

## A report on the incidence of *Trichodina heterodentata* from fishes of Jammu, J&K India

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**Abstract** The present study was aimed at screening for the presence of protozoan's among *Cyprinid* fishes collected from various fish ponds and farms in Jammu division of Jammu and Kashmir (J and K) state. Out of 75 fishes collected from local water bodies of Jammu division, only 35, (49.6 %) were infested with *Trichodina*. *Trichodina* infestations were studied in the period from November to February. In light infestation *Trichodina* was usually present on gills, fins and skin of apparently healthy fish. Clinical signs of Trichodiniasis appeared on fish with heavy infections and in presence of one or more stress factors including, rough handling during transportation from ponds, over crowdedness, malnutrition, high concentration of free ammonia and low oxygen concentration. Clinical signs of Trichodiniasis in fish such as sluggish movement, loss of appetite, black colouration, necrosis and ulcer on different parts of the body, detached scales and excessive accumulation of mucous in gill pouches were also observed.

**Keywords** Fishes · Ectoparasite · *Trichodina heterodentata* · Morphology · Taxonomy

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### Introduction

Trichodinids are ciliate protozoans widely known as ecto-commensals and are probably the most commonly encountered protozoan parasites on wild and cultured fishes in marine as well as freshwater environments (Urawa 1992; Basson and Van As 1994; Martins and Ghiraldelli 2008). To date, about 300 nominal *Trichodinda* species have been reported from different environments in the world (Tang and Zhao 2011, 2012). Many species are morphologically variable and show low host specificity which make their determination difficult (Lom and Dykova 1992). Because of their direct transmission the trichodinid ciliates are able to invade their hosts within a short period, especially fish that are kept under less than optimal conditions (Lom 1995).

The taxonomy of Trichodinids is based on the structure and the appearance of the adhesive disc and number and size of its constituents. All of these features can be revealed only by the silver impregnation technique of Klein and by this over 100 species have been described from fishes (Klein 1958). Consequently, the numerous species identified early without silver techniques are inadequately described (Lom and Dykova 1992). Today, ten genera are described within the family Trichodinidae. The genus (*Trichodina* Ehrenberg 1838) is the largest of this family with more than 200 species described from fish (Asmat et al. 2005).

Trichodinids reproduce by binary fission and it has been the subject of study since the previous century (Kruger et al. 1995). Most trichodinids are not pathogens, but when the relationship host/parasite/environment is broken by nutritional deficiency, poor water quality, infectious and/or parasitic diseases trichodinids may proliferate, being responsible for severe epidermal lesions and disease

outbreaks, as reported by Madsen et al. (2000); Martins et al. (2002); Khan (2004); Huh et al. (2005). According To Khan (2004) outbreaks and mass mortality of Atlantic cod (*Gadus morhua*) associated with *Trichodina murmanica* infection was reported in a coastal embayment of Newfoundland. The lesions mostly induced by this parasite are hyperplasia and necrosis of the epidermal cells (Padnos and Nigrelli 1942; Davis 1947; Sarig 1971; Hassan 1999). The present study reports first time the presence of *Trichodina heterodentata* parasite from the gills of Cyprinid fishes from Jammu division of Jammu and Kashmir state.

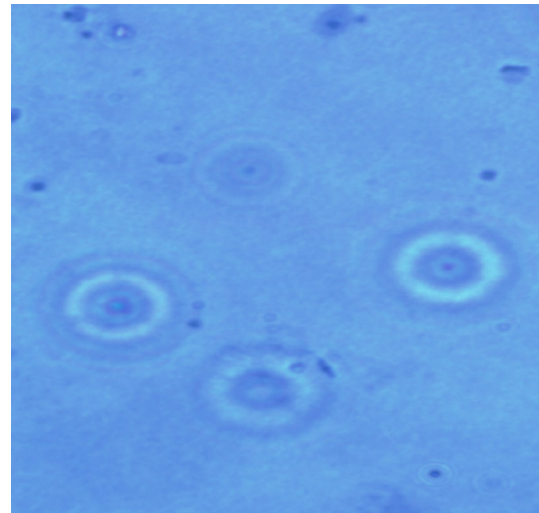
## Materials and methods

A number of 75 apparently healthy and naturally infected fishes of different species, (31 of *Cyprinus carpio*, 22 of *Labeo rohita*, 15 of *Catla catla*, 8 of *Puntius ticto*) were collected from November 2013 to February 2014 with the help of a drag net/hand net from different localities of Jammu division of J and K state.

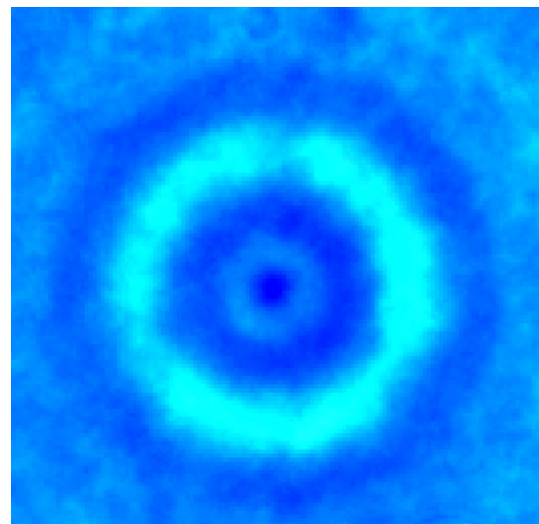
External examination on the gills, fins and body surfaces of the fish for ectoparasites was first carried out using hand lens for detection of parasitic manifestations. Later, skin smears were taken using scalpel blade. The procedure was performed using a spatula by which the skin scrapings (smears) from the head to the tail were obtained. Thereafter, the scraped samples of mucus together with the tissues were placed on a Petri-dish containing 3 ml of 0.9 % saline solution and stirred using a mounted pin (Omeji et al. (2010); Bichi and Ibrahim (2009); Emere and Egbe (2006). Some drops of the mixed solution were collected using dropper, placed on a clean slide and examined under microscope.

Detection of parasites from the gills of the sampled fish was also made using the methods described by Omeji et al. (2010); Bichi and Ibrahim (2009); Emere and Egbe (2006). Gills were cut by scissors, placed in a Petri-dish and gill filaments were dissected using anatomical needle and examined under the microscope. Gill scrapings were placed on few drops of water previously placed onto glass slides then covered with cover-slide and examined under the microscope. The stomach and the intestine of each of the fish were cut opened, and contents washed into the Petri-dish containing the saline solution. The lining of the gut lumen was also scrapped out and placed in the saline solution. One to two drops of the preparation were placed on slide covered with slips and observed using a light binocular microscope for endoparasites.

The total numbers of trichodinids were determined by screening all body surfaces including the fins and gills using a light microscope at 10× × 100× magnification. For species identification and determination of infestation



**Fig. 1** Images of *Trichodina heterodentata* stained with Giemsa stain

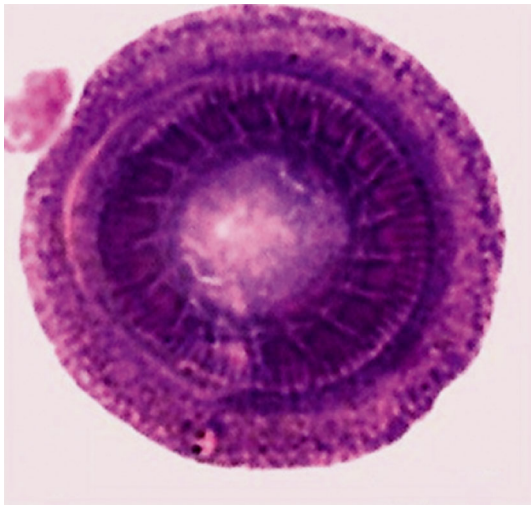


**Fig. 2** Images of *Trichodina heterodentata* stained with Giemsa stain

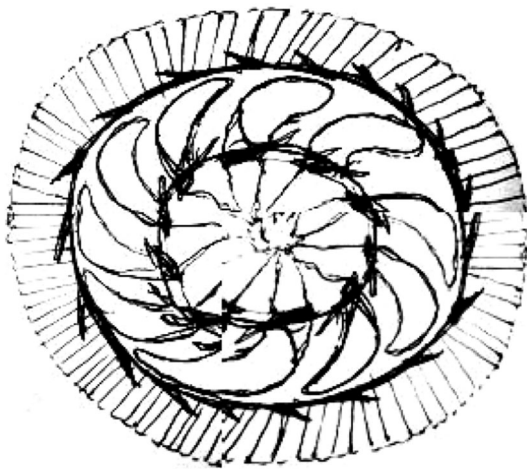
site, following total counts, samples of *Trichodina* were taken from each fish specimen and dry smears were made in accordance with Klein's silver nitrate ( $\text{AgNO}_3$ ) method (Lom and Dykova 1992). The parasites were identified by making their sketches as observed on the binocular microscope and compared with the pictorial guide on fish parasites by Pouder et al. (2005).

## Results

The current study is the first to report trichodinid fauna from the fish species (*Cyprinus carpio*, *Labeo rohita*, *Catla catla*, *Puntius ticto*.) captured from their natural environment in the Jammu division of J and K state. About 75 fishes were collected from different ponds and fish farms of



**Fig. 3** *Trichodina heterodontata* stained with iron haematoxylin



**Fig. 4** Line drawing of *Trichodina heterodontata*

Jammu division. After thorough examination of the collected fishes, a medium-sized trichodinid parasite with disc-shaped body diameter  $57 \pm 6.25$  (48.3–77, 40); convex adoral surface, aboral side with slightly concave adhesive disc; centre of adhesive disc without granules after silver-impregnation was reported. The parasite has a horseshoe shaped macronucleus  $42.6 \pm 3$  (40–47, 5) of external diameter and thickness  $12.0 \pm 1.8$  (10–14, 5). The parasite was compared with the already reported parasites described by different authors in different parts of world and after micrometric measurements, line drawing and with the help of prescribed keys was found to be *T. heterodontata* Fig. 1. The denticles of *T. heterodontata* are characterized by wide blade and having sickle-shape provided with apophysis for blade connection with the central part. The number of denticles vary from 13 to 26. In light

infestation *Trichodina* Fig. 2 was usually present on gills, fins and skin of apparently healthy fish. Clinical signs of Trichodiniasis in fish were sluggish movement, loss of appetite, black colouration, necrosis and ulcer on different parts of the body, detached scales and excessive accumulation of mucous in gill pouches.

## Discussion

Trichodinids are geographically a widely dispersed group of ectoparasites in freshwater, marine and euryhaline environments. Trichodinids are widely studied and well-documented parasites of fishes and their importance is reflected by the reported literature on several aspects of the biology of these parasites, such as distribution (Lom 1962; Lom and Hoffman 1964; Lom 1970; Gaze and Wootton 1998. Ozer and Erdem 1998, 1999; Ozer 2000, 2003a, b), behaviour (Ahmed 1977; Van As and Basson 1987; Ozer and Erdem 1999), the impact of environmental factors (Calenius 1980; Sanmartin Duran et al. 1991; Ozer and Erdem 1999) and their pathogenicity (Lom 1973).

About 70 species have been identified in marine fishes (Kinne 1984) and more than 112 from freshwater fishes worldwide (Lom and Dykova 1992). Some trichodinids including *T. domerguei* and *T. tenuidens* parasitising *Gasterosteus aculeatus* and *Pungitius pungitius* have been recorded in euryhaline waters (Calenius 1980). The morphological variations of denticle form and appearance of central circle in *Trichodina* parasite observed in this study are also in agreement with the statement of Lom and Stein (1966).

Host specificity in trichodinids was highly variable. In general, the severity of most ecto- and endoparasitic infections increases with the age of the host fish, possibly as a result of the greater accumulation period and/or the larger space for feeding and breeding of the parasite. Özer and Erdem (1998) noted a tendency to increase in the mean intensity of *Trichodina* spp. in relation to the length of common carp. Our findings on the intensity levels of *Trichodina* agree Fig. 3 with those reported by the above mentioned authors. Studies on the parasite fauna in farmed and wild fish in Jammu are quite rare Fig. 4. This was the first study conducted on the trichodinids of *C. carpio*, *L. rohita*, *C. catla*, *P. ticto* fish species found in the water bodies of Jammu division of J and K state.

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