

## Protozoa

Protozoa is derived from two Greek words

Protos First zoon Animal

Meaning first animals. First animals due to their animal like nutrition.

These are unicellular eukaryotic heterotrophs. Study of protozoa is called Protozoology.

### Occurance:

Protozoa found in all moist habitats. They are common in sea soil and in fresh H<sub>2</sub>O. Certain free living protozoans are found in polar region at very high altitude. Parasitic protozoans are found in association with most animals. Many protozoans survive dry conditions by formation of cyst.

Optimum temperature for their growth is between 16-25° C and maximum temperature is 36-40° C.

### Importance of protozoa

#### 1. Beneficial Aspects

i) Protozoa serves as an important member in food chains of communities in aquatic environment e.g. in marine water zooplankton (animals like organism) are protozoa that feed on photosynthetic phytoplankton and they in turn become food for larger marine organisms.

Sun light → Phytoplankton (Primary producers) → Zooplankton (Primary consumers)  
↓  
Carnivores (Secondary consumers)

ii) Saprophytic and bacteria feeding protozoa make use of substances produce and organisms involved in final decomposition stage of organic matter. Dead bodies of producers consumers and their excretion products are decomposed by fungi and bacteria and they are decomposed by protozoa. So protozoans are important in degradation of sewage.

iii) In treatments of industrial wastes thee there is accumulation of nitrates and phosphates, protozoans remove inorganic material from H<sub>2</sub>O for their own synthesis and hence H<sub>2</sub>O quality is improved.

iv) Protozoans have also become important research organisms for biologists and biochemist.

#### 2. Harmful aspects:

1 Some protozoan cause diseases in animals and humans. These pathogens are of two general kinds: those that parasitize the intestinal and urogenital tracts, and those that parasitize blood cells

and tissues. Protozoal infections are common in developing tropical and subtropical regions where sanitary conditions and control of the vectors of transmission are poor.

## **Morphology of Protozoa**

### **Size:-**

They have wide variation in size and shape e.g. *lishmania donovani* has a size range of 1-4 $\mu$ m. While ciliates range about 2000  $\mu$ m /2mm.

### **Intracellular structure:-**

Like all eukaryotic cells, protozoan cells consists of cytoplasm separated from the surrounding media by a special cell envelop.

### **Cytoplasm.**

In several form of protozoa, pigments are diffused throughout cytoplasm. They can be green, brown, blue, purple or rose color. In majority of protozoa cytoplasm is differentiated into endoplasm and ectoplasm. The ectoplasm is more gel like and endoplasm is more fluid like. Structures are formal in endoplasm. These include endoplasmic reticulum, Golgi complex, mitochondria, food vacuoles, contractile vacuules and nuclei.

### **Nucleus:-**

The protozoan cells have at least one eukaryotic nucleus however many have multiple nuclei e.g. all ciliates. The protozoan nuclei are of various forms sizes and structures. In several species each individual organism has two similar nuclei in ciliates two dissimilar nuclei. One large macro nucleus and one small micronucleus. Macro nucleus controls metabolic activities and regeneration process. The micro nucleus is concerned with reproductive activity.

## **Plasma membrane and other cell covering**

The cytoplasm with its various structures is separated from external environment and its functions are:

- 1) It provides protection
- 2) Control exchange of substances.
- 3) It is site for reception of chemical and mechanical stimuli.

All protozoa possess a cell membrane. Many have compound covering of membranes referred as pellicle. Food gathering structures are diverse and range from pseudopodia in amoeba feeding tube of suctorians and well developed mouth of many ciliates.

### **Cyst:-**

Many form resistant cysts at certain times of their life cycle. These are able to survive in adverse environmental condition such as drying/ desiccation and low nutrition supply.

### **Locomotory organ:-**

These may move by three types of locomotory organ. Pseudopodia (a temporary projection of a part of cytoplasm in those protozoa which do not have a rigid pellicle.

### **Flagella and Cilia:-**

These are other locomotory organ. Flagellum is fine filamentous projection of cell. Number of cilia ranges from 1-8 in protozoa. Cilia in addition to its locomotory function also help in ingestion of food.

### **Reproduction:-**

Generally protozoa multiply by asexual reproduction. Many are able to carry out both sexual and asexual reproduction. Some parasitic forms may have an asexual phase in one host and sexual phase in another host e.g. plasmodium. Asexual reproduction occurs by simple cell division by binary fission and multiple fission and budding.

### **Sexual Reproduction:-**

In this fusion of two gametes occur in various groups of protozoa. Conjugation occurs in ciliates.

**Regeneration:**The capacity to regenerate the host part is characteristic of all protozoans.

### **Classification of protozoa:-**

Classically they were placed in Kingdom Animalia . Now protozoa might be considered as sub-kingdom of kingdom protista. The major groups are called phyla on basis of their means of locomotion.

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|------------------|-----------------------------|
| I. Amoeba        | <i>Amoeba proteus</i>       |
| II. Ciliates     | Paramecium                  |
| III. Flagellates | <i>Giardia intestinalis</i> |

IV. Sporozoa

They are mostly parasites e.g. *Toxoplasma gondii*