Helminth parasitic fauna of a cyprinid fish *Devario malabaricus* (Jerdon)

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**Abstract**
Parasites are an important group of pathogens that cause infection and diseases in fishes which may badly affect the aquaculture industry. *Devario malabaricus* is an ornamental fish commonly found in Kerala. The present investigation was conducted to survey the helminth infection in *D. malabaricus*. A total of 210 fishes were examined during January 2011 to June 2014, for the presence of parasites. Six species of helminth parasites were recovered from the fish host. They include a species of monogenea, *Diplozoon indicum*, an adult digenea *Macrolecithus indicus*, three larval digenea, *Clinostomum complanatum*, *Tetracotyle* sp. and *Centrocestus formosanus* and an adult nematode *Rhabdochona sarana*. *D. malabaricus* constitutes a new host for *D. indicum, M. indicus, C. complanatum, Tetracotyle* sp. and *Centrocestus formosanus* and an adult nematode *Rhabdochona sarana*. *D. malabaricus* constitutes a new host for *D. indicum, M. indicus, C. complanatum* and *R. sarana*.

**Keywords:** *Devario malabaricus*, Helminth parasites, Monogenea, Digenea, Metacercaria, Nematoda.

1. Introduction
*Devario malabaricus* is an aquarium trade fish belonging to the family Cyprinidae. They are commonly found in freshwater bodies of Kerala feeding mainly on insects and their larvae. Due to their carnivorous nature, occurrence of parasitic infection becomes higher in nature. Diet, feeding habits, vagility of host species are the main factors affecting the parasitic community structure especially for the parasites transmitted to their final host [1]. Parasites are metabolically dependent on their host mainly for their nutritional requirements [2]. Piscine parasites cause profound pathological changes which lowers the growth rhythm considerably and affect the quality of the fish and often leads to death of fish resulting in enormous economic losses to the fish industry [3]. The present study was aimed to analyse helminth parasitic fauna of cyprinid fish *Devario malabaricus* collected from Kannur district of Kerala.

2. Materials and methods
The fishes were collected from different freshwater bodies of Kannur district from January 2011 to June 2014. Collected fishes were brought alive to the laboratory and examined immediately for the presence of helminth parasites. The fishes were dissected out and examined under Stereozoom dissecting microscope in a systematic manner. The parasites recovered were collected in a cavity block containing physiological saline. Monogeneans and digeneans were examined alive under compound microscope using vital stain neutral red and were fixed in either 5-10% formalin or AFA (Alcohol Formalin Acetic acid.). After the fixation, the parasites were stained using alum carmine and preparation of permanent whole mounts followed the procedure outlined by Cantwell (1981) [4]. Characteristics of metacercarial cysts were examined under phase contrast microscope after which they were excysted by rupturing the cyst wall by mounting it under cover glass and applying gentle pressure over it by using a fine needle. Encysted larvae were removed from their cyst wall by using fine needles.

Adult nematodes collected were washed thoroughly to remove debris. The specimens were fixed in hot 70% alcohol. After fixation the worms were stored in glycerine-70% alcohol mixture. Temporary whole mounts were prepared by clearing the parasite either in lactophenol or in creosote. The parasites were mounted in glycerine. Drawings were made with the aid of camera lucida and measurements were taken by using calibrated ocular micrometer and were presented in micrometer (µm).
3. Results and Discussion
A total of 210 host fishes were collected for the present investigation. Six species of parasites were recovered, which include one species of monogenea, one species of adult digenea, three metacercariae and one nematoda.

3.1. Monogenea
3.1.1. *Diplozoon indicum* Dayal, 1941 (Fig.1)
Habitat: Gill filaments
Prevalence of infection: 9.52%
Intensity: 1-3

Description

Remarks
The genera *Diplozoon* with type species *D. paradoxum* Nordmann, 1832 was first described from the gills of *Abramis brama*. Under this genera seven species were reported from India. Pandey and Agarwal (2008) considered two Indian species *D. indicum* Dayal, 1941 and *D. nipponicum* Goto, 1891 as valid. The characters tallies with the original description, but it is smaller in size. Therefore the present fluke reported here as *D. indicum* Dayal, 1941. Recovery of *D. indicum* Dayal, 1941 from *D. malabaricus* in Kannur forms new host and geographical record.

3.2. Digenea
3.2.1. Adult
3.2.1.1. *Macrolecithus indicus* Gupta & Agrawal, 1967 (Fig.2)
Habitat: Intestine
Prevalence of infection: 1.43%
Intensity of infection: 1

Description

Remarks
The characters of the present adult fluke suggests that it belongs to the genus *Macrolecithus* Hasegawa & Ozaki, 1926. As far as is known, only six species have been reported under this genus. They are the type species *M. gotoi* Hasegawa & Ozaki, 1926, *M. elongatus* and *M. phoxinus* Park, 1939, *M. indicus* Gupta and Agrawal, 1967, *M. rasborai* (Srivastava and Ghosh, 1967) and *M. papilliger* Rees (1968). The present parasite agrees with the original description of *M. indicus* all biometric features and recovery this parasite from *D. malabaricus* in Kannur forms new host and geographical record.
3.2.2. Metacercaria

3.2.2.1. Clinostomum complanatum Rudolphi, 1819 (Fig. 3)

Habitat: Body cavity
Prevalence of infection: 0.48%
Intensity: 1

Description
Metacercaria eunencysted in the body cavity of piscine host. Live metacercariae are yellowish white in colour. Body linguiform, aspinose with blunt ends measured 2,677.5-4,305x875-1243.2. Oral sucker sub-terminal, 105-175x157.5-210. Ventral sucker at the anterior third of the body, 525-630x507.5-612.5. Mouth at the center of oral sucker, opens into a small prepharynx and a saccular dilation, the pharyngeal bulb. Caeca occupying greater part of the body on either side; having small lateral diverticula, 2300-3702.7 long. Testes large digitate; anterior testis 122.5-297.5x175-332.5; posterior testis 157.5-402.5x175-459.46. Ovary small, round to oval, intertesticular 81-115x79-115. Excretory bladder small, v-shaped, opens out by a sub-terminal pore.

Remarks
Adult parasites of Clinostomum complanatum is generally found in piscivorous birds. Most preferable host for the metacercariae of C. complanatum is Pseudosphromenus cupanus. Only single parasite was collected from D. malabaricus. Therefore D. malabaricus is considered here as accidental host for this metacercaria. Recovery of the parasite from D. malabaricus forms a new host record.

3.2.2.2. Tetracotyle sp. (Fig. 4 a, b)

Habitat: Muscle
Prevalence of infection: 38.10%
Intensity: 3-11

Description
Cyst oval, milky white in colour and have double layered cyst wall. Excysted parasite, body aspinose and oval, divided in to two parts. Forebody large, measured 402.5-1015x315-857.5. Smaller hind-body measured 70-350x175-332.5. Oral sucker terminal, round to oval, 35-70x52.5-87.5. Prepharynx short, pharynx muscular and measured 30-42x24-33. Acetabulum oval measured 87.5-105x105-122.5. Two prominent accessory suckers present on either side of oral sucker, measured 70-192.5x35-70. Small, globular pharynx measured 17.5-40x17.5-37.5. Caeca extends upto the posterior third of the body. Well-developed holdfast organ present behind the acetabulum and measured 140-315x52.5-140. Holdfast gland large and measured 385-717.5x35-105. Reproductive organs rudimentary, situated in posterior region of hindbody.

Remarks
The metacercaria under study resembles the larval genus Tetracotyle Fillipi, 1857 of the family Strigeidae Railliet, 1919. The organization of the metacercaria collected from the present fish is poorly developed, and therefore, no specific identification was attempted.

3.2.2.3. Centrocestus formosanus (Nishigori, 1924) Price, 1932 (Fig. 5 a, b)

Habitat: Gill filaments
Prevalence of infection: 8.10%
Intensity: 2-7

Description
Cyst appeared thin, transparent, oval, double layered, measured 175-210x96-122.5. Excysted body elongated, spinose and measured 240-410x110-160. Body spines larger and prominent at anterior half of the body and progressively smaller towards the posterior region. Oral sucker funnel shaped, terminal, measured 30-80x35-67. Oral sucker provided with thirty four circum oral spines arranged in two alternating rows. Acetabulum post-equatorial, measured 20-37x31-55. Prepharynx short, pharynx muscular and measured 30-42x24-33. Caeca long, terminate just anterior to excretory vesicle. Testis round to oval situated symmetrically at posterior end of the body, enclose by arms of ‘X’ shaped...
excretory bladder. Ovary oval, lies in front of the right arm of excretory bladder.

Remarks
The characters of present metacercaria suggests that it belongs to the genus *Centrocestus* Looss, 1899. Only one species under this genus, *C. formosanus* (Nishigori, 1924) Price, 1932 was reported from India. The present parasite agrees fully with the original description of *C. formosanus*.

### 3.3. Nematoda

#### 3.3.1. *Rhabdochona sarana* Karve and Naik, 1951 (Fig.6 a, b, c)

**Habitat:** Intestine  
**Prevalence of infection:** 7.62%  
**Intensity:** 2-5

**Description**

Remarks
The morphology of the present worm is in accordance with the genus *Rhabdochona* Railliet, 1916. Moravec (2010) [6] considered 92 species under this genus to be possibly valid. Thirty two nominal species was reported from India and the present worm resembles with *R. sarana* Karve and Naik, 1951 in all aspects. Recovery of the parasite from *D. malabaricus* collected from Kannur forms new host and geographical records.

![Fig. 5. Centrocestus formosanus (Nishigori, 1924) Price, 1932](image)

**Fig.5. Centrocestus formosanus (Nishigori, 1924) Price, 1932**  
a) Cyst  b) Excysted metacercaria

![Fig. 6. Rhabdochona sarana Karve & Naik, 1951 - Female](image)

**Fig. 6. Rhabdochona sarana Karve & Naik, 1951 - Female**  
a) Anterior end  b) Posterior end  c) Vulvar region

#### 4. Conclusions
During the course of present investigation, 210 *Devario malabaricus* were analysed for helminth parasitic survey. A total of 6 species of parasites including one species of monogenea, one adult and three larval digenea and one nematode were recovered. Four new host records and three new geographical records were observed. Among the parasites recovered *Tetracotyle* sp. showed highest prevalence of infection. Multiple infection was also common among *D. malabaricus*. Single fish was infected with *D. indicum, M. indicum, C. complanatum* and *Tetracotyle* sp. It is concluded that helminth infection was very common among *Devario malabaricus* and that can affect quality of the fish and economic losses in aquaculture.

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6. References