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TAXONOMIC NOTES ON SOME FRESHWATER FISHES COLLECTED FROM CHAVARA OF KERALA, INDIA

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ABSTRACT : The present study was conducted to analyze the systematic details of freshwater fishes collected from Chavara of Kerala, India. Taxonomic studies were conducted on the fishes of the genera *Anguilla bengalensis*, *Anguilla bicolor*, *Hyporamphus limbatus*, *Xenentodon cancila*, *Aplocheilus lineatus*, *Mastacembelus armatus*, *Macrognathus guentheri*, *Tetraodon travancoricus*. The fishes were examined for morphometric characters and meristic counts; various taxonomic aspects were discussed.

Key words : Systematics, meristic counts, metric characters, *Aplocheilus lineatus*.

INTRODUCTION

Fishes constitute slightly more than one half the total numbers of approximately 54711 valid vertebrate species. The vast inland areas of Bangladesh, Myanmar, Nepal, Pakistan, Sri Lanka and India depend mainly on the fresh water fishes for feeding its populace. They have great significance in the life of mankind, being an important natural source of protein and providing certain other useful products.

There are descriptions of an estimated 27977 valid species of fishes. Of 54711 vertebrate species recognized the world over 27977 under 515 families and 4494 genera are valid species of fish of which 11952 are of fresh water. In the Indian region alone of 2500 species, 930 are fresh water inhabitants and 1570 are marine. India harbors about 11.5% of the fish fauna so far known in the world.

Many Indian and foreign scientists conducted relevant taxonomic studies on the fish of India, especially of Kerala. Beaven (1877), Lacepede (1803), Hamilton-Buchanan (1822), McClelland (1839), Col. W. Sykes (1839), Jerdon (1849), Blyth (1858), Albert Guenther's (1864) etc are some of them. Dr. Francis Day travelled extensively throughout the British India and made collections. His 'The fishes of Malabar' (1865), 'The Fishes of India' (1878) and 'Fauna of British India' (1889) are valuable taxonomic books describing many new fishes from Kerala. After independence, Sundar Lal Hora (1920, 1923, 1936, 1941) made extensive surveys in different parts of India and described many fresh water fishes. K.S. Misra (1976) published a series of checklists and aids for the identification of fish fauna of India. Works of Jayaram (2010), Menon (1999) and Remadevi (1992) are also worth mentioning. Systematic studies conducted on freshwater fishes of Kerala were rare during the last decade. But many recent taxonomic works of discoveries and rediscoveries of fishes (Plamoottil and Abraham, 2012, 2013a-g; Plamoottil, 2013, 2014a-e; Plamoottil and Abraham, 2014a-d; Plamoottil *et al*, 2014) are promising.

These authors could collect and examine systematic details of many fishes in connection with an undergraduate level project work; taxonomic details of eight freshwater fishes are analyzed and presented.

MATERIALS AND METHODS

Fishes were collected from nearby paddy fields and some ponds. Dip nets with a very fine mesh size of 1.5-2.0 mm fitted in a frame of 50-70 × 40-50 cm are used for collecting bottom dwelling fishes and also those found among dense aquatic vegetation. Live fishes were killed and fixed in nine percent formalin as they die in solution with all the fins expanded. Identification of fishes was based mainly on meristic, morphometric and descriptive characters. The accurate enumeration or counts of scales, fin rays, serration, color bands or number of barbels are of taxonomical importance. Morphometric characters are those which can be measured. The proportion of the measurement of one part of the body in relation to other parts was worked out.

RESULTS AND DISCUSSION

Eight species of fishes (Figs. 1-8) were collected (Figs. 9-10) from various sites of Kollam. Classification adopted

is generally after Nelson (2006) and Howes (1991) with inputs from Eschmeyer (1990).

Taxonomic accounts of species

Taxonomic analysis was done for all collected fishes; most of the taxonomically relevant meristic counts and metric characters were taken into consideration for these studies. Brief systematic accounts of all the fish species are given below.

***Anguilla bengalensis bengalensis* (Gray)**

Muraena bengalensis Gray, 1833, *Indian Zool*, 95 (Type locality: Ganges River).

Diagnosis : Origin of dorsal fin far ahead of vent and origin of the anal fin; body with inconspicuous cross-bands and irregularly scattered blotches and dots throughout; gill opening small and cresentic.

Meristic counts: D- 250- 305; P- 18; A- 220- 250.

Metric characters: TL (mm) - 370; HL (mm) - 62.0. % TL: HL- 16.8; HD- 7.0; PRP- 17.0; BDD-9.2; % HL: HD- 37.0; HW- 53.0; ED- 13.0; IOW- 22.6; INW- 19.4; STL-19.4.

***Anguilla bicolor bicolor* McClelland**

Anguilla bicolor bicolor McClelland, 1844, *Culcutta J. nat. Hist.,* 5 (8): 178. (Type locality: India).

Diagnosis: Body uniform brown to light green without cross bands or scattered spots. Dorsal fin inserted slightly anterior to origin of anal fin.

Meristic counts: D- 220- 245; A- 200- 218; P- 18.

Metric characters: TL (mm) - 460; HL (mm) - 63.8.% TL: HL-13.9; HD-6.3; HW-13.3; PRP-13.5; BDD-6.5; PRD-46.7; PRA- 45.0; DAV-1.9. % HL**:** HW-95.6; ED-9.4; IOW-15.7; INW-15.7; STL-17.2..

***Hyporhamphus* (*Hemirhamphus*) *limbatus* (Valenciennes)**

Hemirhamphus limbatus Valenciennes, 1846, Hist. nat. Poiss., 19: 44 (type locality: Malabar, Bombay, Pondicherry).

Diagnosis: 23 to 37 gill arches on the first gill ach.

Meristic counts: D- 12- 16; P- I, 10- 11; V- i, 5; A- 13-16.

Metric characters: TL (mm)- 137.0; SL (mm)-116.0; HL (mm)- 40.0. % SL: HL-31.3; HD-7.0; HW-7.0; BDD-6.8; PRD-72.8; POD-17.7LD-6.7; LBD-8.8; LBA-10.7; LCP-7.7; DCP-4.7; % HL: HD-21.7; HW-22.6; ED-10.0; IOW-10.0; INW-11.0; WGM-12.2; DOST-80.0.

Other features: Greenish above with a silvery lateral stripe on the flanks; ventral side white; fleshy tip of beak reddish; fins hyaline.

***Xenentodon cancila* (Hamilton- Buchanan)**

Esox cancila Hamilton- Buchanan, 1822, Fishes of Ganges: 213, 380 (type locality: Gangetic Provinces).

Diagnosis: Jaws elongated into a beak with teeth. 23- 37 gill rakers present on first gill arch; scales very small. Caudal fin truncate.

Meristic counts: D- 16; P- 10; V- i, 5; A- 16; C- 19.

Metric characters: TL (mm)- 179.0; SL (mm)- 165.0; HL (mm) - 65.0. % SL: HL- 6.5; HD- 1.1; HW- 0.9; BDD- 1.2; LBD-2.5; LBA- 2.5; % HL: HD- 1.1; HW- 0.9; ED-10.8; STL-64.6; WGM-9.2; IOW-10.8; INW-7.7.

Other features: Pectoral commences a short distance behind the centre of opercle; anal in the posterior third of the body; dorsal opposite to anal; a longitudinal groove present along the upper surface of head.

Remarks : *Xenentodon cancila* was originally described from River Ganges by Hamilton- Buchanan; according to him, a black spot present at the caudal base of this specimen, which is absent in the fish collected during this study; taxonomic studies on the fresh specimens of it from River Ganges alone can solve the problem.

***Aplocheilus lineatus* (Valenciennes)**

Aplocheilus lineatus Valenciennes, 1844, Hist. nat. Poiss., 18: 381 (type locality: Penninsular India).

Diagnosis : Body height at pelvic fin origin 18.0-20.8 in SL; lateral line scales are 32- 34; vertical bands present on the posterior half of the body; dorsal fin with a black blotch at its base; a silver spot present on the occiput of head.

Meristic counts : D- ii, 5; P- ii, 10; V- ii, 3; ; A- i, 14; C- 17; PDS- 26; PRPLS- 6; PRAS- 11; CPS- 12.

Metric characters : SL (mm)- 52.0; % SL: HD- 15.4; HW-17.3; LD-15.4; LBD-5.8; LBA- 21.2; LCP-13.5; DCP-11.5; PRD-80.8; HD- 15.4; HW-17.3; IOW-11.5; WGM-15.4;

Other characters : Ground color is brown with reddish green spots; 9- 12 bands present on the caudal region of the body; mouth terminal, directed slightly upwards, moderately wide, its cleft reach very near to the front border of orbit; barbels absent; eyes large, superior, 25.0- 37.5 in percent of head length; dorsal fin located above the last anal fin ray; caudal fin rounded; scales cycloid of moderate size, 35 in lateral line series.

***Mastacembelus armatus* (Lacepede)**

Macrognathus armatus, Lacepede, 1800, Hist. Nat. Poissons, II, 286 (type locality: unknown).

Fig. 1 : *Anguilla bengalensis.*

Fig. 2 : *Anguilla bengalensis.*

Fig. 3 : *Hyporamphus limbatus.*

Fig. 4 *: Xenentodon cancila.*

Fig. 5 : *Aplocheilus lineatus.*

Fig. 6 : *Mastacembelus armatus.*

Fig. 7 : *Macrognathus guentheri.*

Fig. 8 : *Tetraodon travancoricus.*

Fig. 9 : Fushing in a paddy field.

Fig. 10 : A koruvala used for fishing in ponds.

Diagnosis : Pre opercular spines are usually present; rostrum simple and devoid of tooth plates; dorsal fin with 32- 40 spine and 64- 92 branched rays.

Meristic counts : D- xxxii- xxxx, 64- 92; P- 21- 27; A- iii, 64- 90.

Metric characters : TL- 258.0; SL- 248.0; HL (mm) - 44.0. % SL: HL- 17.7; HD-6.8; HW-5.6; BDD-6.5; PRD-20.6; % HL: HD- 38.6; HW- 31.8; ED-11.4; IOW-9.0; STL-38.6; WGM-20.5.

Other characters : It is brown or yellowish brown in color; zig-zag bands present on the dorsal profile; body with a network of brownish bands; pectoral fin with 3- 4

Table 1 : Scientific names and common names of freshwater fishes collected from Kollam dt.

1	*Anguilla bengalensis bengalensis* (Gray & Hardwicke)	*Muraena bengalensis* *A.nebulosa nebulosa* *A. anguilla*	Indian long fin eel, Brown snake eel	Blangu, Musi Blangu, Vilangu, Mlanjil, Malanjil, Vellamalijeen, Manangeel, Ghalu, Aerel
2	*Anguilla bicolor*	*A.bicolor*, *A.australis*	Short fin eel	Velangu, Karutha-Malinjeen, Malanjil, Musi blangu
3	*Hyporamphus limbatus* (Valenciennes)	*Hemiramphus limbatus* *Hemirhamphus limbatus* *H. gaimardi, H. gorakhpurensis*	Congaturi-half beak, Needle fish, India half beak	Kolan,Murichundan
4	*Xenentodon cancila* (Hamilton-Buchanan)	*Esox cancila* *Esox hindostonicus* *Belone cancila*	Fresh water gar fish	Kolan, Kokila
5	*Aplocheilus lineatus* (Valenciennes)	*Panchax lineatum* *Haplochilus lineatus* *Haplochilus rubrostigma*	Malabar killie, Striped panchax	Maanathukannan, Maanathukanni, Nettichuttan, Poochutti, Varayan Poonjan
6	*Mastacembelus armatus* (Lacepede)	*Macrognathus armatus* *Mastacembelus manipurensis*	Tire-track spiny eel, White spotted spiny Eel, Marbled spiny Eel	Mookkarakan, Aarakan Kallaarakan, Kallaron
7	*Macrognathus guentheri*	*Mastacembelus guentheri*	Malabar spiny eel, Marble spiny eel	Aaral, Aarakan, Pana aarakan
8	*Tetraodon travancoricus* Hora & Nair	*Monotretus travancoricus*	Malabar puffer fish	Attunda, Aattu- maakri

Table 2 : Systematic position, significance and IUCN Status of the freshwater fishes from Kollam dt.

S. No	Scientific name	Order	Family	Significance	IUCN Status
1	*Anguilla bengalensis bengalensis* (Gray & Hardwicke)	Anguilliformes	Anguillidae	FF	EN
2	*Anguilla bicolor*	Anguilliformes	Anguillidae	FF	EN
3	*Hyporamphus limbatus* (Valenciennes)	Beloniformes	Hemiramphidae	FF	CR
4	*Xenentodon cancila* (Hamilton- Buchanan)	Beloniformes	Belonidae	FF	NT
5	*Aplocheilus lineatus* (Valenciennes)	Cyprinodontifor-mes	Aplocheilidae Aplocheilinae	OF	LC
6	*Mastacembelus armatus* (Lacepede)	Synbrachiformes	Mastacembelidae	FF, OF	LC
7	*Macrognathus guentheri*	Synbrachiformes	Mastacembelidae	FF, OF	LC
8	*Tetraodon travancoricus*	Tetraodontiformes	Tetraodontidae, Tetraodontinae	OF	EN

rows of discontinuous spots; a row of black spots present along the base of the soft dorsal fin.

***Macrognathus guentheri* (Day)**

Mastacembelus guentheri Day, F, 1865, *Proc. Zool. Soc. London*: (type locality: Malabar**),** 37; Day, F, 1865, Fishes of Malabar, **(**Trichur, Malabar), 154.

Diagnosis : A few black bands radiate from the eyes that cross the lower jaw; dorsal spines 30; anal spines 3.

Meristic counts : D- xxx, 58; P- 13- 21; A- III, 64; C- 10; LLS- 224; PDS- 47; CPS- 9.

Metric characters : TL (mm) - 272.0; SL (mm) - 257.0; HL (mm) - 40.0. % SL: BDD-13.6; HL-15.6; HD-31.9; PRD-23.3; POD-64.2; PRA- 59.5; LD-1.9; LBSPD-42.8; LBSOD-38.9; LBA-39.0; LP-4.7; DCP-2.0; LA- 1.6; LBP-2.0. % HL: HD-52.5; ED-75.0; IOW-10.0; STL-50.0.

Other features : Body reddish yellow; a white line passes through lateral line; dorsal, caudal and anal fin united at the base; distal half of caudal fin projects out from this. All fins with a number of dots.

Remarks : The first author collected many specimens of *Macrognathus guentheri* from Karuvannoor River of Thrichur, from where Francis Day originally described this fish; examination of both revealed that a number of differences are there between the present fish and the *M.*

guentheri. In *Macrognathus guentheri* head depth 39.5-42.2% HL (vs. 52.5 in the present species), snout length 37.2- 41.1% HL (vs. 50.0) and body depth at dorsal spine origin 110.0-12.0 (vs. 13.7). More over distinct bars and bands are present on the body of *M. guentheri,* which are absent in the present fish; detailed taxonomic studies alone can give a new name to the present fish.

***Tetraodon travancoricus* Hora & Nair**

Tetraodon (*Monotretus*) *travancoricus* Hora & Nair, 1941, *Rec. Indian Mus*., 43 (3) (type locality: Pamba River at Travancore).

Diagnosis : Body ovoid except at the caudal region; upper lateral line does not reach the end of the tail; nasal organ is elevated with a terminal opening; ventral fin absent.

Meristic counts : D-7- 8; P- 16- 17; A- 8; C-10-12.

Other features : Dorsal and lateral sides yellowish; ventral side whitish; two round black blotches are present on the lateral sides and two rectangular black blotches present on either side of the origin of the dorsal fin; two rectangular black blotches are present on the mid dorsal region; a black dot present at the caudal base; it shows distinct sexual dimorphism (Inasu, 1993).

CONCLUSION

The water bodies of Kerala harbor a variety of indigenous fishes. The natural source of ornamental fishes in the water bodies of the state is rich and diversified. The fresh water ornamental fish fauna of the rivers of the Kerala is biologically more diverse, represented by 125 species. Kerala is the foremost fish producing State in India. However, 97% of the state production is from marine sector and only 3% is contributed from inland sector. Altogether 210 primary fishes (excluding the marine migrants) are found in the inland waters, of which 53 species are endemic. Today the Western Ghats is recognized as one of the 35 "biodiversity hotspots" in the world. It harbours very rich flora and fauna. Many fishes are strictly endemic to Western Ghats mountain ranges. Moreover, 47% of endemic fishes are found to be facing high risk of extinction.

Studies on the meristic and morphometric features of a fish is helpful in the correct identification of the species. Analysis with a few characters may not give a clear picture about the taxonomical status of a species. But careful analysis with more relevant variables can trace the taxonomic position. Another important point in the description of a species is the number of specimens taken for the examination. The sufficient number of specimens, the better quality results in taxonomy. Careful analysis of detailed meristic and morphometric characters from more number of specimens may help to collect greater number of distinctions between species and so correct identification.

Meristic counts of members of a species never vary. Hence these identifying characters are more important than morphometric features; the latter may change in fishes living in different environmental conditions. But usually a non-overlapping morphometric difference in more than ten variables between members of a species never occurs.

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