AN OVERVIEW OF THE HILL TROUTS (*BARILIUS* SPP.) OF THE INDIAN REGION

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ABSTRACT

An attempt is made to account the taxonomic and biological information available on the bariline fishes of India. The nominal list includes 21 species in the Indian region. Their distributional status and diagnostic features are detailed.

KEYWORDS

Barilius *spp., cyprinidae, distribution, fish, hill trouts, India*

The bariline cyprinid fishes have a trout-like appearance and inhabit medium to fast torrential mountain streams, earning them the name "hill-trouts". They are affected by the swiftness of current but are capable of progressing against it. On the rush of water they seek shelter under rocks and stones at the bottom or hide under crevices along the edges of the streams (Yazdani, 1984).

Distinguishing features of the genus

The body is moderately elongated and compressed sub-cylindrically. Head is sharply pointed and abdomen is rounded. Snout is compressed, pointed, may be with "pearl organs" and tubercles. Mouth anterior and directed obliquely upwards. Eyes are large, superior in the anterior half of the head. Upper jaw is a little larger than the lower. Lower jaw has a knob above the symphysis and an emargination to receive it in the upper jaw. Pharyngeal teeth present in three rows. Dorsal fin with 7-12 branched rays and Anal fin with 8-14 rays. Caudal fin is forked. Scales moderate and lateral line may be complete, incomplete or absent. Muscular pads are present in front of the bases of the pectoral fin (pectoral pads). Air bladder is large, free and extending to the entire length of the abdomen. Many species are beautifully coloured with vertical bands or blotches or cluster of dots. They range in size from 4-12in (Day, 1878).

DISTRIBUTION

Jayaram (1999) listed 18 species including a subspecies of *B.v. vagra*, under the genus *Barilius* and opined that the placement of the species *bola* and *guttatus* under a separate genus *Raiamas* was unjustifiable based on his assessment of subsequent revisionary works. However, Menon (1999) kept *B. bola* and *guttatus* in separate genera. Recently, three new species have been described from Manipur namely *B. lairokensis. B. ngawa* and *B. chatricensis* by Arunkumar and Singh (2000), Vishwanath *et al.* (2002), and Selim and Vishwanath (2002), respectively, thus bringing the current total of bariline species to 21.

Of the 21 species known from the Indian region, 10 are endemic to India; 15 species are restricted to northern and northeastern India with two species being common to Myanmar, namely, *B. bola* and *B. guffatus* and one exclusive to Myanmar, *B. barnoides*. From Manipur alone four species have been described. Two species *viz.*, *bendelisis* and *vagra* have a wide range of distribution in India and are also found in Bangladesh, Pakistan, Nepal and Srilanka. Four species are endemic to the Western Ghats, *viz.*, *B. evezardi, B. bakeri, B. canarensis* and *B. gatensis;* the first is restricted to Maharashtra, the latter three to central and southern Western Ghats. Of these three species, *B. gatensis* has a wider distribution being found in the Western Ghats of southern Karnataka, Tamil Nadu and Kerala, while *B. bakeri* is found in several west flowing rivers of Kerala only. Biju *et al.* (2000) reported its occurrence in 19 out of the 39 west flowing rivers of Kerala surveyed by them. Recently the species has also been reported from an east flowing river in Karnataka (Rema Devi *et al.*, in press). The species *B. canarensis* has a very limited range of distribution being found in Canara (Karnataka) only.

Worldwide this genus is found distributed in the cold waters of Africa, Myanmar, Cambodia, Egypt, Laos, Thailand and Vietnam.

The *Barilius* spp. of the Indian region, their common name, size, status and distribution are as follows. (After Talwar & Jhingran, 1991; Jayaram, 1999).

STATUS

The book, "Threatened Fishes of India" edited by Dehadrai *et al.* (1994) listed *R. bola* and *B. barila* under the Endangered category, *B. vagra* and *B. evezardi* under the Threatened category and *B. bakeri* as Rare. Menon (1999) placed *B. canarensis* under Endangered and *B. radiolatus* under the Vulnerable category. Molur and Walker (1998) report the status of 12 species of Barilius assessed in a Conservation Assessment and Management Plan (CAMP) workshop for freshwater fishes of India in 1997. The status follows 1994 IUCN Red List Categories and Criteria (Version 2.3) and is indicated globally for Indian endemic species and nationally for Indian non-endemics. Table 1 includes the status according to Molur and Walker (1998).

DIAGNOSIS AND HABIT

Size: *B. barila* is the smallest species growing to a length of about 10cm while the largest growing species is *B. bola* with a length of 30cm. The other species fall in the length-range of 11-18cm (Day, 1878).

Colouration: Body usually silvery along the abdomen becoming greyish on the back. Except one species *viz.*, *B. evezardi* which has a lateral band, the others have incomplete vertical dark bands or one or two rows of spots or blotches on the sides. Fins are yellowish, sometimes with dark bases, caudal mostly edged dark (Day, 1878).

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Feeding: *Barilius* spp. inhabit the upper water levels and with characteristic upturned mouth have been observed to take insects from the surface of water. The gut of *Barilius* shows a gradation from herbivorous to the carnivorous condition, as the gut length is considerably lesser than that of the truly herbivorous teleosts (Surendranath, 1984).

Not much literature is available on the feeding behaviour of *Barilius* excepting *B. bendelisis, B. barila, B. barna, B. bola* and *B. vagra.* While the first three are omnivorous (50% plant & 50% animal diet), *B. vagra* is a carni-omnivore taking aquatic annelids, insect larvae, microcrustaceans, rotifers and soft aquatic plants. Insect components are taken more predominantly during the months of May-July. *B. bola* is carnivorous taking aquatic insects, larvae and nymphs and *B. bendelisis* and *B. barila* are also used as baits for this. *B. bendelisis, B. barna, B. barila* and *B. vagra* are surface feeders using visual stimuli and *bola* is a bottom feeder using olfactory cues to locate food (Singh & Subbaraj, 2000; Surendranath, 1984).

Sexual dimorphism and breeding: No accounts on these aspects are available in literature except for *bendelisis, vagra* and *barna* where elaborate studies have been made. *B. bendelisis* exhibits marked sexual dimorphic characters and the males are generally brightly coloured and larger in size, rough body with minute tubercles on lower and upper lips and all over the head and also on the scales on the dorso-lateral sides. The bases of the pectoral and the region in front of them are highly muscular and robust. These characters are absent in females. Interestingly in *B. barna* the pelvic fins are modified instead of the pectorals. The fins are used for digging burrows during the breeding season and for holding on to rocks while moving against water current. In *B. vagra* males are shorter than females and pectorals of male are rough with minute tubercles up to the 11th lateral line scale and up to 9th scale in females. Minute tubercles are also present on the lateral sides up to middle of lower jaw including lips but tubercles are absent in the middle region of lower jaw in males (Pathani & Gaur, 1989; Tilak *et al*., 1984; Tilak *et al*., 1991)

FISHERY IMPORTANCE

Not much importance is attached to bariline fishes in fishery. However, *B. bendelisis* is the principal commercial hill stream fish in the rivers of Jammu and other areas of eastern Himalaya; *B. tileo*, though bony, is a fairly good table fish (Talwar & Jhingran, 1991); and *B. bola* has been termed *Rajahmas* or "Chief of the fishes" in the Assam rivers as it is an important game fish (Day, 1878). These fishes are small, colourful, attractive and active in their movements but no literature is available on their worth as aquarium fishes.

REMARKS

A comparison of the meristic characters of *Barilius* fishes found in the Western Ghats and those in the northern and northeastern India from published reports show some interesting features. The *Barilius* species of Western Ghats have more number of branched dorsal fin rays compared to their northern Indian counterparts (8-12 *vs.* 7-8). The branched anal fin rays are likewise more in number (10-14 vs 8-10). However *B. bendelisis* that is found throughout the Indian region has the least number of anal rays (7-8). Another interesting observation is in the squamation in these fishes. The lateral line scales are fewer in number in the species in the Western Ghats (38-43) while they

Table 1. Some details on the Barilius spp described until date.

Species	Common name	Size (in cm)	Distribution	Status (1994 IUCN) Category / Criteria
B. bakeri Day	Malabar Baril	15	Kerala high ranges and Karnataka	VU / A1acd
B. barila (Ham.- Buch)	Barred Baril	10	North India and Orissa, Bangladesh, Nepal	VU (N) / B1+2c
B. barna (Ham.-Buch)	Barna Baril	13	Brahmaputra, Mahanadhi, Ganga river systems, Bangladesh, Nepal	LRnt (N)
B. barnoides Vinciguerra	--	--	Myanmar	NE
B. bendelisis (Ham.- Buch)	Hamilton's Baril	15	Throughout India, Bangladesh, Nepal, Pakistan, Srilanka	LRnt (N)
B. bola (Ham.-Buch.)	Indian Trout	30	North India upto Orissa, Bangladesh, Nepal, Myanmar	NE
B. canarensis (Jerdon)	Jerdon's Baril	15	Western Ghats: South Canara	DD
B. chatricensis (Jerdon)	--	11	Manipur	NE
B. dimorphicus Tilak & Hussain	--	18.5	Uttar Pradesh	CR / B1+2c
B. dogarsinghi Hora	Manipur Baril		Manipur	EN / B1+2abd
B. evezardi Day	Day's Baril	12	Western Ghats of Maharashtra	LRnt
B. gatensis (Val.)	River-carp Baril	15	Western Ghats	NE
B. guttatus (Day)	--	18	Manipur and Myanmar	NE
B. lairokensis Arunkumar & Tombi Singh	Ngawa	--	Manipur	NE
B. modestus Day	Indus Baril	11.5	Jammu, Himachal Pradesh, Punjab, Pakistan.	NE
B. ngawa Vishwanath & Manoj Kumar	Ngawa	13	Manipur	NE
B. radiolatus Gunther	Gunther's Baril	--	Punjab and Madhya Pradesh	NE
B. shacra (Ham.- Buch.)	Shacra Baril	13	Brahmaputra, Ganga and Yamuna rivers, Bangladesh, Nepal	LRnt (N)
B. tileo (Ham.-Buch.)	Tileo Baril	13	Assam, West Bengal, Bangladesh, Nepal	LRnt (N)
B. vagra vagra (Ham.-Buch.)	Vagra Baril	12.5	Brahmaputra, Ganga, Indus and Yamuna river systems, Bangladesh, Nepal, Pakistan, Sri Lanka	VU (N) / A1ac
B. vagra vagra pakistanicus Mirza & Sadiq	--	--	Pakistan	VU / A1ac

CR - Critically Endangered; EN - Endangered; VU - Vulnerable; LRnt - Lower Risk near threatened; DD - Data Deficient; NE - Not Evaluated; N - National assessment within india only; A - status due to population reduction; B - status due to restricted distribution, continuing decline and/or extreme fluctuation

are more in number in the species found in the northern and northeastern India (43-94). This is also reflected in the predorsal scale rows being 15-16 in Western Ghats species, 20 in *B. bendelisis* while the same is 18-40 in the species found in other regions. Being found mostly in the cold upper reaches of the hill streams the differences in the meristic characters of the species found in northeastern and southwestern parts of the country could also reflect the more recent origin of the Western Ghats fishes.

Conclusion

Though literature is available on some bariline fishes with regard to their feeding, growth, sexual dimorphism, spawning and cytogenetic traits, most of this work is restricted to the northern Indian species. A lot still remains to be studied with regard to this interesting group of fishes. Interesting variations among different species and also in the species of different populations in different drainages have been observed and this work is still in progress.

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