RESEARCH ARTICLE

Morphological studies on soil protozoa *Euplotes eurystomus* from Godavari basin area at Paithan District

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ABSTRACT

The majority of protozoan species are free living, and they are indicators of pollution. Free living protozoan can be found throughout the environment and are particularly abundant in soil and water. A study had been undertaken on the soil protozoan fauna of Paithan. During the present study *Euplotes eurystomus* species was recorded in Paithan district. The morphology of *Euplotes eurystomus* species was investigated using living observations at light microscopic level and by staining method. Additional data and details on the morphology of *Euplotes eurystomus* described and illustrated. This paper is helpful for their identification of *Euplotes eurystomus.*

Keywords: Protozoa, soil, *Euplotes eurystomus*

INTRODUCTION

Protozoa play an important role in mineralizing nutrient, making them available for use by plant and other soil organisms. Protozoa have a lower concentration of nitrogen in their cells than the bacteria they eat. (The ratio of carbon to nitrogen for protozoa is 10:1 or much more and 3: to10:1for bacteria.) Bacteria eaten by protozoa contain too much nitrogen for the amount of nitrogen protozoa need .They release the excess nitrogen in the form of ammonium (NH_4). This usually occurs near the root system of a plant .Bacteria and other organisms rapidly take up most of the ammonium. Protozoa are also an important food source for other soil organisms and help to suppress disease by competing with or feeding on pathogen .Protozoa also play an important role in regulating the bacterial population. For proper quality and texture of a soil, protozoa have their definite role. For the present study the selected area of Paithan Taluka is fully supported by the Godavari basin. Now a day Godavari is polluted by various ways, hence the aim of this work is to find out the various species of soil protozoa.

MATERIALS AND METHODS

Soil sample was collected in plastic bags. Most of the samples will be collected in morning time as the high 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.. As the soil protozoa need water to move and that plays a big role in determining them, soil was diluted with chlorinated water and observed under the microscope by taking a drop on a slide. Protozoa are usually swim rapidly in water and hence unable to identify. To immobilize those, 10% methyl cellulose will be added to the water drop on slide. This slows the movement of organism without immediate death or bursting.

Culture method

When protozoa are less abundant in the water samples 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

RESULTS AND DISCUSSION

Description of Genus

Peristome large with well-developed adrenal zone; ventral in group and reduced; anal of five cirri conspicuous. Genus *Euplotes* Ehrenberg Inflexible body ovoid;ventral surface flattened, dorsal surface convex ;longitudinally ridged; peristome broadly triangular; frontal part of adoral zone lies in flat furrow;nine or more frontal-ventral; five anal; four scattered caudal; macronucleus band like; a micronucleus; contractile vacuoles posterior;fresh or salt water (comparative morphology, Pierson, 1943, Tuffrau, 1960; symbiotic bacteria, fauna Fremiet, 1952; marine species, Borror , 1962).

Description of Species

E.eurystomous is elongated ellipsoid in shape. Length of *E.eurystomus* is about 133 –98 um (Average 115.42) and width is about 105 –67.2 um (Average 90.3).Nine front ventral cirri are present. Five transverse cirri are present .Three caudal cirri are present. Peristome wide and deep, peristome depression is sigmoid. Macronucleus is 3-shaped and micronucleus is round in shape and present at anterior right side of macronucleus. One contractile vacuole is present. At the dorsal side six dorsal ridges are present. It is generally found in fresh water and brackish water but present species is found in soil of Godavari basin.

Classification-Cilliates

Kigdom: Protozoa goldfuss,1818,Rown,1858
Subkingdom: Biciliata
Infrakingdom: Alveolata Cavalier & Smith,1991
Phylum: CiliophoraDoflein, 1901,Copeland,1956
Subphylum: Intramacronucleata Lynn,1996
Class: Spirotrichea Butschi,1889
Subclass:Hypotrichia Stein, 1859
Order: Euplotina small & Lynn,1985
Suborder: Euplotina Small & Lynn,!985
Family: Euplotidae Ehreberg,18
Genus: ***Euplotes*** Ehrenber,1830
Species: ***E.eurystomus*** Wrzesnioweski,1870

Ventral view *of E.eurystomous* ***Dorsal view of E.eurystomous***

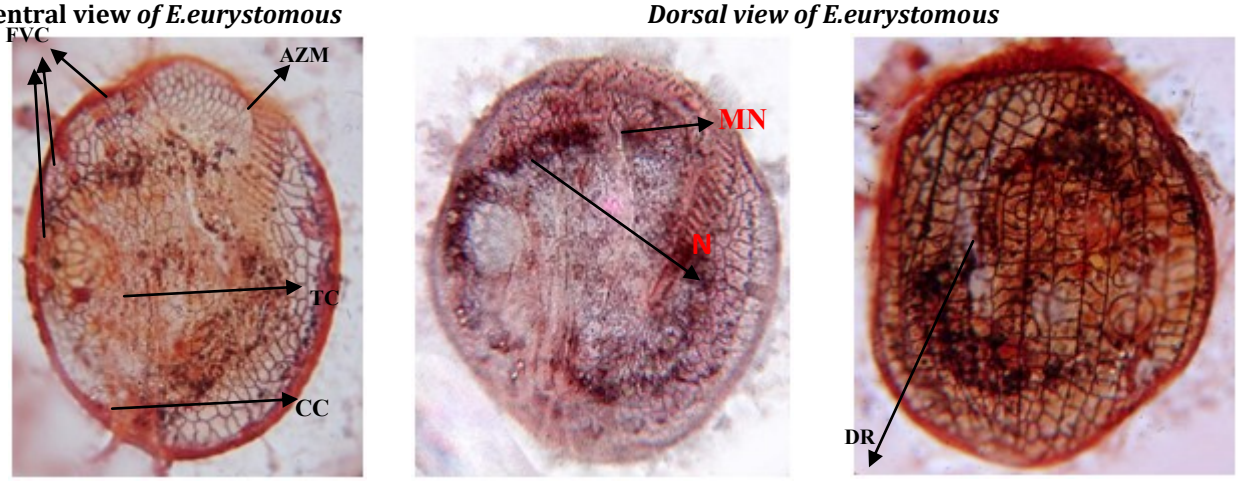

Fig. 1: E. eurystomous *(FVC-front ventral cirri, AZM- Adronalzonalmembrane, TC-Transverse cirri, CC-Caudal cirri, N-3 Shape Macronucleus, MN-Micronucleus, DR-Dorsal ridges. After the comparison of the species with other species of this genus, it is concluded that the present species is E.eurystomus (Wrzesnioweski,1870) redescribed here.*

Table 1: Comparision of the present species with the species of Genus Euplote

Particulars	***E.affines Dujardin (1841)***	***E.eurystomousWrzesniowski (1870)***	***E. muscicola Kahl,(1932)***	***E. woodruffi Gaw,(1939)***	***E. aediculatus Peirson (1968)***	***E.patella Mullar, (1986).***	***E. eurystomous Shaikh(2006)***	***Present species***
Body shape	Small ovoid	ellipsoid	Ovoid	Ovoid	Elliptical	Sub circular or Elliptical	Ovoid or ellipsoid	elongated ellipsoid
Body dimension	40-70$_{um}$ long	138 um by70 um	55.7-68.3µm by33.6-45.3µm	140-90µm	132 um by 84 um	91 um by 52 um	105-170 um by 80-110um	115.4um by 90.3 um
Cirri	9FV,5T,4C	9FV,5T,4C	10FV,5T,4C	9FV,5T,4C	9FV,5T,4C	9FV,5T,4C	9FV,5T,4C	9FV,5T,4C
Peristome	Narrow	Wide and Deep	Narrow	Wide	Narrow	Narrow	Wide	Wide and Deep
Peristomal plate	Long narrow	Broad and triangular	Broad and long	Small	Long triangular	Small triangular	Broad and triangular	triangular
AZM	2/3 of body length	½ of body length	2/3 of body length	2/3 of body length	2/3 of body length	½ of body length	2/3 of body length	½ of body length
Macronucleus	Slight C shape	3 shape nucleus	3 shape nucleus	T shape nucleus	C shape with flattened part	C form band	3 shape nucleus	3 shape nucleus
Micronucleus	Spherical anterior left	Spherical anterior left	Spherical anterior left	Spherical anterior left	Spherical anterior left	Spherical anterior left	Spherical anterior left	Spherical anterior left
Habitat	Fresh and Brackish water	Fresh and Brackish water	Fresh water	Fresh and Brackish water	Fresh and Brackish water	Fresh and Brackish water	Fresh water	Soil sample

Body of present species is inflexible, elongated ellipsoid, and dorsoventrally flattened, dorsally rigid body with very large AZM extending 1/2of the body length, broadly triangular and often supported anteriorly by cytoplasmic collar hence found *Euplotes*. This genus is first reported by Ehrenberg 1830.

After that many other workers reported and studied the genus such as Sharp, (1914),Yacum (1918), Taylor (1920), Klein (1926), Cohen (1934), Turner (1940), Kimball (1941), Kloetzel (1970), Bick (1972), Dini (1981), Klaus (1986), Song *et al*.(2002), Shaikh (2006) Deshmukh (2010). Song *et al* (2010) reported two marine ciliates viz, *E.sinicus* and *E.parabateatus* sp. nov. Comparative morphology was studied by Pierson (1943) .Tuffrau and Borror (1962) reported the species of the genus *Euplotes* from marine water.

Present species has 9 frontoventral, 5 transverse, and 4 caudal cirri present which are similar to *E.patella, E.eurystomus, E.woodruffi, E.adeculatus* and *E.affinis* which also have 9 frontoventrals, 5 transverse and 4 caudal cirri. It also matches with the *E. eurystomus* reported by Glidden, 1996 and Shaikh, 2006 while Curds (1974) reported *E.affinis* with 10 front ventral and 3 caudal cirri and *E.parkein.sp* with 8 front ventral. In present species, peristome is wide with broadly triangular peristome plate which resembles *E. eurystomus* described by Wrzesnioweski, 1870 and Shaikh, 2006. *E. woodruffi* also has wide peristome but small peristome plate. This species differ from *E. patella, E.aediculatus, E.affines, E.moebius*i, as they all have narrow peristome with narrow small triangular or long triangular peristomeplate while *E. moebiusi* has broad and long peristome plate. This species differs from the *E. afffinis* (Bick 1972) which has peristome without peristome plate and also differs from *E. moebiusi* and *E. affinis* described by Curds (1974), which has narrow peristome with long peristome plate.

In present species AZM extends ½ of the body length which is similar to *E. patella,* and *E. eurystomus* while differ from *E. affines* (1841), *E. moebiusi* (1932), *E. woodruffi* (1939*), E.aediculatus* (1968) and *E.eurystomus*, Shaikh (2006) in which the AZM is 2/3 of the body length.AZM covers 35-40 membranelles in the present species (1870*) E.eurystomus* AZM covers about 50-65 membranelles. Macronucleus in present species is '3' shape, resembling with *E. eurystomus* (1870), *E. moebiusi* ,(1932) and *E. eurystomus* (2006) Shaikh also reported '3' shape macronucleus but differ from *E. affines, E. patella, E. adeculatus*, which is having 'C' shape nucleus and *E. woodruffi* having 'T' shape nucleus. In present species micronucleus is spherical, anterior at left margin which is similar to all the previous species of *Euplotes*. Though the species resembles with *E.eurystomus*, their AZM are dissimilar (i.e. in previous (1870) species they are 50-60, in present one i.e. 35-40) and other previous workers did not specify the no of AZM.The present species is compared with all the species of genus *Euplotes*and found *E.eurystomus*. When body dimensions are compared, present species is very close to *E.eurystomus* (Wrzesniowesk, 1870) and Shaikh 2006 hence it is considered as *E.eurystomus* and redescribed here.

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