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Report of new species of ciliate from the genus *Metaradiophrya* (Heidenrich, 1935) in *Pheretima elongata* from Aurangabad district (M.S.) India.

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Abstract
New species of ciliates belong to genus *Metaradiophrya* was recorded from intestine of *Pheretima elongata*, collected from Aurangabad district (M.S.). In the present study, morphological characteristics of this ciliate and its similarities and differences were discussed compared with other species of this genus.

Keywords: *Metaradiophrya* Morphology, *Pheretima elongata*, Aurangabad.

INTRODUCTION

The subkingdom protozoa are divided in to seven phyla which are parasitic as well as non parasitic i.e. Sarcomastigophora, Apicomplexa, Ciliophora, Microspora, Myxozoa and Labyrithomorpha. In the phylum Ciliophora there are three classes Kinetoferag minophorea, Oligohymenophorea and Polymenophorea. The genus *Metaradiophrya* belong to class Oligohymenophorea, sub class Hymenostomatia, order Astomatida and family Hoplitophridae.

The genus *Metaradiophrya* was established by Heidenrich (1935) [5] to receive two well- known species of Hoplitophrya Stein, 1860, which differs significantly from other members of the genus. These are *H. lumbrici*, which was described originally as *Opalinalumbrici* by Dujardin (1841) [4], and *H.falciferа*Stain, 1861).The genus *Metaradiophrya*, is characterized by the possession of an anterior ventrally placed attaching apparatus which is connected to a supporting apparatus consisting of ectoplamic fibers. These ectoplasmic fibers are constant in number and distribution in the different species (de Puytorac, 1954 [6]). The attaching apparatus is composed of a curved ventrally directed central spine or hook, which is part of a larger shaft lying in the right side of the cell body. In some species the apparatus may also include a smaller shaft attached to the central spine and lying in the left side of the cell body. The shape and extent of development of the attaching apparatus is also characteristic for the species. The attaching apparatus and the supporting fibers are together referred to as the cytoskeleton. De Puytorac (1954 [6]), in his monograph on the Astomatous ciliates, made an extensive morphological and taxonomic study of the genus *Metaradiophrya* and gave some excellent description of the known species.

MATERIAL AND METHODS

The host earthworms (*Pheretima elongata*) were collected for the study, near the Kham river in Aurangabad city. Hosts were dissected after anesthetizing with 1% chloroform and gut content were examined under the microscope. The ciliates were found in the middle third and posterior part of the intestine. Smears were made in physiological salt solution. Fixation was done by Schudinn's fixative and the smears were stained haematoxyline.

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Description of the species: *Metaradiophrya pheretimi* (n.sp)

Metaradiophrya pheretimi (n.sp) has wide and elongated body, slightly narrow rounded at the anterior end. Rounded anterior end slightly bent at left side forming unequal arms. The cilia are short and fine, very numerous and arranged in closely set longitudinal rows. There is a clear distinction in to ectoplasm and endoplasm. The ectoplasm is transparent layer and endoplasm looks dense and granular. The length varies between 93.2 to 212µm while the width varies between 46.6 to 88.54µm in the midregion of the body. The macronucleus which is cylindrical and finely granular. It extends through three fourth of the total length of the body. It is about 88.54 to 172.42µm in length and 6.99 to 11.65µm is width. The micronucleus is small and lies at the posterior end of the macronucleus. The contractile vacuoles occur in two groups large and small, they are spherical in shape and varied in number their total number is about 40 to 52. There are usually 19 to 22 larger vacuoles while the smaller vacuoles are numerous. In small cases total contractile vacuoles are 20 to 32 arranged in irregular manner.

Cytoskeleton

The attaching apparatus is typical in general form for that of the genus.It has the form of an inverted 'V' in which the right side of the body is much longer than the central ventrally curved spine. The size of the shaft varies only slightly between 8.64µm to 11.65 µm `in length and it approximately 4µm wide where it joins the spine. The central spine varies between 6.99 to 9.32 µm in length. There are 143 endoplasmic fibers supporting the attaching apparatus.

DISCUSSION

The present species compared with previously described species these are *M. gardneri*, *M. falcifera*, *M. asymmetrica*, *M. lumbrici*, *M. hovassei.* It is seen that some characters are similar with

previous ones some distinguishing characters are also seen. The structure of macronucleus is long narrow and slightly irregular outlines and cylindrical in all the species, in the present it is also cylindrical, but in smaller than *M. gardneri* in length and width. In previous species micronucleus is spherical and fusiform or rod shapes where as in the present species it is irregular in shape and placed at posterior right side of the macronucleus. Contractile vacuoles are arranged in two rows in all the previous species where as they are irregularly scattered in the cytoplasm in the present species. In *M. gardneri* there are 12 large vacuoles and small vacuoles are numerous, in *M. falcifera*, 10 vacuoles arranged in two rows, in *M. asymmetrica* and *M. lumbrici* 8 vacuoles arranged in two rows. In the present species large contractile vacuoles 19 to 22 and smaller ones are numerous and arranged in irregular manner on either side of macronucleus.

In the previous species anterior end is rounded, slightly wider than the posterior end. In all the species posterior end is truncated except *M. falcifera* (which is rounded). In the present species posterior end is truncated or rectangular, but anterior end is rounded and narrow with bent at the left side forms unequal arm.

Cytoskeleton is present in all the previous species which is (inverted asymmetrical 'V' shape) in the present species similar to *M. gardneri.* Hosts are also different in all the previous species including the present species. The details comparative characters are given in table. The numbers and unusual arrangement of contractile vacuoles, narrow and bent anterior end which is not seen in previous species of genus *Metaradiophrya*. The present species is wider than previous species and the number of endoplasmic fibers are also different than that of previous species. In view of its some distinct features, the present species is consider new to science and designated *Metaradiophrya pheretimi* (n.sp).

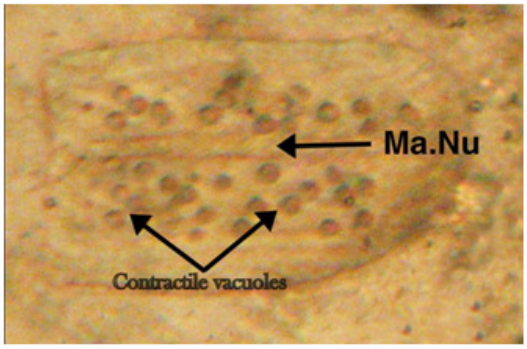

Fig 1. *Metaradiophrya pheretimi* (n.sp)

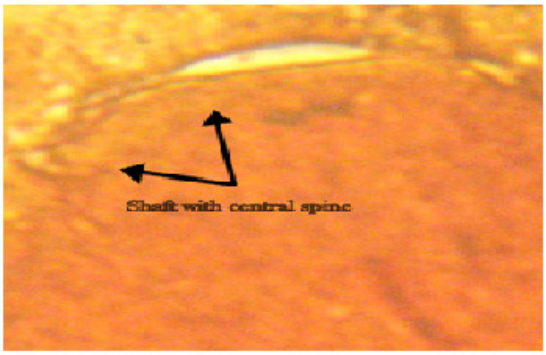

Fig 2. Showing shaft with central spine

Table 1. Showing a comparison of the species of the genus *Metaradiophrya*

	1	2	3	4	5	6
Comparative characters	***M. gardneri*n.sp. B. Rees (1961) [3]**	***M. falcifera* Stain (1961) Heidenrich (1953)**	***M.asymmertrica*n.sp C. Dale Beers (n.sp) (1988)**	***M. lumbrici* Heidenrich (1953)**	***M. hovassei de*Puytorac (1954)[6]**	***M.pheretimi* Present author**
Body shape & dimensions	Elongated narrow slightly wider at ant. end. L- 150- 345 µm W- 45 - 60µm	Elongated both ends rounded L- 100 - 145µm W- 70 - 120µm	Elongated ant. end broad post end truncated L- 115 – 156µm W- 55 - 78µm	Elongated ant. end broad post end truncated L-135µm W- 60µm	Elongated broad in middle L - 120 to 180µm W- 80 to 90µm	Elongated ant. end narrow bent right side, post end broad truncated, rectangular L- 93.2 – 212.03µm w- 46.6 – 88.54µm
Macronucleus	Long narrow, slightly irregular outlinesL- 120-225 µm	Cylindrical	Cylindrical	Cylindrical	Cylindrical	Cylindrical
Micronucleus	Small rod shaped	Fusiform	Spherical	Fusiform	----------	Small spherical
C. vacuoles	Two groups, small & large,12 large &small numerous	10, arranged in two rows either side of macronucleus	8, arranged in two rows 4 vacuoles in each row	Two rows 4 vacuoles in each row	----------	40 to 53. Two groups, small & large, arranged irregular manner Large - 19- 22 Small numerous
Cytoskeleton	Inverted asymmetrical 'V' shape, shaft lies right side, spine ventrally curved	Inverted asymmetrical 'V' shape, shaft lies right side, spine ventrally curved	Inverted asymmetrical 'V' shape, shaft lies right side, spine ventrally curved	Shaft lies right side, spine curved right side	Shaft lies both left and right side, spine curved centrally	Inverted asymmetrical 'V' shape, shaft lies right side, spine ventrally curved
Host	*Eisenia foetida*	*Allbophora caliginosa*	*Eisenia lonnbergi*	*Lumbricus terrestris*	*Allobophora chlorotica*	*Pheretima elongata*
Locality	Cardiff (British)	Cardiff (British)	North Carolina	North Carolina	Cardiff (British)	Aurangabad district (M.S.)

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