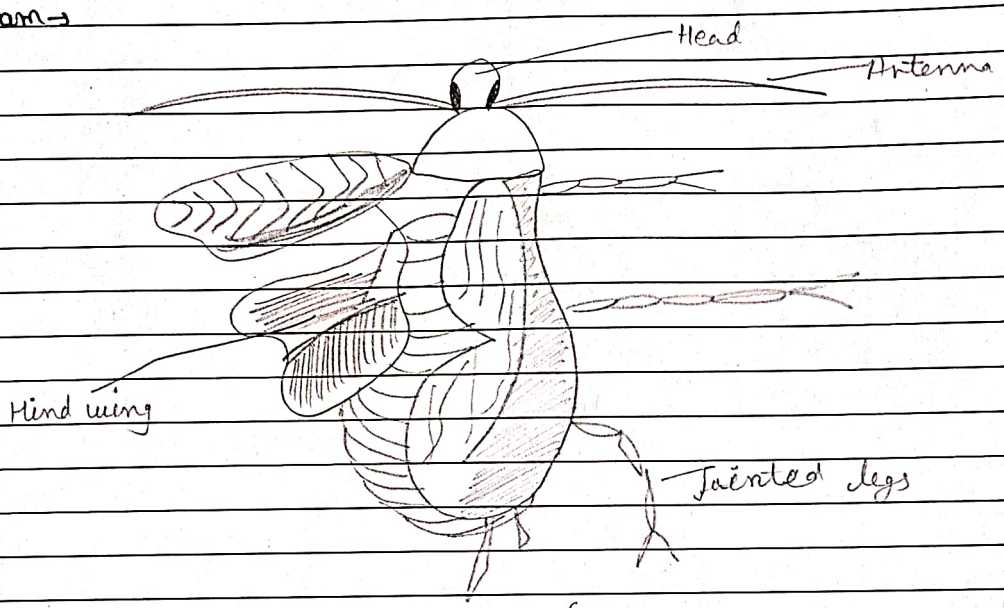
(4) Introduction → 'Cockroach'

Diagram →



Cockroach

Character →

1) It is oval-shaped only.

2) It is ten segmented abdomen.

3) It is long, flexible antennae.

4) It is black or brown colour.

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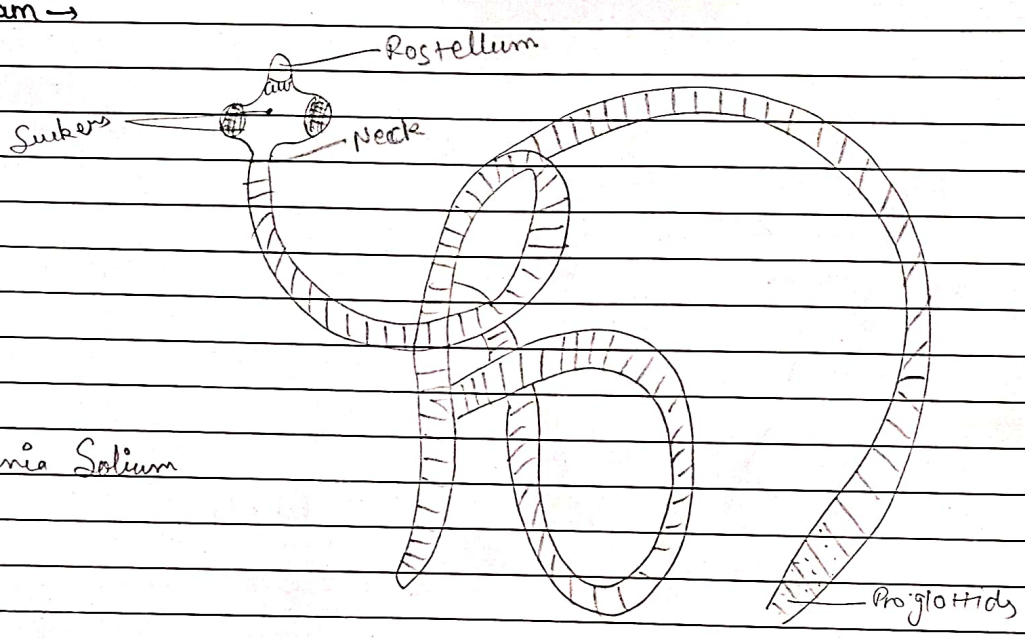
(5) Introduction → "Taenia Solium"

Diagram →



Taenia Solium

Character →

1) It is ribbon like strture.
2) Taenia can be several meters long.
3) Taenia made up of segments called proglottids.
4) It is egg, larva and adult are three stage.

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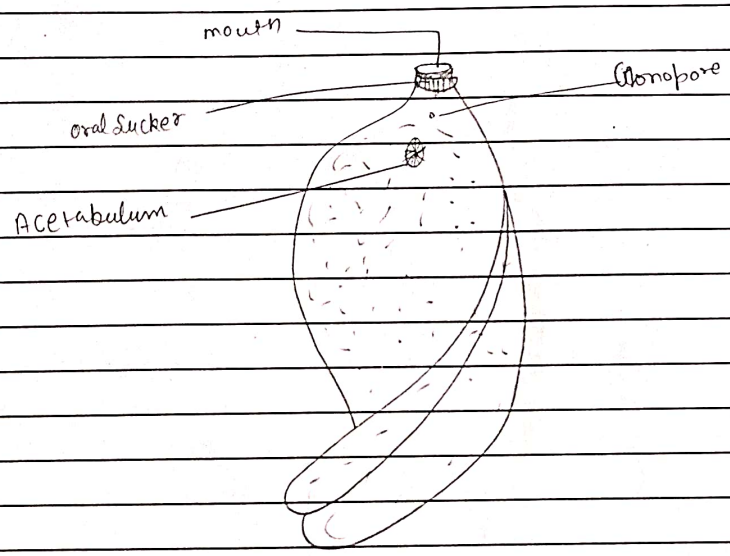
(6) Introduction → "Fasciola"

Diagram →



Fasciola

Character →

1) It is also known liver fluke
2) It is hermaphrodite.
3) In a both male and female reproductive.
4) It is 30 mm long & 15 mm wide.

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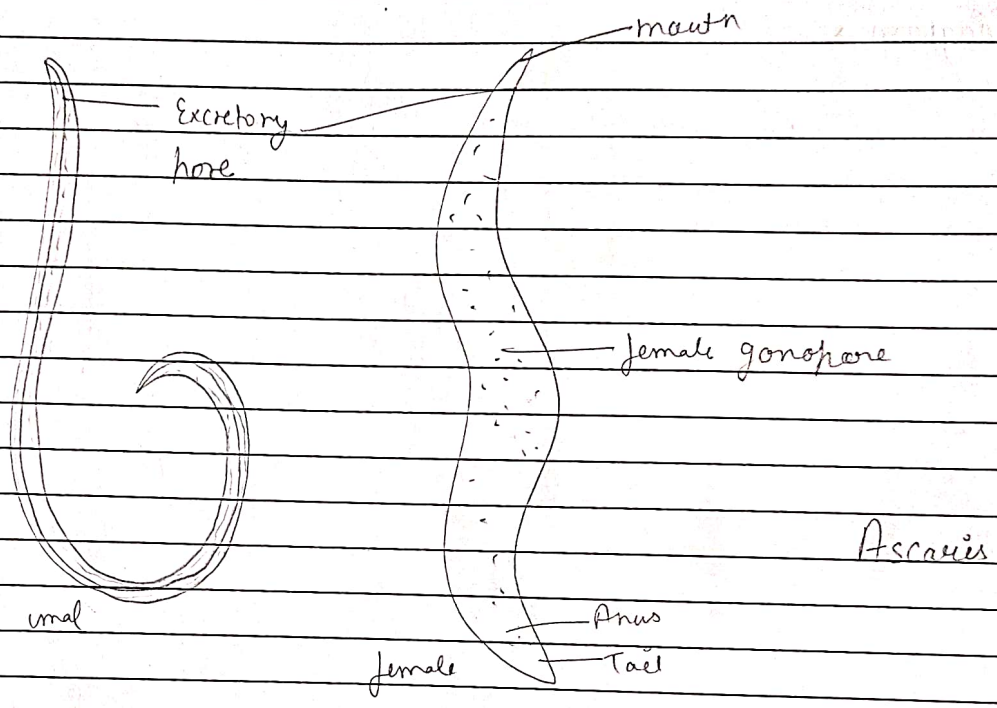
(7) Introduction → "Ascaris"

Diagram →



Ascaris

Character →

1) Ascaris lumbricoides are large roundworms
2) It is long, cylindrical body.
3) It is cream-colored.

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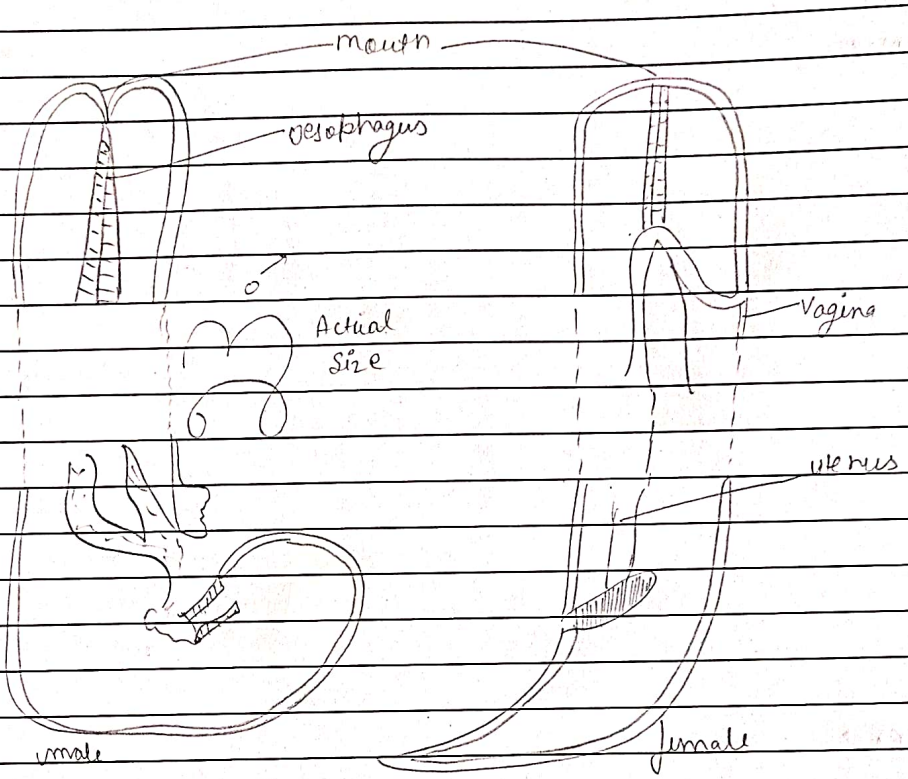
(8) Introduction → "Vaucheria"

Diagram →



chacter →

1) Vaucheria is useful in stabilizing excess mud.
2) Vaucheria contain chlorophyll a, e.
3) It has branched or unbranched filaments.
4) Vaucheria can be found in freshwater.

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