

A new species of the genus *Tor* from Yunnan, China (Teleostei: Cyprinidae)

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Received 6 January 2003

Accepted 22 September 2003

Key words: taxonomy, cyprinid, systematics

Synopsis

A new species of the subfamily Barbinae, *Tor yingjiangensis*, is recognized from Yunnan province, China. It can be distinguished from other *Tor* species by the following combination of characters: last simple dorsal-fin ray osseous and non-serrated; no forward directed predorsal procumbent spine; head length considerably longer than body depth; no tubercles on the snout or sides of the face; 18–20 gill rakers on the outside of first gill arch; 24–26 lateral line scales; median lobe of lower lip short, its posterior margin truncate, not extending to the vertical across the inner corners of the mouth; and the condition of the lower lip consistent in individuals of different sizes. The new species has been misidentified previously as *Tor putitora* (Hamilton, F. 1822. An account of the fishes found in the River Ganges and its Branches. Edinburgh & London. 405 pp), which occurs in the Ganges and Indus River basins. The new species can easily be distinguished from *T. putitora* by having 3–3.5 (vs. 2.5) scales from lateral line to pelvic-fin origin, shorter caudal peduncle length (13.0% vs. 17.2% of standard length), lesser body depth (26.4% vs. 24.0% of standard length) and longer caudal peduncle depth (12.0% vs. 10.9% of standard length), no longitudinal stripe present along side of body, and eyes visible in ventral view of head.

Introduction

Hamilton (1822) first grouped mahseers, *Tor* species separately and placed them under the genus *Cyprinus*; he recognized three species of mahseers, namely *Cyprinus tor*, *C. putitora*, *C. mosal*. Later scholars grouped these fishes under a distinct genus, *Tor* (Gray 1833). The freshwater fishes of the genus *Tor* are medium to large-sized barbs occurring in Indonesia, Pakistan, Kashmir, South and Southeast Asia, including the Indian peninsula (Heckel 1838, Serene 1951, Taki 1974, Wu et al. 1977, Chu & Chen 1989, Zhou & Cui 1996, Menon 1992). They are important economic fishes throughout their distribution, but their taxonomy is in a great confusion (Hora 1939, Mirza & Javed 1986, Mirza 1989, Menon 1992, Roberts 1993, Kottelat 2000).

So far, there is no uniformly accepted diagnosis for the genus *Tor*. Smith (1945) and Jayaram

(1981) diagnosed *Tor* by the following combination of characters: lips fleshy, continuous at angles of mouth; lower lip with or without a median lobe and the post-labial groove uninterrupted; dorsal fin with a scaly sheath at its base. Kottelat & Whitten (1993) diagnosed *Tor* by the following character combination: lower lip developed into fleshy lobe, or at least with two notches delimiting the usual position of the lobe; post-labial groove uninterrupted; no horny sheath on lower jaw; few gill rakers on lower arm (7–17). Rainboth (1996) diagnosed *Tor* by the following character combination: medium- to large-sized fishes with large scales, fewer than 30 scales in lateral line; a non-serrated spine in dorsal fin; medial lobe in lower lip at mandibular symphysis. Mirza (1967) described a new species, *Tor zhobensis* from west Pakistan, then he erected a new subgenus and genus respectively, *Naziritor*, to accommodate this species in 1986 and 1989. Wu et al. (1977), Chen & Chu (1985), Chu & Chen (1989)

and Shan et al. (2000) diagnosed *Tor* by lower lip with a median lobe and post-labial groove continuous. According to the specialized extent of other characters, they (1977, 1989, 2000) further subdivided the Chinese *Tor* species into three subgenera: *Tor* (*Tor*), *Tor* (*Folifer*) and *Tor* (*Parator*). Nowadays, more and more ichthyologists (Rainboth 1991, Zhou & Cui 1996, Kottelat 2001) tend to treat all the previous subgenera as separate genera. Here we accept that the genus *Tor* as a separate genus without any subgenus. By comparing related specimens deposited in our institute, we ascribe to *Tor* fishes with the following character combination: lower lip developed into fleshy lobe, or at least with two notches delimiting the usual position of the lobe; post-labial groove uninterrupted; last simple dorsal-fin ray osseous and non-serrated; no forward directed pre-dorsal procumbent spine; no groove in front of nostrils.

There are eight species belonging to *Tor* in China (Chen & Chu 1989, Zhou & Cui 1996, Shan et al. 2000), and all of them can be found in Yunnan Province. We reexamined the *Tor* specimens deposited in Kunming Institute of Zoology and found the specimens identified as *Tor putitora* by Chen & Chu (1985), Chu & Chen (1989) and Shan et al. (2000) actually represent an undescribed species.

Methods and materials

Methods

Specimens examined belong to the collection of Kunming Institute of Zoology (KIZ), Chinese Academic of Sciences. All counts and measurements are taken following Chu & Chen (1989). Abbreviations are listed as following: A – anal fin; C – caudal fin; D – dorsal fin; P – pectoral fin; LLS – lateral line scales; D-LL – scales between dorsal-fin origin and lateral line; V-LL – scales between pelvic-fin origin and lateral line; SL – standard length; TL – total length; HL – head length.

Materials

Tor yingjiangensis sp. nov:

- Holotype: KIZ164401, 181 mm SL; Yingjiang River, Manyun Town, Yunnan, China.
- Paratype: KIZ704404, 162 mm SL; Yingjiang River, Manyun Town, Yunnan, China (one specimen). KIZ764235, 88.5 mm SL; KIZ764229,

72.5 mm SL; KIZ764236, 82 mm SL; Yingjiang River, Jiucheng Town, Yunnan, China (three specimens).

Results

T. yingjiangensis Chen and Yang, sp. nov. (Figure 1).
T. (Tor) putitora: Chen & Chu 1985 (Yingjiang, Yunnan), Chu & Chen 1989 (Yingjiang, Yunnan), Shan et al. 2000 (Yingjiang, Yunnan).

Diagnosis

This new species can be distinguished from other *Tor* species by the unique combination of the following features: 18–20 gill rakers on the outside of the first gill arch, 24–26 LLS; D-LL: 4–4.5, V-LL: 3–3.5; post-labial groove uninterrupted, median lobe of lower lip short, its posterior margin truncate, not extending to vertical across the inner corners of mouth, and the condition of the lower lip consistent in individuals of different sizes; no tubercles on the snout or sides of the face; length of head considerably longer than body depth; length of rostral barbel almost equal to that of maxillary barbel and longer than diameter of eye; shorter caudal peduncle length; longer body depth and longer caudal peduncle depth; no longitudinal stripe present along side of body; eyes visible in ventral view of head. Mouth terminal; no distinct stripes or spots present on body.

Description

Counts and proportional measurements are shown in Table 1. Body elongate and compressed. Head length longer than body depth. Dorsal and ventral profiles of body slightly convex. Dorsal-fin origin slightly closer to snout tip than to caudal-fin base, and opposite to pelvic-fin origin; last simple dorsal-fin ray osseous and smooth posteriorly; distal margin of dorsal fin concave. Anal-fin origin is at middle of level length between pelvic-fin origin and caudal-fin base. Distal margin of anal fin slightly convex or truncate. Pelvic fin with an elongate auxiliary scale at its outer base. Anus located immediately at front of anal fin. Caudal fin deeply forked.

Head conical and its dorsal profile slightly convex. Snout prominent, shorter than post-orbital length of head. Mouth oblique, its posterior edge not extending

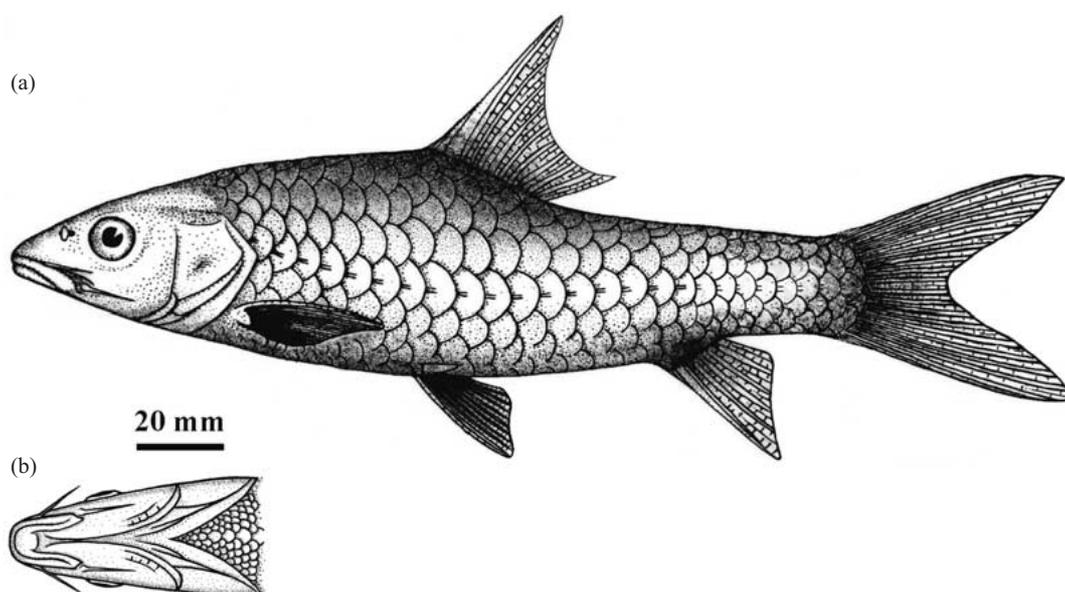


Figure 1. *T. yingjiangensis* sp. nov., holotype, KIZ164401, 181 mm SL, Yingjiang River of Manyun, Yunnan Province, China: (a) lateral view; (b) ventral view of head.

to vertical line of orbit. Lips fleshy, median lobe of lower lip short, posterior margin truncate, not reaching to line across inner corners of mouth (Figure 1(b)). Upper lip without median projection. Eye small and visible in ventral view. Rostral and maxillary barbels almost equal in length and both longer than eye diameter; rostral barbel surpasses vertical line of anterior margin of eye, maxillary barbel surpasses vertical line of posterior margin of eye.

Lateral line complete. 24–26 LLS, D-LL: 4–4.5, V-LL: 3–3.5. Dorsal fin and anal fin bases with a scaly sheath. Isthmus covered with small scales and 18 scales present between isthmus and pelvic-fin origin. Pharyngeal teeth in three rows, 2.3.5–5.3.2. 18–20 gill rakers on the outside of the first gill arch. Peritoneum black.

Coloration in preservation: Head and body yellowish. Pupil black and light brown in the center. The body above lateral line with indistinct light brown spots located on distal region of scales. Abdomen yellowish. Nape yellowish or light brown. All fins yellowish or light yellowish. No midlateral stripes along sides of body.

Distribution

So far, this species is known only from the upper reaches of Irrawaddy River Basin, Yunnan Province,

China (Figure 2). It is highly possible that the species also inhabits other tributaries of the Irrawaddy in northern Burma.

Etymology

The specific name, *yingjiangensis*, refers to its type locality in Yingjiang River, Yunnan Province, China.

Discussion

The new species has long been misidentified as an allopatric species, *T. putitora* (Hamilton 1822), which occurs in Ganges and Indus River basin (Hamilton 1822, Hora 1939, Chen & Chu 1985, Chu & Chen 1989, Shan et al. 2000). Hamilton (1822) first described this species. Gray (1833) erected the genus, *Tor* to accommodate this species. The *Tor* group has a confusing literature and taxonomy in Indian peninsula and Pakistan. Day (1878, 1889) lumped Hamilton's *Cyprinus putitora*, *C. tor* and *C. mosal* together under a single species *Barbus tor*, but this point of view was emended by Hora & Mukerji (1936) and Hora (1939–1943). They concluded that *C. putitora* is clearly distinct from *C. tor* but may be conspecific with *C. mosal*. Mirza (1989) was of the opinion that Hamilton's three species of mahseer are actually the variants

Table 1. Counts and proportional measurements comparisons between *T. yingjiangensis* sp. nov. and *T. putitora* from different sources.

	<i>T. yingjiangensis</i>	<i>T. putitora</i> ¹	<i>T. putitora</i> ²	<i>T. putitora</i> ³	<i>T. putitora</i> ⁴	<i>T. putitora</i> ⁵	<i>T. tor</i> ⁶
Total length (mm)	82–238.5	78–1060					
Standard length (mm)	60–181 (112.8)	45–850 (190.4)					
Dorsal-fin rays	iv, 9	iv, 8	iv, 9–10	iii, 9	iv, 9	iv, 8	
Anal-fin rays	iii, 5	iii, 5	iii, 5	ii–iii, 5	iii, 5	ii, 5	
Pectoral-fin rays	iii, 15–16	17–18	14–17	19	14–17	i, 16–17	
Pelvic-fin rays	i, 8–9	i, 8	9	9	9	i, 8	
Lateral-line scales	24–26	25–28	24–27	25–28	23–28	25–28	
D-LL	4–4.5	4.5	3.5	3.5	4.5	4.5	
V-LL	3–3.5	2.5	2.5	2.5	2.5	2.5	
Predorsal scales	10	9		9	9–11		
Circumpeduncle scales	12	12			11–12		
Percentage of SL							
Body depth	25.5–27.3 (26.4; 0.7)	17.6–27.5 (24.0; 2.4)	21.7–31.9 (25.9)		20.8–25.9 (23.5)		25.3–29.4 (27.3)
Head length	28.7–33.9 (31.6; 2.3)	27.9–33.3 (30.0; 1.4)	25.6–33.3 (28.6)		26.7–30.0 (28.2)	27.8–33.3	25.2–26.8 (26.0)
Caudal peduncle length	11.3–14.8 (13.0; 1.4)	16.3–18.2 (17.2; 0.8)					
Caudal peduncle depth	11.1–13.3 (12.0; 0.9)	7.3–12.2 (10.9; 1.1)					
Percentage of HL							
Snout length	33.3–35.4 (33.8; 0.9)	25.6–35.5 (30.8; 3.0)			29.2–41.7 (33.7)		32.0–37.9 (35.0)
Eye diameter	17.7–25.6 (22.0; 3.8)	15.2–35.7 (25.3; 5.2)			14.4–22.7 (18.0)		21.6–30.0 (25.8)
Interorbital width	25.0–28.8 (26.3; 1.7)	22.6–30.5 (26.1; 2.0)			24.3–31.8 (28.0)		
Rostral barbell length	23.1–27.1 (25.7; 1.6)	18.8–27.4 (23.1; 2.3)					
Maxillary barbell length	24.0–29.2 (26.3; 1.9)	20.0–30.6 (25.7; 3.1)					
Percentage of caudal peduncle length							
Caudal peduncle depth	75–106.7 (93.1; 13.1)	41.2–73.0 (63.7; 7.8)	58.8–84.7 (73.5)		50.0–71.4 (59.1)		
Percentage of TL							
Body depth	18.3–20.8 (19.6; 1.0)	14.2–21.2 (18.6; 1.7)	17.7–22.2 (20.2)				
Head length	21.8–25.9 (23.4; 1.7)	22.1–25.6 (23.4; 0.9)	20.4–23.9 (22.0)	22.2–25.0			
Percentage of HL							
Body depth	77.1–95.2 (84.0; 7.4)	60.0–88.1 (79.9; 7.0)					97.1–113.3 (104.5)

¹From Hora (1939), the data are conversions for meristic comparison; 5 of 16 individuals with well-developed condition of the lips.

²From Mirza & Javed (1986), some data were converted to fit the table.

³From Sen & Jayaram (1982), some data were converted to fit the table.

⁴From Menon (1992).

⁵From Talwar & Jhingran (1992), some data were converted to fit the table.

⁶From Menon (1992), data of *T. tor* population from Irrawaddy Basin, some data were converted to fit the table.

Note: The first number is mean value in parentheses, and the second one is SD (standard deviation).

of the same species, the valid specific name is *T. putitora*, but there was no supporting description and comparison; so this point of view is not so convincing. Here we follow that *T. putitora* and *T. tor* are distinct

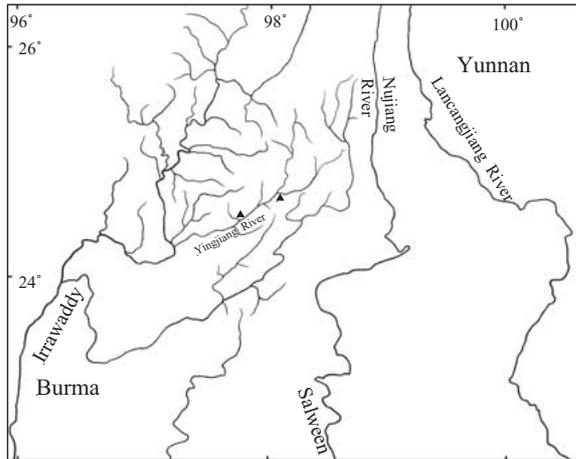


Figure 2. Map showing northern BURMA and western part of Yunnan, China. Triangles (▲) present currently known distribution of *T. yingjiangensis* sp. nov.

species (Hora 1939, Sen & Jayaram 1982, Mirza & Javed 1986, Menon 1992, Talwar & Jhingran 1992), and that the *T. putitora* can be distinguished from all the other *Tor* species by that head length greater than body depth. Hora (1939) provided more detailed measurements about the species. We convert these original data into its morphometric data and take them as the main indexes to compare with *T. yingjiangensis*. The data from other source are also listed in Table 1 for reference. The new species, *T. yingjiangensis* is different from *T. putitora* by the following counts and morphometric characters: 3–3.5 (vs. 2.5) scales from lateral line to pelvic-fin origin; shorter caudal peduncle length (13.0% vs. 17.2% of standard length), and this character is easily distinguishable even in similar size of individuals of both species and their percentage ranges do not overlap in different body size of both species (Figure 3); longer body depth (26.4% vs. 24.0% of standard length), this character is more obvious in the ratio between head length and body depth (84.0% vs. 79.9% of head length); and longer caudal peduncle depth (12.0% vs. 10.9% of standard length), this character could be more obviously expressed in

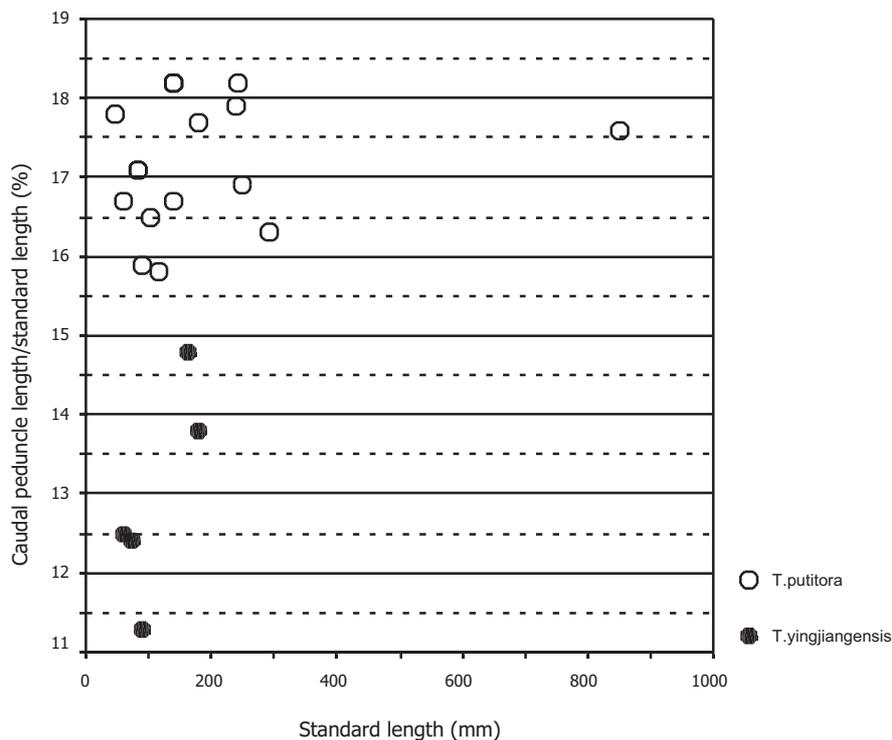


Figure 3. The caudal peduncle length/standard length ratios in different individuals of *T. yingjiangensis* sp. nov. (presented by dots) and *T. putitora* (presented by hollow dots). The data of *T. putitora* from Hora (1939).

the ratio between caudal peduncle length and its depth (Table 1); median lobe of lower lip short, its posterior margin truncate, not extending to the vertical across the inner corners of the mouth, and the condition of the lower lip consistent in individuals of different sizes (Figure 1(b)); no longitudinal stripe present along side of body (Figure 1(a)); and eyes visible in ventral view of head (Figure 1(b)).

Some individuals of *T. tor*, which occur in lower reach of Irrawaddy Basin in Burma, also have head length greater than body depth (Table 1). But in general, body depth is greater than head length (mean percentage value is 104.5) (Table 1). The range of this percentage does not overlap with that of *T. yingjiangensis*. There may be variants in *T. tor* population (Menon 1992).

The systematics of *Tor* species occurring in southeast Asia, including Malay Peninsula, Sumatra and Java is also confusing (Kottelat 1998, 2000, Rainboth 1985, Roberts 1993, 1999). Some species were discussed about their validity, and some species were newly found and described (Zhou & Cui 1996, Roberts 1999). Discussion about the taxonomy of all these species is beyond the scope of this study. But one thing is clear: among all these species, only one species, *T. ater* (Roberts 1999), may have the character of head length greater than body depth (the author did not mention it, but this character can be measured from the figure of its holotype). Compared with *T. ater*, the new species, *T. yingjiangensis*, have less lateral line scales (24–26 vs. 30–31); less predorsal scales (10 vs. 11–12); transverse scales 4–4.5/1/3–3.5 versus 5/1/2; and no midlateral stripes along sides of body.

Acknowledgements

We thank Chen YinRui., Cui GuiHua. for their assistance. Many thanks are due to Carl Ferraris and David Catania, California Academy of Sciences, San Francisco, CA, USA, for their patient and valuable help in preparing the manuscript, and to Maurice Kottelat, for providing reference materials for this study. Two anonymous reviewers and the editor also improved the manuscript. This study was supported by the Grand-A Grant, the National Basic Research Priorities Programme (2003 CD 415103), the Middle Sized Grant and the Taxonomy and Evolution Foundation of Chinese Academy of Sciences, and the Applied and Basis Research Foundation of Yunnan Province.

References

- Chen, Y.R. & X.L. Chu. 1985. Systematic study of the genus *Tor* (Pisces: Cyprinidae) with description of a new species. *Zool. Res.* 6: 79–86.
- Chu, X.L. & Y.R. Chen (ed.) 1989. The Fishes of Yunnan, China. Part I. Cyprinidae. Science Press, Beijing. 377 pp.
- Day, F. 1889. The Fauna of British India Including Ceylon and Burma. Fishes. Taylor & Francis, London. 509 pp.
- Day, F. 1875–1878. The Fishes of India; Being a Natural History of the Fishes Known to Inhabit the Seas and Fresh Waters of India, Burma and Ceylon. Bernard Quaritch, London. 778 pp.
- Gray, J.E. 1830–1835. Illustrations of Indian Zoology; Chiefly Selected from the Collection of Major-General Hardwicke. Treuttel, Wurtz, Treuttel, jun. & Richter, London. 778 pp.
- Hamilton, F. 1822. An Account of the Fishes Found in the River Ganges and its Branches. Edinburgh & London. 405 pp.
- Heckel, J.J. 1838. Fishes aus Cashmir. Carl Freiherrn v. Hugel, Wien. 60 pp.
- Hora, S.L. & D.D. Mukerji. 1936. Fish of the Eastern Doons, United provinces. *Rec. Indian Mus.* 38: 133–146.
- Hora, S.L. 1939. The game fishes of India. VIII. The mahseers or the large-scaled barbels of India. *J. Bombay Nat. Hist. Soc.* 41: 272–285.
- Hora, S.L. 1940. The game fishes of India. IX. The mahseers or the large-scaled barbels of India. *J. Bombay Nat. Hist. Soc.* 41: 518–525.
- Hora, S.L. 1940. The game fishes of India. X. The mahseers or the large-scaled barbels of India. *J. Bombay Nat. Hist. Soc.* 41: 784–794.
- Hora, S.L. 1943. Specific identity of the mahseers. *J. Bombay Nat. Hist. Soc.* 44: 303–304.
- Jayaram, K.C. 1981. The Freshwater Fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka. Zoological Survey of India, Calcutta. 475 pp.
- Kottelat, M. 2001. Fishes of Laos. WHT Publications (Pte) Ltd, Sri Lanka. 198 pp.
- Kottelat, M. & A.J. Whitten. 1993. Freshwater Fishes of Western Indonesia and Sulawesi. Periplus, Hong Kong. 221 pp.
- Kottelat, M. 1998. Fishes of the Nam Theun and Xe Bangfai basins, Laos, with diagnoses of twenty-two new species (Teleostei: Cyprinidae, Balitoridae, Cobitidae, Coiidae and Odontobutidae). *Ichthyol. Explor. Freshwater.* 9: 1–128.
- Kottelat, M. 2000. Notes on the taxonomy, nomenclature and distribution of some fishes of Laos. *J. South Asia Nat. Hist.* 5: 83–99.
- Menon, A.G.K. 1992. Taxonomy of mahseer fishes of the genus *Tor* Gray with description of a new species from the Deccan. *J. Bombay Nat. Hist. Soc.* 89: 210–228.
- Mirza, M.R. & M.N. Javed. 1986. A contribution to the fishes of the genus *Tor* Gray (Pisces, Cyprinidae) from Pakistan and Azad Kashmir. *Biologia (Suppl.)*: 71–82.
- Mirza, M.R. 1967. *Tor zhobensis* sp. nov. a new mahseer from the river zhub, west Pakistan. *Pak. J. Sci.* 19: 54–57.
- Mirza, M.R. 1989. Systematic position of the mahseers of Pakistan (Pisces, Cyprinidae). *Sci. Int. Lahore* 1: 368–369.
- Rainboth, W.J. 1996. Fishes of the Cambodian Mekong. Food and Agriculture Organization of the United Nations, Rome. 265 pp.

- Rainboth, W.J. 1985. *Neolissochilus*, a new genus of South Asian cyprinid fishes. *Beaufortia* 35: 25–35.
- Rainboth, W.J. 1991. Cyprinids of South East Asia. pp. 156–210. *In*: I.J. Winfield & J.S. Nelson (ed.) *Cyprinid Fishes – Systematics, Biology and Exploitation*, Chapman & Hall, London.
- Roberts, T.R. 1993. The freshwater fishes of Java, as observed by Kuhl and van Hasselt in 1820–23. *Zool. Verhand.* 285: 1–94.
- Roberts, T.R. 1999. Fishes of the cyprinid genus *Tor* in the Nam Theun watershed (Mekong basin) of Laos, with description of a new species. *Raffles Bull. Zool.* 47(1): 225–236.
- Sen, T.K. & K.C. Jayaram. 1982. The mahseer fishes of India – a review. *Rec. Zool. Surv. India, Misc. Publ., Occ. Pap.* 39: 38.
- Serene, R. 1951. Sur la faune ichthologique du Laos. Indo-Pacific Fisheries Council. *IPFC/C/51/TECH* 49: 1–26.
- Shan, X.H., R.D. Lin, P.Q. Yue & X.L. Chu. 2000. *Barbinae*. pp. 3–170. *In*: P.Q. Yue (ed.) *Fauna Sinica, Osteichthyes, Cypriniformes III*, Science Press, Beijing.
- Smith, H.M. 1945. The fresh-water fishes of Siam, or Thailand. *Bull. US Nat. Mus.* 188: 1–622.
- Taki, Y. 1974. *Fishes of the Lao Mekong Basin*. United States Agency for International Development, Mission to Laos, Agriculture Division, Vientiane. 323 pp.
- Talwar, P.K. & A.G. Jhingran. 1992. *Inland Fishes of India and Adjacent Countries*. Vol. 1. A.A. Balkema, Rotterdam. 541 pp.
- Wu, H.W. (ed.) 1977. *The Cyprinid Fishes of China*. Part 2. Technology Printing House, Shanghai. 369 pp.
- Zhou, W. & G.H. Cui. 1996. A review of *Tor* species from the Lancangjiang River (upper Mekong River), China (Teleostei: Cyprinidae). *Ichthyol. Explor. Freshwaters* 7(2): 131–142.