



MARCH-2023 (AP)

PREVIOUS PAPERS**IPE: MARCH-2023(AP)****Time : 3 Hours****JR.ZOOLOGY****Max.Marks : 60****SECTION-A****I. Answer ALL the following VSAQ:****10 × 2 = 20**

1. What does ICZN stand for?
2. Define osteon.
3. Draw a labelled diagram of T.S of flagellum.
4. What are retroperitoneal organs?
5. How does a mature RBC of a mammal differ from that of other vertebrates?
6. Mention the advantages of some UV rays to us.
7. What do you call the locomotor structures of Nereis? Why is Nereis called a polychaete?
8. Distinguish between proter and opisthe.
9. Mention the animals that exhibited a 'tube -within-a-tube' organisation for the first time? Name their body cavity.
10. In which way does tobacco affect the respiration?
Name the alkaloid found in tobacco.

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

11. Explain 'Rivet Popper' hypothesis.
12. What are the chief characters of the crustaceans?
13. Describe the three types of cartilage.
14. List out eight characteristics that help distinguish a fish from the other vertebrates.
15. Describe the process of longitudinal binary fission in Euglena.
16. Distinguish between hypertrophy and hyperplasia with an example for each.
17. How do marine animals adapt to hypertonic seawater?
18. Draw a neat labelled diagram of the mouthparts of cockroach?

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

19. Describe the digestive system of cockroach with the help of a neat labelled diagram.
20. List out the major air pollutants and describe their effects on human beings.
21. Explain the structure and life cycle of Entamoeba histolytica with the help of neat labelled diagrams.

IPe AP MARCH-2023

ANSWERS

SECTION-A

1. What does ICZN stand for?

[AP,TS M-19][TS M-15,22]

A: 1) ICZN stands for International Code of Zoological Nomenclature.

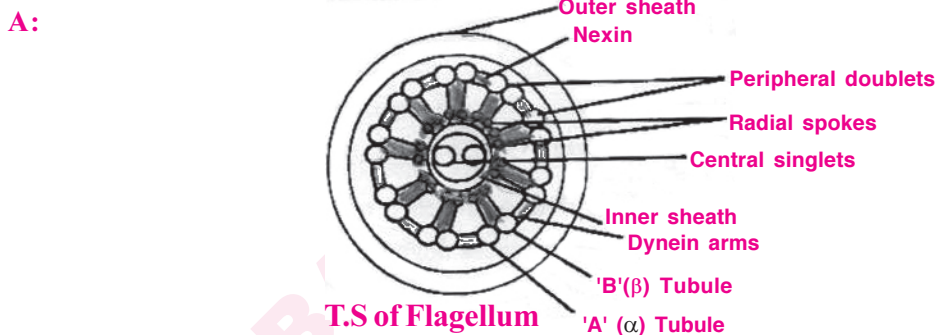
2) It is used to name an identified organism.

2. Define osteon.

[TS M-20][AP M-15]

A: Osteon: In a dense bone, a Haversian canal and the surrounding lamellae and lacunae are collectively called Osteon or Haversian system. It works as transport system.

3. Draw a labelled diagram of T.S of flagellum.



4. 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.

5. How does a mature RBC of a mammal differ from that of other vertebrates?

A: 1) The mature RBC of a mammal are circular, biconcave and enucleate discs.

2) The RBC of other vertebrates are oval, biconvex and nucleated.

6. Mention the advantages of some UV rays to us. [TS M-16,20][IPE-14]

- A:** 1) UV rays kill micro organisms on the body surface of animals.
2) UV rays convert the sterols in the skin to vitamin D.
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7. What do you call the locomotor structures of Nereis? Why is Nereis called a polychaete?

- A:** 1) The locomotor organs of nereis are called parapodia.
2) Nereis is called polychaeta, because each parapodium contains many setae (poly-many, cheta-setae)
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8. Distinguish between proter and opisthe.[TS May-19] [AP M-18] [AP,TS M-15,17]

- A:** 1) The proter is the anterior individual. It receives anterior contractile vacuole, cytopharynx and cytostome of parent.
2) The opisthe is the posterior individual. It receives posterior contractile vacuoles and develop other organelle.
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9. Mention the animals that exhibited a 'tube -within-a-tube' organisation for the first time? Name their body cavity. [AP M-15,18,20]

- A:** 1) 'Tube-within-a-tube' organisation is first formed in **Nematoda**.
2) The body cavity in Nematodes is **Pseudocoelom**.
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10. In which way does tobacco affect the respiration? [AP M-23] [AP May-17]

Name the alkaloid found in tobacco.

- A:** 1) Tobacco effects the respiration because when tobacco is smoked then smoking increases the carbon monoxide level and reduces the oxygen level in the blood.
2) Alkaloid found in tobacco is Nicotine.

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. What are the chief characters of the crustaceans?

[AP May-17] [TS M-15,17]

A: Chief characters of Crustaceans:

[TS May-19]

- 1) Crustaceans are **aquatic mandibulate arthropods**.
- 2) Their exoskeleton is made of calcium carbonate.
- 3) **Head and thorax are fused to form cephalothorax**.
- 4) Head region (cephalic) has **five pairs of appendages**
(i) antinnules (ii) antennae (iii) mandibles (iv) first pair of maxillae (v) second pair of maxillae.
- 5) **Thoracic and abdominal appendages are biramous**.
- 6) Respiratory organs are gills (branchiae)
- 7) Excretory glands are green glands or antennary glands.
- 8) Sense organs are antennae, compound eyes and statocysts.
- 9) **Development is indirect having several larval stages**.
- 10) **Ex:** Palaemon (fresh water prawn), Cancer (crab), Daphina (Water flea).

13. Describe the three types of cartilage.**[AP M-18,20][TS 18,20]****A: I) Cartilage:**

- 1) It is a solid flexible connective tissue.
- 2) It has collagen fibres, elastic fibres, chondroblasts enclosed in lacunae and surrounded by perichondrium.
- 3) Cartilage has no blood supply.
- 4) Growth and regeneration of cartilage takes place by the activity of perichondrial cells.
- 5) Perichondrium has blood capillaries.

II) Types of Cartilage: There are three types of cartilage.**1) Hyaline cartilage:**

- i) Bluish white, translucent cartilage.
- ii) It has delicate collagen fibres.
- iii) It is the weakest and most common cartilage.
- iv) **Ex:** Walls of nose, costal cartilage, trachea, bronchus and larynx.

2) Elastic cartilage:

- i) It is yellow.
- ii) It has elastic fibres in addition to collagen fibres.
- iii) It provides strength and elasticity.
- iv) **Ex:** Pinna, Eustachian tube and epiglottis.

3) Fibrous cartilage:

- i) Matrix has bundles of collagen.
- ii) It is strongest cartilage.
- iii) Perichondrium is absent.
- iv) **Ex:** Intervertebral discs and pubic symphysis.

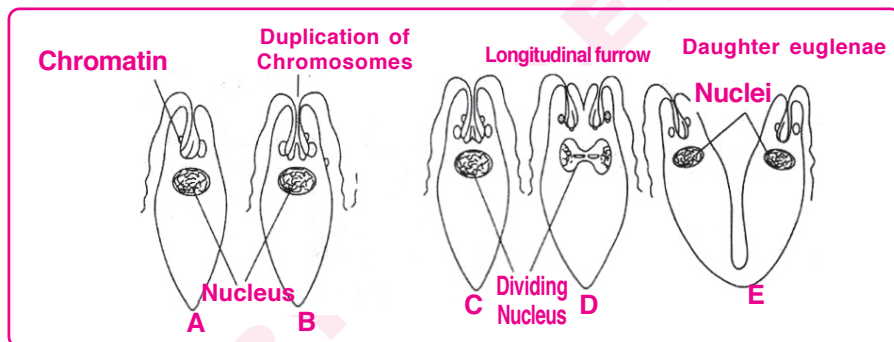
14. List out eight characteristics that help distinguish a fish from the other vertebrates.**A: Exclusive characters of fishes:****[AP M-19]**

- 1) Fishes are aquatic, ectothermal, scaly vertebrates.
- 2) The **scales are mesodermal**: In some fishes they are modified into shields or spines.
- 3) Vertebrae are amphicoelous (cavity on each side of centrum)
- 4) Fins are present for locomotion.
- 5) The fins are paired (pectoral and pelvic) and median (dorsal, caudal and anal)
- 6) Gill are respiratory organs.
- 7) Gill slits are open in cartilaginous fishes and enclosed by operculum in bony fishes.
- 8) The heart is ventral and two chambered, it is also called Branchial heart and Venous heart.

15. Describe the process of longitudinal binary fission in Euglena. [TS M-16][IPE-14]

A: Binary fission in Euglena:

- 1) Euglena undergoes longitudinal binary fission during favourable conditions.
- 2) During this process the stigma, paraflagellar body and contractile vacuoles disappear.
- 3) Nucleus, basal granules, chromatophores and cytoplasm undergo division.
- 4) A longitudinal groove appears in the central part of anterior end.
- 5) It gradually extends to posterior and divides the organism into two.
- 6) One daughter Euglena retains parental flagella, the other daughter develops new flagella.
- 7) As daughter forms look like mirror images, the fission is called 'symmetrogenic division'.
- 8) Stigma, paraflagellar body and contractile vacuole develop freshly in new individuals.



16. Distinguish between hypertrophy and hyperplasia with an example for each.

A: 1) Hypertrophy: Some parasites cause abnormal increase in the size of the host cell which finally ruptures. [AP,TS M-20]

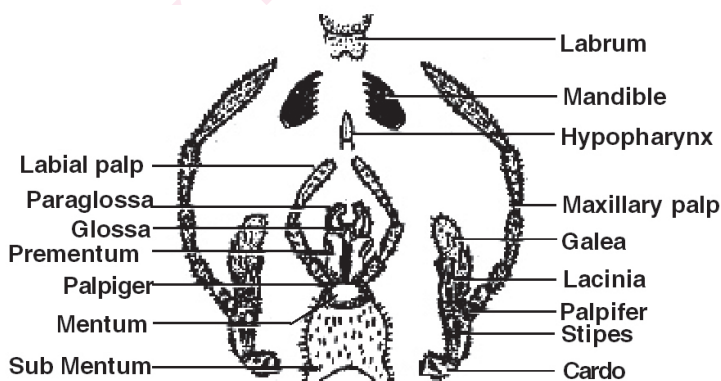
Ex: Plasmodium causes increase in the size of RBC which finally bursts.

2) Hyperplasia: Some Parasites cause increase in the size of the organ by increasing the number of cells. This causes inconvenience or death to the host.

Ex: Fasciola hepatic lives in bile ducts of sheep. It blocks the passage of bile duct by increasing the cells.

17. How do marine animals adapt to hypertonic seawater?**[AP M-23]**

- A:**
- 1) Sea water is high in salt content compared to that of body fluids.
 - 2) So the marine animals continuously lose water through their body surface by exosmosis.
 - 3) To overcome this problem, marine fishes have
 - Agglomerular kidneys with less number of nephrons to minimise water loss through urine.
 - The fish drinks water to compensate loss of water. But the salt content is increased due to this.
 - To remove the excess salts, salt secreting cells are present in gills.
 - 4) In many sea animals, salts enter the body along with the food.
 - 5) To remove the salts, sea gulls and penguins have salt secreting cells in nose and release drops of salts.
 - 6) Turtles and crocodiles have salt glands near eyes which release salt drops.
 - 7) Cartilaginous fishes retain urea and trimethylamine oxide (TMO) in their blood to keep the body fluid isotonic to the sea water.

18. Draw a neat labelled diagram of the mouthparts of cockroach?**Mouth Parts of Cockroach**

SECTION-C

19. 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.

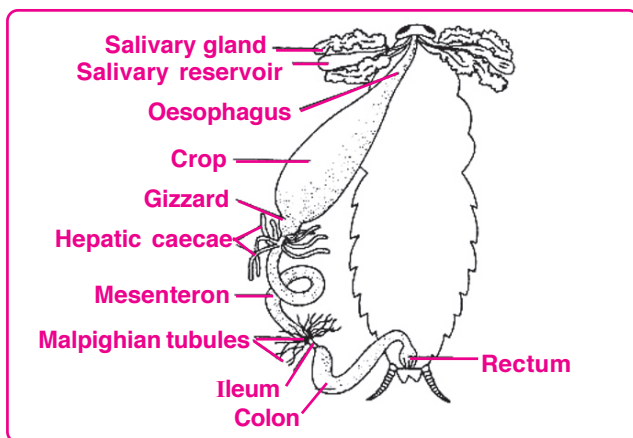
It is divided into 3 regions. They are (I) Foregut (II) Midgut (III) Hindgut

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.

II) 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.



II) 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

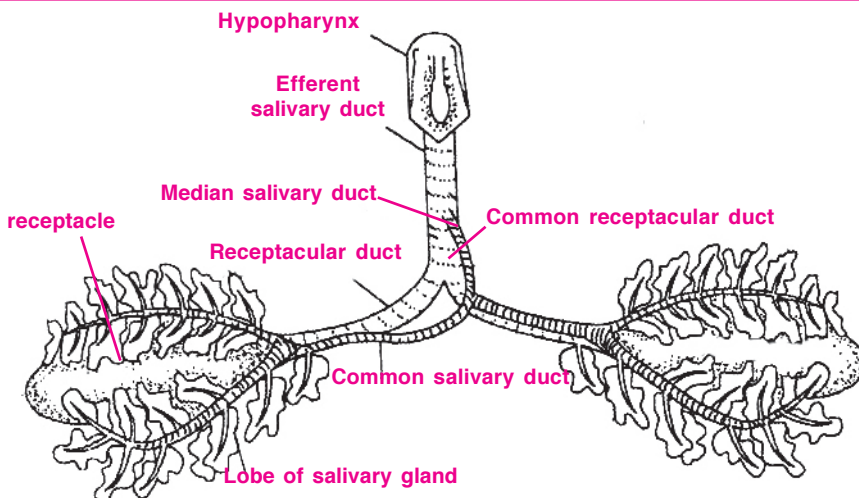
(1) Salivary glands (2) Hepatic caecae (3) Glandular cells of mesenteron.

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

20. List out the major air pollutants and describe their effects on human beings.

[AP M-17,20], [TS May-17][AP,TS-18]

A: • **Air pollution:** Any deviation from the natural composition of air in the environment, causing adverse effects to humans and plants is called air pollution. The agents which carry air pollution are called 'air pollutants'.

- **Major air pollutants:** 1) Carbonmonoxide 2) Carbondioxide 3) Sulphurdioxide
4) Nitrogen oxides 5) Aerosols 6) Noise pollution.

1) Carbon monoxide (CO) : It is produced by incomplete combustion of fossil fuels.

Sources: Automobile exhausts, Factory fumes, Emissions from power plants, Forest fires, Burning of fire wood.

Harmful effects :

- i) In the presence of carbon monoxide, oxygen carrying capacity of haemoglobin is reduced.
- ii) It causes headache and blurred vision, at lower concentrations.
- iii) It leads to coma and some times death also, at higher concentrations.

2) Carbon dioxide(CO₂): It is produced by respiration of living beings. But plants utilise CO₂ for photosynthesis.

Sources: Burning of fossil fuels (gasoline), automobiles, aeroplanes, power plants etc.

Harmful effects:

- i) When its concentration level rises above normal it results in global warming.
- ii) Global warming results so many adverse effects on mankind.

3) Sulphurdioxide(SO₂): It is mainly produced by burning of fossil fuels, melting of sulphur ores and metal smelting.

Harmful effects:

- i) Breathing problems like asthma.
- ii) Aggravation of cardiovascular problems.
- iii) Corrosion of buildings and monuments.

4) Nitrogen oxides (NO, N₂O, NO₂): They are produced by automobile exhaust.

Harmful Effects:

- i) Oxides of nitrogen and SO₂ together produce acid rains.
- ii) Acid rains acidify water bodies, spoil crops, buildings and monuments (Tajmahal).
- Nitrogen dioxide along with hydrocarbons & sunlight in foggy condition produce photochemical smog.
 - (i) Spots are formed on leaves.
 - (ii) Photosynthesis is reduced.
 - (iii) Crop yield is reduced.
- Nitrogen oxides combine with secondary pollutants to form PAN (Peroxy Acetyl Nitrate). It irritates eyes and respiratory tracts.

5) Aerosols (particulate matter): Aerosols are colloidal particles, dispersed in gas. They are produced from combustion of fossil fuels, flyash thermal plants, cement factories, asbestos plants etc.

Harmful effects: They decrease lung function. They cause Asthma aggravation, Premature death of patients of heart and lung diseases, Chronic bronchitis, irregular heart beat.

6) Noise Pollution: Undesirable high sounds (above 120dB) cause noise pollution.

Harmful effects: Extremely high sounds (more than 150 dB) damage ear drums and causes permanent hearing impairment. Noise also causes auditory fatigue, anxiety, sleeplessness (insomnia) and stress.

21. 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

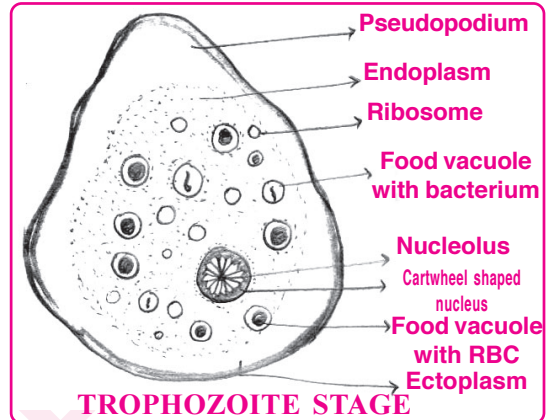
It is a monogenetic histozoic parasite.

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

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

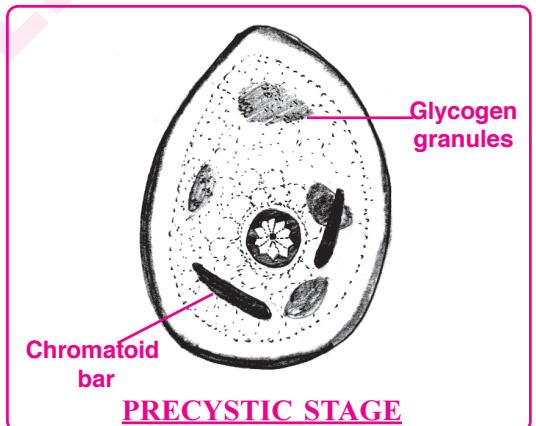
1) Trophozoite stage:

- 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.



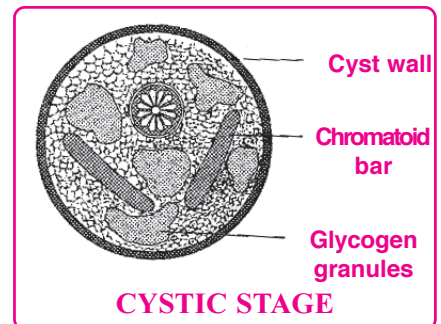
2) Precystic stage:

- i) It founds 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 founds 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 further 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.

