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Diversity of hill stream fishes in Sahastradhara region of Narmada river Maheshwar, District Khargone, Madhya Pradesh: With special reference to their structural modification

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Abstract
The spacific structures, in different groups of fishes, are modified in relation to the habit, habitat, mode of feeding, food preference and the mode of life exhibited by the fishes. The successful survival of fish populations in adverse environments requires responsive adjustments in there, structural and physiology and these have been reflected by modifications at the level of their tissues. A checklist of hill stream fishes in Sahastradhara station of Narmada river was studied from Oct 2016 to Sep 2017. Fishes were collected with the help of local fishermen and from local fish market. Total 8 species of hill stream fishes obtain from the Sahastradhara sampling station of Narmada river.

Keywords: structural, special, modification, environments

Introduction
Some fishes of sluggish water migrate to hill stream and rivers. They develop some special modification to live in water. Their modification are permanent and modified from integument. They help in anchoring the substratum. The structural modifications found in hill stream fishes have been studied by Hora (1922, 1930). Enough literature exists on the adaptive modification of hill stream fishes of India (Singh et at. 1983) [12]. The studied on biology and conservation of hill stream fishes especially Mahaseer have been made by Kulkarni (1971) [6], Tripathi (1978) [17], Pathani (1977, 1982) [7, 8] and Nautiyal (1984) [7]. The present study is based on the hill stream fishes of Sahastradhara about 7 km. from Maheshwar (Khargone). This station situated at Narmada river some people also says this river life line of Madhya Pradesh. It originates from Amarkantak (District. Shahdol). The Sahastradhara is a famous religious and natural picnic spot. Here river Narmada flows rapidly from east to west direction. Presence of big and small stones in this rapid zone. The water current divides in many small and large streams. One can hear loud sound due to rapid flow of water.

Material and Method
The survey of hill stream fishes was made in Sahastradhara during a period of one year from Oct 2016 to Sep 2017. The specific modified hill stream fishes collected with the help of local fisherman from the sampling station and were fixed in 5% formalin and identified according to Day (1978), Shrivastva (1980).

Fig 1: Satellite map of Shastradhara sampelling station of Narmada river.

Result and Discussion

Collected fishes in the period of one year were identified. These fishes are belonging to order Cypriniformes.

Table 1

Fish Species	Seasonal collection		
	Mansoon	Winter	Summer
Lepedocephalichthys balgara	√	√	√
Lepedocephalichthys guntea	√	√	√
Nemachleilus beavani	√	√	
Nemachleilus botia	√	√	
Nemachleilus denisonii	√		
Tor tor		√	
Lebeo gonius		√	
Garra gotyla gotyla	√	√	√

Structural adaptive modification are seen basically in integument structural their description as-

1. *Lepidocephalichthys balgara, Lepidocephalichthys guntea*

Body is elongated streamlined and slightly compressed barbles are 6 in number and colour is as its natural habitat. Their dorsal fins are short and commencing opposite to the pelvic fin. Caudal fin is truncated.

2. *Nemachelius species. (beavani, botia, denisonii;)*

Body is elongated and streamlined. The Lover lip is divided in the middle while both the lips are swollen and pulled outward forming a ring like sucker pelvic and pectoral fins are less horizontally placed and they can easily adhere to bottom but the base of pectoral fin is found to be thickened and cushion like. These species form valuable food for local people. These species are also found in pools and ditches of Nimar sub region local people commonly known as "Gurgun".

3. *Garra gotyla gotyla*

Commonly called local people as "Maliya". Garra posses many spacific adaptive modifications. There are mainly Integument and structural. The lower lip is fringed and overhangs the mouth. Behind the mouth a disc is present which acts as adhesive organ located behind the posterior region of mouth. It consists of a central colored plate the posterior and lateral border of lip is thick and tuberculated. The pectoral and pelvic fins are large, muscular and horizontally placed. Their ventral base provides as cushion like pad.

4. *Tor tor*

Local name "Mahasheer" it has big head and its body cylindrical. It has a powerful muscular tail. Posterior lip is hypertrophical and acts as adhesive organ. This species is also found in hill and cold areas but it is also observed in our sampling site, streams and other rivers of west Nimar.

5. *Labeo gonius*

It has streamlined, cylindrical body and its pectoral fin is much powerful then pelvic fin. Its muscular tail and pectoral fins are modified for rapid water flow habitat.

In India many special of fishes are found Singh *et al*. (1983) [12]. Most of the hill stream fishes posses structural integumental modification Day (1978) also noticed adaptive modification in there fishes. Hora (1922, 1930) described a large number of hill stream fishes with respect to their adaptive modification and evolutionary point of view. In various hill stream fishes like *Garra annandalei, Glyptothoray madraspatnum, Garra lamta, Glyptothorax mullya, Glypothorax telchilta* and *Pseudoechinesis sulcatus* modified adhesive apparatus has been studied by Ruather (1928), Bhatia (1950), Saxena (1959) [11] and Khanna el al. (2009) [5]. Solanki *et al*. (2010) [14] also work on diversity of hill stream fishes of Madhya Pradesh. Singh *et al*. (2013) [12] observed adaptive modification of lip and its associated structures of Hill-stream fish *Schizothorax richardsonii.* Teronpi *et al*. (2015) [16] documented on physico-chemical parameters and fish diversity of hill streams. Plamoottil and Nath (2016) [16] work on Hill Stream Cyprinid Fishes of Manimala River of Kerala and observed 12 species.

To increase the population of these hill stream fishes, it is very important that the stream should be made and their habitat community and food chain should be protected. More study of hill stream fishes should be carried out to identified the hill stream fishes found in Sahstradhara (Maheshwar).

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