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DIVERSITY OF FREE-LIVING CILIATED PTOTOZOA FROM PRAVARA RIVER AHMEDNAGAR

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ABSTRACT
The current research work covers the diversity of freeliving ciliated protzoa from freshwater bodies of Pravara river Ahmednagar regions in Maharashtra (India). During this study, a total of 7 species of ciliates recorded, *Paramecium caudatum, Paramecium multimicronucleatum, Paramecium etraurelia,Vorticella companula, Stenor polymorphus, Euplotes eurystomus*, *Stylonychia mytilus,* from pravara river Ahmednagar. The identification has been made mainly on the basis of body shape, size, arrangements of cilia, and structure of macro- and micronucleus.
Key words: diversity ;freeliving ciliated protzoa, Pravara river

INTRODUCTION

Protozoa is a Greek word meaning proto = first, zon = animals. As the name indicates, they are the first phylum of the animal. Protozoa are microscopic unicellular eukaryotes that have a relatively complex internal structure and perform a complex metabolic activity. More than 67,000 species have been described, most of them are free-living protozoa are found in almost every habitat.

Free-living protozoa are an excellent model for providing information about the vital process of life. Protozoa play a major role in the ecosystem that defines and designs nature; they are a reliable indicator of pollution.

It helps to improve the water quality because the biodiversity of protozoan changes from one place to another and from time to time due to the ecological composition of their presence, absence, and abundance. Water quality is classified as a free-living protozoan as well as a parasite. Free-living parasites are found in large numbers in nature and diverse habitats. The exact size doubling and formation of the different phases facilitate its wide distribution in all possible environmental conditions.

In free-living aquatic organisms, most of them are ciliates. Many species of ciliated protozoan are used as an indicator for environmental monitoring of water quality and can also be used in ecological studies of aquatic habitats in which mosquitoes and other intermediate hosts of pathogenic organisms reside.(Bick 1972) Because of this, it is proposed to study the diversity of different species of free-living ciliated protozoa.

MATERIAL AND METHOD

Freshwater samples were collected from different geographic locations of Pravara River. Pravara river selected as a freshwater body for the present investigation, is an important tributary of Godavari, rises on the eastern slopes of the Sahayadris between Kulang and Ratangad mountains in the Ahmednagar District of Maharashtra. Water samples were collected in plastic bottles and jars. And care was taken that water must be collected along with submerged plants, decaying leaves, surface scum, ooze and bottom water sample were collected mostly in the morning because temp also affects the abundance of ciliated protist in movement of ciliates unable to identify them, to immobilize their movement methyl cellulose (2%) is added on slide, containing ciliates. A drop of methyl cellulose was added to one edge of preparation so that it seeps under the cover slip and diffuses across. (T.T. Shaikh 2006 & Jagtap *et al.,* 2010) .

FIXING:

Schaudinn's liquid: a broad-spectrum protozoan stabilizer, the stabilizer added slowly, to fix a drop of ciliates culture on a slide, one part Schaudinn's liquid was added to three parts of water. one drop of diluted fixative to one drop of ciliates culture on slide.

STAINING:

Staining of ciliophora group done by silver impregnation (Klein 1961) and Tungstophosphoric haematoxylin stain and Feulgen nuclear reaction method (Kudo1981 & T. T. Shaikh 2006) A drop of ciliated culture was added onto a slide and covered with a cover slip, one to two drops of 0.1% methylene

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blue solution was added to the edge of the cover slip, where it stained the nucleus, cytoplasm granules, and cytoplasm processes of primary ciliates.

For detailed determination of ciliates; the hematoxyline followed by Lugol's iodine, Hypo solution and grades of alcholol

CULTURE METHOD:

When ciliates are less abundant in the water sample, the population can be increased by raising them using the following methodsT. T. Shaikh 2006) Hay infusion ,Wheat infusion, Rice infusion.

RESULTS AND DISCUSSION

In the present study total seven species have been found from Pravara river. For identification of ciliated protist done after Corliss and Bick 1972. The identification parameter are given in table.1 & 2. For taxonomic identification the ciliate were immediately observed, on the day of collection, because as time goes, population is changing radically both in terms of number of individuals and species composition. Methyl cellulose has been found to have many advantages, as it arrest the movement, ciliates can be identified by their appearance. The species identification has been made mainly on the basis of arrangement of cilia, size and shape of body and structure of macro- and micronucleus (T.T.Shaikh 2006) Within four months (January, February, March, and April 2021) of collecting samples from the Pravara river, the samples were examined in the laboratory under the microscope with a lens of 10 and a lens of 40 and 100, and 5 species of ciliates were found. In January, 6 samples of sample (river water) were collected in plastic bottles and jars and brought to the laboratory, then the agricultural mediums were made for them for one to two weeks, 3 species were observed under the microscope on the lens of 10 and 40 (*Paramecium caudtum, Euplotes eurystomu, and Stenor polymorphus*). In February 6 samples of river water were brought, and 4 species were observed under the microscope under the lens of 10 and 40 (*Paramecium Caudtum, Paramecium aurelia, Paramecium multimicronucleatum, Vorticella companula, Euplotes eurystomu*). In March, 6 samples of river water were brought, and 5 species were observed under the microscope under the lens of 10, 40, and 100 (*Paramecium Caudtum, Paramecium aurelia, Paramecium multimicronucleatum, Vorticella campanula, Euplotes eurystomu, Stylonychia mytilus*). In April, 6 samples of river water were brought, and 5 species were observed under the microscope under the lens of 10, 40, and 100 (*Paramecium Caudtum, Paramecium aurelia, Paramecium multimicronucleatum, Euplotes eurystomu).*

The systematic position of freeliving protist are listed below:

Order HOLOTRICHIDA
Family Parameciidae
Paramecium caudatum
Paramecium Aurelia
Paramecium multimicronucleatum
Order PERITRICHIDA
Family Vorticellidae
Vorticella companula
Order HETEROTRICHIDA
Family Stenoridae
Stentor polymorphus
Order HYPOTRICHIDA
Family Euplotidae
Euplotes eurystomu
Order HYPOTRICHIDA
Family Oxytrichidae
Stylonychia mytilus

Table1. Morphology of Free Living Protozoa (Cilliate):

S1: No	Particulars	*Paramecium multimicronucleam*	*Paramecium caudatum*	*Paramecium aurelia*	*Vorticella companua*
1	Body Shape	Foot Shape	Foot Shape	Cigar Shape	Bell Shape
2	Ciliary Rows	Complex	Complex	Complex	Vertical Line, Ball Shaped

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3	Macronucleus	One	Eleven	One	One
4	Micronucleus	Four	One Compact	Two Compact	One
5	Contractile Vacuole	Three-Seven Anterior And Posterior	Two	Two	One
6	Habitat	Fresh Water	Fresh Water	Fresh Water	Fresh Water

Table2. Morphology of Free Living Protozoa (Ciliate):

S1: No	particulars	*Stylonychia mytilus;*	*Stenor polymorphus*	*Euplotes eurystomus*
1	Body Shape	dorsoventrally flattened	Rumpet shaped	Elongated ellipsoid
2	Ciliary Rows	The somatic ciliature consists of 8 frontal cirri, 5 ventral cirri, 5 transverse cirri, 3 caudal cirri, 20-25 right marginal cirri and 15 left marginal cirri	The buccal itself is equipped with row of smaller cilia	Nine frontal ventral, seven rows of bristles
3	Macronucleus	Tow	macronucleus rosary-shaped	three
4	Micronucleus	Tow	-	One
5	Contractile Vacuole	-	One spherical contractile vacuole	-
6	Habitat	Fresh water	Fresh water	Fresh water

Paramecium caudatum:

The most widely distributed. The body is foot-shaped, more or less flattened; uniform ciliation except for a group of long caudal cilia. A long broad oral groove (vestibule) that leads to the buccal cavity and the buccal ciliary. With 11 macronucleus, 1 compact micronucleus, 2 contractile vacuoles, and numerous prominent trichocysts. (Hartmut Bick, 1972).

***Paramecium aurelia*:**

The morphological kind of aurelia is cigar-shaped or oblong. It consists of two small vesicular micronuclei, a massive macronucleus, and two contractile vacuoles on the aboral surface, posterior end is more rounded than P. caudatum. It is found in freshwater. (Richard R. Kudo, 1977).

***Paramecium multimicronucleatum*:**

The body contains three to seven contractile vacuoles; four or more vesicular micronucleus, and a single macronucleus. It occurs in freshwater. (Richard R. Kudo1977). The spherical micronucleus was usually located along the macronucleus quite close to the latter. The nuclei had a more oval shape. (Sergei Fokin, 1997).

Vorticella companula:

Body shape is bell-shaped. The peristome extends considerably outwards. The vestibulum is enormous and covered in an undulating membrane. The length of the macronucleus roughly follows the length of the cell's longitudinal axis. The Micronucleus is one and it is very long and worm-like and the contractile vacuole is one near the buccal cavity. (Hartmut Bick, 1972).

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Stentor polymorphus:

The shape is very similar to that of S. it had macronucleus rosary-shaped. (Hartmut Bick1972). The granular cytoplasm contained an elongated macronucleus and a spherical contractile vacuole with alternating green. (Reid P.C. and John A.W.G. ,1983).

Euplotes eurystomu:

The body had an elongated ellipsoid, 9 frontal-ventrals, 7 rows of bristles; peristome wide deep; peristomal depression sigmoid, macronucleus 3-shaped and it is near the flattened anterior corner of macronucleus. It is found in freshwater. (Arthur C. Borror and Bruce F., 1995).

Stylonychia mytilus:

The body measures 250-300 um in length and is dorsoventrally flattened, with a rounded anterior end and a pointed; it has two macronuclei and two spherical micronuclei. There are 5 ventral and 8 frontal cirri in the somatic ciliature. (Michel Tuffrau,

References:

1. **Arthur C. Borror and Bruce F. Hill**, (1995). The Order Euplotida (Ciliophora): Taxonomy, with Division of Euplotes into Several Genera. J. Eukaryot. Microbiol. 42(5):457-466.

2. **Hartmut Bick**, (1972). Ciliated Protozoa: An Illustrated Guide to The Species Used as Biological Indicators in Freshwater Biology. *Geneva: World Health Organization: 1-195.*

3. **Jagtap M.N., Dama L.B., Shaik K.A. and Shaik H.G**., (2012). Isolation of Phytoplankton's From Three Urban Lakes of Solapur City, Maharashtra State, India. *DAV Int. J. Sci.* 1(2): 68-71.

4. **Michel Tuffrau, Ghislaine Fryd-Versavel, and Helene Tuffrau**, (1981). La Reorganisation Infraciliaire au Cours de la Conjugaison chez Stylonychia Mytilus. *Protistologica* XVII (3):387-396.

5. **Pandharinath Kamble U**., (2012). Study of the Prevalence of Free Living Protozoa from Mumbai Region, Maharashtra. *Indian Journal of Fundamental and Applied Life Sciences. 2 (4):144-147.*

6. **Pandharinath Kamble U**., (2014). Study of the Significance of Free Living Protozoan from Mumbai Region. *International Journal of Scientific Research. 3 (4): 2277-8179.*

7. **Reid P.C. and John A.W.G.**, (1983). Resting Cysts in the Ciliate Class Polyhymenophorea: Phylogenetic Implications. J. Protozool. 30(4):710-713.

8. **Ravindra Bakare and Savita Nalawade**, (2018). Protozoan Fauna of Freshwater Habitat in Water Body on Ajinkyatara Fort Dist. Satara, Maharashtra, *in December 2017. 9, (3): 25395-25398.*

9. **Ranju Radhakrishnan and Jayaprakas V**. (2015). Free Living Protozoans As Bioindicators In Vembanad Lake, Kerala, India, an Important Ramsar Site. *International journal of fisheries and aquatic studies; 2(3): 192-197.*

10. **Richard Roksabro Kudo**, (1931). Handbook of Protozoology, Baltimore, Maryland.

11. **Richard R. Kudo**, (1977). Protozoology. U.S.A: Charles C Thomas*., 0-398-01058-7.*

12. **Salah Shanan Hadi e t al** (2015). Prevalence of Protozoa Species in Drinking and Environmental Water Sources in Sudan. *Hindawi Publishing Corporation Biomed Research International.* Article ID 345619.

13. **Shaikh A. S. e t al** (2014). Study of Aquatic Protozoan in Neher-E-Ambary in Aurangabad Vicinity. *Int. Sci. J.* 1(1): 39-45.

14. **Sergei Fokin**, (1997). Morphological Diversity of the Micronuclei in *Paramecium. Arch. Protistenkd. 148 (1997): 375-387.*

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 11, Dec 2022

15. **T.T. Shaikh (2006)***: Studies on some free living and Parasitic Ciiliates. Ph. D thesis of. Dr. B. A. M. University Aurangabad.* http://hdl.handle.net/10603/121738

16. **Wilhelm Foissner and Helmut Berger**, (1996). A Use-Friendly Guide to the Ciliates (Protozoa, Ciliophora) Commonly Used By Hydrobiologists as Bioindicators in Rivers, Lakes, and Waste Water, With Notes on Their Ecology. *Freshwater Biology 35:375-482.*