

# Notes on the taxonomy, nomenclature and distribution of some fishes of Laos

Maurice Kottelat \*

\* Route de la Baroche 12, Case postale 57, CH-2952 Cornol, Switzerland (address for correspondence); and Department of Biological Sciences, National University of Singapore, Kent Ridge, Singapore 119260.  
Email: mkottelat@dplanet.ch

## Abstract

Various nomenclatural and taxonomic problems relating with fishes of Laos are reviewed. *Barbichthys nitidus* Sauvage, 1878 is treated as a junior synonym of *B. laevis* (Valenciennes, 1842). *Crossochilus elongatus* Pellegrin & Chevey, 1934 is a member of *Onychostoma*, not *Acrossocheilus*. *Varicorhinus elongatus* Fang, 1940 is a secondary junior homonym of *C. elongatus* and is replaced by *Onychostoma fangi*, new replacement name.

## Introduction

This paper presents comments on nomenclature, systematics and distribution of some species of fishes of Laos. These are notes of a technical level which for various reasons could not be included in a field guide going to press at this date (Kottelat, 2000b) but whose publication is necessary either to explain the presence of some species in that book or to explain why some name changes are introduced. The opportunity is also used to clear some nomenclatural details.

Some new distribution records (explicitely indicated as such) are based on data obtained from Walter J. Rainboth (University of Wisconsin), while on assignment for the Mekong River Commission's Reservoir Fisheries Project, and are used here with permission from W. Rainboth and MRC's Assessment of Mekong Fisheries Project.

## Material and methods

Material mentioned in this study is in the following collections: CMK, author's collection; MNHN, Muséum National d'Histoire Naturelle, Paris; RMNH, Nationaal Natuurhistorisch Museum, Leiden. ICZN refers to the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature, 1985 [3rd edition], 1999 [4th edition]). Other abbreviations: SL, standard length. See Kottelat (2000a) for other conventions.

## Family Notopteridae

### *Chitala* Fowler

The grammatical gender of *Chitala* Fowler, 1934 is feminine, and not masculine as stated by Eschmeyer (1998: 1891) (ICZN art. 30.2.4).

## Family Cyprinidae

### *Acheilognathus barbatulus* Günther

Record from Laos is based on material from Nam Ma basin (Houaphan Province, South China Sea slope) obtained by me in 1999 and from Nam Ma Yen (Louang Nam Tha Province, Mekong basin) obtained by W. J. Rainboth (pers. comm.).

### *Barbichthys* Bleeker

**Remarks.** The Indochinese and Sundaic populations have been considered as representing different species or subspecies by Banarescu (1980): *B. laevis* (Valenciennes, in Cuvier & Valenciennes, 1842) and *B. nitidus* Sauvage, 1878. The recorded differences are based on specimens of dissimilar sizes: 13 *B. nitidus* 83-180 mm SL and 7 *B. laevis* 50-95 mm SL. When comparing specimens of same sizes of both populations, I do not see differences. Therefore I treat them as a single species, *B. laevis*.

Roberts (1993a: 15) listed specimen RMNH 2531 as "possibly holotype [of] *B. laevis*"; two lines further, he listed RMNH 1811 and 1812 as "possibly syntypes" of the same species. The species has no holotype but syntypes as Valenciennes (in Cuvier & Valenciennes, 1842: 15) explicitly stated that the colour description is based on a drawing by Kuhl and van Hasselt (reproduced in Roberts, 1993a: fig. 1; the figured specimen is a syntype) and the morphology on the specimens (plural) in RMNH.

### *Hemibarbus labeo* (Pallas)

Recorded from Mekong basin in Laos from Bokeo Prov. (W. J. Rainboth, pers. com.). This is apparently the result of introduction, either in Laos, or more likely upriver in Mekong basin in China.

### ***Labeo* Cuvier and *Morulius* Hamilton**

Several authors (e.g., Rainboth, 1996) have considered *Labeo chrysophekadion* as a distinct genus, *Morulius*. While I admit that the Asian species currently referred to *Labeo* seem to constitute an heterogeneous assemblages, I have decided not to treat *Morulius* as distinct from *Labeo*. The character which has been used to distinguish *Morulius* from *Labeo* (lower lip separated from isthmus by a deep, continuous postlabial groove in *Morulius*, vs. postlabial groove interrupted medially in *Labeo*) is difficult to use. A frenum is clearly distinct deep in the groove in *L. chrysophekadion*; in *L. pierreii* about 80 mm SL, there is a deep groove behind the lower lip, interrupted by a massive frenum. In larger specimens, the lower lip is coalescent medially with the isthmus at the level of the frenum.

In addition, there is also a nomenclatural problem. The type species of *Morulius* Hamilton, 1822 is *Cyprinus morala* Hamilton, 1822 by subsequent designation by Bleeker (1863b: 195). *Cyprinus morala* is considered as a synonym of *Labeo angra* (Hamilton, 1822), a species which does not show close resemblance with *L. chrysophekadion*.

### ***Mystacoleucus chilopterus* Fowler**

Recorded from Mekong basin in Thailand on the basis of material (identified from slide) collected in Pak Mun (Vidthayanon et al., 1997) and a record from Mae Nam Kok in Chiang Rai Province (Smith, 1945: 129)

### ***Mystacoleucus marginatus* (Valenciennes)**

Roberts (1993a: 19) considered that there was a holotype of *Barbus marginatus*, 9 inches long, which should have been in RMNH. In the original description of the species, Valenciennes (in Cuvier & Valenciennes, 1842: 19) never indicated that he had a single specimen or that it was in RMNH or that there was none in MNHN. He indicated "This fish [understand this species], 9 inches long, has been collected in Java in the river Tjicánigui, and one finds it in Sijira too". The size indication is not to be understood as the size of a single specimen but as the maximum known size, which may be Valenciennes' own observation or derived from other's (Kuhl and van Hasselt) data. It is also difficult to imagine that the description of the coloration (especially the blueish on the back and the silvery of the sides) could be derived from a museum specimen; it is probably derived from the figure of Kuhl and van Hasselt (reproduced in Roberts, 1993a: fig. 11). Unless it can be demonstrated that Valenciennes had examined a single specimen and that this specimen was also the model of the figure

of Kuhl and van Hasselt, we have no reason to believe that there was a holotype (i.e., only one specimen was on hand). Specimen(s) examined by Valenciennes and specimen(s) used by Kuhl and van Hasselt as model are syntypes. These may include MNHN 4303 listed by Roberts.

Similarly, although Valenciennes (p. 168) noted in the description of *Barbus obtusirostris* (a synonym of *M. marginatus*) that he had a single specimen ("the individual is 4 inches long"), the colour description cannot be based on a museum specimen ("The colour is russet on the back, silvery, with iridescent reflections, on the belly. All the fins are yellow. The scales of the back are bordered with purple"), but rather on Kuhl and van Hasselt's figure (reproduced by Roberts, 1993a: fig. 12). Again, unless it can be demonstrated that this figure is based on the specimen examined by Valenciennes, there is no holotype but at least two syntypes.

### ***Onychostoma elongatum* (Pellegrin & Chevey)**

Pellegrin & Chevey (1934: 340; 1935: 467, fig. 3) described *Crossochilus elongatus* from Nghia Lo in northern Vietnam. Chinese authors (e.g., Wu et al., 1977: 285; Chu & Chen, 1989: 204) have used this name for a species of *Acrossocheilus*. However, there is nothing in the original description which allows this conclusion. Pellegrin & Chevey did not mention the particular mouth and lip structure of *Acrossocheilus* in their description; the single specimen available to them had a body depth 4.5 times in SL, while Wu et al. and Chu & Chen report a body depth 3.4-4.0 times in SL and their figures show a much stouter fish than Pellegrin & Chevey's. The material reported by Chinese authors also has a different appearance and apparently represents an unnamed species.

I identified a single specimen from the Nam Ma basin in northern Laos as conspecific with *C. elongatus*. It agrees in all points with the original description. It is a species of *Onychostoma*, although it differs from all *Onychostoma* known to me in having the lower lip somewhat more developed, extending along about half of the side of jaw (vs. restricted to corner of mouth) and the mouth more arched. This condition is also observed in juveniles of most species of slender, striped *Onychostoma* (*O. gerlachi*, *O. fusiforme*, *O. meridionale*). It also has the striped colour pattern of many slender *Onychostoma* species, while most *Acrossocheilus* have a barred pattern (I mentioned elsewhere that *Acrossocheilus* is probably polyphyletic; Kottelat, 2000a). The general appearance is also that of *Onychostoma*.

*Varicorhinus elongatus* Fang (1940: 138) is usually considered a valid species in *Onychostoma*

(Chen, 1989: 119; Kottelat, 1998: 41). It is thus a junior secondary homonym of *Crossochilus elongatus* and therefore not available. I propose *Onychostoma fangi* nom. nov., as a new replacement name for *V. elongatus* Fang, 1940.

**Material examined.** CMK 15347, 115 mm SL; Laos: Houaphan Prov.: Nam Soy, about 1 km west of Ban Soy; 20°16'07"N 104°31'29"E; M. Kottelat et al., 7 May 1999.

***Osteochilus hasseltii* (Valenciennes)**

Valenciennes (in Cuvier & Valenciennes, 1842: 274) based his description of *Rohita hasseltii* on a single specimen, 10 inches long, examined in RMNH. Judging from its vague wording, it seems that the colour description is also based on this preserved specimen and not on one of Kuhl and van Hasselt's drawings ("it appears that there were spots along the sides"). Thus this specimen is treated as holotype. It is not listed by Roberts (1993a: 20).

Roberts (1993a: 20) wrote: "As first reviser I select *R. hasseltii* as the senior name". It is nowhere explained over which name *R. hasseltii* should have priority. The context seems to indicate that a first reviser action on the priority of the simultaneous synonyms *R. hasseltii* and *R. erythrura* is meant. The priority of *R. hasseltii* Valenciennes, in Cuvier & Valenciennes (1842) over *R. erythrura* Valenciennes, in Cuvier & Valenciennes (1842: 268) is formally stated here. Priority between *R. hasseltii* and *R. vittata* has been settled by Kottelat (1989: 9) who selected *R. hasseltii* as having priority.

***Parachela oxygastroides* (Bleeker)**

The species commonly identified as *P. oxygastroides* from Indonesia (e.g. Kottelat et al., 1993) differs from both the Mekong basin specimens and the original material of Bleeker (1852: 431) in having, among others, a dark longitudinal stripe along each caudal lobe.

***Paralaubuca harmandi* Sauvage**

Recorded from Mekong basin in Thailand (Vidthayanon et al., 1997) on the basis of material from the main river Mekong in Chiang Rai and Nong Khai Provinces (C. Vidthayanon, pers. comm.).

***Probarbus jullieni* Sauvage**

Sauvage (1880: 232) did not indicate on how many specimens his description of *Probarbus jullieni* is based; his text does not allow to reach a conclusion on whether he had one or more specimens. Sauvage's size indications are only indicative of the size of the largest specimen he examined (as is obvious from his various papers and comparison with MNHN holdings) and cannot be used to infer that he had a single specimen only. MNHN collections include 3 specimens with same locality and collector data and they are thus syntypes. Kottelat (1984: 804) designated a lectotype. There is no reason to follow Roberts' (1992: 42) claim that the specimen with a size agreeing with the maximum size listed by Sauvage is the holotype.

In the same paper, Sauvage also described a second cyprinid species with the same species-group name, *Cyclocheilichthys jullieni* Sauvage, 1880 (p. 230). The holotype of *Cyclocheilichthys jullieni* is lost and Kottelat (1984: 801) tentatively treated it as a synonym of *Probarbus jullieni*. As the two species are simultaneous synonyms, Kottelat (1984: 801) retained *P. jullieni* as having priority over *C. jullieni*. Roberts (1992: 42) concurred with this conclusion and hypothesized that the two species are in fact based on the same specimen, adding: "line by line comparison of the descriptions of *C. jullieni* and *P. jullieni* reveals near perfect agreement, the only important differences involving omissions" and citing as evidence a one word difference in the descriptions of the colour pattern. I do not know what Roberts' definition of "near perfect agreement" is, but in comparing the two descriptions, I see several differences (Table 1).

**Table 1.** Differences in the wording of the original descriptions of *Cyclocheilichthys jullieni* and *Probarbus jullieni*.

	<i>C. jullieni</i>	<i>P. jullieni</i>
dorsal-fin rays	12	3/9
anal fin rays	8	3/5
transverse scale count	5/4	4/3
body depth	3.5 times in SL	almost 4 times in total length
head length	4 times in SL	4.66 times in total length
snout	much longer than eye	1.5 times eye diameter
dorsal-fin origin midway between snout tip and 3rd simple dorsal-fin ray length	caudal peduncle slightly shorter than head 330 mm	caudal fin 3/4 of head length 340 mm

It is known that in at least one instance Sauvage described twice the same species on the basis of the same material - in two papers 10 pages apart in the same volume (*Pseudobagrus nudiceps* Sauvage, 1883a: 145 from Japan and 1883b: 155 from Siam; Smith [1934: 296] and Kottelat [1984: 811] concluded that it is a Japanese fish and that its duplicate description from Siam is a lapsus). There is, however, no reason to suspect that this happened more than once. Considering the above data, I see no reason to conclude that the descriptions of *P. jullieni* and *C. jullieni* are based on the same specimen (and as noted above, there is no reason to believe that Sauvage had a single specimen of each nominal species). In order to definitively settle this question, specimen MNHN 9647 is here designated as neotype of *Cyclocheilichthys jullieni*; as this specimen is the lectotype of *Probarbus jullieni*, the two names are now objective synonyms.

***Pseudohemiculter dispar* (Peters)**

Recorded in Laos from Nam Ngay, Nam Ou basin, in Phongsali Prov. (Mekong basin) (W. J. Rainboth, pers. com.) and from Nam Ma basin, Houaphan Prov. (pers. obs.)

***Puntius* Hamilton**

Rainboth (1996: 102-103) divided *Puntius* as classically understood [admittedly a catch-all genus] into *Puntius* and *Systemus*. Kottelat (1998: 49) and Kullander et al. (1999: 110) pointed to the conceptual shortcomings associated with this action (too limited species and geographic coverage [only 8 out of ca. 100 included species are dealt with], lack of information on extralimital taxa, etc.). Kullander et al. further noted that *P. brevis*, retained in *Puntius* by Rainboth, is probably not congeneric with the type species of *Puntius*. In addition, some species from Laos (*P. stoliczkanus*, *P. partipentazona*) which would now be placed in *Systemus* do not seem to have closer affinities with them than with *Puntius*. Therefore, I prefer to retain all in *Puntius* for the time being.

***Rasbora aurotaenia* Tirant**

Recorded from Mekong at Pak Mun (C. Vidthayanon, pers. comm.).

***Rasbora dorsinotata* Kottelat**

Recorded in Laos from Nam Ma Oun, Louang Nam Tha Prov. (W. J. Rainboth, pers. comm.).

***Rasbora hobelmani* Kottelat**

Recorded in Laos from Nam Mao, Oudomxai Prov. (W. J. Rainboth, pers. comm.).

***Tor* Gray**

Some kind of discussion of the species of *Tor* in Laos is given by Roberts (1999). Our present knowledge of the genus *Tor* is chaotic and unfortunately this paper does not contribute in clarifying the situation. Many statements are not substantiated by the presented data and the scarce comparison material.

Evidence for the conspecificity of *T. sinensis* and *T. laterivittatus* is not presented. The faint stripes reported by Roberts for specimens figured by Zhou & Cui (1996: figs. 12-14) do not appear on these figures. I cannot follow this synonymy without evidence, and thus treat *T. laterivittatus* as distinct.

Roberts treats *T. tambra* and *T. tambroides* as distinct species in his Table 1, but tentatively regards *T. tambroides* as a variety or morph of *T. tambra* in the text. His table suggests that the situation is more complex and I am unable to reach a conclusion as to their validity or synonymy. Roberts based his data on 9 specimens 83.5-111 mm SL and one specimen 465 mm SL of *T. laterivittatus* (as *T. sinensis*) and 3 specimens 97-101 mm SL of *T. tambra*; "large numbers [of *T. tambra*] representing all sizes from very small to 1 m were observed" and "specimens of various sizes [of *T. laterivittatus*] were examined in fresh condition". What "large numbers" means, what "all sizes" mean, what "observed" or "examined" means remains unclear as no supporting data was provided.

Roberts (1993a: 22) treated *T. tambra*, *T. douronensis* and *T. soro* as synonyms without providing convincing data indicating which specimens have been examined, without data supporting the assumption of individual variation in lip development, etc. Until such information becomes available, I cannot see reasons not to follow Weber & de Beaufort (1916) in recognizing these species as valid in Indonesia.

**Family Cobitidae**

***Botia longiventralis* Yang & Chen**

Recorded in Laos from Luang Prabang market (W. J. Rainboth, pers. comm.).

**Family Bagridae**

***Mystus albolineatus* Roberts**

Recorded from Mekong basin in Thailand (Vidthayanon et al., 1997) on the basis of material from Mekong tributaries in Nakhon Phanom Province (C. Vidthayanon, pers. comm.).

## Family Siluridae

### *Wallago* Bleeker

**Remarks.** Bleeker (1851: 265) originally included *S. muelleri* Bleeker, 1846 and *S. wallago* Valenciennes, in Cuvier & Valenciennes, 1840, in his genus *Wallago* without designating a type species. The type species has to be designated from among these two nominal species. Bleeker (1862a: 394) designated *S. attu* Schneider, 1801 as type species, but as this species was not included in the genus in the original description, this designation is not valid. The first valid designation is by Bleeker (1862b-1863a) who designated *S. attu* as type on p. 17 and included *S. muelleri* in the synonymy of *W. attu* on p. 79. This satisfies the requirements of ICZN art. 69(a)(v). *Silurus muelleri* is thus the type species of *Wallago*, by subsequent designation by Bleeker (1862b-1863a)

The history of the type species designation for *Wallago* is discussed by Eschmeyer (1990: 666) who considers that conditions of ICZN art. 69(a)(v) are not satisfied because this article states that a species not originally included can be considered as validly designated as type only if "at the same time" it is placed in synonymy with a species originally included. Eschmeyer correctly notes that p. 17 and 79 of Bleeker (1862b-1863a) appeared in different fascicles at different dates; he then concludes that conditions of ICZN art. 69(a)(v) are not satisfied. There are several reasons to disagree with this interpretation. I feel we have here a typical case of the lack of accuracy in the wording of the ICZN (see Kottelat, 1999, Dubois, 1987: 39, 1995: 62 for other examples).

ICZN and its glossaries do not include a definition of the wordings "at the same time" (English version of the ICZN) and "en même temps" (French version). Contrary to Eschmeyer, I do not consider that these locutions mean 'published in the same work at the same date' or 'simultaneously' (which would have been the appropriate wording if that were the intention of the redactors of the ICZN). Instead, I consider that these locutions in the ICZN have the same meaning(s) as they have in everyday's English and French. In both languages, these locutions have different meanings depending of the context, and in the present context both might effectively mean 'simultaneously' [in French 'simultanément'] (if so, why is this more explicit wording not used? it is used in other articles of ICZN when simultaneity is meant). But, as sentence coordinators, these locutions also mean 'on the other hand', 'yet', 'both' [in French 'à la fois'], implying, in the present context, that the two actions (the designation and the synonymy) were done together,

in the same work, that they constitute two parts of a whole (but this does not necessarily imply simultaneity).

The nuances in the meanings of "at the same time" may not be very obvious in the English version of ICZN, but the use in the French version of 'en même temps' instead of 'simultanément' makes the case very clear. The two versions of the Code are equivalent in force, meaning and authority (ICZN art. 85) and in case of differences of meaning, the case is supposed to be submitted to the Commission. In fact ICZN is often ambiguously worded and differences in meaning do exist and cases which have already been submitted to the Commission (see, e.g., Kottelat, 1999 for a concrete exemple) have never been addressed, so that at this stage I see no point formally submitting the case to the Commission.

It is obvious that Bleeker (1862b-1863a) forms a whole (the 1862b fascicle ends in the middle of a sentence which is continued in the 1863a fascicle) and common sense is that Bleeker "at the same time" designated *S. attu* as type species of *Wallago* on p. 17 and listed *S. muelleri* as synonym of *W. attu* on p. 79 of the same work. The fact that these two components appeared on different pages which unfortunately were in different fascicles is irrelevant.

In any case, Bleeker (1862b-1863a) is an interrupted publication and ICZN art. 10(b) unambiguously applies here: "if publication ... is interrupted and continued at a later date, the ... nomenclatural act becomes available only when it satisfies all the relevant provisions ...". Bleeker's (1862b-1863a) type species designation for *Wallago* becomes available by publication of the 1863a fascicle.

The wording of ICZN art 69(a)(v) is unfortunate on an additional aspect: if 'at the same time' were interpreted as meaning 'simultaneously', it then would allow cases in which the two actions (the type species designation and the listing in synonymy) are included in different articles published simultaneously by the same author, as, e.g., in the case of two papers published in the same issue of a journal, one containing the designation of species A (not originally included) as type species of a genus, the other including the listing of species B (originally included) in the synonymy of species A. This would not make much sense but is not impossible.

The above discussion was written when the 3rd edition of the ICZN was in force. The 4th Edition is in force since January 1, 2000 but the wording of art. 69(a)(v) [now 69.2.2] has not changed as far as the above discussion is concerned; the ambiguous wording "at the same time" remains. Art. 85 is replaced by arts. 86.2 and 87 which do not change

its meaning; but new art. 87 is particularly pernicious as its second sentence opens wide the doors to useless and unnecessary arguments. Art. 10(b) is replaced by art. 10.1.1 with similar wording.

### Family Clariidae

#### *Clarias meladerma* Bleeker

Recorded from Mekong basin in Thailand (Vidthayanon et al., 1997) on the basis of material from Nong Khai Province (C. Vidthayanon, pers. comm.).

### Family Salangidae

#### *Neosalanx* sp.

Recorded in Laos from Ban Houay Sai, Bokeo Prov. (W. J. Rainboth, pers. comm.). I suspect the presence of this species in the Mekong basin might be the result of introductions upriver in the basin in China. I could not find precise data on the introduction of salangids in the Mekong basin, but one species, *N. taihuensis*, has been introduced from lake Taihu (near Shanghai) in lake Dianchi (Yangtze basin) in Yunnan in 1979 (Wang et al., 1998). Cai & Dai (1999: 220) report the presence in the Mekong basin in Xishuangbanna (at the border with Laos) of the shrimp *Neocaridina denticulata sinensis*, whose type locality is also lake Taihu, whose distribution extends in China from the Yangtze basin northwards, and which they hypothesize to have been inadvertently introduced to Yunnan with *N. taihuensis*.

### Family Datnioididae

#### *Datnioides* Bleeker

The names *Coius* Hamilton (1822: 85, 369) and *Coiidae* have been given priority over *Datnioides* Bleeker (1853: 440) and *Datnioididae* by Roberts & Kottelat (1994) following Eschmeyer (1990: 100) who considered that Fowler (1905: 504) had designated *Coius polota* Hamilton, 1822 as type species. As discussed by Kottelat (2000c) the type species of *Coius* is *Coius cobojius* Hamilton, 1822, which makes *Coius* a junior subjective synonym of *Anabas* Cloquet, 1816. *Datnioides* is thus the valid name for this genus.

### Family Gobiidae

#### *Glossogobius aureus* Akihito & Meguro

Roberts (1993b: 35) records *G. giuris* from Khone Falls; this is apparently the *G. koragensis* of Baird (1998: 99) who based his identification on Rainboth (1996: 201). Rainboth commented: "Possibly all the Mekong specimens identified as *G. koragensis*

actually belong to *G. aureus*". *Glossogobius koragensis* otherwise being endemic to the Sepik basin in Papua New Guinea, this identification seems highly unlikely. The colour pattern figured by Allen (1991: pl. 15) is very different from the Mekong specimens (figured by Rainboth); the lateral blotches are deeper than long (this is apparently the "wider than the depth of body at this position" of Akihito & Meguro (1975) which becomes "wider than half of local body depth" in Rainboth and which is contradicted by his figure). I have had access to a single and not very well preserved juvenile specimen and it is difficult to decide what it is. The size and shape of the blotches, the patterning of the caudal and anal fins as figured by Rainboth and by Baird et al. (1999) are reminiscent of *G. aureus*.

### Family Badidae

#### *Badis ruber* Schreitmüller

A species of *Badis* has been collected in Laos from Nam Ngon, Luang Prabang Prov. (W. J. Rainboth, pers. comm.). Identification as *B. rubra* is based on the identification by S. O. Kullander (pers. comm.) of material from the Mekong basin in Nong Khai Prov., Thailand.

### Acknowledgments

I thank Walter J. Rainboth (University of Wisconsin), Anders Poulsen (Assessment of Mekong Fisheries Project) and Chavalit Vidthayanon (National Inland Fisheries, Bangkok) for permission to use some unpublished results, Sven O. Kullander (NRM) and Peter K. L. Ng (ZRC) for comments on this manuscript.

### Literature cited

- Akihito [Prince] & K. Meguro. 1975. Description of a new gobiid fish, *Glossogobius aureus*, with notes on related species of the genus. Japan. J. Ichthyol., 22: 127-142.
- Allen, G. R. 1991. Field guide to the freshwater fishes of New Guinea. Christensen Research Institute, Madang, PNG, 268 pp.
- Baird, I. G. 1998. Preliminary fishery stock assessment results from Ban Hang Khone, Khong District, Champasak Province, Southern Lao PDR. Center for Protected Areas and Watershed Management, Pakse, 112 pp.
- Baird, I. G., V. Inthaphaisy, P. Kisouvannalath, B. Phylavanh & B. Mounsouphom. 1999. The fishes of southern Lao. Lao Community Fisheries and Dolphion Protection Project, Ministry of Agriculture and Forestry, 160 pp.
- Banarescu, P. 1980. Remarks on the genera *Scaphiodonichthys*, *Barbichthys* and *Cosmochilus* (Pisces, cyprinidae). Rev. Roum. Biol., Biol. Anim., 25: 93-100.
- Bleeker, P. 1851. Nieuwe bijdrage tot de kennis der

- ichthyologische fauna van Borneo met beschrijving van eenige nieuwe soorten van zoetwatervisschen. Nat. Tijdschr. Ned. Ind., 1: 259-275.
- Bleeker, P. 1852. Zesde bijdrage tot de kennis der ichthyologische fauna van Borneo. Visschen van Pamangkat, Bandjermassing, Praboeakarta en Sampit. Nat. Tijdschr. Ned. Ind., 3: 407-442.
- Bleeker, P. 1853. Zevende bijdrage tot de kennis der ichthyologische fauna van Borneo. Zoetwatervisschen van Sambas, Pontianak en Pangaron. Nat. Tijdschr. Ned. Ind., 5: 427-462.
- Bleeker, P. 1862a. Notices sur les genres *Parasilurus*, *Eutropiichthys*, *Pseudeutropius* et *Pseudopangasius*. Versl. Meded. Kon. Akad. Wetens. Amsterdam, 14: 390-399.
- Bleeker, P. 1862b-1863a. Atlas ichthyologique des Indes Orientales Néerlandaises. Tome II. Siluroïdes, chacoïdes et hétérobranchoïdes. Müller, Amsterdam, 1862: pp. 1-32, pls. 49-72, 1863: pp. 33-112, pls. 73-101.
- Bleeker, P. 1863b. Systema cyprinoideorum revisum. Ned. Tijdschr. Dierk., 1: 187-218.
- Cai Y & Dai A. Y. 1999. Freshwater shrimps (Crustacea: Decapoda: Caridea) from the Xishuangbanna region of Yunnan, southern China. *Hydrobiologia*, 400: 211-241.
- Chen Y.-Y. 1989. Anatomy and phylogeny of the cyprinid fish genus *Onychostoma* Günther, 1896. *Bull. Br. Mus. Nat. Hist., Zool.*, 55: 109-121.
- Chu X.-L. & Chen Y.-R. (eds.). 1989. [The fishes of Yunnan, China. Part I. Cyprinidae]. Science Press, Beijing, 377 pp. [Chinese].
- Cuvier, G. & A. Valenciennes. 1842. Histoire naturelle des poissons. Tome seizième. Bertrand, Paris, xx+472 pp., pls. 456-487.
- Dubois, A. 1987. Again on the nomenclature of frogs. *Alytes*, 6: 27-55.
- Dubois, A. 1995. The valid scientific name of the Italian treefrog, with comments on the status of some early scientific names of Amphibia Anura, and on some articles of the Code concerning secondary homonyms. *Dumerilia*, 2: 55-71.
- Eschmeyer, W. N. 1990. Catalog of the genera of recent fishes. California Academy of Sciences, San Francisco, 697 pp.
- Eschmeyer, W. N. 1998. Catalog of fishes. California Academy of Sciences, San Francisco, 3 vols., 2905 pp.
- Fang P. W. 1940. Deux nouvelles espèces de cyprinidés de Chine appartenant au sous-genre *Onychostoma* Günther. *Bull. Soc. Zool. Fr.*, 65: 138-140.
- Fowler, H. W. 1905. Some fishes from Borneo. *Proc. Acad. Nat. Sci. Philad.*, 57: 455-523.
- Hamilton, F. 1822. An account of the fishes found in the river Ganges and its branches. Constable, Edinburgh, 2 vols., 405 pp., 39 pls.
- International Commission on Zoological Nomenclature. 1985. International Code of Zoological Nomenclature. Third Edition. International Trust for Zoological Nomenclature, London, xx+338 pp.
- International Commission on Zoological Nomenclature. 1999. International Code of Zoological Nomenclature. Fourth Edition. International Trust for Zoological Nomenclature, London, xxix+306 pp.
- Kottelat, M. 1984. A review of the species of Indochinese fresh-water fishes described by H.-E. Sauvage. *Bull. Mus. Natn. Hist. Nat. Paris, Sér. 4, Sect. A*, 6: 791-822.
- Kottelat, M. 1989. Zoogeography of the fishes from Indochinese inland waters with an annotated checklist. *Bull. Zool. Mus. Univ. Amst.*, 12: 1-54.
- 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. Freshwat.*, 9: 1-128.
- Kottelat, M. 1999. Nomenclature of the genera *Barbodes*, *Cyclocheilichthys*, *Rasbora* and *Chonerhinos* (Teleostei: Cyprinidae and Tetraodontidae). *Raffles Bull. Zool.*, 47: 591-600.
- Kottelat, M. 2000a. Diagnoses of a new genus and 64 new species of fishes from Laos (Teleostei: Cyprinidae, Balitoridae, Bagridae, Syngnathidae, Chaudhuriidae and Tetraodontidae). *J. South Asian Nat. Hist.*, 5: 37-82.
- Kottelat, M. 2000b. Fishes of Laos. Wildlife Heritage Trust, Colombo, 198 pp.
- Kottelat, M. 2000c. The type species of the genus-group names *Coius* Hamilton, 1822 and *Datnia* Cuvier, 1829 and the type-genus of the family-group name Datnioididae Bleeker, 1858. *J. South Asian Nat. Hist.*, 5: 91-94.
- Kottelat, M., A. J. Whitten, S. N. Kartikasari & S. Wirjoatmodjo. 1993. Freshwater fishes of Western Indonesia and Sulawesi. Periplus Editions, Hong Kong, 259 pp., 84 pls.
- Kullander, S. O., F. Fang, B. Delling & E. Ahlander. 1999. The fishes of the Kashmir Valley. Pp. 99-167 in: L. Nyman [ed.], *River Jhelum, Kashmir Valley. Impacts on the aquatic environment*. Swedmar, Göteborg, 198 pp.
- Pellegrin, J. & P. Chevey. 1934. Poissons de Nghia-Lo (Tonkin). Description de quatre espèces nouvelles. *Bull. Soc. Zool. Fr.*, 59: 337-343.
- Pellegrin, J. & P. Chevey. 1935. Addendum à une note précédente sur les poissons de Nghia-Lo (Tonkin). Description de quatre espèces nouvelles. *Bull. Soc. Zool. Fr.*, 59: 467-468.
- Rainboth, W. J. 1996. Fishes of the Cambodian Mekong. FAO, Rome, 265 pp., 27 pls.
- Roberts, T. R. 1992. Revision of the Southeast Asian cyprinid fish genus *Probarbus*, with two new species threatened by proposed construction of dams on the Mekong River. *Ichthyol. Explor. Freshwat.*, 3: 37-48.
- Roberts, T. R. 1993a. The freshwater fishes of Java, as observed by Kuhl and van Hasselt in 1820-23. *Zool. Verhand.*, 285: 1-94.
- Roberts, T. R. 1993b. Artisanal fisheries and fish ecology below the great waterfalls of the Mekong river in southern Laos. *Nat. Hist. Bull. Siam Soc.*, 41: 31-62.
- 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: 225-236.
- Roberts, T. R. & M. Kottelat. 1994. The Indo-Pacific tigerperches, with a new species from the Mekong

- basin (Pisces: Cobiidae). *Ichthyol. Explor. Freshwat.*, 5: 257-266.
- Sauvage, H.-E. 1880. Notice sur quelques poissons de l'île Campbell et de l'Indo-Chine. *Bull. Soc. Philom. Paris, Sér. 7*, 4: 228-233.
- Sauvage, H.-E. 1883a. Sur une collection de poissons recueillie dans le lac de Biwako (Japon) par M. F. Steenackers. *Bull. Soc. Philom. Paris, Sér. 7*, 7: 144-150.
- Sauvage, H.-E. 1883b. Sur une collection de poissons recueillie dans le Mé-Nam (Siam) par M. Harmand. *Bull. Soc. Philom. Paris, Sér. 7*, 7: 150-155.
- Smith, H. M. 1934. Contributions to the ichthyology of Siam. IX-XIX. *J. Siam Soc., Nat. Hist. Suppl.*, 9: 287-325, pls.10-14.
- Smith, H. M. 1945. The fresh-water fishes of Siam, or Thailand. *Bull. U. S. Natn. Mus.*, 188: i-xi + 1-622, 9 pls.
- Vidthayanon, C., J. Karnasuta & J. Nabhitabhata. 1997. Diversity of freshwater fishes in Thailand. Office Environment Policy Planning, Bangkok, 102 pp.
- Wang Y., Wang Y., Wang C., Peng Q.-Y., Chen Y.-R. & Yang J.-X. 1998. [Study on the correlation between the growing characters of *Neosalanx taihuensis* and its resources in Lake Dianchi]. *Zool. Res.*, 19: 289-295.
- Wu, H.-W. 1977. [ed.] [The cyprinid fishes of China. 2]. Technical Printing House, Shanghai, 2: 229-598, 109 pls. [Chinese]
- Zhou, W., Cui, G.-H. 1996. A review of *Tor* species from the Lancangjiang River (Upper Mekong River), China (Teleostei: Cyprinidae). *Ichthyol. Explor. Freshwat.*, 7: 131-142.