Lecture No. B1MICP1U5.2.2

GENERAL ACCOUNT AND ECONOMIC IMPORTANCE OF PROTOZOA

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ECONOMIC IMPORTANCE OF PROTOZOA

Mrs. Neetu Das
Assistant Professor (Microbiology)
Govt. V.Y.T. PG. Autonomous College , Durg ,C.G

The protozoa are acellular, microscopic organisms found everywhere, in water; soil, on the body of plants and animals. Although they are minute and apparently insignificant, but they are of considerable economic value to the mankind.

1.Beneficial Protozoa:

The protozoa are useful in the following ways:

Food:

Protozoa provide food for insect larvae, crustaceans and worms, which are taken by large animals like fishes, lobsters, clams, and crabs, which are eaten by man. Thus they form sources of food supply to man both directly and indirectly.

Symbiotic Protozoa:

Certain protozoa like Trichonympha and Colonymphya etc. live in the gut of termite, which help in the digestion of cellulose. The digested cellulose is utilized by the host.

Insect Control:

Several protozoa control harmful insects by persisting their bodies.

Helpful in Sanitation:

A large number of protozoa living in polluted water feed upon waste organic matters and thus purify it. Many protozoa feed upon bacteria and play important role in the sanitary betterment and keeping water safe for drinking.

Industry:

The skeletal deposits of marine protozoa (Foraminifera and Radiolaria) from oceanic ooze at the sea-bottom. About 30% of oceanic bed is covered with the Globigerina ooze. These skeletal deposits are put to many uses. Some are employed as filtering agents, others are made into chalk and still others are used for abrasive.

Building Material:

The skeletal deposits in due course of time change into the limestone rock. Limestone is provided by the Globigerina ooze, such as that of cliffs of Dover, which have played an important role in the defence of England. Comerina (Formally known as Nummulites, are the largest protozoa, which form limestone. Thus, limestone-beds are used as building material.

Oil Exploration:

Petroleum is organic origin. The skeletal deposit of Forminifera and Radiolaria are often found in association with oil deposits. In this mean; they help in the exact location of oil.

Scientific Study:

Many protozoa are used in biological and medical researches. A Holotricha. Tetrahymena geleii is used in nutritional research. The effects of various foods and poison have been investigated on this protozoan.

2. Harmful Protozoa:

The protozoa are harmful in following ways:

i. Pollution of Water:

Drinking water in natural condition is made unpalatable by the reproduction of some free-living protozoa in it. For example, Uroglenopsis brings flashy odour like that of cod- liver oil. Peridinium emits smell resembling that of clam-shells.

Destruction of Animals of Food Value:

Dinoflagellates like Noctiluca and Gonyaulax, when become abundant, are responsible for turning the ocean red. The water becomes foul and cause toxic reaction to molluscs like clam oysters and mussels and they become unfit for eating by human beings.

Destruction of Wooden Articles:

Some flagellates like Trichonympha and Colonympha live in the gut of termites and help in the process of cellulose digestion. In the absence of these flagellates the termites will die or change their diet. Thus such protozoa indirectly help in distraction of wooden articles and books.

Reduction in Fertility of Soil:

It has been observed that about 200- 300 species of protozoa are present in soil. These protozoa feed on nitrogen-fixing bacteria thus reduce the fertility of soil.

Parasitic Protozoa:

Parasitism is an association of two organisms in which one organism lives at the expense of the other giving nothing in return. The first animal is called parasite and other the host. Parasitism is a specialized mode of life and various level of it are found in protozoa. There are two type of parasites on the basis of their survival Facultative parasites are those that can live for various lengths of time without the host. The obligatory parasites are those which can-not survive when separated from their host.

Ecological and industrial importance of protozoans

Protozoans play important roles in the fertility of soils. By grazing on soil bacteria, they regulate bacterial populations and maintain them in a state of physiological youth—i.e., in the active growing phase. This enhances the rates at which bacteria decompose dead organic matter. Protozoans also excrete nitrogen and phosphorus, in the form of ammonium and orthophosphate, as products of their metabolism, and studies have shown that the presence of protozoans in soils enhances plant growth.

Protozoans play important roles in wastewater treatment processes, in both activated sludge and slow percolating filter plants. In both processes, after solid wastes are removed from the sewage, the remaining liquid is mixed with the final sludge product, aerated, and oxidized by aerobic microorganisms to consume the organic wastes suspended in the fluid.

In the activated sludge process, aerobic ciliates consume aerobic bacteria, which have flocculated (formed loose aggregates, making them easily separated from liquid). In the percolating filter process, substrates are steeped in microorganisms, such as fungi, algae, and bacteria, which provide food for oxidizing protozoans.

In the final stages of both processes, solids settle out of the cleaned effluent in the settlement tank. Treatment plants with no ciliates and only small numbers of amoebae and flagellates produce turbid effluents containing high levels of bacteria and suspended solids.

Good-quality, clean effluents are produced in the presence of large ciliated protozoan communities because they graze voraciously on dispersed bacteria and because they have the ability to flocculate suspended particulate matter and bacteria.

Protozoans probably play a similar role in polluted natural ecosystems. Indeed, there is evidence that they, by feeding on oil-degrading bacteria, increase bacterial growth in much the same way that they enhance rates of decomposition in soils, thereby speeding up the breakdown of oil spillages

Some radiolarians and foraminiferans harbour symbiotic algae that provide their protozoan hosts with a portion of the products of photosynthesis. The protozoans reciprocate by providing shelter and carbon and essential phytonutrients. Many ciliates contain endosymbiotic algae, and one species, *Mesodinium rubrum*, has formed such a successful relationship with its red-pigmented algal symbiont that it has lost the ability to feed and relies entirely on symbiosis for its livelihood.

Mesodinium often forms dense red blooms, or red tides, when it reaches high densities in water. Among the ciliates with endosymbionts, *Mesodinium* is the only completely photosynthetic species. Other ciliates achieve photosynthesis in another way. Although they do not have symbiotic algae, they consume plantlike flagellates, sequester the organelles that contain the plant pigments, and use them for photosynthesis. These organelles are known as plastids. Because the isolated plastids eventually age and die, they must be replaced continuously.

The impact of protozoan grazing on phytoplankton can be considerable. It has been estimated that at least half of the phytoplankton production in marine waters is consumed by protozoans. Like the soil protozoans, these planktonic protozoans excrete nitrogen and phosphorus at high rates. The protozoans are a fundamental component in recycling essential nutrients (nitrogen and phosphorus) to the phytoplankton.

REFERENCES

1.Economic Importance of Protozoa | Zoology Article Shared by Shrikant M

2.REFERENCE, ENCYCLOPEDIA BRITANICA Protozoan MICROORGANISM ARTICLE MEDIA

3. M.J.PELCZAR,JR , E.C.S.CHAN , N.R. KRIEG, MICROBIOLOGY, TATA MCGROW-HILL , 5 TH EDITION PAGE 389-413