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The first report of the Malabar puffer, *Carinotetraodon travancoricus* (Hora & Nair, 1941) from the Neyyar wildlife sanctuary with a note on its feeding habit and length-weight relationship

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ABSTRACT

Carinotetraodon travancoricus, the Malabar puffer fish has been collected and reported for first time from the Kallar stream, Neyyar Wildlife Sanctuary of southern part of Kerala. The food and feeding habit and length-weight relationship of the fish also has been studied and presented.

Key words: *Carinotetraodon travancoricus,* Neyyar Wildlife Sanctuary, Kallar stream, length- weight relationship

INTRODUCTION

The Western Ghats of India along with Sri Lanka is considered as one of the biodiversity hotspots of the world (Mittermeier et al. 1998; Myers et al. 2000). This mountain range extends along the west coast of India and is crisscrossed with many streams, which form the headwaters of several major rivers draining water to the plains of peninsular India. The Ghats is a critical ecosystem due to its high human population pressure (Cincotta et al. 2000). Freshwater fish diversity is very high, with around 280 species and a high rate of endemism (Dahanukar 2004). The southern Western Ghats that comprise the Ashambu (Agasthyamala) Hills in the state of Kerala form a biogeographically unique ecoregion (Nair 1991). The rivers of Kerala once harboured a rich fish fauna according to many investigators but very little information is available on the southern tip of Kerala, which are currently threatened by overexploitation, introduction of exotic fishes, habitat destruction and pollution. Here we report the Malabar puffer fish collected from Kallar stream a tributary of Vamanapuram River, part of Neyyar Wildlife Sanctuary. The characteristics of the specimen in the present collection is found to be the same as per the original descriptions and this article forms the extension of its ranges to southern part of Western Ghats.

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Carinotetraodon travancoricus commonly known as Malabar puffer fish inhabits in freshwater and estuaries which is endemic to Kerala and Karnataka (Talwar & Jhingran 1991; Jayaram 1999; Remadevi 2000). *Carinotetraodon travancoricus* was first described from Pamba River by Hora & Nair (1941). This fish is present in 13 rivers of Kerala including Chalakudy, Pamba, Periyar, Kabani, Bharathapuzha and Muvattupuzha and are reported from the coastal regions of the state such as Lake Vembanad, and kole wetlands of Trichur (Easa & Basha 1995). This fish has been exploited extensively for aquarium trade mainly from Periyar and Achenkovil rivers and Lake Vembanad (Easa et al. 2003). The details on different aspects such as biology and ecology of this species are not reported in the scientific literature. Generally, the puffer fishes are considered to be neurotoxic and non edible (Hasan et al. 2008).

Carinotetraodon travancoricus has ovoid body except at the caudal region. For the fresh specimen the general body colour is yellowish on the dorsum and sides and whitish below. Two round black blotches are present on the lateral sides and two rectangular black blotches on either sides of the origin of the dorsal fin. Another two rectangular black blotches were present on the mid dorsal region. A black dot is present at the caudal base. All the fin rays are yellowish. Body is larger and longer in males. Males have a dark bluish band from mouth to

the caudal fin (Inasu 1993). Ventral fin is absent. Caudal peduncle is short and stout. Nasal organ is elevated with a terminal opening. Dermal ossification is with black spicules, which are evenly scattered over the body.

MATERIALS AND METHODS

Kallar stream a tributary of Vamanapuram River has its origin and course through the tropical rainforest of Western Ghats located near Ponmudi in Thiruvananthapuram district, Kerala, South India. We collected 30 specimens of *C. travancoricus* from Kallar stream, part of Neyyar wildlife Sanctuary, and during the month of February-March 2011 while collecting aquatic insects. The specimens were collected from two different sites of the stream with 5 km apart. The collection locations are from the middle region of the stream with an altitude between 75-85m above mean sea level. The substrate of the first site is with gravel and rock and the second site the bottom is clay-loam with high amount of sand and silt. The description about the sites and details of the fish are given in table.1. The specimens were identified with the description given by Talwar & Jhingran, (1991) and for comparison the voucher specimens collected from Achenkovil River with a voucher number - CRG-SAC-CT-01, kept at the Museum of the Conservation Research Group, St. Albert's College, Kochi, India has been used. This fish species has not been reported from the Kallar stream by the earlier workers (Ramanujan 1994, Cherian et al. 2001)) and hence this information is adding one more species to the ichthyofauna of Neyyar Wildlife Sanctuary.

The gut content analysis of all *C. travancoricus* collected during the study period has been examined as per standard procedure described by Windell & Bowen (1978). For the identification of food items, the frequency of occurrence and points method suggested by Hynes (1950) and Pillai (1952) were employed. The estimation of dominant food item was done by combining results of percentage occurrence and points method to yield the index of preponderance (*I*i) proposed by Natarajan & Jhingran (1962). The contents were separated and identified item wise and listed. The values of Relative length of gut (RLG) are calculated with the following equation as suggested by Al-Hussaini (1949): RLG= length of the gut/ total body length. Fulton's Condition factor (K) was determined using the formula $K = 100\ W/L3$ following Tesch (1971), where W is the weight of the fish and L is the length of the fish. The length-weight relationship of all specimens collected were worked out the using the logarithmic form of the equation $W=aL^b$ where, W= weight and L= total length of the fish.

RESULTS AND DISCUSSION

The alimentary canal of *C. travancoricus* consists of mouth, buccal cavity, well developed stomach, short intestine and the mouth is terminal in position. The food and results of the gut content analysis has been given in table.2. The fish fed primarily on animal matter including cladocera, rotifers, copepods, insect parts and semi digested animal matter. The plant matter consisted of mainly diatoms. In addition to this, fine sand grains and detritus occurred in appreciable quantities. The pie chart (Fig.2) showing the prime important food item towards the animal prey (53%) and reveals the carnivorous nature of feeding. The most shares of the semi-digested animal matter were insect larvae and crustacean parts. The relative length of gut (RLG) of all examined specimens were shows the value of less than unity. This implies that the fish is carnivorous feeding habit (Dasgupta 2004). The dense overhanging vegetation of the forest habitat is an important allochtonous source of food particularly insects and their larval forms, fruits and larvae of fish. In addition, the leaf litter supports a large numbers of aquatic insects and other invertebrates such as rotifers. The presence of sand and detritus in the stomachs also indicates the bottom feeding habits of the fish. The wide spectrum of food item indicates the ability of the fish to forage from a wide area through both horizontal and vertical migration in the entire stretch of the stream. The results in general agreed upon with the bottom/column euryphagous carnivorous feeding habit of the fish.

Fig. 1 *C. travancoricus* (Total lenght 30mm)

Table 1. Details of the collection sites from where *C. travancoricus* has been collected from the Kallar stream.

Sl.No.	Parameters	Site I Thavakkad	Site II Vithura
1	Latitude and longitude	8º 41'28N 77º 03'59 E	8º 40' 55N 77º 05' 11E
2	Altitude (msl)	75	84
3	Water temperature (ºC)	25	28
4	pH	7.3	8.0
5	Velocity (m/s)	0.350	0.126
6	Water depth (cm)	70	70
7	Stream width (m)	11	6
8	Stream Order	3	3
9	Stream substrate	Rocks and gravel	Sand and silt
10	Type of microhabitat	Riffle, pool	Riffle, run
11	Length of fish mm (Mean ±SD)	19.125±5.086 (Range 17-30)	16.66±3.64 (Range 13-30)
12	Weight of fish (mg) (Mean ±SD)	280.45±328.086 (Range 114-1100)	158.3±182.98 (Range 86.7-963)
13	No. of fishes collected	8	22

Table 2. Index of preponderance of various food components in the gut of *C. travancoricus*

Sl. No.	Food item	Percentage of volume (Vi)	Percentage of occurrence (Oi)	Vi Oi	percentage of Index of Preponderence (I i)= $\frac{Vi\ Oi}{\sum Vi\ Oi} \times 100$
1	Algae	16.46	10.10	166.24	16.61
2	Diatom	20.36	10.10	205.63	20.55
3	Insect parts	18.48	10.10	186.64	18.65
4	Cladocerans	08.12	10.10	082.01	08.19
5	Rotifers	05.81	10.10	058.68	05.86
6	Copepods	08.30	09.09	075.44	07.54
7	Semi digested animal parts	12.59	10.10	127.15	12.70
8	Miscellaneous (sand grains, detritus etc.)	09.81	10.10	099.08	09.90

Table 3. The length-weight relationship values of *C. travancoricus collected from the Kallar stream*

a	*b*	Upper 95% *b* value	Lower 95% *b* value	*r* value
-0.9713	2.5378	3.2503	1.8253	0.8095

The length –weight relationship calculated for *C. travancoricus* is log W=-0.9713+ 2.5378logL. The calculated values of length-weight relationship are given in Table 3. The L-W relationship shows that the fish is following an isometric growth in the collection sites during the period of study even though the *b* value is lower than the ideal value 3 since the Bailey test gives a non significant result. In the length weight relationship of fish the exponent *b* show a normal distribution on both sides of cubic value with little deviation. It is already agreed that the exponent *b* in fish differ according to the species, sex, age, season and feeding stage (Kharat et al. 2008). The overall results suggests that the fish is a bottom feeder preferring animal matter over plant components and exhibiting an allometric pattern of growth which may be due to the peculiar body shape of the species and not because of the prevailing environmental factors or low feeding strategies.

The mean condition factor varied from 2.98 to 3.307 with the highest value from site I and the lowest from site II (Fig.3) and the values are not statistically significant. The condition factor is a useful index for monitoring the general conditions of the fish especially the feeding intensity, age and growth rates (Oni et al. 1983) and this factor is strongly influenced by both biotic and abiotic environmental factors and hence used as an index to assess the status of the aquatic ecosystem in which the fish live (Anene 2005). Even though the condition factor of *C. travancoricus* from the site II is slightly lower than site I in Kallar stream, the values indicate the good condition of the fish and this reveal the optimum abiotic and biotic factors of this stream for the survival of this species. To understand the entire biological traits such as breeding season, breeding behavior, larval recruitment etc. of this species from these habitats, more studies are to be conducted.

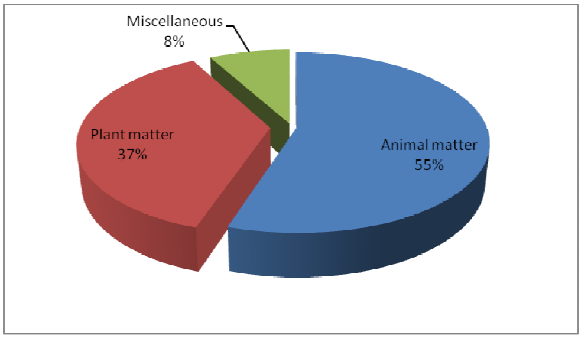

Fig. 2. Index of Preponderance of *Carinotetraodon travancorius*

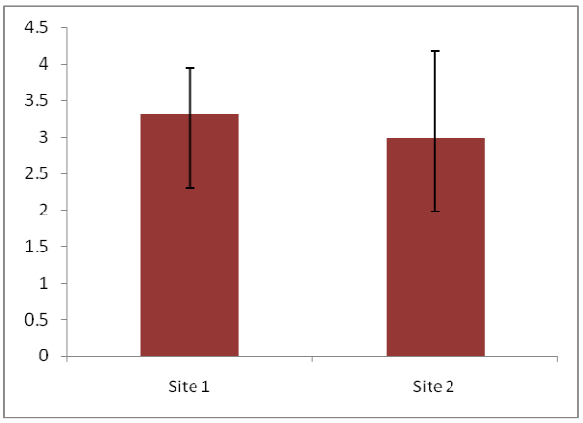

Fig. 3. Condition factor (*K*) of *C. travancoricus* from the two sites in Kallar stream

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