

## **Trypanosoma mukasai in the Fishes from Kashmir- a First Report**

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### **ABSTRACT**

*Schizothorax curvifrons* Heckel, *Carassius carassius* Linnaeus, *Cyprinus carpio* Linnaeus and *Triplophysa marmorata* (Heckel, 1838) species of fishes were captured in Anchar Lake and river Jhelum of Kashmir Himalaya during December, 2008 to June, 2009 for parasitological investigation. During the analysis haemoflagellates from the genus *Trypanosoma* were recorded in blood smears. Trypanosomes were present in all the species except *C. carpio*.

**Keywords:** *Trypanosoma*, fish parasites, hematology, Kashmir waters

### **INTRODUCTION**

Trypanosomes are haemoflagellates having a single free flagellum at the anterior end of the body. The first trypanosome was discovered from the blood of *Salmo trutta* by Valentin (1841). The parasite have been reported from fishes in different parts of the globe. e.g. *T. mukasai*, *T. froesi*, *T. satakei* and *T. britskii* from Brazil (Lopes *et al.*, 1991), *T. occidentalis* from Washington (Becker, 1967), *T. magdalenae* from Columbia, *T. acanthobramae* and *T. neinevana* were recorded from Iraq (Warsi and Fattohy, 1976).

From Indian, Qadri (1962) reported *T. batrachi* from *Clarias batrachus*; *T. gachuii* from

*Ophiocephalus gachua* (Misra et al., 1973); *T. elongatus* from *Channa punctatus* (Raychaudhuri and Misra, 1973); *T. armeti* from *Mastacembelus armatus* (Mandal 1975); *T. trichogasteri* (Gupta and Jairajpuri, 1981), *T. colisi* (Gupta, 1986), *T. trichogasteri* var. *fasciatae* (Gupta et al., 1998); *T. rohilkhandae* (Gupta and Saraswat 1991) and *T. sauli* (Gupta et al., 2006) from *Channa punctatus*.

Most species of trypanosomes in fishes cause pathogenic diseases of considerable medical and economic importance. Symptoms of piscine trypanosomiasis range from mild anemia associated with low levels of parasitaemia to severe pathological changes due to heavy parasite burdens (Islam and Woo, 1991). Leukocytosis, hypoglycemia and hypocholesterolemia (Gupta and Jairajpuri, 1983) are frequent outcomes of trypanosomiasis.

Although a great number of parasitological investigations have been conducted on the fishes in Kashmir but most of the data pertain to ecto and endo-parasites mainly associated with the digestive system (Kaw 1950 and 1951; Fotedar 1958; Fotedar & Dhar 1973, 1974, 1977). Therefore, the piscine haemoparasites of fish infected with haemoparasites have not been investigated so far. Thus, the present study is aimed to report and identify the blood parasites of the genus *Trypanosoma* parasitizing freshwater fishes in Jhelum River and Anchar Lake, Kashmir.

### **MATERIALS AND METHODS**

The study area was Anchar Lake and River Jhelum, Kashmir. Live fish belonging to four taxa namely, *Cyprinus carpio* Linnaeus, *Carassius carassius* Linnaeus, *Schizothorax curvifrons* Heckel and *Triplophysa marmorata* (Heckel, 1838) were collected from River Jhelum (34°04'17"N /74°49'08"E) and Anchar Lake (34°08'48" N /74°47'22" E) monthly between December, 2008 to June, 2009. On the field, the identification of the fish, and the collection of samples were carried out. Blood was collected from 210 live fishes from the caudal peduncle and heart as described by Lucky (1977). Part of the blood sample was used directly to make smears on grease- free slides for staining. For

determining haematology, samples were collected in glass vials containing EDTA as anticoagulant at an approximate concentration of 5mg/ml of blood (Blaxhall & Daisley, 1973).

Thin blood smears were made from the blood samples collected. The smears were air dried and fixed in absolute methanol. Slides were stained with Phosphate buffered Giemsa and examined under a microscope using a 100x oil immersion objective. Images were taken with the help of a Leica DM LS2 digital camera. Measurements were done according to Lom & Dykova (1992). Data were analyzed by using ANOVA and Student's T-Test.

## **RESULTS**

In Giemsa-stained blood films, the body of the trypanosome stained deep blue, though its free flagellum, arising from the pointed anterior end of the body, was poorly stained. The kinetoplast was prominent, lying close to the blunt posterior end of the body (Fig. 1-3). The rounded nucleus stained pink with Giemsa and lay closer to the anterior end of the trypanosome than its posterior extremity. Morphometry and the number of fishes analyzed during are shown in Table 1.

No division stages were seen in the blood smears. Trypanosomes varied in size (Table 2, Figs. 1-3). Flagella were generally short and difficult to stain. Three Out of the four fish species investigated, i.e., *T. marmorata*, *S. curvifrons* and *C. carassius* were found to be infected with the trypanosome with an overall prevalence of 41.6%, 7.6% and 2.32% (Table 3), respectively. The trypanosomes (Figs. 1-3) from *T. marmorata*, *S. curvifrons* and *C. carassius* confirmed well to the description given for *T. mukasai*. The body length, body width and nuclear length of the trypanosomes described in this work are into the range of index quoted by Baker 1960. The nucleus lies forward of the midline (see Nuclear index values, Table.2), which supports its identity as *T. mukasai*.

**Table 1. Morphometry and the number of fishes analyzed during present study**

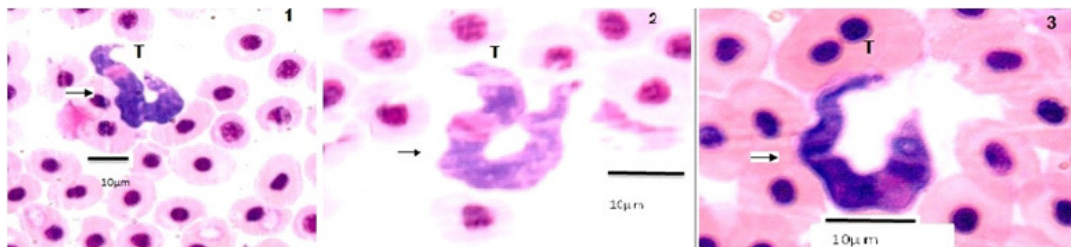
Fish	Number of sampled fishes	Length (centimeters)	Weight (grams)
<i>Cyprinus carpio</i>	55	21.73±2.15	190.83±53.99
<i>Carassius carassius</i>	55	14.39±2.17	58.99±31.85
<i>Schizothorax curvifrons</i>	60	23.05±3.16	128.05±58.11
<i>Triplophysa marmorata</i>	40	6.53±1.51	91.5±10.5

**Table 2. Measurements of *Trypanosoma mukasai* (values as Mean + S.D) in  $\mu\text{m}$  from the fishes of Anchar lake and River Jhelum**

Measurement	Length ( $\mu\text{m}$ )
Body length (BL)	36.63±4.35
Body width (BW)	4.64±0.88
Nuclear length (NL)	5.12±1.01
Nuclear width (NW)	3.86±0.5
Middle of nucleus to anterior extremity (AN)	14.42±2.62
Posterior extremity to middle of nucleus (PN)	21.71±3.1
Nuclear index (NI=PN/AN)	1.54±0.34
Kinetoplast to middle of nucleus (KN)	20.53±3.5
Kinetoplast Index (KI = PN/KN)	1.12±0.03
Total length (TL)	47.13± 3.1
Flagellar index (FI)	3.4

**Table 3. Overall Prevalence of *Trypanosoma mukasai* in different fishes collected from Anchar Lake & River Jhelum**

Parasite	Fish	Water body	Prevalence (%)
<i>T. mukasai</i>	<i>Triplophysa marmorata</i>	Anchar Lake	41.6
	<i>Carassius carassius</i>	Anchar Lake	2.32
	<i>Schizothorax curvifrons</i>	River Jhelum	7.6
	<i>Cyprinus carpio scapularis</i>	Anchar Lake	0
	<i>Cyprinus carpio communis</i>	Anchar Lake	0
	<i>Cyprinus carpio scapularis</i>	River Jhelum	0
	<i>Cyprinus carpio communis</i>	River Jhelum	0
	<i>Cyprinus carpio communis</i>	River Jhelum	0



Where, T stands for Trypanosome

Fig.1-3:- *Trypanosoma mukasai* in a Giemsa-stained blood film from different fishes in River Jhelum and Anchar Lake at 1000X

1) *Triplophysa marmorata*; 2) *Carassius carassius*; 3) *Schizothorax curvifrons*

## DISCUSSION

The higher infection prevalence of *T. mukasai* in *Triplophysa marmorata* when compared to other fishes in the same water bodies (Anchar Lake) seems to be attributable to the habitat preferences of these fish. *Triplophysa marmorata* may spend a lot of its time near or within vegetation, and this may make it highly exposed to infection and reinfection by leech bites. Leeches, once engorged with the blood of the host, detach and rest on a protected substrate (under a stone or in plant debris) in the water until the next meal (Paperna, 1996). This makes *T. marmorata* more prone to trypanosome infection than other fishes from the same habitat.

Baker (1960) found two morphological forms of *Trypanosoma mukasai* small (2244µm long) and large (4565µm) in the blood of fish. Baker (1960) commented that nuclear position, rather than flagellar length may be important in distinguishing the African freshwater fish trypanosomes. The nucleus lies forward of the mid-line consistently in the trypanosomes recorded in this study (see NI values, table 2), which support their identity as *T. mukasai*.

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