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Research Paper ZOOLOGY

Study of the Biodiversity of Free Living Protozoa from Mumbai Region , Maharashtra.

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ABSTRACT

The distribution and abundance of fresh water protozoa is guided like to other microbial communities by a variety of ecological factors. The environmental condition in which ciliate can live and multiply, there is always an optimum range for each group.(Kudo,1966).During the year Dec.2008 to Dec 2011,total 50 water samples were collected of which 20 samples were found to be positive for protozoa and total percentage of prevalence was 40%.The maximum percentage of prevalence was recorded in the month of January, which gradually decreases upto March. In the month of May there was no protozoa recorded from the water samples and hence prevalence reaches to zero.Whereas in summer high temperature and low percentage of ammonical nitrogen, organic nitrogen and oxidizable organic matter have been noted and this affects the ciliate density. The ciliate are more sensitive to pH and chlorinity. It has been also noted that activation energy for multiplication an indicator for temperature dependence of microorganism was higher for protozoa (Finlay B.J. 1988)

KEYWORDS: Protozoa, Protista (Protozoology).

INTRODUCTION:

Protozoa are unicellular animals. The body of protozoa is morphologically a single cell and manifest all characteristics common to the living things. The various activities which make up the phenomena of life are carried on by parts within the body or cell. These parts are comparable in function with the organ of metazoan which are composed of a large number of cells grouped into tissues and therefore called organellae. (Kudo,1966).Protozoa are efficient at gathering microbes as food and they are sufficiently small to have generation times that are similar to those of food particles on which they feed. The biodiversity of protozoa changes from place to place and time to time because of environmental make up. Their presence, absence and abundance classifies the water quality. Protozoa are 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 facilated their wide distribution in all possible environmental condition. Fresh water protozoa are found in 16 of the 34 protist phyla in the Corliss (1994) classification. Some phyla are particularly well represented, including the ciliates(phylum – ciliophora),chryso monads (phy-phaeohyta),choanoflagellates(phylum-choanozoa),the naked and testate amoebas (phy-rhizopoda) and the heliozoans(phylum-heliozoa).The present study covers biodiversity and morphology of free living protozoan from fresh water bodies of Mumbai region(M.S.) India. During this study total number of 12 species has been recorded.08 species of ciliates,01 species of flagellate,01 species of rhizopod,01 species of actinopod,01 species of suctorian have been reported from different fresh water bodies including ponds, lake, river and tanks.

MATERIAL AND METHOD:

The water samples were collected from various water bodies of Mumbai city and its vicinity. These samples were brought to laboratory and examined under the microscope for the further study and observation. Water samples were observed directly by taking a water drop on a slide and add one drop of 10% methyl cellulose and it was covered with cover slip and observed under the low power of microscope for further study. As far as possible examine fresh preparations with low power objectives.

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.

i) Hay infusion ii) Wheat infusion iii) Rice infusion

SLIDE PREPARATION:

Fresh Preparation (Temporary mounting):

In making fresh preparation with the large protozoa care must be exercised to avoid pressure of the cover slip on the organism as this will caused deformities. If small bits of detritus debris are included in the preparation, the cover slip will be supported by them and the organism will not be subjected to any pressure. In this preparation a small drop of water is placed in the center of the slide and is covered by a cover slip. Then observe the slide under the microscope for further study. As far as possible examine fresh preparations with low power objectives.

Permanent Preparation (Permanent mounting):

Various fixatives and stains produce different results, care must be exercise in making and evaluating permanent preparations. The smear was taken on the slide and kept for drying .After drying the smears are fixed next. The most commonly used fixative for protozoa is Schaudinns fluid. The slides are placed in this Schaudinns fluid for 15 to 20 minutes and then transferred to lugoles iodine and hypo solution for five min in each solution. A Smear then passed through a series of different grades of alcohol and after rapidly rinsing in distilled water it is placed in Haematoxylene stain for one and half hour but smear is placed for whole night in case of transparent organisms. The smears are then washed in distilled water and dehydrated through a series of alcohol and mounted in DPX or Canada balsam.

To study the kineties, silver impregnation method was used. In which silver nitrate is applied in demonstrating the silver line system of ciliates.

RESULT AND DISCUSSION:

BIODIVERSITY OF FREE LIVING PROTOZOAN:

CILIATES:-

1. AMPHILEPTUS LANCEOLATUS

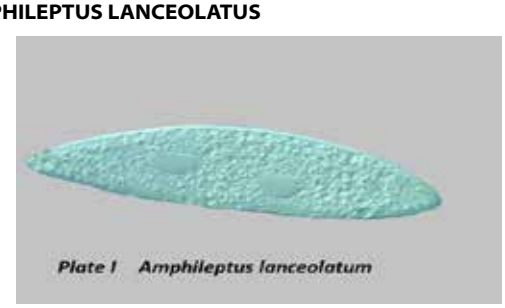


Plate I Amphileptus lanceolatum

Description:

The present species is flattened & flask shaped Ant end is short neck & somewhat bends towards post side ventral side. Body measures 100µ-150µ in length and 40µ-60µ in width cytostome is about two fifth

from ventral margin. There is no trichocyst and dorsal ciliary rows is not distinct. There are two spherical micronucleus situated in the middle of the body. A small micronucleus has been situated in between these two macronuclei. There is one terminal contractile vacuole with satellite.

2. BLEPHARISMA ELONGATUM

Plate II Blepharisma elongatu

Description:
Body of this organism is flat and compressed. Left side is slightly curved, where as the right side is more or less convex, dependent on the number of food vacuoles present. It measures 195µm long and 65µm wide. The peristome extends about half of the body length and it contains an adoral zone of about 40 membranelles (AZM) and conspicuous undulating membrane extending about half the length of the peristome. The oral region revealed a typical undulating membrane of closely packed dikinetids of which only one kinetosome was ciliated. A large number of the peristome was occupied by cytopharyngeal ribbons. The cytoplasm is highly vacuolated contain compact macronucleus, micronucleus and food vacuoles.

3. CHILODONELLA UCINATA

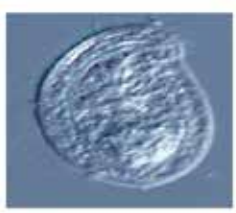


Plate III Chilodonella ucinata

Description: This species is first reported by Ehrenberg, 1935. Body is ovoid in shape and dorsoventrally flattened. It measures about 50-80µm in length and 24µ-38µ in width Ventral surface contains 11 cilary rows and dorsal surface has cross rows of bristles. The cytostome are rounded or oval in shape. Two contractile vacuous are observed one at anterior side near the cytopharynx and other at posterior end near the macronucleus. Macronucleus is ovoid or rounded in shape and situated at the posterior end of the body. Micronucleus is small spherical situated within macronucleus.

4. COLEPS BICUSPID

Plate IV Coleps bicuspid

Description: This species was firstly reported by Noland (1925). This species have barrel shaped body, which is covered by regularly arranged prominent ectoplasmic pellicular plates that are made of amorphous calcium carbonates. Body is flattened and measured about 55µ to 65µm in length.

Oral aperature is at anterior end and surrounded by long cilia. There are about 14 to 16 longitudinal rows of plates are present. At the posterior end there are two spinous processes are seen.

It occurs in reservoirs, lake and ponds. These organisms feed on other protozoan or rotifers etc.

5. EUPLOTES EURYSTOMUS

Plate V euplotes eurystomus

Description:
This ciliate is firstly reported by Wrzeshiweski1870. Body is ovoid in shape, measuring about 110 to 195 µm and width of 70 to 130 µm in diameter. The ventral side of body shows rows of cilia called cirri. These are of 9 front ventral cirri, 05 transverse cirri, and 02 left marginal and 2 right caudal cirri. Cirri are generally used for swimming and also to walk along substrate water. The oral surface is flat where as aboral surface is convex and slightly ridged. The end of cytopharynx is flat to left and anterior to the fifth and cirrus (Kudo 1966). There are six ventral ridges extending from the transverse cirri adoral zone of memberanelle lies in flat furrows and is widest anteriorly and extends posteriotly in a helical manner.

6. TINTINNOPSIS BEROIDEA

Plate VI Tintinnopsis beroidea

Description:
T. beroidea was first reported by Stein (1867). The lorica of the forms of genus Tintinnopsis is composed of an inner chitinous layer. Body is bullet shaped usually cylindrical in the anterior region. It measures 30 to 60µm in length. Posterior region is conical in shape, where as the aboral end is acute or bluntly pointed. (Brandt 1906)

The adoral zone of membranelles is well developed. The body ciliation is sparse or lacking. Body wall is thin and covered with foreign particles.

7. HYPOTRICHIDIUM CONICUM

Plate VII Hypotrichidium conicum

Description:
Body of this species is broad and reniform. It measured about 100µ-180µ in length. The anterior end is broadly rounded while posterior end is more pointed. The peristome is large and has an undulating membrane. AZM is extend one half of the body length. There are two rows of ventral cirri and two rows of marginal cirri.

There are two ovoid macronuclei present in a longitudinal row and two micronuclei are observed each is present near the macron

8. OXYTRICHA LUDIBUNDA

Plate IX Oxytricha ludibunda

Description:
Present species is broadly ellipsoid and narrow, anterior end and post. end are broadly rounded. Body measures 50µ to 60µ in length and 25µm to 30 µm in width. There are two, ovoid macronuclei present. Adoral zone of memberanelle extend to one third of the body length. 8 Frontals, 5 ventral's, 5 anals and short caudals are present. The contractile vacuoles are absent.

FLAGELLATE:-
1. EUGLENA SPIROGYRA

Plate XVI Elugelana spirogyra

Description:
Body is cylindrical form with narrow anterior end and rounded posterior end. The body measures 60µ-115µ in length by 8µ-40µ in width. The anterior end there is an opening through which a flagellum protrudes. Flagellum arises from a blepharoplast located in the cytoplasm. Between the blepharoplast and the flagellum shows small swelling, the paraflagellar body which is situated on the junction of the two roots (axonemes) of flagellum (Holande, 1942). The flagellum about one fourth of body Length. Many discoid chromatophores are present. The two ovoid paramylum bodies scattered in two third of the body. Stigma is sluggish and prominent nucleus is centrally placed.

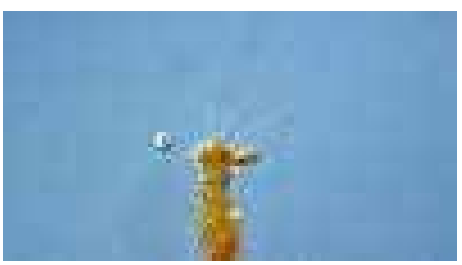
RHIZOPODA:-
1. AMOEBA PROTEUS

Plate XVII Amoeba Proteus

Description:
Body of this organism is transparent, amoeboid, and elongate and club shaped. It does not have a definite shape and pellicile. It measures about 100µ-300µ in length and 50 µ to 180 µ in width, when moving. The cytoplasm is containing ecto and endoplasm. The ectoplasm is hyaline, elastic and bears number of longitudinal lobopodia. The endoplasm contains vesicular nucleus, contractile vacuole, food vacuoles, mitochondria granules fat bodies and crystals. Pseudopodia are smooth and blunt. They have both ecto and endoplasm. These Pseudopodia are lobopodia and help the individual in locomotion.

ACTINOPOD:-
1. ACTINOPHRYS VESICULATA
Description: Body is spherical in shape. It is colourless and measures about 30µ-40µ in diameter. Ectoplasm is contain secondary vesicle with saccate and endoplasm is contain a large contractile vacuole. Pseudopodia are radiating and extend from all parts of the body with axial filaments arising from the membrane of the single nucleus. Pseudopodia are usually needle like and also called axopodia. Nucleus is spherical, centrally placed. It is solitary but may be colonial when young.

SUCTORIAN:-
1. ASTROPHYRA AREANARIA



Description:
Body of this species is stellate and branched. It measures about 120µ to 160µ in diameter. The eight elongate process arises from central portion and

each of them is 60µ to 140µ long. These processes are broad at the base and pointed at the distal end. Body is covered with sand granules and other objects.

Macronucleus and micronucleus are not found in present species. Cytostome is absent. Single contractile vacuole observed at the base of tentacles. This species found in fresh water pond of Mumbai region.

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