

# Contribution to taxonomy and nomenclature of freshwater fishes of the Amur drainage area and the Far East (Pisces, Osteichthyes)

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Naseka, A.M. & Bogutskaya, N.G. 2004. Contribution to taxonomy and nomenclature of freshwater fishes of the Amur drainage area and the Far East (Pisces, Osteichthyes). *Zoosystematica Rossica*, **12**(2), 2003: 279-290.

Based on reexamination of original descriptions, type materials, comparative material, and a wide literature the present data on nomenclature and taxonomy of several taxa of freshwater fishes important because of a big deal of uncertainty connected with their identification and/or status are critically analysed. Discussed are *Macropodus ocellatus*, *Acanthorhodeus*, *A. asmussii*, *A. macropterus*, *Rhodeus amurensis*, *Cyprinus rubrofuscus*, *Parabotia manchurica*, *Lefua*, *L. costata*, *L. pleskei*, *Pelteobagrus*, *P. mica*, *P. argentevittatus*, *Pseudobagrus*, *P. ussuriensis*, *P. herzensteini*.

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## Introduction

For almost 100 years, the publications by Berg (1909, 1914, 1916, 1949, etc.) and Nikolsky (1956) have been the manual for several generations of Russian ichthyologists on the fish fauna of Amur and other Far East river systems. An annotated checklist of cyclostomata and fishes of the continental waters of Russia (Reshetnikov, 1998) and an atlas (Reshetnikov, 2002a, 2002b) were recently published; however, they contain poorly revised information and many serious to minor factual, technical and methodological inaccuracies. It has become clear that updating knowledge based on current systematic research and advanced methodology is the barest necessity.

The fish fauna of the Amur River system and the rivers of the Sea of Japan in the territory of Russia includes at least 125 species in at least 70 genera. It is a hot spot of fish diversity and the unique area with regard to both the number of taxa and their ecological groups. A new period of reanimation of interest to taxonomy, phylogeny and systematics of fish from the Amur-Manchurian zoogeographic region and adjacent areas has started, and a few checklists and taxonomic reviews of the Far East freshwater fishes have already appeared (e.g., Bogutskaya & Naseka, 1997; Shed'ko, 2001, 2002; Vasilieva, 2001; Novomodny, 2002a, 2002b, 2003; Shapovalov, 2003; Shed'ko & Shed'ko, 2003).

The present-day interest to Amur and Far East freshwater fishes has been obviously motivated by several main reasons. The first one is that a considerable discrepancy has been revealed in a number of taxonomic opinions in the recent Chinese and Japanese literature when compared to that published in Russia. The second reason is wide using of molecular methods that offered a strong incentive for revision of polymorphic and taxonomically difficult groups. The third reason is the changes in systematic methodology. Using phylogenetic approach concentrates taxonomic effort on searching monophyletic groups and rearrangements of paraphyletic groups on the supraspecific and specific levels. This paper is not intended for discussion of species concepts and their implication to fish taxonomy. The reader is referred to Mayden & Wood (1995), Mayden (1997), Kottelat (1997), Howard & Berlocher (1998), Kullander (1999), Ghiselin (2002). We would only like to emphasize that the grouping criteria used in the phylogenetic species concept (PSC), the diagnosability and monophyly (McKittrick & Zink, 1988; Cracraft, 1989; Warren, 1992), return us to necessity of detailed morphological and ecological studies rather than considering all differences between populations in terms of "polymorphic" or "complex" species approach.

Within a wide-scaled revision of freshwater fishes of Russia and adjacent areas, we started from checking nomenclatural and taxonomic sta-

tus of most nominal taxa in consideration. All original descriptions were examined, as well as type material for most key species. In the given paper, we present some data on nomenclature and basic taxonomy of several taxa, which are especially important because of a big deal of uncertainty connected with their identification and/or status.

### Material and methods

We examined original descriptions of all nominal taxa in consideration. The type material examined is deposited at the Zoological Institute of the Russian Academy of Sciences, St.Petersburg (ZIN), Naturhistorisches Museum Wien (NMW), Institute of Zoology of the Polish Academy of Sciences, Warsaw (IZ PAN), Musee National d'Histoire Naturelle, Paris (MNHN), Zoological Museum of the Humboldt University, Berlin (ZMB), and the Natural History Museum, London (BMNH). Collection numbers and localities of examined specimens are given in respective parts of the paper. Most specimens were radiographed. Fin counts include two last branched rays as one ray. Standard length (SL) is body length from the anteriormost point of the upper jaw to the posterior margin of hypurals.

The species concept is PSC consistently used for the first time in systematics of freshwater fishes of Russia (Bogutskaya et al., 2001). The status of subspecies of earlier authors or synonyms has been preliminarily evaluated individually on the basis of data available to us by the moment. In few cases, we just provide our understanding of data from critically analysed literature.

### Discussion on nomenclature and taxonomy of some taxa

#### Family OSPHRONEMIDAE

The family is represented in the fauna of Russia by a single genus and a single species. The genus *Macropodus* La Cepede, 1801: 416 (type species *Macropodus viridiauratus* La Cepede, 1801) was earlier referred to Belontiidae (Liem, 1963; Nelson, 1994; Paepke, 1994; Kim, 1997; etc.). Britz (2001) assigned it to the subfamily Macropodinae that was moved to the family Osphronemidae. The name Macropodinae Liem, 1963 is now emended to Macropodinae to avoid the homonymy between Macropodinae (Osteichthyes, Perciformes) and Macropodidae Gray, 1821 (Mammalia, Marsupialia) (Kottelat, 2001c; Opinion 2058).

#### *Macropodus ocellatus* Cantor, 1842

We know only one published illustration of *Macropodus* which is done from a specimen reliably caught in the Amur drainage in the territory of Russia (Storchilo, 1993). This specimen must be identified as *Macropodus ocellatus* Cantor, 1842: 484 (Zhoushan Dao), since only this species of the genus has a rounded caudal fin (without elongated lobes). This species is distributed in Japan, Korea and China from Zhujiang R. in the south to Amur R. in the north. In the Amur drainage area and Korea, *M. ocellatus* has been commonly (Choi et al., 1990; Storchilo, 1993; Kim, 1997; Bogutskaya et al., 2001; etc.) misidentified as *M. chinensis* Bloch, 1790. *M. chinensis* is a junior synonym of *M. opercularis* Linnaeus, 1758, which is distributed in East Asia from Yangtze drainage in the north to North Vietnam in the south. Keys, pictures, and comments on nomenclature and taxonomy of *Macropodus* can be found in a number of publications (Rendahl, 1958; Paepke, 1990, 1991, 1994; Freyhof & Herder, 2002).

#### Family CYPRINIDAE

#### *Acanthorhodeus* Bleeker, 1871

The taxonomic relationships and status of *Acanthorhodeus* Bleeker, 1871: 39 (type species *A. macropterus* Bleeker, 1871) and *Acheilognathus* Bleeker, 1859a: 427 (type species *Capoeta rhombea* Temminck & Schlegel, 1846) are still doubtful. Most authors synonymize these two genera following Arai & Akai (1988), who based their conclusions mainly on karyological data. This opinion is supported by molecular data (Okazaki et al., 2001). Nevertheless, we still retain *Acanthorhodeus* as a distinct genus (Naseka, 1998; Bogutskaya et al., 2001; etc.) because of some significant morphological differences between the two. The type species of the genus *Acheilognathus*, *A. rhombeus* (Temminck & Schlegel, 1846) from Japan, is characterized by 11-13 branched rays in the dorsal fin and 9-10 in the anal fin and the absence of the rigid spine in the dorsal fin (the examined paralectotype BMNH 1864.2.16.141 has the last unbranched dorsal fin ray thin, flexible and segmented along a half its length, 13 branched dorsal fin rays, and 10 branched anal fin rays). The type species of the genus *Acanthorhodeus*, *A. macropterus* Bleeker, 1871, is distinguished by the markedly larger number of both the dorsal and anal branched rays (15-18 and 10-13, respectively) and the thickened last dorsal-fin ray turned into a marked spine only flexible on the very top.

Since Dybowski (1872) and Berg (1909), it has been widely accepted that two species of *Acanthorhodeus* occur in the Amur drainage: *A. asmussii* (*Devario asmussii* Dybowski, 1872: 212, Khanka Lake) and *A. chankaensis* (*Devario chankaensis* Dybowski, 1872: 212, Khanka Lake). Examination of materials collected by us in 1993 and 2000 revealed that one or two additional species had been mixed under these names (Bogutskaya et al., 2001). Especially interesting is the sympatric occurrence of two species characterized by a deep body and long both the dorsal and anal fins (16-19 and 12-14 branched rays, respectively), which can be distinguished by the shape of both the dorsal and anal fins and the colour pattern of the latter (Figs 1, 2) in both males and females.

The heterogeneity of *Acanthorhodeus* from Amur was also noticed by Novomodny (2002a, 2002b), who included two more species into the list of species from Amur as *A. macropterus* Bleeker, 1871 and *A. gracilis* Regan, 1908.

As to *A. chankaensis*, the original description, though rather poor, gives one character which makes possible to identify the species with almost no doubt when compared with other spiny bitterlings of Amur, the small number of branched rays in the dorsal (12-13) and the anal (10) fins. In addition, *A. chankaensis* is clearly distinguishable by its small inferior mouth with a horny edge on the lower lip. Syntypes of *A. chankaensis* have been probably lost; we have found no Dybowski's specimens of this species in the museums (IZ PAN, NMW, ZMB) which keep materials collected by this author.

A species close to *A. chankaensis* and identified as *A. gracilis* Regan, 1908: 60 (Pl. 2, Fig. 1, Chong-ju, South Korea) was reported from Amur by Novomodny (2002a, 2002b). This author gives no morphological data on specimens examined by him, except for the difference in configuration of nuptial tubercles in males. The holotype of *A. gracilis* (BMNH 1907.12.10.51, male), examined by us, is in poor condition; it possesses only few remains of the tubercles, so, it is impossible to judge on their shape and localization on the snout. As to most other external characters, they are rather similar in *A. gracilis* and *A. chankaensis*. They both belong to a group of *Acanthorhodeus* species characterized by a small number of branched rays in both the dorsal and anal fins.

In some recent Chinese and Korean publications (Choi et al., 1990; Kim, 1997; Zhang, 1995; Chen et al., 1998), *A. asmussii* is synonymized with *A. macropterus* Bleeker, 1871: 39 (Pl. 2, Fig. 2, Yangtze R.).

We examined the syntypes of *Devario asmussii* (IZ PAN 6112, 2 specs, and ZMB 7936, 2 specs)<sup>1</sup>. We specifically give three illustrations of *A. asmussii* (Figs 1, 3a, 3b): a photo of a specimen from our recent samples, a photo of a syntype (male), and a drawing to show what fish was identified as *A. asmussii* by Berg (1909, etc.). As it is clearly seen, *A. asmussii* is characterized by a deep body (48-52% of SL in adults), a large dorsal fin with its outer margin markedly convex, an almost straight or slightly convex anal-fin margin, and the presence in males of two stripes (the black one and the white one) along the margin of the anal fin. *Acanthorhodeus asmussii amurensis* Holcik, 1962: 160, Fig. 3, 4 (Lake Kabar, Amur at Elabuga) is a synonym of *Acanthorhodeus asmussii*.

*A. macropterus* differs in the much shallower body. According to the original description (Bleeker, 1871: 39), its depth is 2.5 times in its length. The holotype (Fig. 4a) is in poor condition, but its body configuration agrees with Bleeker's drawing (Fig. 4b). The true *A. macropterus* is also figured by Dabry de Thiersant (1872, Pl. 40, Fig. 5) and Choi et al. (1990, Fig. 22). We know no reliable records from the Amur drainage of a bitterling that could be identified as *A. macropterus*. Judging by the specimens from the type locality (Yangtze) (uncat., C. Smith, University of London), the most characteristic feature of the species is the contrasting, relatively broad white margin of the anal fin in males and several longitudinal rows of black dots on the dorsal and anal fin, which are greyish.

The species close to *A. asmussii* but differing in the yellowish coloration, absence of the stripes along the margin of the anal fin, and concave both the dorsal and anal fin margins (Fig. 2) is probably an undescribed species, but further study of all nominal species of spiny bitterlings is needed.

### **Rhodeus amurensis** (Vronsky, 1967), sp. dist.

A small bitterling described as *Pseudoperilampus lighti amurensis* (Vronsky, 1967: 24, tabl. 1, Amur, Ussuri, Kia) was then assigned to the genus *Rhodeus* (Bogutskaya & Naseka, 1997) and given specific status (Bogutskaya et al., 2001). However, there is an opinion (Akai & Arai, 1998; Arai et al., 2001) that this species is conspecific with *R. sinensis* (*Rhodeus sinensis* Günther, 1868: 280, Chikiang, Yangtze drainage). Moreover, *R. lighti* (*Pseudoperilampus lighti* Wu, 1931: 25, fig. 4, Foochow, Fukien [= Fujian]) and *R. uyekii* (*Pseudoperilampus uyekii* Mori, 1935: 562, fig. 1, Keijo [= Seoul]) were also synonymized with

<sup>1</sup>The designation of the neotype (ZIN 28193) of *Devario asmussii* by Holcik, 1962 is not valid (Art. 75 of the International Code of Zoological Nomenclature).

*R. sinensis* (Akai & Arai, 1998). On the other hand, it was suggested (Novomodny, 2002a, 2002b) that *R. amurensis* is a synonym of *R. fangi* (*Pararhodeus fangi* Miao, 1934: 180, fig. 31, Chinkingang [= Zhenjiang], Kiangsu [= Jiangsu] Province, Eastern China). However, this taxonomic conclusion was published in only abstracts of a conference, so, no real argumentation is given but a reference to Lin (1998). In the latter publication, which is a review of the Chinese fauna of Acheilognathinae, Lin makes a taxonomic conclusion completely different from that of the Japanese authors cited above. He synonymizes *R. sinensis* (and at least two more valid species) with *R. ocellatus* (*Pseudoperilampus ocellatus* Kner, 1866: 543, Shanghai; Lin gives wrong both the date and the reference to the original description), but keeps *R. lighti* as a distinct species and does not mention *Pseudoperilampus lighti amurensis* Vronsky in synonymy of any species. As to *R. fangi*, two species are mixed up, judging by the figure given (Lin, 1998, p. 452, fig. 256): the male (below) is *R. fangi*, while the female (above) is *R. sinensis* Günther s. str. The situation got almost anecdotic by the statement of Novomodny (2002b: 31) that "certainly this species [*R. fangi* Miao] is a synonym [of] *Rhodeus uyekii* Mori".

We agree with Arai & Kato (2003) that identification of small *Rhodeus* species is difficult, especially differentiation between specimens from *R. sinensis* – *R. lighti* complex having 48 chromosomes and those having 46 diploid number (*R. smithii* complex), such as *R. atremius* (Jordan & Thompson), *R. notatus* Nichols and *R. fangi* (Arai et al., 2001; Okazaki et al., 2001).

Thus, in the context of the Manchurian fauna, our basic goal was to compare data on *R. amurensis* with primary data on *R. sinensis*, *R. uyekii*, *R. lighti* and *R. fangi* based on original descriptions (Günther, 1868; Wu, 1931; Mori, 1935; Vronsky, 1967) and new data describing type material where available (Akai & Arai, 1998). We examined 12 specimens of *R. amurensis* collected during our 2000 and 2003 expeditions (ZIN uncat., SL 23.5–35 mm; 3 specs were cleared and stained with alizarin S), which entirely correspond to the diagnosis by Vronsky (1967: 23–24). *R. amurensis* (Figs. 5a, 5b), *R. sinensis*, and *R. lighti* differ from *R. fangi* and other *Rhodeus* species in the following characters: all specimens, juveniles and adult males and females, have a dark spot on the anterior portion of the dorsal fin, which is especially bright in juveniles and females; there is a distinct but narrow black margin on the anal fin in males with no other anal fin stripes; the lateral band starts under the dorsal fin base (not in front of it), this band is deeper in males than in females; total vertebrae are

32 to 35 with modally 16 abdominal and 18 caudal ones; the temporal section of the infraorbital sensory canal and the supratemporal canal are lacking. According to Arai & Kato (2003, Fig. 8a), *R. fangi* has a complete infraorbital sensory canal with both orbital and temporal sections well developed and connected, and a branch of the supratemporal canal. All specimens of *R. amurensis* examined by us have a highly interrupted infraorbital canal without temporal section, and no supratemporal canal section.

*R. amurensis* differs from all 26 species of the Acheilognathinae examined by Arai & Kato (2003) in the extremely reduced cephalic sensory canals. First, the canals are very short: the supraorbital canal is only represented by a short (one to three segments) section just above the eye; the nasal section is absent, and the nasal bone is completely lacking; the infraorbital canal consists of two or three discontinuous short sections on the 2nd, 3rd, and 4th infraorbital bones, the canal is completely absent from the first infraorbital; the 5th infraorbital is absent; there are no canal sections on the pterotic, postcleithrum and posttemporal, the extrascapula is absent; the preopercular-mandibular canal has two shortened sections, which are widely separated: one on the central part of the dentary (commonly two segments) and another on the central part of the preoperculum. Second, all the canal sections are poorly ossified and lie in grooves on the underlying bones rather than being closed in.

In addition, *R. amurensis* clearly differs from *R. sinensis* (we have examined the lectotype BMNH 1858.10.19.150, male and the paralectotype BMNH 1858.10.19.149, male; their photos are given in Akai & Arai, 1998, Figs. 1a, 1b) in a set of characters: shallow body with maximum body depth 34–38% SL (vs. deep body, 42–49% SL in *R. sinensis*); very short section of the anal fin (only its very top), which is marked with dark pigment (vs. the whole edge intensely pigmented); less (8–9) dorsal fin branched rays (vs. 9–11); less (8–9) anal fin branched rays (vs. 10–11); larger number of scales in the lateral series, 34–35 in our specimens; 34–39 (mean 36.2) given by Vronsky (1967) (vs. 30–33 with a mode of 32); lesser number (0 to 3, rarely 4) of pored scales (vs. 4 to 8). Judging by the data given by Akai & Arai (1998, Figs 1, 4), *R. sinensis* is rather similar to the typical *R. lighti* from Shanghai (Wu, 1931; Akai & Arai, 1998), though the latter has a lesser number of pored scales, 2 to 5. However, the male and female from Liaoning (a province in Northern China on the border with Korea) identified by Akai & Arai (1998: 107, Figs. 4c, 4d) as *R. lighti* represent a species different from *R. lighti* from the type locality (Shanghai). These specimens are characterized by the much shal-

lower body, 8-9 branched rays in both dorsal and anal fins, and a very weak marginal stripe on the anal fin in the male. They are very similar to *R. amurensis* (Fig. 5).

When compared to *R. uyekii* from Korea, *R. amurensis* differs in the constant presence of the spot on the dorsal fin and short marginal stripe on the anal fin, while *R. uyekii* (Akai & Arai, 1998, Fig. 5; Choi et al., 1990, Fig. 13; Kim, 1997, Figs. 17a-c) has the black stripe along the whole margin of the anal fin and no spot on the dorsal fin. *R. uyekii* is probably present in Russian waters being introduced from China or Korea. A photo of a specimen of this species is given by Novomodny (2003: 7, as "Fang's bitterling"). A revision of all small-sized bitterlings of Russia is strongly needed.

### **Cyprinus rubrofuscus** La Cèpide, 1803

The Amur carp is widely treated as subspecies *C. carpio haematopterus* Temminck & Schlegel in the Russian literature. However, the name *Cyprinus haematopterus* Temminck & Schlegel, 1846: 189 (Pl. 96, Nagasaki, Japan) is permanently invalid as a junior primary homonym of *Cyprinus haematopterus* Rafinesque, 1820 (Eschmeyer, 1998). The earliest available name for the Amur (Asian) carp is *Cyprinus rubrofuscus* La Cèpide, 1803: 490, 530 (Pl. 16, fig. 1, China), and this taxon has been commonly considered a subspecies, *C. carpio rubrofuscus*, in the recent Chinese literature (Chen & Huang, 1977; Zhu, 1995; etc.). Kottelat (2001a, 2001b) considers it to be a distinct species. He supposes (Kottelat, 1997, 2001a) that the common carp, *Cyprinus carpio* Linnaeus, 1758, a species native to Eastern Europe and Central Asia, is not introduced in Europe from Asia as it is commonly thought.

### Family COBITIDAE

Steyskal (1980) showed that the correct orthography of a family-group name based on *Cobitis* Linnaeus, 1758 should be Cobitidae, a spelling that had not been in a wide use before, while Cobitidae was commonly used (Kottelat, 1986). The International Commission on Zoological Nomenclature (Opinion 1500) ruled that Cobitidae is the spelling to be retained.

### **Parabotia** Dabry de Thiersant, 1872

It was assumed long ago (Nikolsky, 1956) that the single species of the Botiinae distributed in our waters, *Leptobotia mantschurica* Berg, 1907: 420 (Mutan-kiang R., Sungari system), is proba-

bly conspecific with the Chinese species *L. fasciata* (*Parabotia fasciatus* Dabry de Thiersant, 1872: 191, pl. 49, fig. 7, Yang-tse-kiang), which is the type species of the genus *Parabotia* Dabry de Thiersant, 1872: 191. The author of *Parabotia* is commonly considered to be Guichenot in Dabry de Thiersant, 1872, since Guichenot is cited after many new names described in the paper by Dabry de Thiersant. However, Guichenot just gave labels in the collection (Bleeker, 1871; Kottelat, 2004), so, according to Art. 50.1 of the International Code of Zoological Nomenclature, the author of *Parabotia* is Dabry de Thiersant.

In the Russian literature, the status of *Leptobotia* and *Parabotia* has not been revised, and our Manchurian species has been given under the generic name *Leptobotia* (Berg, 1949; Reshetnikov, 2002a; many others). In the Chinese literature, *Leptobotia* and *Parabotia* are commonly considered separate genera (Pan et al., 1991; Zhang, 1995; Zhu, 1995; etc.), though the fact that the taxonomy of this group of botiins is not settled was specifically emphasized (Reshetnikov, 1998; Kottelat, 2004).

The genus *Leptobotia* Bleeker, 1870: 256 (type species *Botia elongata* Bleeker, 1870: 254, 2nd pl., upper fig.) is originally characterized by a simple (not bifurcated) infraorbital spine (Sauvage & Dabry de Thiersant, 1874). We have examined three syntypes of *Botia pratti* (BMNH 1891.6.13.35-37; Kia-tiang-fu, Szechwan, China; a synonym of *Leptobotia rubrilabris* Dabry de Thiersant, 1872) and some additional specimens of *Leptobotia elongata* Bleeker, 1865 (BMNH 1891.6.13.38-39, Kia-tiang-fu, Szechwan, China; BMNH 1969.4.15.25, Szechwan, China; BMNH 1981.2.3.24, Luzhou Shi, Sichuan, China). All these specimens have a sharp non-bifurcated infraorbital spine with the top reaching not farther than the posterior eye margin. In addition, the specimens share the following characters: strongly laterally compressed body; deep caudal peduncle (its depth 1.15-1.3 times in its length); pelvic fin reaching the anal fin origin; anus located below the dorsal fin base end and in the middle of the distance between the origins of the pelvic and anal fins; transverse dark stripes are wide and few (up to 5). The drawing by Bleeker (1870: 254, 2nd pl., upper fig.) gives a good presentation of these main distinguishing features of *Leptobotia*.

Species commonly assigned to *Parabotia* (we have examined the following specimens: *Nemacheilus xanthi*, a synonym of *Parabotia fasciata*, the holotype BMNH 1888.5.15.43, Ichang, China; *Parabotia fasciata*, 10 specs BMNH 1889.6.8.64-73, Kiu-Kiang, China; 2 specs BMNH 1981.2.3.21-22, Danfeng Xiau, Shaanxi, China; *Parabotia banarescui*, 1 spec BMNH

1927.10.1.4, Nanking, China) are distinguished by the bifurcated infraorbital spine with only both extremities externally visible; elongated, slightly laterally compressed body; shallow caudal peduncle (its depth 1.5-1.6 times in its length); pelvic fin reaching only the middle between the pelvic and anal fin origins; anus located markedly behind the dorsal fin base end and much closer to the anal fin base (in the middle between the end of the pelvic fin and the anal fin origin); transverse dark stripes are relatively narrow and numerous (more than 10; 12 to 14 in *P. fasciata* and *P. banarescui*).

***Parabotia mantschurica*** (Berg, 1907), comb. n.

Reexamination of the syntypes of *L. mantschurica* (ZIN 14085, R. Mutan-kiang [= E-ho], tributary of Sungari R.) as well as additional specimens of this species (ZIN 22237, Sungari; ZIN 28358, Amur) revealed that all examined specimens have the infraorbital spine deeply bifurcated and all the other characteristic features of *Parabotia* given above. So, we assign *L. mantschurica* to the genus *Parabotia*.

*Parabotia fasciata* has been synonymized (see Kottelat, 2004) with a wide range of nominal species: *Nemachilus xanthi* Günther, 1888, *Botia multifasciata* Regan, 1905, *Leptobotia mantschurica* Berg, 1907, *L. intermedia* Mori, 1929, *L. hopeiensis* Shaw & Tchang, 1931, *L. kudorii* Mori, 1933, *B. kwangsiensis* Fang, 1936, *B. wui* Chang, 1944. However, before a taxonomic revision of *Parabotia* is done, we refrain from synonymization of *P. mantschurica* with *P. fasciata* from Southern China (type locality: R. Yangtze). As exemplified by many other species, Manchurian and Korean populations or subspecies of East Asian species with wide ranges are often non-conspecific with those from Southern China. As it is seen from the comparison of specimens of *P. mantschurica* and *P. fasciata*, the former is differing in the transverse stripes widened on the back so that the stripes are broader than the intervals between them (vs. narrow stripes of equal width on the back, flanks and belly so that the stripes are markedly narrower than the intervals between them in *P. fasciata*).

Family **BALITORIDAE**

The family-group name Nemacheilinae was established by Regan (1911). This taxon has been generally considered as a subfamily of Cobitidae Swainson, 1839, together with Botiinae and Cobitinae. Sawada (1982), based on a detailed morphological study, placed Nemacheilinae into the family of river loaches, Homalopteridae Bleeker, 1859, and this was then widely accept-

ed. Kottelat (1988) showed that the correct name for this family is Balitoridae Swainson, 1839. The whole complex Cobitidae s.l. needs a deep revision. Closer relationships of Nemacheilinae to Cobitidae rather than to Balitoridae (Homalopteridae auct.) (Wu et al., 1981; Chen & Zhu, 1984) got a pronounced support recently (Liu et al., 2002) by molecular data that showed the phylogeny within the Cobitoidei as Catostomidae + (Gyrinocheilidae + ((Botiinae + ((Balitoridae + (((Cobitinae + Nemacheilinae)))))).

The lack of methodologically correct data on phylogenetic links within Cobitidae and Balitoridae makes some authors return to uniting them in a single family Cobitidae (Hosoya, 2002) or divide them into a larger number of families, Nemacheilidae, Balitoridae, Cobitidae and Botiidae (Nalbant & Bianco, 1998; Nalbant, 2002).

***Lefua pleskei*** (Herzenstein, 1887), sp. dist.

The genus *Lefua* Herzenstein, 1888: 3 (type species *Octonema pleskei* Herzenstein, 1887) is close to or a junior synonym of *Oreonectes* Günther, 1868: 369 (type species *O. platycephalus* Günther, 1868) (Herzenstein, 1889; Banarescu & Nalbant, 1968, 1995). The entire complex of taxa under the names *Oreonectes*, *Barbatula* Linck, 1789: 38 (type species *Cobitis barbatula* Linnaeus, 1758), *Triplophysa* Rendahl, 1933: 21 (type species *Nemacheilus hutjertjuensis* Rendahl, 1933) and some other nemacheilins is badly known, so any conclusion is impossible. However, our examination of specimens of *Oreonectes platycephalus* (2 syntypes BMNH 1848.7.12.6-7, Hongkong; 3 syntypes BMNH 1855.3.27.16-18 Chikiang, China; 17 syntypes BMNH 1858.9.19.155-173, China; ZIN 8338, 1 spec., Hongkong, from British Museum, a probable syntype; ZIN 34226, 1 spec., Kwantung Prov.) revealed marked differences from species commonly assigned to *Lefua* in a number of characters: pattern of scales arrangement (normal overlapping scales in *O. platycephalus* vs. reduced, non-overlapping scales), sensory canal structure (well developed ossified canals with normal pores vs. poorly ossified canals with a double row of minute pores), number of total vertebrae (37-38 vs. 38-43), shape and size of the free posterior chamber of the gas-bladder (the posterior chamber small, half as long as the ossified anterior chamber capsule, and located just behind the anterior chamber vs. the posterior chamber large, as long as the anterior capsule, connected to the latter by a well developed pedicel, and located in the abdominal cavity). So, we retain *Lefua* as a valid genus.

Only one species of *Lefua* has been commonly listed from continental Asia, *L. costata* (Diplo-

*physa costata* Kessler, 1876: 29, Pl. 3, Fig. 3, Dalai-Nor), which has been considered a senior synonym of *Octonema pleskei* Herzenstein in Warpachowski & Herzenstein, 1887: 48 (Fig. 5, Lefu R. at Nikolaevka, Khanka Lake basin) and *Elxis coreanus* Jordan & Starks, 1905: 201 (Fig. 7, Ghensan). However, this synonymization seems to us not sufficiently based, especially when *D. costata* is compared to *O. pleskei* (see Herzenstein 1887, 1889). The original descriptions of both species are detailed enough, and the main feature distinguishing them, the position of the dorsal fin, is clearly formulated.

We reexamined the following available type specimens as well as additional specimens: *L. costata* – ZIN 2477 (the holotype of *Diplophysa costata*), ZIN 12766 (2 specs, Inner Mongolia), ZIN 13720 (2 from 6, Sungari); *L. pleskei* – BMNH 1891.10.7.73 (a syntype of *Octonema pleskei*), ZIN 7209 (4 syntypes of *O. pleskei*), ZIN 15480 (3 specs, Khanka), ZIN 13720 (4 from 6, Sungari), also 15 specimens collected by us in 2000 and 2003 (ZIN uncat., Kamyshovaya R., a stream at Kraskino, Sea of Japan basin); *L. coreanus* – ZIN 13723 (4 specs, from the type locality, Ghensan); *L. echigonia* Jordan & Richardson, 1907 – ZIN 25799 (4 specs, Suruga, Hondo, Japan); *L. nikkonis* – BMNH 1907.12.23.45-54 (12 specs, Biwa, Japan).

In a good coincidence with the original descriptions (Kessler, 1876; Warpachowski & Herzenstein, 1887), the holotype of *L. costata* (Fig. 6) clearly differs in the anterior position of the dorsal fin: the distance between the branchial slit to the dorsal-fin origin is markedly less than the distance between the dorsal-fin origin to the end of the caudal peduncle. In syntypes of *L. pleskei* (Fig. 7), the dorsal fin is located much farther posteriorly: the distance between the branchial slit to the dorsal-fin origin is slightly greater than or equal to the distance between the dorsal-fin origin to the end of the caudal peduncle. Such a different relative position of the dorsal fin is due to a different location of the dorsal fin pterygiophores relative to the vertebral column: in *L. costata*, there are 17 predorsal vertebrae (including Weberian ones), while in *L. pleskei* this number is 18 or 19. *L. costata* has a larger eye, its horizontal diameter is about 1.8 times in the snout length, while in *L. pleskei* the eye horizontal diameter is 2.0-2.2 times in the snout length. All specimens examined from Khanka Lake and the coastal rivers are characterized by the features typical of *L. pleskei*, so, the species is probably not highly variable. This gives reasons for considering *L. pleskei* a separate species.

It should be specifically mentioned that there is a sample (ZIN 13720, Dachuan, Mutan-kiang, Sungari), which contains 4 specimens close to *L.*

*pleskei* (with posteriorly placed dorsal fin, a long snout and 18 predorsal vertebrae) and 2 specimens with characters of *L. costata* (with anteriorly placed dorsal fin, a short snout and 17 predorsal vertebrae). To avoid sexual dimorphism, we compare only females from both groups. The four latter specimens, however, differ from the syntypes of *L. pleskei* by fewer total vertebrae (39-40 vs. 41-42 in *L. pleskei*) and a more pronounced spotted coloration. After having examined this sample, Berg (1909: 164) referred the differences found to infraspecific variability. However, the recent study of phylogenetic relationships and infraspecific variation of loaches of the genus *Lefua* in Japan (Sakai et al., 2003) supports the existence of an undescribed species and give some reason to assume much more complexity in the continental "*Lefua costata*".

#### Family BAGRIDAE

This family has been thoroughly revised by Mo (1991) based on a study of a wide range of anatomic characters. He provided diagnoses and keys for all genera. However, Mo (1991, p. 11, 12) examined only two of the five Amur bagrids, *Pelteobagrus fulvidraco* (Richardson, 1846) and *Pseudobagrus ussuriensis* (Dybowski, 1872).

#### *Pelteobagrus* Bleeker, 1864

This genus is represented in the Amur drainage area, in addition to *P. fulvidraco*, by two more species, *P. brashnikowi* (Berg, 1907) and *P. mica* (Gromov, 1970). They had been earlier assigned to genera, which are absent from the fauna of Russia, *Leiocassis* Bleeker, 1858 and *Mystus* Scopoli, 1777, respectively.

*Pelteobagrus* is available from Bleeker, 1864: 9 (type species *Silurus calvarius* Basilewsky, 1855), though dated as 1865 by some authors (Weber & De Beaufort, 1911; etc.). Eschmeyer (2003) gives both dates. In dating the paper as 1864, we follow the reviews by Troschel (1865, 1866): he cited pages 1-212 of the 2nd volume of the *Ned. Tijdschr. Dierk.* as published in 1864 while the pages 213-375 were dated as 1865 by him.

#### *Pelteobagrus mica* (Gromov, 1970), comb. n.

*Mystus mica* described by Gromov (1970: 400, Fig., Tabl. 1, Lake Ommi in Middle Amur, Amur at Leninskoe) from a large set of specimens from different localities had been a poorly known species, when it became clear that the species is common and abundant in the lower Amur drainage. Using the diagnosis provided by Mo (1991), we assign it to the genus *Pelteobagrus*, because it possesses such diagnostic characters of the latter

as the deeply forked caudal fin, jaw muscles restricted to cheek, and the absence of tubulose sensory pores. In the list of Amur fishes, the species has been recently replaced by *Macrones argentivittatus* Regan, 1905: 390 (Novomodny, 2002a), another small-sized bagrid from China, as *Leiocassis argentivittatus*. No argumentation was given, but the author probably followed some Chinese authors (Zhang, 1995; Chu et al., 1999), who listed *L. argentivittatus* from the Amur drainage area. We compared the type material of *Mystus mica* deposited at ZIN (39434, the holotype and 4 paratypes, Omni Lake; 39435, 9 specs, Amur at Leninskoe), data from the original description and our numerous (over 50 specs) material collected in Melgunovka and Spasovka rivers (Khanka Lake basin) with the original description of *Macrones argentivittatus* Regan. As it is seen in Figs 8 and 9, *P. mica* differs from *P. argentivittatus* in the shape and size of the adipose fin and the colour pattern. As it is clearly stated by Gromov (1970) and seen in all specimens examined by us, *P. mica* has a large adipose fin with a long base. The adipose fin is almost as long as deep and its origin is located on the vertical of the anal fin origin or slightly in front of it. In *M. argentivittatus* (Regan, 1905, Pl. 5, Fig. 2, reprinted in our Fig. 9), the adipose fin is deep but has a narrow base so that its origin is located much behind the vertical through the anal fin origin, and Regan (1905, p. 390) clearly states that the adipose fin "has a free posterior margin". He also described the coloration of his *M. argentivittatus* in details and mentioned a dark lateral band from the head to the caudal fin in addition to a band along the midline of the back, but said nothing about an additional short band below the anterior part of the main lateral band. In all specimens of *P. mica* examined by us, there is an additional pigmented band on the level of the pectoral fin; in most specimens, this band runs almost to the vertical through the pelvic fin origin. This colour pattern matches well that described by Gromov (1970). Unfortunately, we could not examine the type specimens of *L. argentivittatus*, which are in the Museum d'histoire naturelle de la Ville de Geneve (Weber, 1998), so we cannot judge upon generic assignment of this species with certainty. Mo (1991) tentatively assigned *L. argentivittatus* to *Pseudobagrus*, since it shares with the latter such a derived feature as an invasion of the jaw muscle on the cranial roof (see below under *Pseudobagrus*). *Pelteobagrus mica* does not possess this character, the upper portion of the m. adductor mandibularis attaches to the lateral cranial surface just below the cranial roof lateral margin. This is an additional argument against synonymization of *P. mica* with *M. argentivittatus*.

### ***Pelteobagrus brashnikowi* (Berg, 1907)**

The identification of another species of the genus *Pelteobagrus*, originally described as *Macrones (Leiocassis) brashnikowi* Berg, 1907: 421 (Chlya Lake at Nikolaevsk and the Amur estuary; ZIN 13964, the holotype and 1 syntype left from 5), which had been considered for quite a long period as an endemic species of the Amur drainage, was also called in question. *P. brashnikowi* from Amur was synonymized with *P. nitidus* (*Pseudobagrus nitidus* Sauvage & Dabry de Thiersant, 1874: 5, Yangtze) (Zhang, 1995; Chu et al., 1999; Novomodny, 2002a). *P. nitidus* is also reported for Korea (Choi et al., 1990; Kim, 1997). We did not have comparative material from the type locality of this species and no type specimens are known, so we refrain from any conclusion, though it is necessary to underline that the only really distinctive feature of *P. nitidus* is its "very short adipose fin" (Sauvage & Dabry de Thiersant, 1974, p. 6). Illustrations of a bagrid called "*nitidus*" from Amur (= Heilongjiang) and Korea (Choi et al., 1990, Fig. 98; Zhang, 1995, Fig. 84; Kim, 1997, Fig. 101) show specimens with the adipose fin of a "normal" size (not smaller than in other species of *Pelteobagrus* or *Leiocassis*).

### ***Pseudobagrus* Bleeker, 1859**

The name *Pseudobagrus* first appeared in Bleeker (1858: 34, 60) as a nomen nudum. It is available from Bleeker, 1859b: 257 (type species: *Bagrus aurantiacus* Temminck & Schlegel, 1846). We follow Troschel (1861: 287) who dated Bleeker's "Enumeratio specierum piscium..." as 1859 from a separate published in Batavia. We examined a copy of the separate in the library of the Natural History Museum, London. Eschmeyer (2003) cites the manuscript of Fowler who gave the date as November 1859, possibly from a separate. Some authors date this work as 1860 from the journal publication. For example, Kottelat (2000) gives a reference to Bleeker's own statement made on 14 February 1860 (Bleeker, 1860b: 344) that „the 6th volume [of Acta Soc. Scient. Indo-Neerl.] will be published these days". *Pseudobagrus* was also published later the same year (Bleeker, 1860a: 87).

*Pseudobagrus* is considered by Mo (1991) to be a genus closest to *Pelteobagrus*, but distinguished from it in having commonly a round to slightly emarginate caudal fin; invasion of the jaw muscle onto the sphenotic, pterotic and even frontal on the cranial roof; sensory pores of the lateral line on the body bearing tubulose extensions.



For checking Mo's conclusions, we examined the type material, namely the holotype of *Bagrus ussuriensis* Dybowski, 1872: 210 (ZMB 7954, Amur) and the holotype of *Macrones herzensteini* Berg, 1907: 421 (ZIN 7092, R. Onon), and some additional specimens (ZIN 41602, 2 specs, Khanka; ZIN 22223, 2 specs, Sungari at Kharbin). All specimens are characterized by a "soft" dorsal surface of the head, which lacks externally exposed bones of the posterior part of the cranium characteristic of *Pelteobagrus*. The lateral half of the cranial roof is covered by the posterior sections of the m. adductor mandibularis that extends posteriad as far as the vertical through the branchial slit. Each pore of the lateral line terminates by a short tube. Besides these common characters, *B. ussuriensis* and *M. herzensteini* share most other external features, so, they seem to be conspecific. However, a final conclusion needs revision of a wider range of specimens.

#### Acknowledgements

The project is supported by the Russian Foundation for Basic Research (grants 00-07-90304, 00-04-63069, 01-04-49552, and 03-04-63145). We are grateful to V. Nazarov and N. Chernykh (TINRO), Yu. Sushitsky and V. Herstein (Nature Reserve "Khankaisky"), S. Shed'ko (Institute of Biology and Soil, Far Eastern Branch RAS), D. Pitruk and A. Balanov (Institute of Marine Biology, Far Eastern Branch RAS) for their help in organizing field samplings in 1993, 2000 and 2003, to E. Barabanshikov (TINRO) for sending us additional material from the Far East. Examination of type specimens in different museums was only possible due to support from J. Freyhof and P. Bartsch (ZMB), M. Brylinska (University of Olsztyn), C. Smith (University of London) and E. Miksch (NMW). We appreciate the help from M. Hautecouere for making photos from Bleeker's specimens deposited in MNHN. We are thankful to I. Kerzhner (ZIN) for his valuable comments on the manuscript.

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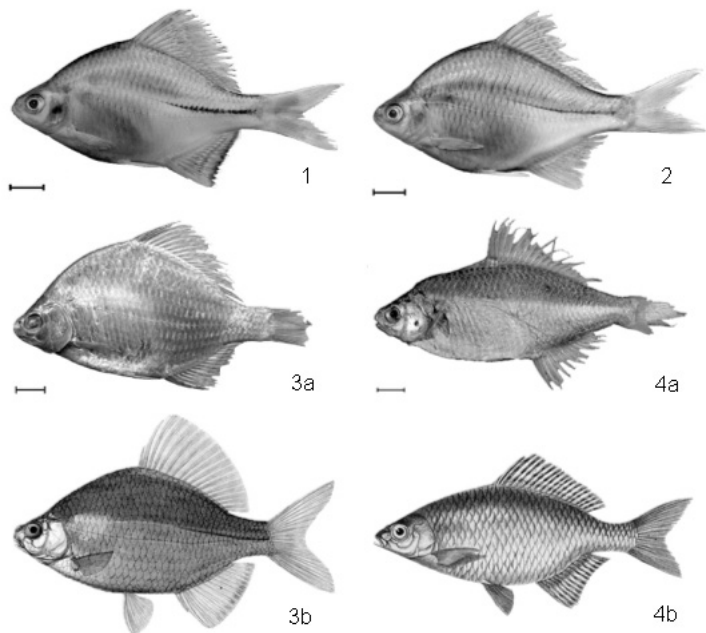
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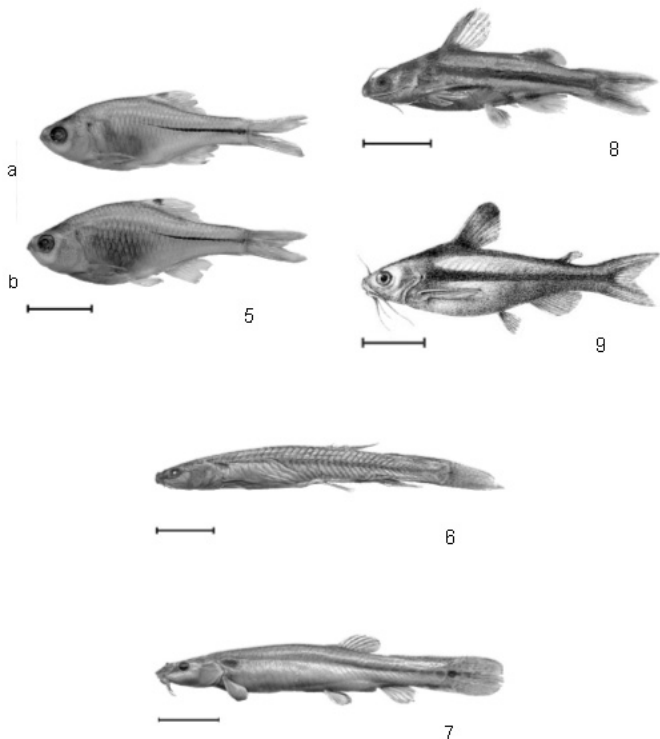
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Received 16 March 2004



**Figs 1-4.** 1, *Acanthorhodeus asmusii*, Khanka Lake, Nature Reserve "Khankaisky", station "Vostochny", 19. VIII 2003; 2, *Acanthorhodeus* sp., Khanka Lake, Nature Reserve "Khankaisky", station "Vostochny", 19. VIII 2003; 3a, syntype of *Devario asmusii* IZ PAN 6112, Khanka Lake; 3b, *Acanthorhodeus asmusii*, reprinted from Berg (1909, plate ii), ZIN 13802, Amur R. at Nikolaevsk; 4a, holotype of *Acanthorhodeus macropterus*, MNHN 0000-5045; 4b, *Acanthorhodeus macropterus*, reprinted from Bleeker (1871, plate ii, fig. 2.), Yangtze R. Scale bars: 10 mm.



**Figs 5-9.** 5, *Rhodius amurensis*, male (a) and female (b), Spasovka R. at Sosnovka, Khanka Lake basin, 19.VIII.2003; 6, holotype of *Diplophysa costata* ZIN 2477, Dalai-Nor Lake, Amur River basin; 7, paratype of *Lefua pleskei* ZIN 7209, Lefu R. at Nikolaevka, Khanka Lake basin; 8, paratype of *Mystus mica* ZIN 39434, Lake Ommi in middle Amur; 9, *Macropodus argentivittatus*, reprinted from Regan (1905, plate 5, fig. 2. China). Scale bars: 10 mm.