



## Adaptive modifications in some hillstream fishes of Betul district

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### Abstract

Fishes form the largest group of vertebrates and they serve as best food supplement. It contains protein, fat, vitamins and minerals. District Betul in Madhya Pradesh is situated at the centre of India. It has dense forest and many streams arise from hills. Tapti river and Machna river are originated from this district and Tawa river originated from the neighbouring district Chhindwara enters in Betul district. These rivers are inhabited by many fishes including hill stream fishes. The present study intends to identify the main hill stream fishes of Betul district and to observe their structural modification.

**Keywords:** *Adaptive modification, Chikhlar stream, Hillstream fishes*

### Introduction

A number of fishes of sluggish water have migrated to hill streams and rivers and developed some special permanent modification to live there. Their modifications are integumental and helps in anchoring. Various structural modification found in hill stream fishes have been studied in part of twentieth century by Hora (1922, 1930). Enough literature exists on the hill stream fishes and adaptive modification in fishes of India (Singh *et al.*, 1983), but a few reports are available from central India. Studies on the biology and conservation of hill stream fishes especially Mahseer (Tor) have also been made by Kulkarni (1971), Tripathi (1978), Pathani (1977 and 1982) and Nautiyal (1984). The present paper is intended to report the presence of some special hill stream fishes in Betul district and hill stream adaptation found in them. The three hill stream collecting centers during the present investigation are

located in the Betul district of Madhya Pradesh. This district is situated approximately 21° 22' to 22° 24' N latitude and 77° 04' to 78° 33' E longitude and at an altitude of about 653 m above m.s.l. It has dense forest and many streams arise from hills. Three sampling centers were selected namely Tapti ghat (Tapti river), Chikhlar stream (Machna river) and Satpura dam (Tawa river). All rivers except Tawa originate from this district.

### Materials and Method

A survey of hill stream fishes was made in Tapti ghat (Tapti river), Chikhlar stream (machna river) and Satpura dam (Tawa river) of Betul district, during a period of one year from Feb. 2007 to Jan. 2008 (Table 1 and 2). Fishes were collected from these spots and were fixed in 5% formalin and identified according to Day (1978) and Srivastava (1980).

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### Results and Discussion

In the present study a total of 9 species belonging to 2 families were identified. These include *Barilius bendelisis*, *Garra gotyla gotyla*, *Labeo gonius*, *Tor tor*, *Lepidocephalichthys balgera* L. *guntea*, *Nemacheilus beavani*, *N. botia* and *N. denisonii* (Table 2).

**Table 1: Sampling Station**

S. No.	Collecting Centre	Rivers
1	Tapti Ghat	Tapti River
2	Chikhlar Stream	Machna River
3	Satpuna Dam	Tawa River

**Table 2: Record of fishes collected from different collection centre**

Name of Fishes	Name of Collection Centre		
	Tapti Ghat	Chikhlar Stream	Satpura Dam
<b>Order:- Cypriniformes</b>			
<b>Family:- Cyprinidae</b>			
1. <i>Barilius bendelisis</i> (Ham.)	+	-	+
2. <i>Garra gotyla gotyla</i> (Gray)			
3. <i>Labeo gonius</i> (Ham.)	+	+	-
4. <i>Tor tor</i> (Ham.)			
<b>Family- Cobitidae</b>	-	-	+
5. <i>Lepidocephalichthys balgara</i> (Gunther)	+	-	+
6. <i>L.guntea</i> (Ham)	+	+	-
7. <i>Nemacheilus beavani</i> (Gunther)	+	+	+
8. <i>N. botia</i> (Ham)	-	+	+
9. <i>N.denisonii</i> (Day)	-	+	+
	+	-	-

All these fishes possess adaptive modifications in their integument. Some hill stream adaptive modification found in these fishes are as follows: -

**1. *Barilius bendelisis* and *Labeo gonius*:**

Their body shows cylindrical shape with strong muscular tail. They are found in rapidly flowing stream and rivers.

**2. *Tor tor* :** The body is cylindrical and has a powerful muscular tail. Posterior lip is hypertrophied and it acts as adhesive organ. This species also found in stream and rivers.

**3. *Nemacheilus sp.*:** In *Nemacheilus beavani*, *N. botia*, *N. denisonii*, the body is elongated. The lips are divided in the middle and are swollen, so that

they form a ring like sucker and pulled outward. Paired fins are less horizontally placed and they can easily adhere to bottom of torrential streams. *Nemacheilus sp.* is also found in pools and ditches.

**4. *Garra gotyla gotyla*:** This species possess many adaptive modifications. The highly muscular upper lip is fringed and overhangs the mouth. In the form of a disc behind mouth is found in *Garra gotyla gotyla* and act as adhesive organ. The paired fins are big, muscular and horizontally placed. Their bases are provided with cushion-like thick muscular pads.

**5. *Lepidocephalichthys sp.*:** In *Lepidocephalichthys balgara* and *L. guntea* the body is elongated and slightly compressed. Barbels are six



in number. Dorsal fin is short and commencing opposite of the pelvic fin. Caudal fin is truncate. The fish fauna of India consists of many species. (Singh *et al*, 1983). Most of the hill stream fishes possess modified structural organization of integument. Day (1978) also documented adaptive modification in these fishes. Hora (1922 and 1930) described a large number of hill stream fishes with respect to their adaptive modification and evolutionary point of view. Khanna and Bhutiani (2004) studied the fish and their ecology of River Ganga. In various hill stream fishes like *Garra*

*annandalei*, *Glyptothorax madraspatnum*, *Garra lamta*, *Glyptothorax telchilta*, *G. mullya* and *Pseudecheneis sulcatus* presence of adhesive apparatus has been studied by Rauther (1928), Bhatia (1950) Saxena (1959) and Khanna *et al.* (2009).

To increase the population of these hill stream fishes, it is vital that the availability of water throughout the year in streams should be made and their habitat, community and food chain be preserved. More studies should be carried out to identify the hill stream fishes found in this district.

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