



## NOTES ON SOME SNAKEHEAD FISHES OF INDIA WITH AN AID TO THEIR IDENTIFICATION

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### INTRODUCTION

The identity of snakehead fishes (Perciformes: Channidae) in India, particularly species belonging to *Channa gachua* complex remains to be confusing due to clubbing of a number of species under the synonymy of *Channa orientalis* Bloch and Schneider by several authors including Talwar and Jhingran (1991), Jayaram (1999) and Menon (1999) as well. Courtenay and Williams (2004) considered most of these synonyms are incorrect and records of *C. orientalis* from southern parts of India and elsewhere except for Sri Lanka are erroneous. Ng and Lim (1989, 1990) and Ng *et al.* (1999) suggested that *C. gachua* is in need of revision.

Myers and Shapovalov (1931) discussed in detail the differences between *Ophiocephalus* Bloch (1793) and *Channa* Scopoli (1777) and argued in support of merging *Ophiocephalus* with *Channa*, considering the former as a generic synonym. Their observations were based on a comparison of *Ophiocephalus gachua* Hamilton (with pelvic fins) and *Channa orientalis* Bloch and Schneider (without pelvic fins) as under.

The genera *Ophiocephalus* and *Channa* had been previously separated by the presence or absence of pelvic fin and phyloric or caecal appendages (Day, 1876). But, Hora (1921) and Deraniyagala (1929) observed that the phyloric caecae were present in both *O. gachua* and *C. orientalis*. Deraniyagala (1929) also considered both the species are identical in head scale and other characters and found no significant differences, apart from the lack of pelvic fins in

*C. orientalis*. Both the species in Sri Lanka are known from the same biotope. Further, Day (1876) noted that, "It is not uncommon in India to find specimens of *Ophiocephalus gachua* having a ventral fin deficient, but I have not observed both wanting" and as a specimen of *O. gachua* lacking both pelvic fins was taken on the Island of Formosa by Leo Shapovalov, Myers and Shapovalov (1931) concluded that *C. orientalis* may be regarded as a "series of anomalous specimens".

However, after an excellent discussion on merging of genera, Myers and Shapovalov (1931) were hesitant to synonymise both the species (as was also in Deraniyagala, 1929) and listed them separately. Taking a leaf from Myers and Shapovalov (1931), De Witt (1960) considered absence of pelvic fins in snakeheads is an anomalous character and so, *C. gachua* is placed under synonymy of *C. orientalis*. The same has been followed by Talwar and Jhingran (1991), Jayaram (1999) and Menon (1999).

The present piece of work is aimed at examining the synonymy given for snakehead fishes (Perciformes, Channidae) by Talwar and Jhingran (1991) and Menon (1999) which includes merger of *C. burmanica*, *C. gachua*, *C. harcourtbutleri* and *C. orientalis*. It also points out identity of *C. diplogramma*, the giant Malabar snakehead.

### MATERIAL AND METHOD

With the above backdrop all the specimens present in the National Zoological Collection

labeled as *Channa orientalis* (Bloch and Schneider) have been examined and other eminent Indian Scientists were contacted for their concurrence. Several Indian literatures reporting this species from different parts of India were studied for presence or absence of pelvic fins being it the only significant difference.

*Material examined:* *C. orientalis*: F-12482/1, 2 ex., 69-80 mm SL, Dambua Estate, Sri Lanka (pelvic fin absent).

Indian specimens labeled as *C. orientalis*: F-11332/1, 3 ex., Dam Guva Estate, Jakvala (W.P.); F-4365/2, 8 ex., Fateh Sagar, Udaypur, Rajasthan; F-4389/2, 4 ex., Fateh Sagar, Udaypur, Rajasthan; F-4390/2, 1 ex., Fateh Sagar, Udaypur, Rajasthan; F-4490/2, 13 ex., Birwan Nalla, Jammu; F-6283/2; 10 ex., Sulkam River, Mandla, Madhya Pradesh; FF-3385, 2 ex., Malbasa pond, Amarpur, South Tripura; F-5834/2, 1 ex., Stn.13, Dhanodi Nala, about 3 miles west of Udampur, Jammu; F-5835/2, 1 ex., a small 'Bauli' by side of Nadiali Nala of Megehna, Jammu; FF-2665, 1 ex., Deo R., Kanchanpur, north Tripura; FF-2741, 2 ex., Thangal Davar, Imphal, Manipur; FF-2751, 1 ex., Bishnupur, 30km from Imphal, Manipur; FF-2762, 1 ex., Nambul, Manipur; FF-3194, 11 ex., Karo special phase-II, 12 km east of Karghati, Bokaro, Jharkhand; FF-3200, 1 ex., Konnar nalla, Hazaribag, Jharkhand; FF-3195, 7 ex., Khasmahal surrounding Bokaro thermal power station, Jharkhand; FF-3333, 1 ex., Tiau R., 25 km east of Champai, Mizoram; FF-3440, 1 ex., Damodar R., Dishergarh; FF-3450, 1 ex., Kawrawng Lui R., Ngengbui, Chintuipui, Mizoram; FF-3716, 1 ex., Subarnarekha R., down stream from Chandil Dam, Jharkhand; FF-4031, 3 ex., Morna R., Akola, Maharashtra; FF-4043, 2 ex, Waghur R., tributary of Tapi R., Jalgaon, Maharashtra (pelvic fin present in all).

Indian specimens labeled as *C. harcourtbutleri*: F-10038/1, 1 ex., Stream 3 miles N-W of Potsengboum, Manipur; F-10039/1, 2 ex., Khurdo stream near Thanga, Manipur; F-10040/1, 1 ex., Loktak Lake, Manipur; F-10041/1, 2 ex., Haingang-pat, Manipur; F-10042/1, 1 ex., Maklong R., Manipur; F-4250/2, 28 ex., Imphal

River, 4 miles down Karrkopi daktunglow, Manipur; F-4297/2, 1 ex., Imphal River, Manipur; F-4296/2, 1 ex., Borak River, Karrong, Manipur.

## DISCUSSIONS

The conclusion of merging *Ophiocephalus gachua* (Hamilton) with *Channa orientalis* (Bloch and Schneider) considering absence of pelvic fin as an anomalous character (De Witt, 1960) is not supported by several species that are lacking pelvic fins like *C. orientalis* (i.e., *C. asiatica* (Linnaeus, 1758), *C. bleheri* Vierke, 1991, *C. burmanica* Choudhuri, 1919 and *C. nox* Zhang et al., 2002). Apart from that, it is important to note that Hora and Mukerji (1934) examined the specimens from Sri Lanka to find that *C. orientalis* is lacking basipterigoids and even traces of pelvic fin rudiments, a finding mostly overlooked.

Munro (1955), following Deraniyagala (1929), determined the snakehead species without pelvic fins of Sri Lanka as *C. orientalis* and other species with pelvic fins as *C. gachua kelaarti*, a nominal name identical with *C. gachua*. Lim et al., (1990) suggested that *C. gachua* is separate from *C. orientalis*. Pethiyagoda (1991) differentiate *C. orientalis* and *C. gachua* on the basis that,

- i) *C. orientalis* is endemic to Sri Lanka;
- ii) *C. gachua* attains a larger size than *C. orientalis*;
- iii) *C. orientalis* does not possess pelvic fins while *C. gachua* usually has pelvic fins;
- iv) the breeding behavior of *C. orientalis* is to orally incubate their eggs whilst *C. gachua* orally incubate, build a crude nest or scatter their eggs and
- v) *C. orientalis* is the more colourful species than *C. gachua*.

Kottelat (1998), Musikasinthorn (2000), Viswanath and Geetakumari (2009) and others consider *C. gachua* a valid species, not a junior synonym of *C. orientalis*, a species distinct from the former on account of absence of pelvic fin.

To ascertain identity of specimens in National Zoological Collection, Kolkata those were earlier determined as *Channa orientalis* were re-examined. But, it was found that none of them

were identical with the Sri Lankan specimens of *Channa orientalis* Bloch and Schneider (1801) (Figure 1 & 2). All these specimens are having pelvic fins and so, those are to be considered as *Channa gachua* (Hamilton). Personal communications from Dr. K. Remadevi from Z.S.I., Chennai, Dr. K.C. Gopi from Z.S.I., Kozhicode and Dr. A.K. Karmakar from Z.S.I., Kolkata confirmed that they have not come across a single specimen from Indian water bodies without having pelvic fin to be regarded as *Channa orientalis*. Dr. P. Musikasinthorn also expressed similar view regarding Indian specimens when discussed in person.

Further, published information on *C. orientalis* from different parts of India were also studied. Specimens from Assam (Sen, 1985: 179), Andhra Pradesh (Barman, 1993: 267), Arunachal Pradesh (Sen, 2006: 380), Sikkim (Karmakar, 2006: 212), Manipur (Karmakar and Das, 2005: 163), Nagaland (Karmakar and Das, 2006: 420), Mizoram (Karmakar and Das, 2007: 531), Tripura (Barman, 2002: 294), Meghalaya (Sen, 1995: 594), Gujarat (Sen and Banerjee, 2000: 454), West Bengal (Sen, 1992: 216), Madhya Pradesh (Sharma, 2007: 228) were identified as *C. orientalis* but having pelvic fins, and so, all are referable to *C. gachua*. Similarly, specimens of *C. gachua* having pelvic fin were determined as *C. orientalis* from Cauvery river system (Jayaram *et al.*, 1982: 95-96), Tadoba Andhari Tiger Reserve (Yadav, 2006: 154), Melghat Tiger Reserve (Yadav, 2005: 285), Bandhavgarh Tiger Reserve (Thilak, 2009: 156), Pachmarhi Biosphere Reserve (Sharma, 2009: 167), Jabalpur District, Madhya Pradesh (Sharma, 2008: 267). Dr. S. Kar kindly expressed that there was no specimen lacking pelvic fin were present among the materials collected from conservation areas of Madhya Pradesh and Chhattishgarh (Kar, 2008). Reports of this species from Andamans (Rao *et al.*, 2000) also said to have pelvic fins and so, it is too not to be considered as *C. orientalis*.

From distributional point of view, Day (1876), Deraniyagala (1929) and Pethiyagoda (1991) equally observed that *Channa orientalis* is endemic to Sri Lanka. In the original description (Bloch and

Schneider, 1801) the specimens said to have come from 'Indies' and most probably not from India exactly.

It is therefore concluded that *Channa orientalis* Bloch and Schneider does not occur in India and the synonymy given in Talwar and Jhingran (1991) as well as Menon (1999) is erroneous. And, the name *Channa orientalis* is misapplied to *Channa gachua* specimens in Indian waters. The *Channa* specimens having a combination of characters - 'moderate to large scales; 39 to 47 scales in lateral line; 4 or 5 rows of scales between hind border of eye and angle of preopercle; pelvic fins present; length of pelvic fin less than half of pectoral fin length; dorsal fin with 32 to 37 rays; anal fin with 20 to 23 rays and head length 27-32% of standard length' are to be determined as *Channa gachua* (Hamilton).

Among the synonymy of *C. orientalis*, given in Menon (1999), *Ophiocephalus apus* Canestrini, *O. coramota* Cuvier, *O. fusca* Cuvier, *O. kellartii* Gunther, *O. limbatus* Cuvier, *O. marginatus* Cuvier, *O. montanus* McClelland, and *Philypnoides surakartensis* Bleeker are referable to *Channa gachua* (Hamilton) (Pethiyagoda, 1991; Roberts, 1993; Ng *et al.*, 1999; Courtenay and Williams, 2004). Talwar and Jhingran (1991) considered *O. aurantiacus* Hamilton as a possible synonym of *C. orientalis*, which has been followed by Menon (1999), Eschmeyer (1999) and Froese and Pauly (2010) as well. But from the figure drawn in Hamilton (1822), it is evident that this is having pelvic fins and other morphological characters (D 34; A 22; cheek scales 5-6) bring it closer to *Channa gachua*. The 'orange-peel colour' of body and fins, with some irregular stains of a redder hue, especially on the sides of the head, the pectoral and on the caudal fins, may be attributed to colour variance owing to ecological conditions.

Kullander *et al.*, (2000) has treated *Channa burmanica* Chaudhuri as a valid species and characterized in having no pelvic fin, higher lateral line scale count (50 vs 36 to 46 in *C. orientalis* and *C. bleheri*) and more anal fin rays (28 vs 20 to 25).

Ng *et al.*, (1999) distinguished *O. harcourtbutleri* Annandale from its congener as



a distinct species. *Channa harcourtbutleri* (Annandale, 1918), described from Inle Lake, Myanmar and also known from Manipur in India (Hora, 1921a), closely resemble *C. gachua*, but differs in having anal fin with 23 to 26 rays; postorbital head depth 31-35% of head; head length 32-34% of SL and width of head 17-19% of SL (vs 39-44%, 27-32% and 18.6-21.7% in *C. gachua*). No ocelli on posterior part of dorsal fin at any life stage of *C. harcourtbutleri* while an ocellus present in subadults of *gachua*. The authors examined the Indian specimens labeled as *C. harcourtbutleri* to find them as erroneous identification. Vishwanath and Geetakumari (2009) correctly doubted its presence in Manipur and it is certain that *C. harcourtbutleri* is not occurring in India. *Channa burmanica* Chaudhuri, known from Myanmar, is characterized in having no pelvic fin, lateral line scales 50, dorsal fin rays 38, anal fin rays 28 and predorsal scales 8 and can easily be distinguished from *C. bleheri* and *C. orientalis*, the other two species lacking pelvic fins and found in India and Sri Lanka.

Day (1865a) described a species as *Ophiocephalus diagramma* from Malabar and Canara coast and the same name was also used in his Fishes of Malabar (1865b). But considering the smallness of scales Sir F. Day (1876) placed it under synonym of *O. micropeltes* (Cuvier), a species known from Thailand, Viet Nam, Malaysia, Sumatra and Borneo. This synonymy was followed for quite a long time. It is quite unnatural to have a patchy distribution of *C. micropeltes* away from its natural habitat unless introduced and then colonized. The Indian species with small scales is now proved to be a distinct species (*Channa diplogramma*, the giant Malabar snakehead) on the basis of molecular



*Channa orientalis*, ventral view (F-12482/1)

studies (Benziger *et al*, 2011; Bhat *et al*, 2012).

In this present context, the identity of Indian snakeheads including the species clubbed earlier with *Channa orientalis* are placed hereunder in form of a working key so as to clearly distinguish them from each other. Another species, *Channa melanostigma*, of *C. gachua* complex recently described by Geetakumari and Vishwanath (2010), has also been included in the key. Of the 30 species belonging to the genus *Channa* Scopoli known till date (Froese and Pauly, 2012), Indian waters are represented by only 11 species. But the key includes three more extra-limit species, *viz.*, *C. burmanica*, *C. harcourtbutleri* and *C. orientalis* for easy identifications.

#### Working Key for identification of *Channa* species of Indian region:

- 1a. Scales small; lateral line contains more than 70 scales ..... 2
- 1b. Scales moderate to large; lateral line contains 35 to 70 scales ..... 3
- 2a. Lateral line scales 95 to 110; predorsal scales 22 ..... *C. diplogramma* (Kerala, India)
- 2b. Lateral line scales about 80; predorsal scales 17 ... .. *C. amhibeus* (Northern Bengal, India and Bhutan)
- 3a. Pelvic fins absent ..... 4
- 3b. Pelvic fins present ..... 6
- 4a. Lateral line scales 50, dorsal fin rays 38; anal fin rays 28 ..... *C. burmanica* (Myanmar)
- 4b. Lateral line scales 36 to 46; dorsal fin rays 30 to 37; anal fin rays 20 to 25 ..... 5
- 5a. Dorsal fin with 30 to 34 rays; anal fin with 20 to 22 rays; lateral line consists of 36 to 42 pored scales ..... *C. orientalis* (Sri Lanka)



*Channa orientalis*, lateral view (F-12482/1)

- 5b. Dorsal fin with 35 to 37 rays; anal fin with 24 or 25 rays; lateral line consists of 43 to 46 pored scales ..... *C. bleheri* (Assam, India)
- 6a. Cheek scale 4 or 5 rows between hind border of eye and angle of preopercle ....7
- 6b. Cheek scale 8 to 12 rows between hind border of eye and angle of preopercle .....11
- 7a. Length of pelvic fin more than half of pectoral fin length; pectoral fin without band ... ..... *C. punctatus* (India; Pakistan, Afghanistan, Sri Lanka, Nepal, Bangladesh, Myanmar, Yunnan in China)
- 7b. Length of pelvic fin less than half of pectoral fin length; pectoral fin banded ... 8
- 8a. Body covered with scattered numerous dark black spots; dorsal fin with 36 or 41 rays; lateral line contains 45 to 53 scales ... 9
- 8b. Scattered dark black spots on body absent; dorsal fin with 32 to 37 rays; lateral line contains 39 to 48 scales .....10
- 9a. Caudal fin with 14-15 distinct black zigzag transverse bars; dorsal fin origin after 3-4 scales vertically above the pectoral fin origin; vertebrae 50-51... *C. melanostigma* (Arunachal Pradesh, India)
- 9b. No distinct black bars on caudal fin; dorsal fin origin vertically above the pectoral fin origin; vertebrae 44 ..... *C. stewartii* (Eastern Himalayas - India & Nepal)
- 10a. Depth of head behind orbit 39 to 44% of head length; head length 27 to 32% of standard length; anal fin with 20 to 23 rays ... .. *C. gachua* (India; Sri Lanka, Pakistan, Myanmar, Malaysia, Thailand, Viet Nam, Sunda Island, & Indonesia)
- 10b. Depth of head behind orbit 31 to 35% of head length; head length 32 to 34% of standard length; anal fin with 23 to 26 rays ... .. *C. harcourtbutleri* (Myanmar)
- 11a. Sensory pores arranged singly under lower jaw; two large cycloid scales on each side of lower jaw undersurface ..... 12
- 11b. Sensory pores under lower jaw arranged in groups; big cycloid scales on lower jaw undersurface absent .....13
- 12a. Lateral line scales 61 to 63; dorsal fin rays 50 to 52; anal fin rays 33 to 34; scattered dark black spots on head and body ... .. *C. barca* (West Bengal and Assam, India; Bangladesh)
- 12b. Lateral line scales 51 to 54; dorsal fin rays 45 to 47; anal fin rays 28 to 30; no dark black spots on head and body ... .. *C. aurantimaculata* (Assam, India)
- 13a. Dorsal fin rays 50 to 55; anal fin rays 31 to 35; predorsal scales 13 to 16; a large ocellus on upper part of caudal fin base often present; white spots on body and fins ... .. *C. marulius* (India; Pakistan, Sri Lanka, Bangladesh, southern Nepal, Myanmar, Thailand, Mekong basin of Laos & Cambodia, southern China)
- 13b. Dorsal fin rays 42 to 45; anal fin rays 25 to 29; predorsal scales 18 to 20; no ocellus on caudal fin ... .. *C. striata* (India; Pakistan, eastward to Thailand, south China)

#### SUMMARY

Examination of specimens labeled as *Channa orientalis* and study of reports of this species in literature resulted in concluding that *Channa orientalis* Bloch and Schneider does not occur in India. Status of the species given in synonymy of *C. orientalis* in Menon (1999) has been discussed and summarized that all species including *Opheocephalus aurantiacus* Hamilton are considered as to be referable to as *Channa gachua* (Hamilton) except for *C. orientalis*, *C. burmanica* and *O. harcourtbutleri* which are treated as valid species. No Indian specimens are confirmed to be *Channa harcourtbutleri*. A working key for identification of snakehead fishes of India along with *C. burmanica* and *C. orientalis* have been provided to avoid future confusion.

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