



Channa brahmacharyi sp. nov., a new species of dwarf snakehead from Meghalaya, North-East India (Teleostei: Channidae)

Priyankar Chakraborty¹✉, Kranti Yardi¹, Prasun Mukherjee²

¹Bharati Vidyapeeth Institute of Environment and Education Research, Bharati Vidyapeeth (deemed to be) University, Pune, India 411043

²School of Water Resources Engineering, Jadavpur University, Kolkata, India-700031

Author Contributions- All authors equally contributed to the study

✉ **Corresponding author:**

Bharati Vidyapeeth Institute of Environment and Education Research,
Bharati Vidyapeeth (deemed to be) University,
Pune, India 411043.

Email: priyankarchakraborty1991@gmail.com, +91 8335946771

Article History

Received: 26 December 2019

Accepted: 17 February 2020

Published: February 2020

Citation

Priyankar Chakraborty, Kranti Yardi, Prasun Mukherjee. *Channa brahmacharyi* sp. nov., a new species of dwarf snakehead from Meghalaya, North-East India (Teleostei: Channidae). *Species*, 2020, 21(67), 101-108

Publication License



This work is licensed under a Creative Commons Attribution 4.0 International License.

General Note

Article is recommended to print as color digital version in recycled paper.

ABSTRACT

A new species of snakehead, *Channa brahmacharyi* sp. nov., is described based on 8 specimens (109.54mm–135.69 mm standard length), collected from Simsang river in Meghalaya. The new species is closely similar to *Channa lipor* Praveenraj, Uma, Moulitharan

& Singh and *Channa aurantipectoralis* Lalhlimpuia, Lalronunga & Lalramliana. It can be distinguished from its congeners by the presence of 8-9 oblique bands horizontally along the dorsal flank of the body, 45-47 pored lateral line scales, 34-37 dorsal fin rays, 23-26 anal fin rays and 45 total vertebrae. With this new species the number of snakehead species endemic to the Eastern Himalayan Biodiversity hotspot is now increased to 15.

Keywords: Valid species, taxonomy, labyrinth, 'gachua' group, biodiversity

1. INTRODUCTION

The genus *Channa* Scopoli, 1777, commonly referred to as snakeheads, are freshwater teleosts dispersed across tropical Africa, parts of the Middle East, and Asia (Berra, 2001). There are currently around 50 valid species of snakehead fishes in three genera (*Aenigmachanna*, *Channa* and *Parachanna*) belonging to the family Channidae (Britz et al. 2019). Fishes of this genus are characterized by an elongated cylindrical body, a large mouth with well-developed teeth on the jaws, vomer and palatines, long dorsal- and anal-fin bases with soft rays, and accessory air-breathing organs (Labyrinth organ), (Courtney & Williams, 2004). The Eastern Himalayan region encompassing the North East states of India is considered to be a hotspot for *Channa* diversity showing a high level of endemism in species (Ruber et al. 2019). In the span of a decade, as many as nine species of snakeheads, viz. *Channa melanostigma* Geetakumari & Vishwanath, 2011, *C. andrao* Britz, 2013, *C. aurantipectoralis* Lalhlimpuia et al. 2016, *C. pardalis* Knight, 2016, *C. stiktos* Lalramliana, Knight, Lalhlimpuia & Singh 2018, *C. quinquefasciata* Praveenraj, Uma, Knight, Moulitharan, Balasubramanian, Bineesh & Bleher 2018, *C. bipuli* Praveenraj, Uma, Moulitharan & Bleher 2018, *C. lipor* Praveenraj, Uma, Moulitharan & Singh 2019, *C. brunnea* Praveenraj, Uma, Moulitharan & Kannan 2019 were described from this region. A snakehead species was discovered and several specimens were collected by Indian fish expert and trader Mr Andrew Arunava Rao in August 2019 from the state of Meghalaya and they were provided for studying. This Snakehead (Figure 1-3) is described as a new species in the present paper and compared with other members of the *Channa gachua* group. The authors herein describe it as *Channa brahmacharyi* sp. nov.

2. MATERIALS AND METHODS

The fish were euthanized using clove oil mixed with ethanol which was then mixed into water. Then they were fixed in 10% formalin and transferred to 70% alcohol for preservation. Measurements follow those of Britz (2008) and were taken using digital vernier callipers (Mitutoyo). Measurements were taken to the nearest 0.1 mm. Bilateral counts were taken from the left side and the counts were done using a stereo-zoom transmitted light microscope (EISCO). All eight individuals of the type material were radiographed for vertebrae count. The holotype and one of the paratypes is deposited at Zoological Survey of India, Kolkata. While the rest of the specimens examined in the study are deposited at the fish collection of Bharati Vidyapeeth Institute of Environment Education and Research (BVIEER), Pune. The comparison of the new species with other species was done on the basis of original descriptions and other literature sources.

3. RESULTS

Channa brahmacharyi, sp. nov.

(Figures 1-3)

Holotype- awaiting cataloguing, Zoological Survey of India, Kolkata 109.54 mm SL; India: Meghalaya: East Garo Hills district: Simsang river, 25°34'08"N 90°30'04"E; Rao A.A 16 August 2019.

Paratypes- waiting cataloguing, Zoological Survey of India, Kolkata 135.69 mm SL (one specimen); BVIEER FC/005-010, 112.35-126.73 mm SL (6 specimens); same as Holotype.

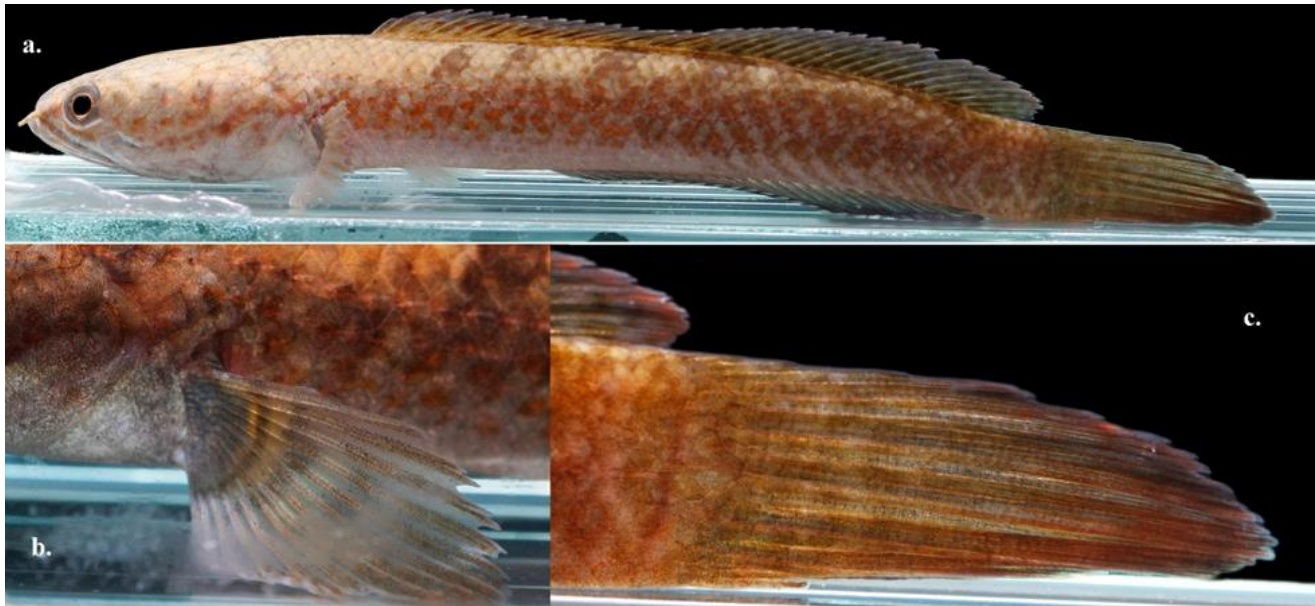


Figure 1 *Channa brahmacharyi*, live coloration, shortly after capture. a. BVIEER FC/003 b. pectoral fin c. caudal fin.



Figure 2 A non-type specimen of *Channa brahmacharyi* sp. nov. showing live coloration. Photograph by first author, 2019.

Diagnosis

Channa brahmacharyi is a member of the *Channa gachua* species group. It is distinguished from the larger species in the group by not observed to exceed size of 135 mm SL and from all members except *C. lipor* in possessing a unique coloration of reddish brown to orange body with nine brown oblique bars in the flank, deep orange–red spots on the flanks. It possess 34–37 dorsal-fin rays; 23–26 anal-fin rays; pored lateral-line scales 45–47, transverse scale row 5–6/1/7–8. *Channa brahmacharyi* appears similar to *C. gachua* owing to its short body size, but differs from *C. gachua* (topotype) and its juvenile by the absence of an ocellus in the posterior most part of the dorsal fin (vs. present); scales below lateral line at anal-fin origin 7–8 (vs. 5), and more vertebrae 45 (vs. 40).

Description

For general appearance see figures 1–3. Data on the morphometry of the new species is provided in Table 1. A member of the *Channa gachua* species group following the presence of semi-circular bands on the pectoral fins and a u-shaped isthmus. Body elongate, laterally compressed at caudal peduncle. Body depth is 15.5–16.7 % in SL. Head large, length 31–36.3% in SL. Head width is the highest posterior to eyes and anterior to opercle, interorbital region almost flat, and eyes large and bulging, diameter is 11.1–15.6% in HL. Mouth large, maxilla extends beyond the angle of the jaw. Upper jaw about 38.6–42.4% of HL. Both jaws with rows of minute pointed teeth no canines, vomer with a few number of canines pointing inward, palatine teeth minute. Cephalic sensory pores on the ventral side of the head in single arrangement. Dorsal fin with 34–37 simple rays. Anal fin with 23–26 simple rays. Pectoral fins with 15–16 total rays (branched 14–15 + simple 1). Pelvic fin with 5 branched rays. Total caudal fin rays (including

procurent rays) 14-16. Predorsal scales from before dorsal fin origin up to the two succeeding scales of the flower like arrangement of scales 7-9. Pored lateral line with 45-47 scales extending from shoulder girdle in a horizontal line, but dropping one scale row at scale 15 or 16, then continuing horizontally to caudal peduncle. Scales above lateral line 5.5-6.5 and below 7.5-8.5 at anal-fin origin. Circumpeduncular scales 24. Vertebrae: 45.

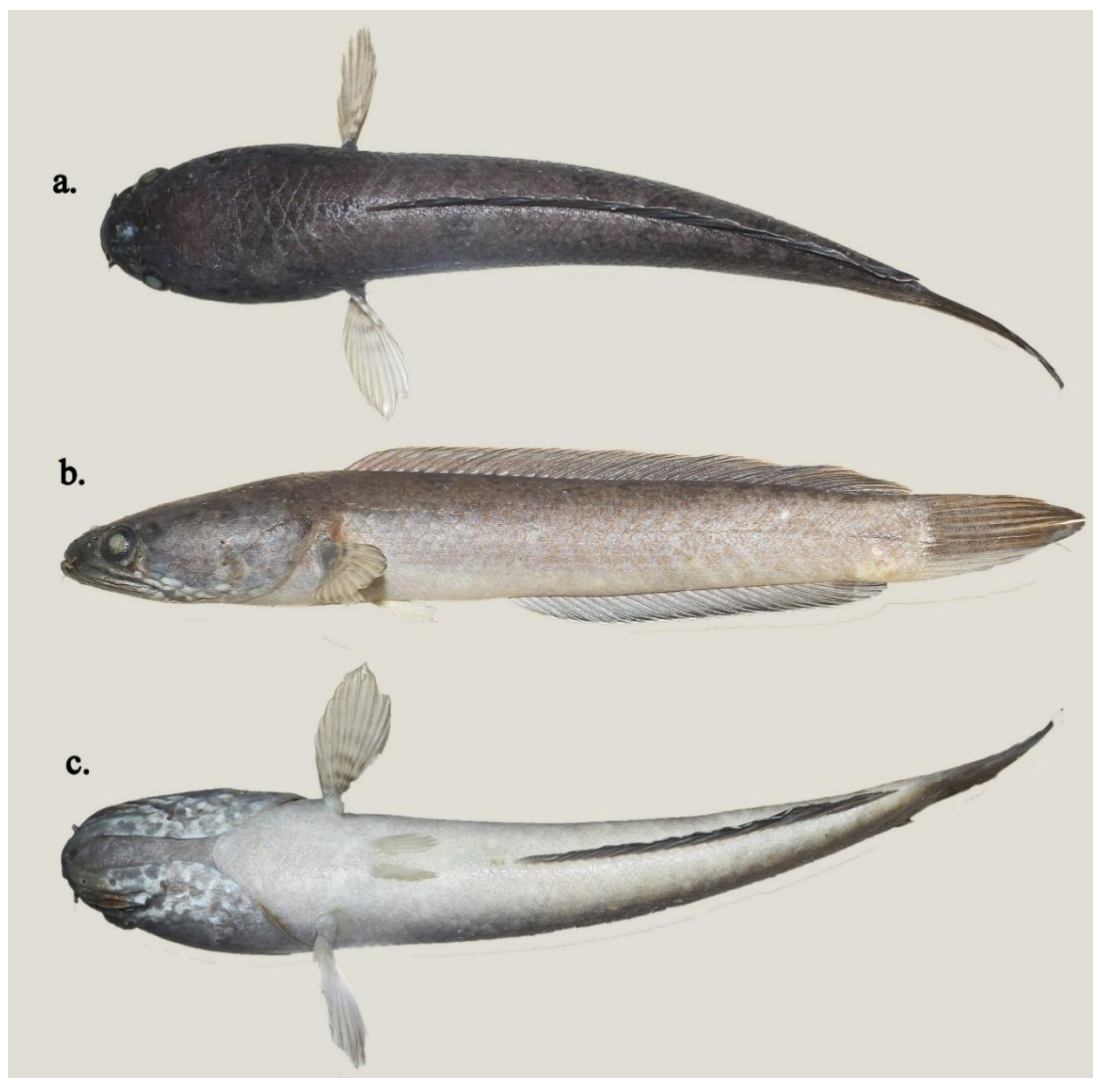


Figure 3 *Channa brahmacharyi* sp. nov., a. dorsal b. lateral, c. ventral. ZSI, 112.54 mm SL.

Table 1 Morphometric data of *Channa viridimaculata* sp. nov. (n=8)

Characters	Holotype (ZSI)	Paratypes (ZSI) BVIEER FC/005-10)	Mean (+/-) standard deviation
Standard length	109.54 mm	112.35–135.69 mm	
(in percent of SL)			
Head length	31.0	28.6–32.2	29.8 +/- 0.8
Head depth	13.9	11.9–12.7	12.5 +/- 0.5
Head width	19.1	17.5–19.1	18.3 +/- 0.7
Body depth	16.1	12–16.1	13 +/- 0.8
Body width	12.4	11.6–13.1	13.9 +/- 1.1
Pre dorsal length	35.1	34.9–36.8	34.8 +/- 0.7

Pre anal length	52.5	48.2–52.5	49.9 +/- 0.3
Pre pectoral length	32.0	28.8–33.4	30.9 +/- 0.8
Pre pelvic length	34.7	34.7–37.2	36.7 +/- 0.7
Dorsal fin length	57.7	56.4–57.7	57.7 +/- 0.9
Anal fin length	38.4	36.8–39.1	38.1 +/- 0.9
Pectoral fin length	21.3	19.9–21.3	19.4 +/- 0.8
Pelvic fin length	10.4	8.0–8.1	8.1 +/- 0.2
Caudal peduncle length	4.8	6.4–7.5	6.5 +/- 0.7
Caudal peduncle depth	12.5	8.3–9.5	8.9 +/- 0.4
Snout length	5.4	5.9–6.3	5.8 +/- 0.3
Eye diameter	4.6	5.7–6.2	5.6 +/- 0.5
Preorbital depth	7.5	7.6–8.3	8.1 +/- 0.4
Postorbital length	18.6	11.2–18.3	16.3 +/- 1.6
Interorbital width	9.3	8.8–9.1	9.3 +/- 0.5
Upper jaw length	12.8	12.9–13	12.9 +/- 0.2
(in percent of HL)			
Snout length	20.9	18.1–23.4	21.3 +/- 1.2
Eye diameter	14.4	19.3–20	18.9 +/- 1.0
Preorbital depth	26.3	23.5–29	27.3 +/- 1.3
Postorbital length	65.2	57.3–63.3	62.9 +/- 1.4
Head depth	39.3	37.1–41.9	41.4 +/- 1.3
Interorbital width	31.4	27.4–32	31.2 +/- 0.9
Upper jaw length	44.6	40.1–45.4	43.3 +/- 0.3
(Ratios)			
Depth/width of body	0.9	0.9–1.3	0.9 +/- 0.1
SL/HL	3.5	3.3–3.6	3.5 +/- 0.2
SL/body depth	6.7	6.2–6.7	6.6 +/- 0.4

Coloration

In life (Figure 1-2), body coloration orangish to brick red dorsally and ventrally. 8-9 dark brown oblique bands along the flanks. Presence of irregular, oval orange to red spots on the body with highest concentration of these spots on the posterior half. There is a red orbital streak from right behind the eye up to the operculum edge. Dorsal fin pale orange or brown in the lower half and with bluish, sometimes greenish reflecting interradial membranes followed by black sub-margin, a thin orange margin (more pronounced in some specimens) and a white distal margin. Anal fin similar to dorsal fin except for any pale orange or brownish coloration. Pectoral fin with 4-5 semi-circular bands. Caudal fin with a few, faint irregular bars on them, followed by brown radials, blue interradial membranes and a pale orange distal margin.

In alcohol (Figure 3), uniformly dark grey. Ventral surface lighter in coloration with cream colored isthmus, white markings on the ventral surface of the head. Vent cream in color. Pectoral fins with a dark brown base with alternating creamy white and dark brown bands on fin membranes. Dorsal and anal fins are uniformly dark with a narrow white rim. The irregular transverse bars on the caudal fin are not visible.

Etymology. The specific epithet '*brahmacharyi*' honours the late Dr. Ratan Lal Brahmachary a distinguished ethologist, biochemist and pioneer in tiger pheromone research.

Distribution. *Channa brahmacharyi* sp. nov. is presently known only from the Simsang River in the North-eastern state of Meghalaya, India. The part of the stream from where the fish were collected (Figure 4) is clear with high water flow and cobbles and sand for substrate. The portion of the stream where the fish was collected is devoid of vegetation.

Remarks. This fish is not known to occur in the ornamental fish trade as of now. From the same area in the river, sympatric fish species such *Olyra* sp., *Garra* sp., *Devario* sp. has been observed alongside with some unidentified cyprinids.



Figure 4 Type locality of *Channa brahmacharyi* in Simsang River, East Garo Hills, State of Meghalaya, India. Photograph by A.A.Rao, 2013.

4. DISCUSSION

The *Channa gachua* species-group has been acknowledged by many ichthyologists (Britz, 2013; Britz et al., 2019) and there are about 25 valid species belonging to the group. Though a large number of species have been described since the proposal of the *Channa gachua* grouping, the high level of synonymy makes it difficult to ascertain the exact number of valid species. *C. brahmacharyi* is the 10th species to be discovered from the Eastern Himalayan biodiversity hotspot belonging to the *C. gachua* group.

Among the species of snakeheads that are currently placed in the '*Channa gachua*' group, *Channa brahmacharyi* shows close affinities with all of them with respect to general morphology, an u-shaped isthmus and cycloid scales on the underside of the lower jaw and alternating bands on the pectoral fin. However, it differs from *C. andrao*, *C. bleheri*, *C. brunnea*, *C. burmanica*, *C. hoaluensis*, *C. ninbinhensis*, *C. nox* and *C. orientalis* in possessing a pair of pelvic fins (vs. their absence). It differs from *C. amphibeus*, *C. barca*, *C. aurantimaculata* and *C. aurantipectoralis* possess a higher number of pored lateral line scales (more than 49 vs. 45-47). While in three species, namely *C. punctata* (35-40), *C. panaw* (39-41) and the newly described *C. rara* (43) possesses pored lateral line scales

and lateral line scales that are fewer (less than 44 scales vs. 45–47 pored lateral line scales). *C. brahmacharyi* differs from *C. bipuli* (4.5), *C. pardalis* (4.5), *C. quinquefasciata* (3.5–4.5), *C. harcourtbutleri* (4), *C. melanostigma* (3.5), *C. stewartii* (3.5) and *C. gachua* (3–3.5), in possessing higher number of the scales in transverse series above lateral line up to base of dorsal fin 6. Among the rest of the species of the group, the new species is distinctly different from both *C. ornatipinnis* and *C. pulchra* in the absence of numerous black spots on the flanks (vs. presence of black spots) which can also be observed in preserved specimens. The closest congeners of *C. brahmacharyi* sp. nov., are *C. aurantipectoralis* and *C. lipor*. However, the new species can be easily distinguished from *C. lipor* by the presence of a higher number of pored lateral line scales 45–47 (vs. 35–40), scales extending from the shoulder girdle in a horizontal row dropping one scale row at scale 14–15 (vs. 10–11), transverse scale rows 5–6/1/7–8 (vs. 3/1/6), more dorsal fin rays 34–37 (vs. 29–32), anal fin rays 23–26 (vs. 20) and the caudal fin being devoid of any zigzag bars (vs. caudal fin with zigzag bars). *C. brahmacharyi* can be distinguished from *C. aurantipectoralis* in possessing fewer number of pored lateral line scales 45–47 (vs. 51–64), having a pectoral fin with semi-circular bands which are visible even in a preserved specimen (vs. uniformly greyish pectoral fin), fewer circumpeduncular scales 24–25 (vs. 28) and absence of a distinct v-shaped blotch on the dorsal surface of the head of the live specimens (vs. presence of a v-shaped blotch on the dorsal surface). We have omitted the comparison to *C. royi*, *C. shingon* and *C. torsaensis*. The three were omitted in accordance to the recent findings of Britz et al. (2019).

Channa brahmacharyi has so far been only known from its type locality in the Simsang River, Meghalaya. Totalling to 15 endemic *Channa* species including the one described in this paper have so far been reported from the Eastern Himalayan Biodiversity Hotspot, making it a center for high endemism of fish species (Vishwanath et al., 2011). Thereby increasing the need to survey and sustainably manage the region's waterways. The authors believe that studying the ecotypes of snakeheads found across the Eastern Himalayan Biodiversity Hotspots can reveal important information regarding the monophyly of the *Channa gachua* group in recognizing additional characters as well as rise of other probable groupings.

Comparative Material

- *Channa aurantimaculata* Musikasinthorn, 2000, Dibrugarh, Assam, Priyankar Chakraborty, February 2019, 3 ex SL 87.63, 98.29 and 341.63 mm, awaiting cataloguing, ZSI, Kolkata
- *Channa bleheri* Vierke, 1991, Tinsukia, Assam, Priyankar Chakraborty, February, 2019, 2 ex SL 61.45–72.89 mm, awaiting cataloguing, ZSI, Kolkata
- *Channa brunnea* Praveenraj, Uma, Moulitharan & Kannan, 2019, Jalpaiguri, West Bengal, Priyankar Chakraborty, March 2019, 5 ex SL 56.64, 67.9, 83.57, 91.67 and 110.32 mm, awaiting cataloguing, ZSI, Kolkata
- *Channa gachua* Hamilton, 1822, Topotypic, North 24 Paraganas, West Bengal, Priyankar Chakraborty, April 2019, 1 ex SL 127 mm, awaiting catalogue, ZSI, Kolkata.
- *Channa andrao* Britz, 2013, Jalpaiguri, West Bengal, Priyankar Chakraborty, March 2019, 1 ex SL 115.06 mm.
- *Channa quinquefasciata* Praveenraj, Uma, Knight, Moulitharan, Balasubramanian, Bineesh & Bleher, 2018, Torsa River, Alipurduar district, West Bengal, Priyankar Chakraborty, March, 2019, 1 ex SL 109.22 mm, awaiting cataloguing, ZSI, Kolkata.
- *Channa stewartii* Playfair, 1867, Kalikhola Bhutan, Priyankar Chakraborty, May 2019, 1 ex, SL 173.73 mm, awaiting cataloguing, ZSI Kolkata.

Acknowledgement

The authors are also thankful to Dr Erach Bharucha, Director of Bharati Vidyapeeth Institute of Environment Education and Research (BVIIEER, Pune) for providing the facilities and the encouragement to carry on the study. The authors would also like to thank Mr Subhrendu Sekhar Mishra, Officer in charge, Scientist-C, Marine Fish Section, Zoological Survey of India for his valuable inputs regarding the manuscript.

Funding: This study has not received any external funding.

Conflict of Interest: The authors declare that there are no conflicts of interests.

REFERENCE

1. Berra TM. Freshwater fish distribution. Academic Press, San Diego, 2001: 604. Maharashtra, India (Teleostei: Labyrinthici: Channidae). Zootaxa, 2019: 4683: 589–600.
2. Britz R, Dahanukar N, Anoop VK, Ali A. *Channa rara*, a new species of snakehead fish from the Western Ghats region of

3. Britz R. *Channa andrao*, a new species of dwarf snakehead from West Bengal, India (Teleostei: Channidae). *Zootaxa*, 2013: 3731:287–294.
4. Britz R. *Channa ornatipinnis* and *C. pulchra*, two new species of dwarf snakeheads from Myanmar (Teleostei: Channidae). *Ichthyological Exploration of Freshwaters*, 2008: 8: 335–344.
5. Courtenay WR, Williams JD. Snakeheads (Pisces, Channidae) – a biological risk assessment. U.S. Department of the Interior, U.S. Geological Survey Circular, 2004: 1251: 1–143.
6. Rüber L, Tan HH, Britz R. Snakehead (Teleostei: Channidae) diversity and the Eastern Himalaya biodiversity hotspot. *Journal of Zoological Systematics and Evolutionary Research*. 2019.[published online]<https://doi.org/10.1111/jzs.123245>.
7. Vishwanath W, Ng HH, Britz R, Singh LK, Chaudhry S, Conway KW. Chapter 3. The status and distribution of freshwater fishes of the Eastern Himalaya region. In: Allen, D.J., Molur, S. & Daniels, B.A. (Compilers), *The status and distribution of freshwater biodiversity in the Eastern Himalaya*. IUCN, Cambridge and Gland, 2011: 22–41.