Journal of Research in Biology

An International Scientific Research Journal

ISSN No: Print: 2231 –6280; Online: 2231- 6299

Original research

urn:lsid:zoobank.org:pub:0DE67D47-28C9-4435-A8FD-D70EEA6A47ED
urn:lsid:zoobank.org:act:09D3BF5E-C465-4FC2-9B8F-88CAB90C56DC

Batasio flavus, a new catfish species (Siluriformes: Bagridae) from Kerala, India

Author:
Mathews Plamoottil

Institution:
Assistant Professor in Zoology, Baby John Memorial Government College,
Chavara, Kollam Dt, Kerala.

ABSTRACT:

Batasio flavus, a new species of the family Bagridae, is described from Manimala River of Kerala, India. It is distinguished from its relative species by the following combination of characters: body slender, dorsal profile nearly straight; body and fins yellow; median longitudinal groove on head narrow, single and extending to base of occipital process; occipital process very short, equal to the length of orbit and never reach basal bone of dorsal fin; orbits are widely set; dorsal fin spine very weak, feebly ossified and its anterior and posterior edges smooth; considerable distance between base of last rayed dorsal fin and origin of adipose dorsal fin and the second dorsal fin with a straight margin for entire length. The new fish species is described and compared with its related species.

Keywords:
Bagrids, New species, Manimala River, *Batasio travancoria, B. sharavatiensis*

Corresponding author:
Mathews Plamoottil

Email Id:
mathewsplamoottil@gmail.com

Article Citation:
Mathews Plamoottil.
Batasio flavus, a new catfish species (Siluriformes: Bagridae) from Kerala, India
Journal of Research in Biology (2015) 5(5): 1799-1808

Dates:
Received: 17 November 2014 **Accepted:** 30 June 2015 **Published:** 18 August 2015

Web Address:
http://jresearchbiology.com/documents/RA0520.pdf

Journal of Research in Biology

INTRODUCTION

The species of genus *Batasio* Blyth, 1860 are small to medium-sized bagrid catfishes found in South and Southeast Asia. They are diagnosed from other members of the Bagridae in possessing large sensory pores on head, a pair of prominent posterior processes on the anterior part of the vomer, narrow mental region, transversely elongated, bar-like entopterygoid (Mo, 1991) and also in possessing small barbels.

Batasio batasio (Hamilton, 1822), *B. tengana* (Hamilton, 1822), *B. affinis* Blyth (1860), *B. fluviatilis* (Day, 1888), *B. dayi* (Vinciguerra, 1890), *B. merianiensis* (Chaudhuri, 1913; Ng, 2009; Tamang & Sinha, 2014), *B. travancoria* Hora & Law (1941), *B. pakistanicus* Mirza & Jan (1989), *B. tigrinus* Ng & Kottelat (2001), *B. elongatus* Ng (2004), *B. sharavatiensis* Bhatt & Jayaram (2004), *B. macronotus* Ng & Edds (2004), *B. fasciolatus* Ng (2006), *B. spilurus* Ng (2006), *B.`feruminatus* Ng & Kottelat (2007), *B. procerus* Ng (2008) and *B. convexirostrum* Darshan *et al.,* (2011) are the valid *Batasio* species (Misra, 1976; Ng & Kottelat, 2001; Jayaram, 2006, 2010; Ng, 2008; Darshan *et al.,* 2011). *Batasio travancoria* Hora & Law and *B. sharavatiensis* Bhatt & Jayaram are the two *Batasio* species described from south India. *Batasio travancoria* is the only one species of *Batasio* residing in the water bodies of Kerala. During a recent survey of Manimala River of Kerala, India, a yellowish colored species of *Batasio* was obtained, which on comparison with its congeners was found to be undescribed. It is described here as a new species *Batasio flavus.*

MATERIALS AND METHODS

Measurements were made point to point with dial calipers and data recorded to tenths of a millimeter. Counts and measurements were made on the left side of specimens whenever possible. Subunits of the head are presented as proportions of Head Length (HL); head length and measurements of body parts are given as proportions of Standard Length (SL). Methods used are those of Jayaram (2002).

Abbreviations used: ZSI/ANRC - Zoological Survey of India, Andaman & Nicobar Regional Centre, Haddo, Port Blair, Andaman & Nicobar Islands; ZSI - Zoological Survey of India, Kolkata; ZSI / SRC - Zoological Survey of India, Southern Regional Centre, Chennai; IOW - Inter Orbital Width; LBAD - Length of Base of Adipose Dorsal fin; AD - Adipose Dorsal fin; RD - Rayed Dorsal fin; BDD - Body Depth at rayed Dorsal front; BDA - Body Depth at Anal front; DCP - Depth of Caudal Peduncle; HD - Head Depth; HL - Head Length; CL - Caudal Lobe; HADA - Height of Adipose Dorsal at Anal front.

BATASIO FLAVUS, SP. NOV

(Figures. 1- 3; Table 1)

Holotype: ZSI/ANRC - 12228, 81.0 mm SL, India: Kerala, Manimala River at Paduthode, coll. Mathews Plamoottil, 11 January 2012.

Paratypes: ZSI/ANRC - 12229, 3 specimens, 69.0-88.0 mm SL, India: Kerala, Manimala River at Paduthode, coll. Mathews Plamoottil, 11 January 2012.

Diagnosis

The new species can be distinguished from its congeners in having a slender (BDD 16.0-18.0 % SL) body; body and fins yellowish; dorsal profile nearly straight; single median longitudinal groove on head; occipital process very small and hidden under skin; adipose dorsal fin with a straight margin for entire length and inserted behind a considerable distance from rayed dorsal fin; head flatter (HD 53.0-57.1 % SL) and orbits widely set (IOW 27.0-31.3 % HL).

Description

Morphometric data as in Table 1. Body elongated and moderately compressed. Dorsal profile rising evenly and gradually from the tip of snout to the origin of dorsal fin, then going in a roughly straight line to caudal fin base, except a concavity in front and behind adipose dorsal fin. Ventral profile flat up to posterior end

Fig. 1. **A fresh specimen of *Batasio flavus*, sp.nov, Paratype, ZSI/ANRC- 12229**

Fig. 2. *Batasio flavus*, sp.nov, Holotype, ZSI/ANRC - 12228

Fig.3. **Head region of *Batasio flavus*, sp.nov**

of anal fin base, then sloping slightly to the end of caudal peduncle. Urino - genital opening located at anterior 1/3 from the origin of ventral fin; anal opening fairly in front of anal fin origin.

Skin smooth, lateral line complete and mid lateral. Head compressed, conical, rounded anteriorly; bony elements on the dorsal surface of head are covered with thin skin. Snout rounded projecting over the mouth; nostrils wide apart; anterior nostrils tubular and located at the base of maxillaries, separated from the posterior nostrils by a distance equal to the diameter of the orbit. Median longitudinal groove on the head narrow, single, extending to base of occipital process; occipital process very short, equal to length of orbit and never reach basal bone of dorsal fin; an inter neural shield present between occipital process and dorsal fin; occipital process cannot be seen externally as this part is covered by a thick flesh. Mouth small, inferior, lunate, crenulated and continuous at the angles of the mouth. Eyes ovoid, dorso- lateral, horizontal axis longest. Pores present between nostrils, before eyes and along free borders of gill covers; 4-5 large pores from angle of mouth to opercle.

Mouth sub terminal; premaxillary teeth not exposed when mouth is closed. Oral teeth villiform on all

teeth bearing surfaces. Barbels four pairs; maxillary barbels short, slender, extending to middle of orbit, never reach pectoral base or outer opercular margin, reach half way to pectoral base. Nasal barbels slender, fairly reach anterior margin of orbit. Inner mandibulars very short and feeble, origin on either side of mid ventral line, its length ¾ of the diameter of orbit. Outer mandibulars originate posterio - lateral to inner mandibulars, reach in vertical just behind anterior margin of orbit.

Dorsal fin with a small spine and seven branched rays. Origin of dorsal fin above the middle of pectoral fin in smaller ones and at the tip of pectoral in larger ones. Dorsal fin margin convex. Tip of dorsal fin reach the tip of pelvic fin or 2/3 of length pelvic fin from its origin. Dorsal fin spine straight, slender, very weak, feebly ossified and flexible, anterior and posterior edges smooth. Pectoral fin with a moderately strong spine and 7-8 rays. Anterior margin of spine smooth, posterior margin with 10-13 small moderate serrations along entire length. Adipose dorsal fin with a straight margin for entire length, its anterior end never reach the base of last dorsal fin ray, but reach above the tip of pelvic fin or a little in front of the tip of pelvic fin. Considerable distance between base of last dorsal fin ray and origin of adipose dorsal fin. Adipose dorsal fin base extending to about ½ of an eye diameter behind last anal ray. Inter dorsal distance 8.0-12.3 in percent of SL and 41.7-47.6 in percent of adipose dorsal fin base. Pectoral fin margin convex posteriorly. Tip of pectoral fin just reach or reach a little behind the level of origin of dorsal fin. Pelvic fin origin at vertical through posterior end of dorsal fin base and with 5 rays and with a convex margin. Tip of it reach below anterior end of adipose dorsal fin base or a little behind it, it never reach anal fin origin but reach or reach nearer to the anal opening. Anus and urino genital openings are located on the mid ventral line in between ventral fin and anal fin origin.

Origin of anal fin base is vertical through ¼ of the length of adipose dorsal fin from its anterior end, located nearer to pelvic fin than to caudal fin base, with four undivided rays and 9-10 branched rays. Distal margin of anal fin slightly convex. Tip of anal fin never reach caudal fin base. Caudal peduncle depth 50.0-53.5 in percent of its length. Caudal fin deeply forked with rounded lobes having 17 principal rays.

Coloration: Body and fins yellow; a small brownish black triangular spot present in front of rayed dorsal fin base; a triangular dark or light brownish black spot present on caudal base. A thin brownish black line passes through mid lateral line.

Etymology: The specific epithet *'flavus'* is a Latin word meaning 'light yellow' refers to the color of the body of the new fish.

Distribution: Currently known to occur only at Paduthode of Manimala River, Kerala, India.

Habitat: The river stretch of Manimala River at Paduthode, the type locality of *Batasio flavus*, is generally occupied by sand or sandy gravel with occasional presence of bed rock or black clay. Width and depth in this area are 45.0-125.0 m and 0.3-6 m respectively; the bank height is 4.0-5.0 m above the general water level in summer season. The area is blanketed by moderate to dense riparian vegetation; intermittent occurrence of low riparian vegetation noticed at certain places.

DISCUSSION

The new species differs from *Batasio travancoria* Hora & Law (1941) of Pamba and Kallada Rivers of Kerala in many characters. In *Batasio travancoria,* body is grey or brown (vs. yellow in new species), median cephalic groove appear as double fontanels (vs. single), occipital process can be seen externally (vs. not seen externally) and adipose dorsal fin originates immediately behind the rayed dorsal fin (vs. AD inserted behind a considerable distance from RD). New species have a slender body (BDA 14.0-14.8 % SL vs. 14.8-17.3 in *B. travancoria*), flatter head (HD 11.1-

Table 1. Morphometric characters of *Batasio flavus*

Sl.No.	Characters	HT	Range	Mean	SD
1	Total length (mm)	98.5	82.0-106.0	95.8	8.7
2	Standard length (mm)	81.0	69.0-88.0	79.8	7.8
	% of SL				
3	Head length	22.8	21.0-23.8	22.7	1.0
4	Head depth	12.3	11.1- 13.6	12.5	1.1
5	Head width	15.4	14.2- 17.0	15.7	1.2
6	Post orbital length	10.0	9.6- 10.6	10.0	1.0
7	Head length excluding snout	17.3	16.5- 17.3	17.0	1.0
8	Body depth at dorsal origin	16.0	16.0-18.0	17.1	0.8
9	Body depth at anal origin	14.2	14.0-14.8	14.6	0.3
10	Body width at dorsal origin	13.0	12.8-14.8	13.975	0.8
11	Body width at anal origin	9.8	7.2-9.9	8.4	1.1
12	Pre dorsal length	34.0	32.6-35.8	34.1	1.3
13	Post dorsal length	63.2	63.0-65.2	63.9	0.9
14	Pre pectoral length	22.8	21.7-23.9	22.7	0.9
15	Pre pelvic length	48.1	45.0-50.0	47.7	2.1
16	Pre anal length	67.3	65.0-68.0	66.6	1.3
17	Length of rayed dorsal	16.0	13.6-17.6	15.3	1.9
18	Height of adipose dorsal	4.8	3.0- 5.0	4.4	0.9
19	Length of pectoral	17.0	14.8-17.3	16.0	1.0
20	Length of pelvic	14.7	12.3-14.8	13.2	1.3
21	Length of anal	11.3	11.1-12.5	11.9	0.9
22	Length of dorsal spine	13.5	11.1-13.7	14.2	1.2
23	Length of pectoral spine	14.6	11.6-14.8	16.0	1.5
24	Length of upper caudal lobe	18.5	18.2-21.7	19.2	1.7
25	Length of lower caudal lobe	21.6	19.8-21.7	20.9	0.9

26	Length of base of rayed dorsal	13.3	13.1-14.5	13.6	0.3
27	Length of base of adipose dorsal	26.5	25.0-29.0	26.6	1.7
28	Length of base of pectoral	4.0	3.6-4.3	4	0.4
29	Length of base of pelvic	3.7	3.3-4.1	3.6	0.2
30	Length of base of anal	14.8	14.2-16.0	14.9	0.8
31	Length of base of caudal	12.3	11.1-13.9	12.6	1.2
32	Length of caudal peduncle	18.5	17.2-21.7	18.7	2.1
33	Depth of caudal peduncle	9.8	8.6-11.6	9.8	1.3
34	Width of caudal peduncle	3.7	2.9-3.8	3.5	0.4
35	Distance from pectoral to pelvic	26.5	24.6-29.6	26.7	4.4
36	Distance from pelvic to anal	19.7	17.6-20.3	19.0	1.2
37	Distance from anal to caudal	30.5	29.7-31.8	30.5	1.8
38	Distance from adipose dorsal to caudal	14.8	14.2-15.0	15.0	1.1
39	Distance from rayed dorsal to adipose dorsal	11.1	8.0-12.3	9.6	1.0
40	Distance from anal to vent	1.5	1.5- 2.6	2.0	0.1
41	Distance from ventral to vent	17.9	15.2- 17.9	16.0	2.0
42	Head length (mm)	18.5	16.0-21.0	18.1	2.2
	% of HL				
43	Head depth	54.1	53.0-57.1	55.1	2.1
44	Head width	67.6	67.5-71.4	68.8	1.8
45	Distance from occiput to snout	91.3	89.2-94.1	91.1	2.1
46	Distance from occiput to dorsal origin	59.4	57.1-73.5	63.1	7.3
47	Length of frontal groove	60.0	56.8- 76.5	68.2	10.2
50	Eye diameter	27.0	23.5-28.1	25.6	1.9
51	Inter orbital width	27.1	27.0-31.3	28.7	1.8
52	Inter narial width	26.0	19.0-27.0	23.6	4.0
53	Snout length	37.8	31.3-38.0	35.1	3.3

54	Width of gape of mouth	27.0	25.0-30.6	28.2	2.3
55	Length of maxillary barbels	32.8	32.4-47.1	37.6	6.7
56	Length of nasal barbels	16.2	16.2-19.0	17.9	1.3
57	Length of outer mandibular barbels	11.7	10.8-20.6	16.8	5.3
58	Length of inner mandibular barbels	10.5	9.7-17.6	13.9	3.9
	Ratios				
59	Standard length/ Head length	4.4	4.0-4.8	4.3	0.4
60	Standard length/ Body depth	5.9	5.1-6.2	5.7	0.5
61	Body depth/ Body width	1.3	1.2- 1.4	1.3	0.1
62	Length of base of AD/Length of base of RD	1.9	1.7- 2.0	1.8	0.1
3	Length of base of AD/Inter dorsal distance	2.4	2.1- 2.6	2.4	0.2
64	Length of base of RD/ Inter dorsal distance	1.2	1.1-1.6	1.2	0.2
65	LBAD/HADA	6.3	6.0-9.1	7.1	1.4
66	Head length/length of rayed dorsal fin	1.4	1.4- 1.6	1.5	0.1
67	Head length/height of adipose dorsal fin	5.3	4.6- 6.0	5.4	0.6
68	Head length/Length of pectoral fin	1.3	1.3-1.6	1.4	0.2
69	Head length/Length of pelvic fin	1.7	1.5- 1.9	1.7	0.2
70	Head length/Length of anal fin	1.9	1.7- 2.1	1.9	0.2
71	Length of base of AD/Length of base of anal fin	1.8	1.7-1.8	1.8	0.1
72	Length of caudal peduncle/depth of caudal peduncle	1.9	1.5- 2.0	1.8	0.2
73	Length of upper caudal lobe/Length of lower CL	.9	.9-1.0	0.9	0.1
74	Inter orbital width /Eye diameter	1.1	1.0-1.3	1.1	0.1
75	Snout length/Eye diameter	1.4	1.4- 1.8	1.6	0.2
76	Snout length/Inter orbital width	1.4	1.2-1.8	1.4	0.3

13.6 % SL vs. 14.8-15.6), smaller eyes (23.5-28.1 % HL vs. 32.2 - 36.8), anterior and posterior edges of dorsal spine smooth (vs. both edges feebly serrated), short based adipose dorsal fin (25.0-29.0 % SL vs. 36.4-40.2) and longer caudal peduncle (17.2-21.7% SL vs. 11.1-13.5). *Batasio flavus* can be distinguished from *B. sharavatiensis* Bhatt & Jayaram (2004) of Karnataka in having a short based adipose dorsal fin which starts after a considerable distance from rayed dorsal fin (vs. long based AD which originates immediately after RD in *B. sharavatiensis*), anal fin with lesser number of branched rays (9-10 vs. 12-14), slender body (BDD 16.0-18.0 % SL vs. 18.2-23.3), shorter head (21.0-23.8 % SL vs. 26.4-28.6) and larger eyes (23.5-28.1 % HL vs. 17.2-18.7).

Batasio merianiensis (Chaudhuri, 1913) of Assam can be distinguished from *B. flavus* in having a deeper body (BDA 15.2-18.4 % SL vs. 14.0-14.8),

vertical dark brown bars on head and body (vs. absent in the new species), and short based adipose dorsal fin (16.9 -22.2 % SL vs. 25.0-29.0). *Batasio convexirostrum* Darshan *et al.* (2011) of Mizoram can be distinguished from the new species in having a pre dorsal bar (vs. absent in *B. flavus*), longer snout (39.2-45.5 % HL vs. 31.3-38.0), very short inter dorsal distance (1.7-4.1 % SL vs. 8.0-12.3), long based adipose dorsal fin (31.0-34.9 % SL vs. 25.0-29.0) and pectoral fin with more branched rays (9-10 vs. 7-8). *Batasio niger* Vishwanath & Darshan (2006) of Manipur was considered as a junior subjective synonym of *B. havmolleri* by Ng & Kottelat (2007). The former differs from the new species in having a body with a black oblique pre dorsal bar (vs. absent in *B. flavus*), deeper body (BDA 18.4-24.8 % SL vs. 14.0-14.8) and higher head (16.7-22.3 % SL vs. 11.1-13.6). *Batasio fasciolatus* Ng (2006) of west Bengal can be differentiated from *B. flavus* in having 5-6 vertical dark brown bands (vs. absent in the new species), deeper body (BDA 18.1-20.3 % SL vs. 14.0-14.8), longer dorsal spine (13.6-16.8 % SL vs. 11.1-13.7) and smaller eyes (16.5-16.8 % HL vs. 23.5-28.1). *Batasio spilurus* Ng (2006) of Assam differs from *Batasio flavus* in having a longer (26.9- 28.6 % SL vs. 21.0-23. 8.), deeper (15.7-17.0 % S L vs. 11.1-13.6) head and short based adipose dorsal fin (12.6- 12.8 % SL vs. 25.0-29.0). *Batasio fluviatilis* (Day, 1888; Ng & Kottelat, 2007) differs from the new species in having a dark oblique predorsal bar and a dark spot on the sides of the body below the middle of the adipose-fin base (vs Absent in *B. flavus*) and a long based adipose-fin (30.0-33.3 % SL vs. 25.0-29.0). *Batasio tengana* Hamilton (1822) of Brahmaputra River differs from *B. flavus* in having a dark mid dorsal stripe (vs. absent in *B. flavus*), elongated head (23.8-28.8 % SL vs. 21.0-23.8), shorter based adipose dorsal fin (14.5-17.5 % SL vs. 25.0-29.0) and slender caudal peduncle (DCP 6.7- 8.2 % SL vs. 8.6-11.6). *Batasio batasio* (Hamilton-Buchanan) (1822) of West Bengal have an elliptical dark brown spot below dorsal fin base (vs. absent in *B. flavus*), mottled pattern of faint brown patches on body (vs. absent), deeper head (16.3-21.2 % SL vs. 11.1 -13.6), longer snout (43.9-46.2 % HL vs. 31.3-38.0), double (vs. single) cephalic fontanels and occipital process reaching basal bone of dorsal fin (vs. never reach).

CONCLUSION

Batasio species are obligate inhabitants of headwater streams and the upper reaches of smaller rivers characterized by fast-flowing, shallow, well oxygenated stretches of riffles and run broken up by pools or cascades in some cases. They prefer to live in small streams with rocky or sandy bottom. Taxonomic studies undergoing on these fishes are rare; it is mainly because they are not abundantly distributed in the large rivers where fishing practices are common; they are considered as weed fishes as they are not edible; as size is small, they cannot be caught by the common gill nets and cast nets; their number may also be less. It was only in 1941, the first *Batasio* species discovered from Kerala. Now it is after 74 years, a second *Batasio* species reaches to scientific world from Kerala. The new species, *Batasio flavus* is a unique *Batasio* species with many peculiar characters unseen in its congeners; they require spotless and clear water and are intolerant to the accumulation of organic wastes and other contaminants. Regular monitoring of the water quality is essential for the protection and preservation of this rare species.

Comparative materials Examined

***Batasio travancoria*:** ZSI 13449/1, Holotype, 73.6 mm SL; India: Travancore, from the foot of the largest falls of Peruntenaruri, a tributary of the Pamba River at Edakadathy. 2 ex. 59.0, 65.0 mm SL, Kulathoopzha, Kallada River. ZSI 13452/1, 1 ex., 58.1 mm SL; India: Travancore, Palode, Chittar River.

Batasio sharavatiensis: Holotype: ZSI/ SRC F 6419, 99 mm SL, Joginmatha, Uttara Kannada, Karnataka, coll. Anuradha Bhatt, 08. 03. 1998. Paratypes: ZSI/ SRC F

6420, 104.0 mm SL, Joginmatha, Sharavathi River, Uttara Kannada, Karnataka, coll. Anuradha Bhatt, 18. 3. 1999.

Batasio merianiensis: ZSI F 7781/1, 1 ex., holotype, 65.7 mm SL; India: NE Assam, Meriani. Taxonomic details were taken from original descriptions and revision for other species of *Batasio* found outside South India.

ACKNOWLEDGMENTS

The author acknowledges Principal, Baby John Memorial Government College, Chavara, Kerala for providing the facilities. I am grateful to anonymous reviewers for comments that helped to improve the manuscript.

REFERENCES

Bhatt A and Jayaram KC. 2004. A new species of the genus *Batasio* Blyth (Siluriformes: Bagridae) from Sharavati River, Uttara Kannada, Karnataka. Zoosprint Journal. 19(19): 1339- 1342.

Blyth E. 1860. Report on some fishes received chiefly from the Sitang River and its tributary streams, Tenasserim Provinces. Journal of the Asiatic Society of Bengal. 29(2): 138-174.

Chaudhuri BL. 1913. Zoological results of the Abor Expedition, 1911–12. XVIII. Fish. Records of the Indian Museum. 8(3): 243-257, Pls. 7-9.

Darshan AN, Anganthoibi and Vishwanath W. 2011. *Batasio convexirostrum*, a new species of catfish (Teleostei: Bagridae) from Koladyne basin, India. Zootaxa. 2901: 52-58.

Day F. 1888. Supplement to the fishes of India; being a natural history of the fishes known to inhabit the seas and fresh waters of India, Burma, and Ceylon. Williams, London & Norgate, Edinburg, 779-816.

Hamilton B. 1822. An account of the fishes found in the River Ganges and its branches. Archibald Constable, Edinburgh and Hurst, Robinson, London, 405.

Hora SL and Law NC. 1941. Siluroid fishes of India, Burma and Ceylon. IX. Fishes of the genera *Gagata* Bleeker and *Nangra* Day. X. Fishes of the genus *Batasio* Blyth. Records of the Indian Museum. 43, 9-42.

Jayaram KC. 2002. Fundamentals of Fish Taxonomy. Narendra publishing House, Delhi.174.

Jayaram KC. 2006. Cat Fishes of India. Narendra Publishing House, Delhi. 383.

Jayaram KC. 2010. Freshwater fishes of the Indian Region. Narendra publishing House, Delhi. 256-260.

Mirza MA. and Jan MA. 1989. *Batasio pakistanicus* new species, a new catfish (Pisces, Bagridae) from Pakistan. Scientific Khyber. 2: 283-286.

Mo TP. 1991. Anatomy, relationships and systematics of the Bagridae (Teleostei: Siluroidei) with a hypothesis of siluroid phylogeny. Theses Zoologicae, Koeltz, Koenigstein. 216p.

Misra KS. 1976. The fauna of India and Adjacent countries. Zool. Sur. India, Kolkata. 367.

Ng HH and Kottelat M. 2001. A review of the genus *Batasio* in Indochina with the description of *B. tigrinus* from Thailand. Rev. Suisse Zool. 108(3): 495-511.

Ng HH. 2004. *Batasio elongatus*, a new species of bagrid catfish from southwest Myanmar (Siluriformes: Bagridae). Ichthyological Exploration of Freshwaters. 15 (1): 67-70.

Ng HH and Edds DR. 2004. *Batasio macronotus*, a new species of bagrid catfish from Nepal (Teleostei: Bagridae). Ichthyological Exploration of Freshwaters. 15 (4): 295-300.

Ng HH. 2006. The identity of *Batasio tengana* with

description of two new species of *Batasio* from north eastern India. Journal of fish Biology. 68: 101-118.

Ng HH. 2008. *Batasio procerus*, a new species of catfish from northern Myanmar (Siluriformes: Bagridae). Ichthyological Exploration of Freshwaters. 19(1): 1-6.

Ng HH and Kottelat M. 2007. *Batasio feruminatus*, a new species of bagrid catfish from Myanmar (Siluriformes: Bagridae), with notes on the identity of *B. affinis* and *B. fluviatilis*. Ichthyological Exploration of Freshwaters. 18: 289-300.

Ng HH. 2009. Redescription of *Batasio merianiensis*, a catfish (Teleostei: Bagridae) from northeastern India, Journal of Threatened Taxa. 1(5): 253-256.

Tamang L and Sinha B. 2014. Additional record of *Batasio merianiensis* (Chaudhuri 1913), a catfish (Teleostei: Bagridae) in upper Brahmaputra River drainage in Arunachal Pradesh, India. Journal of Threatened Taxa. 6(5): 5738-5743.

Vinciguerra D. 1890. Viaggio di Leonardo fea in Birmania regione vicini (Pesci). Ann. Mus. Civ. Storia nat. Genoa. 9(2): 129-362.

Vishwanath W and Darshan A. 2006. A new species of the genus *Batasio* Blyth from Manipur, India. Zoosprint Journal. 21(2): 2160-2163.