

## Study of the Significance of Free Living Protozoan From Mumbai Region



### Zoology

**KEYWORDS :** Protozoa, Protista, Protozoology etc.

**DR. Umakant  
Pandharinath Kamble**

Department of zoology, S.S. & L.S. Patkar varde college, S.V.Road, Goregaon (W),  
Mumbai : 400 062

### ABSTRACT

*Protozoan's are unicellular, eukaryotic organism that are placed in animal kingdom protista. The word protozoa come from the Greek word Protos and Zoon meaning "First animals are eukaryotic protists. The study of protozoa is of great practical important to man, several species form highly virulent parasites of men and animals, causing various dreadful infectious diseases particularly in the tropical countries. No less than twenty to twenty five different species of parasitic protozoa are known to live in man alone. The knowledge of these parasites is useful from the medical point of view. The knowledge of the portals of entry and means of transmission of these parasites is of vital important from the stand point of preventive medicines. Thus a general study of the phylum protozoa is most essential to understand the parasitic forms and to fight out their menace to mankind, domestic animals and crops.*

### INTRODUCTION

Free living protozoa are the excellent model for providing the information about the vital process of life. They play key role in the ecosystem defining and designing the nature saprobity, protozoa are the reliable indicator of pollution. They help in improvement of water quality. The present study regarding the water quality of taxonomic importance will be a landmark to create the awareness in the masses of the society.

The biodiversity of protozoa changes from place to place and time to time because of environmental make-up. Their presence, absence and abundance classify the water quality. Protozoan is free living as well as parasitic. Free living protozoan are present in vast number in nature and in great variety of habitats. The minute size multiplication and formation of various stages facilitate their wide distribution in all possible environmental condition. In free living aquatic protozoa most of them are ciliates. Many species of ciliated protozoa are used as indicator for the ecological monitoring of water quality and they can also be used in ecological studies of aquatic habitats in which mosquitoes and intermediate host of diseases causing organisms are breeding. In view of this, it is proposed to survey and study the composition and distribution of various species of free living protozoa in relation to some selected physico-chemical parameter. Deterioration of water quality due to pollution can be studied through the indicator organism like protozoa. The parameters as well as species composition of protozoa will be studied site wise and seasonal wise. The investigation will create the awareness regarding the saprobity in the masses of the society. The protozoa exhibit, distinct, diverse and delicate adaptation to the changing habitats in the prediction to future environmental changes. Protozoa may reduce the impact of saprobity and improve the water quality which is useful to solve day to day problems of society and country at large. The study will highlight the composition and seasonal fluctuation of protozoa from the water bodies of Mumbai region and also the saprobity system of these water bodies. It will record the role of protozoa as indicators of pollution, at the same time their contribution in the improvement of water quality.

### MATERIAL AND METHOD:

The water samples were collected from various water bodies from Mumbai city and its vicinity. Water samples were collected in plastic bottles and plastic bags or in plastic cans. Care should be taken that water must be collected along with submerged plants, decaying leaves or any other detritus material. Most of the samples were collected in morning time as the temperature affects the abundance of protozoa and they found more abundant at low temperature.

These samples were brought to laboratory and examined under the microscope for the further study and observation. Water samples were observed directly by taking water drop on a slide and it was covered with cover slip so that water cannot be dry. Protozoa are usually swim rapidly in water and hence unable to

identify. To immobilize those, 10% methyl cellulose was added to the water drop on slide. This slows the movements of organism without immediate death or bursting.

### Culture method:

When protozoa are less abundant in the water sample their population can be increased by culturing them. For cultivation of these organisms following methods are used.

- 1) Hay infusion
- 2) Wheat infusion
- 3) Rice infusion

### RESULT AND DISCUSSION:

Free living protozoans are easily cultured in the laboratory on large scale and release into the polluted water and observe the significance (function) of protozoa.

### SIGNIFICANCE OF FREE LIVING PROTOZOA:

- 1) The protozoa are free and single cell individuals possessing form and functions similar to cells of the metazoan body. The knowledge, therefore helps in the comprehension and application of the biological principles. On account of their minute size and quick reproduction they are studied by the genetics for heredity and variations. A part of the knowledge of cytology depends upon the study of protozoa. Numerous aquatic forms feed upon bacteria and help in the purification of water.
- 2) The morphological simplicity of protozoa throws light upon the beginning of the organic structure and the probably nature of the first form of life. Thus, the study of Protozoology helps in the advancement of our knowledge about the origin and evolution of life.
- 3) Protozoa play a vital role in the food chain of communities in aquatic environments. Many species of protozoan living in polluted water feed upon organic matters, which also provide food for insect larvae, crustacean and worms, such as organic matter is then consumed by large animals like fishes, lobster, crabs, which are, ultimately eaten by man. Thus they form source of food supply to man either directly or indirectly. Like other zooplankton, protozoan plays an important role in productivity of aquatic ecosystem. It also a particular importance in the ecological balance of many communities, in wetlands as well as aquatic environments are the saprophytic and bacteria feeding protozoa.
- 4) It follows that micro organism are important in the degradation of sewage. Although bacteria participate in prominent way in the process, the role of protozoa is becoming more completely understood and appreciated. Biological sewage treatment involves both anaerobic digestion and aeration. Anaerobic protozoa such as species of Metopus, Saprodinium, and Epalxis are active in the anaerobic step, while those treatment steps requiring aeration and flocculation include the aerobic protozoa such as Bodo, Paramecium, Aspidisca and Vorticella.

5) In the treatment of industrial waste, where there is an accumulation of nitrates and phosphates, the settling tanks are illuminated to promote the growth of algae and protozoa. These protists remove the organic matter from the water for their own synthesis. Water quality is improved, and the autotrophs are skimmed from the water surface, dried, and used as fertilizers. Protozoa have also become important research organisms for biologists and biochemists for the following reasons. Many protozoa are easily cultured and maintained in the laboratory. Their capacity to reproduce asexually enables clones to be established with the same genetic makeup.

6) Numerous studies have shown this ciliate to be a convenient model for the toxicological evaluation of various substances, such as carcinogens<sup>1</sup> (Bonnet et al., 2003), insecticides<sup>2</sup> (Nistiari et al. 1981), detergents, mycotoxins<sup>3</sup> (Benitez et al., 1994), bacterial toxins<sup>2</sup> (Nistiari et al., 1990), inorganic organic chemical<sup>4</sup> (Bogaerts et al., 2001), heavy metals<sup>5</sup> (Huber et al., 1990), pharmaceutical drugs, phototoxicity and environmental radiation evaluation<sup>6</sup> (Koutna et al., 2004).

7) Over the past two decades legislation in different countries adopted restrictive criteria for the use of laboratory animals in scientific and educational purposes, which brought about the necessity to introduce the alternative research<sup>7</sup> (Balls, 2002). The protozoan *Tetrahymena* (Nistiari et al., 2003) appeared to be a beneficial model for studies of environmental and industrial pollutant and biological toxins. *Tetrahymena* is as valuable unicellular animal model organism for determination of xenobiotics and drug toxicity.

8) Protozoa also contribute in the mitigation of global warming. Photosynthetic species of protozoa act like trees. They use carbon dioxide to manufacture carbohydrates during photosynthesis. Photosynthetic protozoa use carbon dioxide dissolved in the ocean. Oxygen molecules released by protozoa during photosynthesis are used by aquatic animals. Adequate dissolved oxygen in aquatic environments is important for the survival of aquatic animals. Oxygen is basic life necessity as it is needed in respiration or energy production.

9) Some free-living ciliates may reduce pollution. A good example of it is *Coleps*. It can engulf the whole rotifer, whereas many bacterivorous ciliated protozoa feed upon bacteria and play an important role in sanitary betterment of water quality.

10) Therefore, it can be concluded that protozoans constitute an important component of aquatic ecosystem and that should not be ignored in limnological studies of zooplankton abundance and distribution.

## REFERENCE

1. Balls, 2002 by organism living on and in protozoa | 2. Cheng T.C. 1986 by General parasitology 11nd ed. | 3. Kudo, R.R. 1966. Protozoology 5th ed. Springfield III Thomas. | 4. Finlay B.J. Freshwater protozoa: Biodiversity and ecological function and conservation. 7:1163-1186. | 5. Bick (1972): Ciliated protozoans: As illustrated guide to the species used as biological indicators. | 6. Calkins G.H. 1902 Marine Protozoa from Woods Hole, Bull. U.S. Fish Comm. | 7. Corliss J.O. (1952) Silver impregnation of ciliated protozoa by the Chatten-Lwoff technique. Stain Technology 28:97. | 8. Pitelka D.R. (1949) Observation of flagellar structure in flagellate |