



MARCH -2019 (TS)

PREVIOUS PAPERS**IPE: MARCH-2019(TS)****Time : 3 Hours****JR.ZOOLOGY****Max.Marks : 60****SECTION-A****I. Answer ALL the following VSAQ:****10 × 2 = 20**

1. Write the full form of IUCN. In which book threatened species are enlisted
2. What are dynein arms? What is their significance?
3. What are the respiratory structures of Limulus and Palamnaeus respectively?
4. Distinguish between Osteoblasts and Osteoclasts.
5. How do you justify the statement "heart in fishes is a branchial heart"?
6. What is a Kinetin?
7. What are Retroperitoneal organs?
8. Distinguish the terms Phototaxis and Photokinesis.
9. "The eggs of Ascaris are called Mammillated eggs"
10. What are Microglia and what is their origin and add a note on their function?

SECTION-B**II. Answer any SIX of the following SAQs:****6 × 4 = 24**

11. Explain "Rivet Popper hypothesis"
12. Describe the structure of cardiac muscle.
13. What are the salient features exhibited by Polychaetes?
14. Describe the structure of the heart of frog.
15. Describe the process of transverse binary fission in Paramecium.
16. What is the need for parasites to develop special adaptations ? Mention some special adaptations developed by the parasites.
17. Draw a neat labelled diagram of the mouthparts of cockroach.
18. Define ecological pyramids and describe with examples pyramids of numbers and biomass.

SECTION-C**III. Answer any TWO of the following LAQs:****2 × 8 = 16**

19. Explain the structure and lifecycle of Entamoeba histolytica with the help of neat and labelled diagrams
20. Describe the digestive system of cockroach with the help of a neat labelled diagram.
21. Describe different types of food chains that exist in an ecosystem

ipe ts march-2019 **ANSWERS**

SECTION-A

1. Write the full form of IUCN. In which book threatened species are enlisted.

[APM-20][TS M-19]

- A:** 1) IUCN stands for International Union for Conservation of Nature and natural resources.
2) Threatened species are enlisted in 'Red Data Book' of IUCN.

2. What are dynein arms? What is their significance?

[TS M-19]

- A:** **1) Dynein arms:** In cross section of flagellum, the 'A' tubule of each peripheral doublet bears paired arms along its length. They are called dynein arms.
2) Significance: Dynein arms bring about sliding movement of microtubules utilising ATP so that flagellum or celium bends.

3. What are the respiratory structures of Limulus and Palamnaeus respectively?

- A:** 1) The respiratory organs of limulus are book - gills (aquatic). **[TS M-19]**
2) The respiratory organs of palamnaeus (Scorpion) are book lungs (aerial).

4. Distinguish between osteoblasts, and osteoclasts?

[TS M-19]

A:

Osteoblasts	Osteoclasts
1) Osteoblasts are immature osteocytes.	1) Osteoclasts are phagocytic cells of the bone.
2) They produce collagen fibres and minerals for the bone.	2) They remove minerals from the bone.

5. How do you justify the statement- "heart in fishes is a branchial heart". [TS M-19]

- A:** 1) Heart in fishes is two chambered.
2) It pumps blood directly to gills so it is called branchial heart.

6. What is a kinety? [AP May-19,22][TS M-19][TS May-17][AP, TS M-16] [IPE-14]

- A:** 1) A longitudinal row of kinetosomes and their inter connecting kinetodesmata are collectively called kinety.
2) Kinety is a part of infra ciliary system of ciliates.

7. What are retroperitoneal organs? [TS M-16,19] [AP 18]

- A:** 1) The organs like kidneys in vertebrates are covered by the parietal peritoneum only on the ventral side.
2) Such a peritoneum is called retroperitoneum and the organs lined by it are called retroperitoneal organs.

8. Distinguish the terms phototaxis and photokinesis. [TS M-19]

- A:** 1) **Phototaxis** is the influence of light on directional movement of organism either towards or away from light. **Ex:** Euglena exhibits positive phototaxis. It moves towards light.
Cockroach exhibits negative phototaxis. It moves away from light.
2) **Photokinesis** is the influence of intensity light on non-directional movement of organism.
Ex: Larvae of Pinnotheres maculatus (mussel crab) moves fast with increasing intensity of light in its own direction.

9. The eggs of Ascaris are called 'mammillated eggs'. Justify.

[AP Mar-19] [TS M-18,19]

- A:** The eggs of Ascaris have a protein outer coat which has papillae hence looks rippled. So it is called mamillated egg.

10. What are microglia and what is their origin and add a note on their function.

- A:** 1) Microglia are neuroglia cells. [AP, TS M-19]

- 2) They are non conducting cells of nervous system.
3) They are phagocytic and combat infection or injury of the nervous system.
4) They are mesodermal in origin.

SECTION-B

11. Explain 'Rivet Popper' hypothesis.

[AP Mar, May-17] [TS May-17,19,22]

A: 1) '**Rivet Popper hypothesis**' explains the consequences that happen when some species are lost in an ecosystem.

2) Rivet Popper Hypothesis:

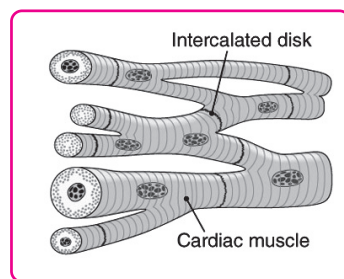
- 3) An aeroplane is taken as an example for ecosystem.
- 4) Various rivets of the plane are considered as various species.
- 5) Removing a rivet (species) from a seat (minor important part) may not damage the plane, but removal of rivet from a wing (critical part) can result into a crash.
- 6) So, removal of one rivet of various parts can slowly damage the Plane.
- 7) Likewise, removal of 'Critical Species' may affect entire community which affects the entire ecosystem.

12. Describe the structure of a cardiac muscle.

[TS M-16,19]

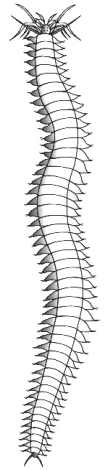
A: Structure of cardiac muscle:

- 1) Cardiac muscle is the heart muscle(myocardium)
- 2) The myocardial cells are short, cylindrical, mononucleate and striated.
- 3) The muscle fibres are branched.
- 4) The muscle cells are connected by gap junctions for quick conduction of electrical impulses.
- 5) There are dark lines called intercalated discs which are characteristic of heart muscle.
- 6) These discs help in rapid conduction of electrical impulses, resulting in heart beat.
- 7) Heart beat (contraction of muscle) is involuntary and carried on by pace maker.
- 8) The rate of heart beat is under the control of nervous systems and adrenalin.
- 9) The cardiac muscle is highly resistant to fatigue.
- 10) The cardiac muscle is a functional syncytium.

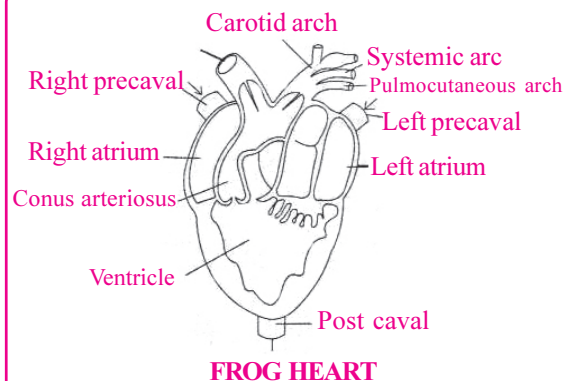


13. What are the salient features exhibited by polychaetes? [TS M-16, 19][AP-18,20]**A: Salient features of Polychaetes:**

- 1) Polychaetes are **marine annelids**.
- 2) They are **commonly bristle worms or clam worms**.
- 3) Many are **free moving forms**. Others **live in tubes**.
- 4) Distinct head with **sense organs like eyes, tentacles and palps** are present.
- 5) Parapodia are locomotor organs.
- 6) Parapodia **serve respiration in addition to gills**.
- 7) **Clitellum and Gonoducts** are absent.
- 8) They are **bisexual**.
- 9) Sex cells are released into coelom and pass out through nephridiopores.
- 10) Fertilisation is external.
- 11) **Larva is Trochophore**.
- 12) **Ex:** Nereis (sandworm), Aphrodite (sea mouse), Arenicola (lugworm)

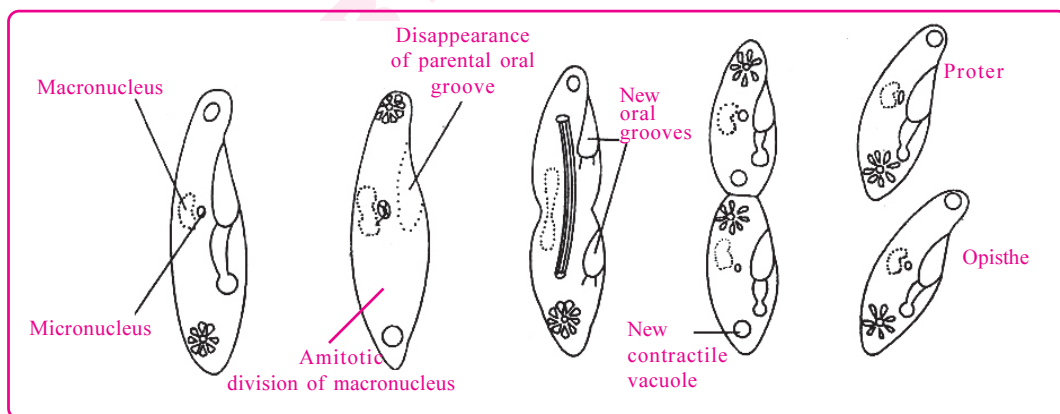
**14. Describe the structure of the heart of frog.****[TS M-19]****A: Structure of heart of frog:**

- 1) Frogs heart is a **muscular pump** located in upper part of the body cavity.
- 2) Frogs heart is **three chambered**.
- 3) There are **two auricles and one ventricle**.
- 4) **Double layered pericardium** surrounds the heart and protects it from mechanical shocks.
- 5) **Sinus venosus** is a triangular chamber opening into right atrium (auricle) on the dorsal side of the heart.
- 6) The **ventricle opens** into conus arteriosus on the ventral side of heart.
- 7) **Conus arteriosus** bifurcates and each branch give rise to three aortic arches namely carotid, systemic and pulmocutaneous.
- 8) Blood from the heart goes to various parts **through aortic arches**.
- 9) Three major veins collect blood and joins sinus venosus.
- 10) Circulation of frog is described as incomplete **double circulation**.



15. Describe the process of transverse binary fission in Paramecium. [AP May-19]**A: Binary fission in Paramecium:****[AP M-16,17] [TS May-17][TS M-19,20]**

- 1) Paramecium undergoes transverse binary fission during favourable conditions.
- 2) Before binary fission, it stops feeding and the oral groove disappears.
- 3) The **micro** nucleus divides in to two by **mitosis**.
- 4) The **macro** nucleus divides into two by **amitosis**.
- 5) A transverse constriction appears in the middle.
- 6) It deepens and divides the parent into two daughter individuals.
- 7) The anterior is called **proter** and posterior is **opisthe**.
- 8) Each daughter gets one contractile vacuole of the parent and a second vacuole is newly formed in both.
- 9) Opisthe receives the posterior contractile vacuoles along with macro and micro nuclei.
- 10) The missing organelle are newly developed by both.
- 11) Binary fission is completed in two hours.
- 12) In a day, the paramecium can produce 4 generations of offspring.
- 13) The transverse binary fission is called **homothetogenic fission**



16. What is the need for parasites to develop special adaptations? Mention some special adaptations developed by the parasites. [TS M-19]

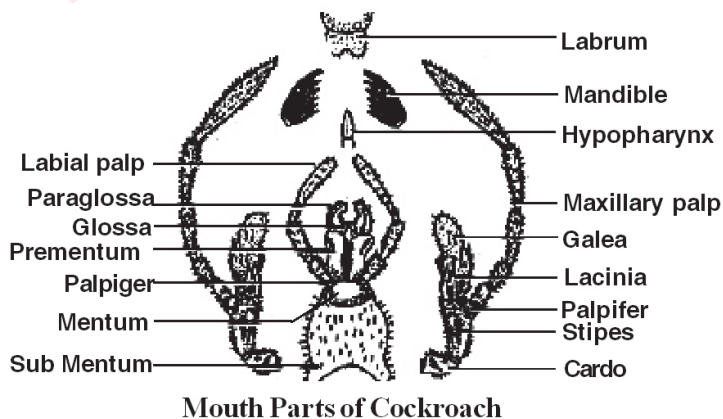
- A:**
- Parasites depend on hosts for their survival. The hosts tend to reject and resist the parasites.
 - So parasites have evolved adaptations to counteract and neutralise host's defence system. The adaptations are loss of unnecessary sense organs, development of organs of attachment, high reproductive capacity etc.

Special Parasitic adaptations:

- In order to live in the host, some parasites develop attachment organs are Hooks, suckers, rostellum etc.
- Some parasites develop protective covering like tough 'cuticle' tegument to withstand digestive juices. **Ex:** Ascaris, Fasciola.
- Some parasites produce large number of eggs.
Ex: Taenia has 700-900 proglottids, each producing 3500 eggs.
- Some parasites produce anti enzymes to neutralise host's digestive juices. **Ex:** Taenia.
- Some parasites develop complex life cycles with many larval stages. **Ex:** Fasciola.
- Some parasites show development of cysts. **Ex:** Entamoeba.
- Some parasites change the surface antigens to escape from vaccines. **Ex:** Plasmodium, HIV

17. Draw a neat labelled diagram of the mouthparts of cockroach.

A:



18. Define ecological pyramids and describe with examples, pyramids of numbers and biomass.

[TS M-19]

- A:**
- 1) **Ecological Pyramids:** It is a graphic representation of the trophic structure and function of an ecosystem
 - 2) The pyramids were first studied by Elton. Hence those are known as Eltonian pyramids.
 - 3) **Types of Pyramids:** (i) Pyramid of number (ii) Pyramid of biomass (iii) Pyramid of energy.
 - 4) **Pyramid of numbers:** A pyramid of numbers is a graphical representation that shows the number of organisms at each trophic level. It is an upright pyramid where the producers are always more in number than other trophic levels.
 - 5) **Pyramid of Biomass:** A pyramid of biomass is a graphical representation of biomass present in a unit area of various trophic levels. It shows the relationship between biomass and trophic level quantifying the biomass available in each trophic level at a given time.
 - 6) **Pyramid of energy:** An energy pyramid is a graphical model of energy flow in a community. The different levels represent different groups of organisms that might compose a food chain.
 - 7) The base of each pyramid represents the producers or the first trophic level.
 - 8) The top of pyramid represents top order consumer.
 - 9) Producers are more in number than herbivores and herbivores are more in number than carnivores.
 - 10) Similarly biomass and energy is more at lower levels than at higher levels.

SECTION-C

19. Explain the structure and life cycle of *Entamoeba histolytica* with the help of neat labelled diagrams. [TS M-19][AP M-15,18]

A: *Entamoeba histolytica*: Phylum- Protozoa; Class- Rhizopodea

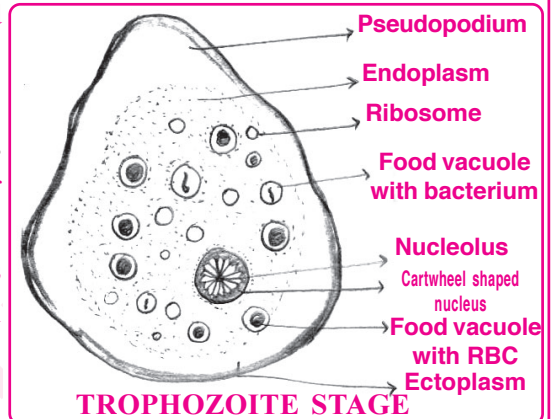
It is a monogenetic histozoic parasite.

It lives in the large intestine of man. It causes amoebic dysentery

D) Structure of *E. histolytica* consists of 3 stages.

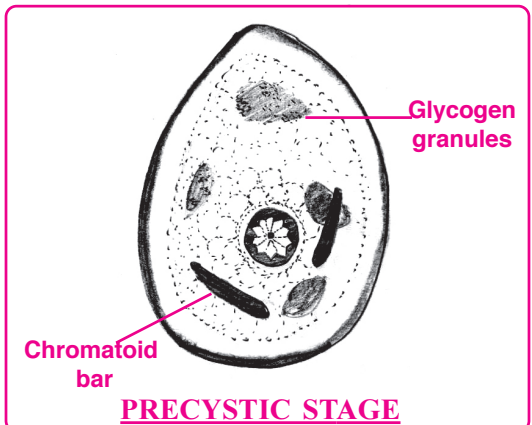
1) Trophozoite stage:

- i) In this stage, it lives in **mucous and submucous layers of large intestine** of man.
- ii) Its body is surrounded by plasmalemma.
- iii) Its cytoplasm is differentiated into an **outer, non-granular ectoplasm** and the **inner granular endoplasm**.
- iv) Endoplasm contains ribosomes, **food vacuoles with bacterium and food vacuoles with RBC, a cart wheel shaped nucleus**.
- v) It produces the proteolytic enzyme called **histolysin** (tissue digesting enzyme).
- vi) This is the most active, motile, feeding and pathogenic stage.



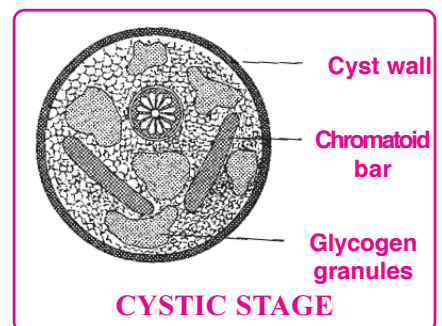
2) Precystic stage:

- i) It is found in the **lumen** of large intestine.
- ii) It becomes **small and oval** at this stage.
- iii) Its cytoplasm consists of glycogen granules and chromatoid bars. They act as reserve food.
- iv) It is the non-feeding, non-motile and non-pathogenic stage.



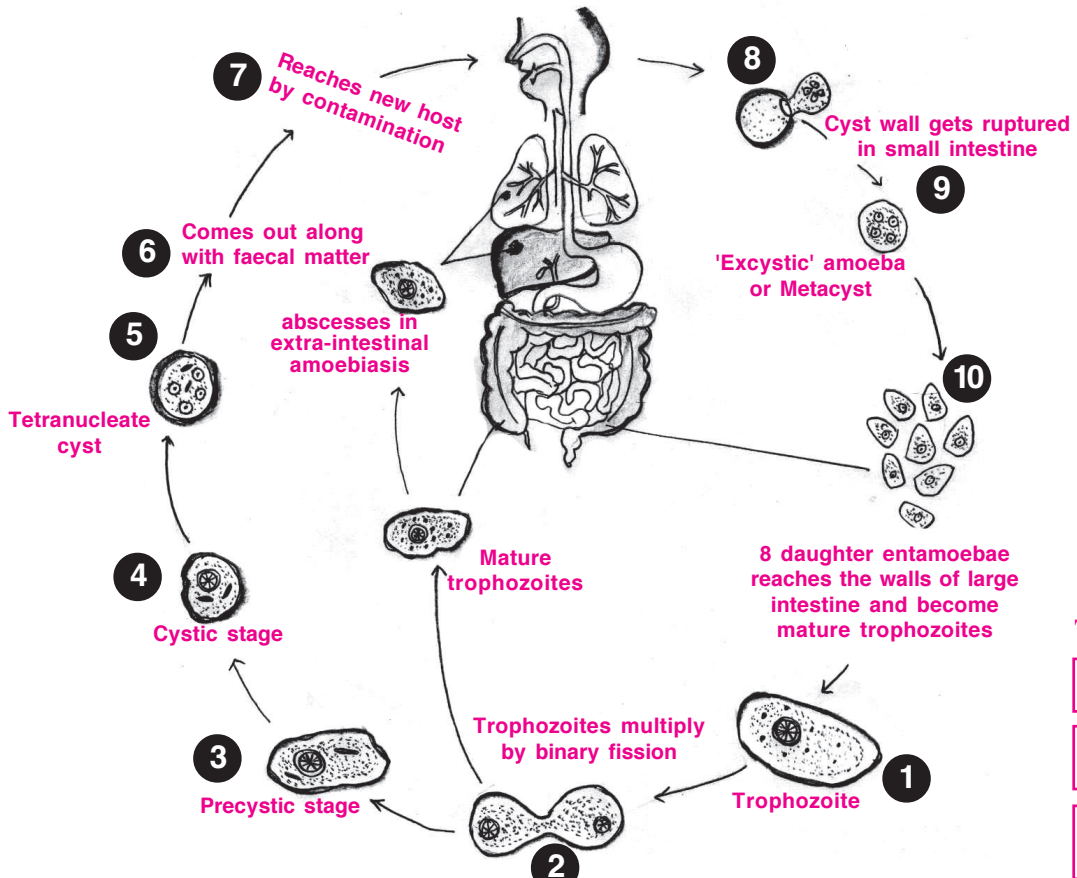
3) Cystic stage:

- i) It is **round** in shape.
- ii) It is found in the **lumen** of large intestine.
- iii) Formation of a **thin, delicate highly resistant cyst wall** takes place.
- iv) The nucleus undergoes two mitotic divisions and four nuclei are formed. Hence it is called **tetra nucleate cyst**. This is the **infective stage** to man.
- v) These cysts pass through faeces and wait until they reach a healthy person.



II) Life Cycle of *E. histolytica*:

- 1) *E. histolytica* in trophozoite stage undergo binary fissions and produce a number of daughter entamoeba.
- 2) They feed upon the bacteria and host's tissues. They grow in size and multiply by binary fissions.
- 3) Some of these, enter the lumen of the large intestine and transform into 'precystic stage'.
- 4) Here, the precystic stage transforms into 'cystic stage'.
- 5) There they intumescence and develop into tetranucleate cysts. This entire process is completed within a few hours.
- 6) These tetranucleate cysts come out along with the faecal matter. They can remain alive for about 10 days.
- 7) These cysts then reach new host through contaminated food and water.
- 8) The cyst wall gets ruptured by enzyme trypsin in the small intestine of a new human host.
- 9) There it releases the tetranucleate amoebae. These are called metacysts.
- 10) Here, four nuclei of the metacysts undergo mitotic divisions and produce eight daughter nuclei. Each nucleus gets a bit of cytoplasm and thus eight daughter entamoebae are produced.
- 11) They reach the wall of large intestine and become mature trophozoites causing amoebic dysentery.
- 12) **Extra intestinal amoebiasis:** Some times, the trophozoites reach the liver and cause 'abscesses' (secondary amoebiasis). From there they may go to lungs, heart, brain and kidneys. There they cause abscesses in those parts leading to severe pathological conditions.

**LIFE CYCLE OF ENTAMOEBA HISTOLYTICA**

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Boxes

20. Describe the digestive system of cockroach with the help of a neat labelled diagram.**A: Digestive system of Cockroach:**

[AP M-20][TS May-19][TS Mar-19]

The digestive system of cockroach consists of I. Alimentary canal II. Digestive glands.

I) Alimentary canal: The alimentary canal extends from mouth to anus.

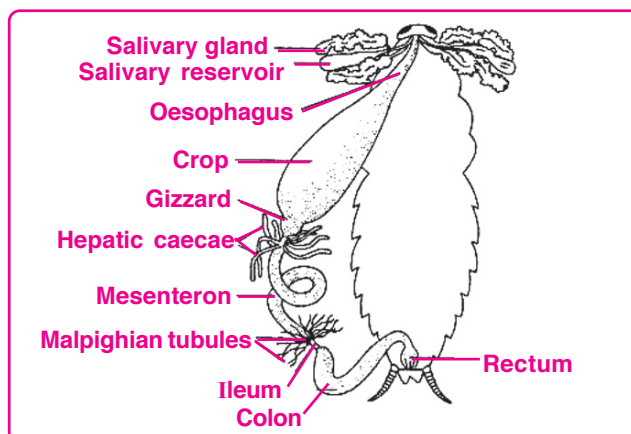
It is divided into 3 regions. They are (I) Foregut (II) Midgut (III) Hindgut

1) Foregut (Stomodaeum):

- i) Foregut has pharynx, oesophagus, crop and gizzard.
- ii) Pharynx is a very short tube. It leads into a narrow tubular oesophagus.
- iii) Oesophagus opens into a sac like crop. It stores food for digestion.
- iv) Its outer surface is covered by tracheal tubes.
- v) Behind the crop there is a thick walled muscular gizzard.
- vi) The chitinous inner lining of the gizzard has six powerful teeth.
- vii) These teeth form an efficient grinding apparatus.
- viii) Thus Gizzard acts as a grinding mill and sieve.
- ix) The membranous funnel projected into mesenteron from gizzard is called stomodeal valve.
- x) This valve prevents backward movement of food from mesenteron into gizzard.

2) Midgut(Mesenteron):

- i) It is a short narrow tube.
- ii) Anterior part of midgut contains 6 to 8 finger shaped diverticula called hepatic caecae.
- iii) These are helpful in digestion and absorption of digested food material.
- iv) The anterior part of midgut is secretory and posterior part is absorptive.
- v) Secretory part secretes enzymes.
- vi) The food bolus is surrounded by chitinous and porous peritrophic membrane which is secreted by the funnel like stomodeal valve of the gizzard.
- vii) It protects midgut wall from hard food particles.



3) Hindgut (Proctodaeum) :

- i) It is a long coiled tube.
- ii) The hindgut is divided into ileum, colon and rectum.
- iii) There is a sphincter between mesenteron and hindgut.
- iv) The sphincter prevents back movement of undigested food and uric acid from the hindgut to midgut.
- v) Ileum collects uric acid from Malpighian tubules which are present at the anterior end of ileum
- vi) Colon is a long, coiled tube. It opens into short and wide rectum which opens out through anus.
- vii) Rectum has 6 longitudinal folds called rectal papillae. They absorb water from undigested food.
- viii) Entire hindgut is internally lined by cuticle.

II) Digestive glands: The digestive glands of cockroach includes

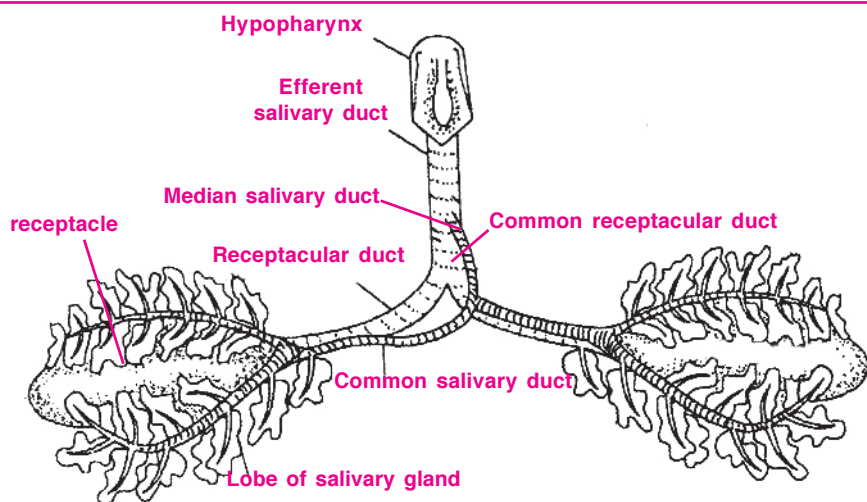
(1) Salivary glands (2) Hepatic caecae (3) Glandular cells of mesenteron.

1) Salivary glands:

- i) A pair of salivary glands are present on either sides of the crop.
- ii) Each salivary gland has two lobes
- iii) Each lobe has many lobules called acini.
- iv) Each acinus is made up of secretory cells called zymogen cells.
- v) All the zymogen cells are connected by ductules.
- vi) The ductules open into a common salivary duct. The two common salivary ducts are joined to form the median salivary duct.
- vii) There is a pair of salivary receptacles to store saliva.
- viii) The receptacular ducts unite to form common receptacular duct.
- ix) The median salivary duct is connected to common receptacular duct to form an efferent salivary duct.
- x) The efferent salivary duct opens at the base of hypopharynx in mouth cavity.
- xi) Saliva is secreted by zymogen cells which contains starch digesting enzyme amylase.

2) Hepatic caecae: There are six to eight finger like diverticula called hepatic caecae which contain secretory and absorptive cells

3) Glandular cells of Mesenteron: Glandular cells of mesenteron secrete maltase, invertase, proteases and lipase.



SALIVARY APPARATUS OF COCKROACH

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Boxes

21. Describe different types of food chains that exist in an ecosystem.

[TS May-22][AP, TS Mar-19][AP May-17] [AP, TS M-16][IPE-14]

A: I) Food Chain:

- 1) Sun is the main source of energy to ecosystem.
- 2) The biological systems of environment have several food levels called trophic levels.
- 3) A trophic level is composed of organisms which have same source of energy and same number of transferring steps. There are generally 3 to 5 trophic levels.
- 4) Sometimes, a given species may occupy more than one trophic level. **Ex:** Sparrow
- 5) The food energy always passes from lower trophic level to higher trophic levels.
- 6) When the food path is linear, the components resemble the links of a chain. Hence, it is called food chain.
- 7) The food chain generally ends in decomposers.

II) Types of Food Chains:

- 1) Grazing food chain
- 2) Parasite food chain
- 3) Detritus food chain.

1) Grazing food chain: It is also called predator food chain. The first trophic level is occupied by green plants (producers). Second trophic level is occupied by Herbivores. The third, fourth and fifth trophic levels are occupied by primary, secondary and tertiary carnivores respectively.

Ex: i) Rose bush → aphids → spiders → small birds → hawks.

ii) Grass → Grass hopper → Frog → Snake → Hawk

iii) Grass → Goat → Man

iv) Plants → Caterpillar → Lizard → Snake

v) Grass → Deer → Tiger.

2) Parasitic Food chain: In this, the food energy passes from large organisms to small organisms. The first trophic level is occupied by large trees. They provide shelter and food to a variety of birds, reptiles and mammals. These animals form the second trophic level. Each of these animals host many ecto and endo parasites.

Ex: Tree → Birds, lizards, mammals → parasites.

3) Detritus Food chain: This food chain begins with detritus. Detritus is dead organic matter of leaves, dead bodies and **faeces** of animals. Detritus has decomposers which secrete enzymes, that break down detritus into simple absorbable substance. Detritus feeders are earthworms, flies and maggots which form the second trophic level.

Ex: Detritus → Earthworms → Frogs → Snakes → Hawks.

- **Food web:** The food chains are not isolated chains. They are interconnected. They form a web called food web. The feeding relationships are not simple. There are omnivores which complicate the chains. **Ex:** Man, Bear, Crow.