International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 1, 2020
ISSN: 1475-7192

Record Of Tripartiella Bulbosa (Davis 1947) From The Fingerlings Of Labeo Rohita (Hamilton 1822) In Murshidabad, West Bengal With Comments On Prevalence Rate And Seasonal Incidence

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Abstract
Protozoan ectoparasites pose a significant threat to the health and survival of fish populations, particularly during their vulnerable early life stages. In this study, an intensive icthyoparasitological survey was conducted in Murshidabad, India, with the aim of investigating the presence and prevalence of trichodinid ciliophorans, specifically Tripartiella bulbosa (Davis 1947), on fingerlings of Labeo rohita (Hamilton 1822).

Fingerlings of Labeo rohita were sampled from multiple sites within Murshidabad district of West Bengal. The gills of the fingerlings were carefully examined, and the presence of Tripartiella bulbosa was recorded. The overall prevalence rate of Tripartiella bulbosa infestation was found to be 65.67%. Notably, the highest prevalence of infestation was observed during the winter season during a study in the year 2018, indicating a seasonal pattern of occurrence for this ciliate ectoparasite.
The findings of this study provide valuable insights into the prevalence and seasonal patterns of Tripartiella bulbosa infestation in Labeo rohita fingerlings in West Bengal. This information can serve as a basis for developing effective strategies for the prevention, control, and management of trichodinid ciliate ectoparasites in aquaculture systems. Further research is warranted to investigate the impact of these ectoparasites on fish health and to explore potential treatment and mitigation measures for their control.

Key words :*Trichodina bulbosa, Labeo rohita fingerlings, prevalence, Murshidabad, West Bengal*

Introduction
Trichodinid ciliophorans are a diverse group of symbiotic parasites that commonly infest aquatic invertebrate and vertebrate hosts (Van As and Basson, 1989). Their taxonomy is primarily based on the structure and appearance of the adhesive disc, as well as the number and size of its constituents. The silver impregnation technique developed by Klein (Klein, 1958) is crucial for revealing these features. Despite their global distribution, trichodinids remain understudied in India, with the majority of records originating from West Bengal. Notably, several new and previously described species within the genera *Trichodina* Ehrenberg, 1838, *Paratrichodina* Lom, 1963, *Trichodinella* (Raabe 1950) Šramek-Hušek, 1953, and *Dipartiella* (Raabe 1959) Stein, 1961 have been reported (Mitra and Bandyopadhyay 2006a, b; 2009, Mitra et al., 2012a, b, 2013).

The present study focuses on the presence of *Tripartiella bulbosa* infestations on the gills of fingerlings of *Labeo rohita* (Hamilton-Buchanan) in various water bodies of West Bengal, India. The objectives of this paper are to provide a detailed morphological description of *Tripartiella bulbosa* and to evaluate its seasonal prevalence rate in fish populations.

Understanding the prevalence and impact of trichodinid ciliophorans, particularly *Tripartiella bulbosa*, is of great importance for fish health and aquaculture management. These parasitic infections can lead to significant economic losses by affecting fish growth, respiratory function, and rendering them more susceptible to secondary infections. By shedding light on the occurrence and seasonal patterns of *Tripartiella bulbosa* infestation in *Labeo rohita* fingerlings, this study aims to contribute to the development of effective strategies for prevention, control, and management of trichodinid ciliate ectoparasites.

To achieve the objectives of this research, a comprehensive survey was conducted across multiple water bodies in Murshidabad district of West Bengal, involving the collection and examination of *Labeo rohita* fingerlings. Detailed

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morphological observations and measurements of *Tripartiella bulbosa* were performed, and the seasonal prevalence rate of this ectoparasite was evaluated. It is hoped that the findings of this study will enhance our knowledge of trichodinid ciliophorans in India, provide important insights into their impact on fish health, and inform future studies and interventions for the control and mitigation of these parasitic infections.

Material and Methods

Samples were gathered from local fisherman in Murshidabad, West Bengal, at various ponds. gill and skin smears were formed on grease-free slides. Klein's dry silver impregnation method was used to impregnate slides containing trichodinid ciliophorans (Klein 1958). An Olympus research microscope (Model CH 20i) was used to examine prepared slides at a 1000X magnification with an oil immersion lens, and an Olympus digital camera was used to take pictures. The uniform particular features proposed by Lom (1958), Wellborn (1967), and Arthur and Lom (1984) are followed by all measurements, which are made in micrometers. Minimum and maximum values are listed in each instance, followed by the arithmetic mean and standard deviation in parenthesis. The mode is provided in place of the arithmetic mean for denticles and radial pins. The distance between the blade and ray tips represents the denticle's span. The sticky disc plus the border membrane are used to calculate body diameter. Denticle elements are described in accordance with the standards set out by Van As and Basson (1989). The order and methodology of the description of the denticle elements adhere to those suggested by Van As and Basson (1992).

Results and Discussion (Table 1, Figures 1-3 and 4)

Morphology

Body is disc shaped. Dark adhesive discs. Denticle unique shaped. The blade is long, obliquely sloped backwards, and has parallel lateral borders that are constricted at each end, but there is also a constriction that is particularly noticeable in the middle of the blade. The blades' distal borders are virtually rounded. The distal boundary is lower and the tangent point is flat. The blade's anterior protrusion has been reduced to a little tubercle. There is a well-developed posterior notch. The portion that connects the anterior projection to the central part is well-formed and curved in that direction. The center of the denticle is knee-like, short, and bent. The ray is pointed at the center of the sticky disc and is short and stumpy. Observed macronucleus with a horseshoe form. The adoral ciliary spiral rotates between 180 and 200 degrees.

Remarks

Davis (1947) originally identified *Tripartiella bulbosa* in the gills of *Margariscus margarila* in West Virginia, USA. It was discovered by Pai (1950) in *Macropodus chinensis* and *Bufo bufo* tadpoles at Shanghai, China. The four Chinese herbivorous fish species *Ctenopharyngodon idella*, *Hypopthalmichthys molitrix*, *Aristichthys nobilis*, and *Mylopharyngodon piceus* were the ones Chen (1956) also documented. Later, it was redescribed from Bulgaria by Kashkovsky (1974) and Golemansky and Grupcheva (1975). *T. bulbosa* was found in *Cirrhinus mrigala*, *Labeo rohita*, *Labeo bata*, *Mystus bleekeri*, and *Ambasis nana*, according to Mukherjee and Haldar (1982). The same was reported by *Catla catla* and *Catla mrigala*, according to Das and Haldar. In West Bengal, Basu and Haldar (1998) reported the discovery of *T. bulbosa* from cultured *C. mrigala* and *L. rohita*.

T. bulbosa, according to Lom and Haldar (1977), belongs to the group of *Tripartiella* with denticles and is distinguished by having a delicate central part, an unconstructed blade at either end, parallel borders joining the center by a more or less pronounced knee-like bend, tubercle-shaped anterior projection, and a short and stumpy ray resembling short projecting spines. The ciliophoran discovered during this inquiry supports the aforementioned characteristics of the species. As a result, we recognize the ciliophoran in question as *T. bulbosa* (Davis 1947; Lom 1959).

Taxonomic summary

Type host: Fingerlings of *Labeo rohita* (Hamilton-Buchanan)
Type locality: Various ponds of Murshidabad, West Bengal
Location: Gill filaments
Prevalence: 65.67 % (maximum in winter)

Parasite seasonal dynamics

The seasonal prevalence of *Tripartiella bulbosa* in the fingerlings of *Labeo rohita* exhibits significant variability throughout the year. The findings of this study demonstrate a distinct pattern where the prevalence increases during winter, reaching its peak value of 65.67%, and subsequently decreases to 23.8% during the summer season. This observation suggests a close relationship between the presence of Trichodinids and environmental conditions, particularly temperature.

The highest prevalence levels of *T. bulbosa* were recorded during winter, which coincides with the multiplication season for Trichodinids. It appears that the relatively lower water temperature during winter creates favorable conditions for the proliferation of *T. bulbosa*. Conversely, the lowest infestation rate was observed during summer, likely due to the inhibitory effect of high water-temperatures on the proliferation of Trichodinids. The elevated temperatures in summer seem to prevent the growth and multiplication of *T. bulbosa* populations.

These findings emphasize the influence of seasonal variations and environmental factors, specifically temperature, on the prevalence and dynamics of *Tripartiella bulbosa* in *Labeo rohita* fingerlings. Understanding the relationship between Trichodinid infestations and environmental conditions is crucial for effective management and control strategies in aquaculture systems. Further investigations are needed to explore the specific temperature ranges that favor the multiplication or suppression of Trichodinids and to develop appropriate measures for the prevention and mitigation of these ectoparasites in fish populations.

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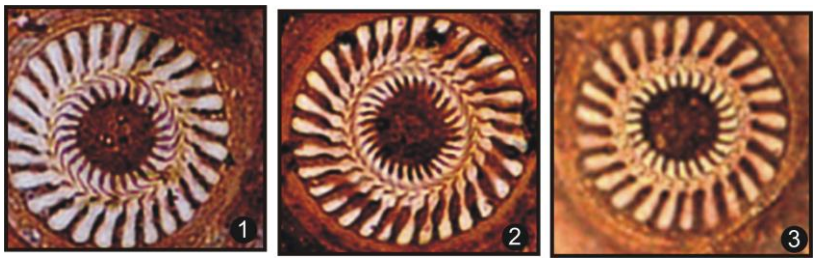
Table 1: Details of measurements of 20 specimens of *Tripartiella bulbosa* (Davis 1947) Lom, 1959 from fingerlings of *Labeo rohita* (Hamilton 1822) are presented below:

Sl. No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	
Diameter of the body	17.7	19.3	18.3	22.4	21.4	23.6	19.3	22.2	22.4	18.3	23.4	23.8	22.4	22.4	19.3	19.3	22.2	18.3	19.8	16.7	
- of the adhesive disc	15.3	16.3	14.3	19.4	19.4	20.4	16.3	18.4	20.4	16.3	20.4	21.4	18.4	20.4	17.3	15.3	18.4	16.3	15.8	12.7	
- of the denticulate ring	7.1	11.2	9.2	8.7	8.7	8.7	7.6	11.2	9.7	8.2	6.1	10.2	9.2	9.2	8.2	9.2	8.2	9.7	6.1	7.1	5.1
- of the central area	4.3	7.6	6.1	5.1	5.1	5.1	7.6	7.1	6.3	3.6	5.6	6.1	7.1	6.3	7.1	5.6	7.1	3.6	5.1	4.1	
Number of denticles	21	21	24	20	20	20	21	21	23	22	22	24	22	23	21	22	21	22	19	18	
Number of radial pins per denticle	4	4	4	4	4	4	4	4	4	4	3	3	3	4	3	3	4	4	4	**3**	
Dimensions of denticle																					
- span	4.1	4.6	5.2	5.6	5.6	4.6	4.6	5.1	4.3	6.1	6.1	4.1	4.1	4.3	4.4	4.6	5.1	6.1	5.6	4.8	
- length of the denticle	2.5	3.1	3.3	2.5	2.5	3.1	3.1	2.6	3.1	2.5	3.1	2.5	2.5	3.1	2.5	3.1	2.6	2.5	2.0	2.0	
- length of the ray	1.0	1.0	1.2	1.4	1.4	1.0	1.0	0.5	0.5	0.6	0.6	0.5	1.0	0.5	0.6	1.0	0.5	0.6	1.0	1.0	
- length of the blade	3.1	3.1	3.4	3.6	3.6	3.1	3.1	4.1	4.1	3.1	3.1	3.1	4.1	4.1	3.1	3.1	4.1	3.1	4.1	3.1	
- width of the central part	0.5	0.5	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.7	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.5	0.7
Width of the border membrane	1.2	1.5	2.0	1.5	1.5	1.6	1.5	1.9	2.0	1.0	1.5	1.2	2.0	2.0	1.0	2.0	1.9	1.0	2.0	2.0	
Adoral ciliary spiral											180–200°										



Figs. 1-3: Silver impregnated adhesive discs of *Tripartiella bulbosa* (Davis 1947)

Fig. 4: Seasonal Prevalence of *Tripartiella bulbosa* (Davis 1947) on the fingerlings of *Labeo rohita* (Hamilton 1822) in various seasons of 2018.