International Journal of Pure and Applied Zoology
Volume 3, Issue 2, pp: 176-180, 2015
http://www.ijpaz.com

ISSN (Print) : 2320-9577
ISSN (Online): 2320-9585
Rishan Publications

Research Article

THE OCCURRENCE OF THE RUMEN CILIATE *ENOPLOPLASTRON TRILORICATUM* (DOGIEL 1925) FROM THE RUMEN OF *BOS INDICUS* IN INDIA

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Article History: Received 5th February 2015; Accepted 27th April 2015; Published 12th 2015

ABSTRACT

An investigation has been made to study the morphology of rumen ciliate protozoa from the subfamily Diplodiniinae. A total 814 rumen fluid samples of adult Indian cattle *Bos indicus* were collected. The present paper deals with the occurrence of *Enoploplastron triloricatum*. The body dimensions and variations of characters recorded from the specimen taken at random (n=50) from different slides and compared with earlier reports and critical comments were made on their specific identity.

Keywords: Rumen, Protozoa, Ciliates, *Enoploplastron.*

INTRODUCTION

The rumen micro flora comprises mainly bacteria, fungi and protozoa. The majority are ciliate protozoa with very few number of flagellates have an important role in contributing nutrients to the host animal (Ogimoto and Imai, 1981).

Gruby and Dalafond in 1843 were first observed the protozoa in ruminants thereafter number of protozoa species have been reported by various workers from the different parts of the world. Dogiel (1925, 1927), Becker and Talbott (1927), Hsiung (1932), Clarke (1964), Ogimoto and Imai, (1981), Dehority (1993 and 2005), Gocman, (1999a and 2000b), Kubesy and Dehority (2002) in Egypt, Gocman *et al.* (2005), Gabrele *et al.* (2006), Isabele, *et al.* (2007), Martenele Isabele *et al.* (2008), Bayram, and Gozde, (2009) Gocman and Gurrelli, (2009), Gurelli (2014) in Turkish cattle. A few studies of rumen ciliates from Indian domesticated ruminants Kofoid and Maclennan (1930, 1932 and 1933) in *Bos indicus*, Das Gupta (1935) in Indian Goat, Mathur, (1963) in domesticated animals, Misra *et al.* (1972) in cattle, Mukherjee and Sinha (1989, 1990) in goats Kulkarni (2001) in Indian cattle have been reported. The present paper deals with the occurrence of *Enoploplastron triloricatum*.

MATERIALS AND METHOD

Samples of rumen fluid were collected from adult Indian cattle (*B. indicus*) slaughtered at abattoirs of Kannad, Dist. Aurangabad of Maharashtra state (India). After the removal of the stomach the rumen was slit open and 10-15 ml of rumen fluid was collected in a glass vial then immediately the glass vial was closed airtight and brought to the laboratory. It was centrifuged and preserved by adding 1:1 glycerine alcohol solution. To determine the intensity of the ciliates live specimens were examined under the microscope by taking drop of fluid on a clean glass slide. The permanent slides of the sample were made in duplicate stained by wet Tungstophosphoric Hematoxylin stain. Identification of genera and species of rumen ciliates were based on description published by Dehority (1993). All the measures of the ciliates were based on a study of specimens taken at random from different slides with an calibrated ocular micrometer, line drawings were made with a camera lucida of magnification 10x X 40x.

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RESULTS AND DISCUSSION

Enoploplastron triloricatum (Dogiel, 1925)

Description of the species (Figure 1 and 2): The body of this species is elongated slightly ellipsoidal in shape. The adoral ciliary zone is distinct encloses mouth. The left ciliary zone lies near the anterior end in the same transverse plane of adoral ciliary zone. The operculum is distinct, broad, extends short distance anterior to the oral zone. The ventral surface is flat, or slightly convex extends straight posteriorly and forms a small ventral lobe. The dorsal surface is more convex with maximum diameter in the middle of the body. The mouth opens into a wide, tubular oesophagus extends posteriorly into the anterior portion of endoplasmic sack. The endoplasmic sack occupies almost all portion of the body extends posteriorly following lateral surfaces between the macronucleus and the ventral edge of the body. The ectoplasm is relatively thin in lateral sides but is much thick in anterior and posterior regions. The boundary layer is distinctly visible. The rectum is wide tubular lying parallel to the small ventral lobe. It opens to the exterior by the thin slit like anus.

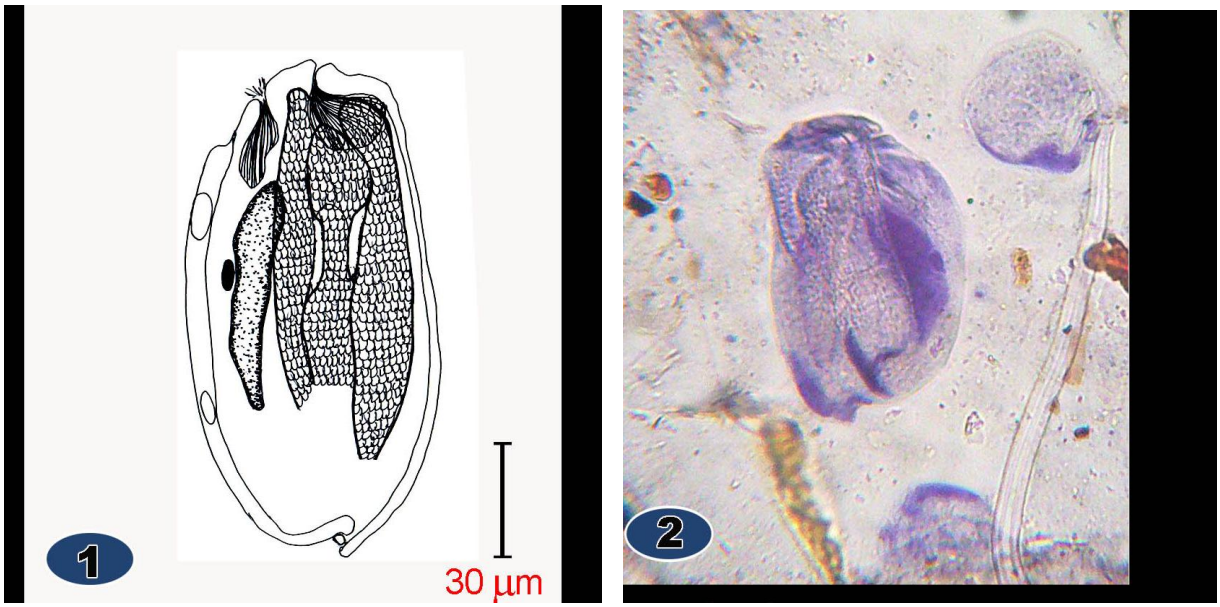

Figure 1 and 2. Line drawing and Photomicrograph of *Enoploplastron triloricatum.*

The macronucleus is thick, long rod shape body. It lies under the right dorsal edge of the body. The anterior end of macronucleus is smoothly rounded while the posterior end is narrow, smoothly tapering. The micronucleus is an ellipsoidal body lie in the middle of the left dorsal side of the macronucleus. There are two contractile vacuoles lying along the left dorsal edge of the macronucleus one vacuole found at the level of the anterior end of macronucleus while another near the level of the posterior end of the macronucleus.

There are three skeletal plates either separate or partly fused beneath right and ventral surfaces of the body. The dorsal and median plate lies beneath the right side of the body between macronucleus and ventral surface the median plate is slightly more in width. The ventral plate lies adjacent to the median plate and extends beneath the ventral surface. The plates lie close together with their edges touching, except in the middle of the anterior half of the body. In this region, plates are separate showing gaps of plain ectoplasm between plates.

The body dimensions and other measurements of *Enoploplastron triloricatum* are given in table 1.

Dogiel (1925) firstly described this species as *Diplodinium triloricatum* and redescribed in 1927 as *Ostracodinium triloricatum f. triloricatum* from reindeer and cattle in U.S.S.R. and from reindeer in British East Africa. Kofoid

and Maclennan (1932) established a new genus *Enoploplastron* and named this species as *Enoploplastron triloricatum*. Comparative dimensions of the species described here and those of earlier workers are shown in table 2.

Table 1. The body dimensions and other measurements of *Enoploplastron triloricatum* are as below (n=50).

Sr. No.	Parameters	Min.	Max.	Average
1	**Body**			
	Length	73.6	115.2	92.10
	Width	48	86.4	62.40
	L/W Ratio	1.25	1.89	1.48
2	**Macronucleus**			
	Length	30.4	57.6	44.10
	%Length to the Body	35.71	60.00	47.88
	Diam. Ant. End.	4.8	11.2	7.07
	Diam. Post. End	4.8	9.6	6.59
3	**Micronucleus**	1.6	8.0	4.80
4	**Adoral ciliary zone (Mouth)**	11.2	17.6	14.05
5	**Left ciliary zone**	9.6	14.4	12.10
6	**Rectum**	8	11.2	9.18
	Lobe/Spine			
7	Ventral lobe	1.6	6.4	3.13
	Skeletal Plate			
8	**First Dorsal**			
	Length	51.2	80	67.14
	Width	6.4	11.2	9.34
	Second Dorsal			
	Length	51.2	80	66.11
	Width	6.4	14.4	10.53
	Ventral			
	Length	51.2	80	65.86
	Width	6.4	11.2	9.41

All measurements are in microns (µ).

Table 2. Comparative body dimensions of *Enoploplastron triloricatum.*

Parameters	Authors					
	Dogiel (1927) Cattle	Dogiel (1927) Reindeer	Dogiel (1927) Antilope	Ogimoto and Imai (1981)	Dehority (1993)	Present Study
Length	85-112 (100)	75-103 (90)	60-110 (82)	80-110	60-112 (100)	73.6-115.2 (92.10)
Width	51-70 (61)	40-58 (47)	37-56 (45)	60-78	37-70 (61)	48-86.4 (62.40)
L/W Ratio	1.64	1.90	1.8	--	1.60-1.90 (1.64)	1.25-1.89 (1.48)
Ma.Nu.L	--	--	--	--	--	30.4-57.6 (44.10)

The table clearly shows that the length of the species recorded during the present study is close to the length recorded by Dogiel (1927) in Reindeer but it is smaller than the length in Cattle (Dogiel 1927) and larger than the length measured in Antelope (Dogiel 1927). The size range described here is comparable to the size range described by Ogimoto and Imai (1981). The width of the species recorded here is close to the width of the species reported by Dogiel (1927) in Cattle and Dehority (1993) but it is larger than the width recorded by Dogiel (1927) in Reindeer and Antelope. The maximum width recorded by Ogimoto and Imai (1981) is smaller than the maximum width recorded during the present study. The L/W ratio described here is less than the L/W ratio reported by earlier workers.

CONCLUSION

In the present studies, *Enoploplastron triloricatum* is recorded for the first time from the rumen of cattle in India.

ACKNOWLEDGEMENTS

The authors would like to thank Principal, Shri. Shivaji College, Parbhani and Principal, Shivaji A.C. and Sci. College, Kannad, Dist. Aurangabad for providing laboratory and Library facilities.

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