

Microcobitis, a new genus name for *Cobitis misgurnoides* (Teleostei: Cobitidae)

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Microcobitis, new genus, is established with *Cobitis misgurnoides* Rendahl, 1944 as type species. It is diagnosed by having the lower lip developed into four barbel-like lobes, adult males bearing a lamina circularis at the base of the second pectoral-fin ray, suborbital spine in a groove under the eye and not covered by skin, a pre-epiphysal fontanel between the frontal bones, a cartilaginous epiphysal bar, and the absence of body swellings in males.

Introduction

The genus *Cobitis* is the largest and most widespread within the loach family Cobitidae, ranging nearly continuously from the Atlantic coast in Europe to the Pacific coast in East Asia (Bănărescu, 1991). The genus contains about 30 species and shows in most cases a rather homogenous appearance with a slender body up to 180 mm SL, a long snout (37-52 % HL) and four longitudinal rows of black pigmentation on the body sides ('Gambetta zones' I to IV) on a light whitish or yellowish background colour. However, there are some species that differ from this general pattern, and one of these exceptions is *C. misgurnoides* Rendahl, 1944 (Fig. 1). Rendahl introduced this new species with a very detailed and accurate description basing on 26 specimens; from this description it became clear that *C. misgurnoides*

differs from all other species of *Cobitis* in several characters: It is smaller than all other species of *Cobitis*, reaching only up to 41 mm SL, has a shorter (29-40 % head length) and more rounded snout than most *Cobitis* and bears a midlateral row of brown blotches, an unclear mid-dorsal row and irregular blotches between these rows. Most importantly, it differs from all species of *Cobitis* in the shape of the lower lip, which is divided into four barbel-like projections. In a recent genetic review of the genera within the family Cobitidae, Šlechtová et al. (2008) demonstrated that *C. misgurnoides* is not a member of the genus *Cobitis*, but represents an independent monophyletic lineage that is distinct from all named genera. There is no available name for this genus and the aim of the present note is to establish a formal generic name for *C. misgurnoides* Rendahl.

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Material and methods

Institutional abbreviations: BMNH, Natural History Museum, London; FRLM, Fisheries Research Laboratory, Mie University, Mie; IAPG, Institute of Animal Physiology and Genetics, Liběchov; SJB, Collection of first author, ZFMK, Alexander Koenig Research Museum, Bonn; ZRC, Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore.

All measurements follow Kottelat (1990) and were made point-to-point with a pair of dial calipers to the nearest 0.1 mm. Head length (HL) was measured as lateral head length from the tip of the snout to the posterior most point of opercle. Terminology of neurocranial bones, epiphysial bar and fontanelles follows Sawada (1982) modified according to Conway & Mayden (2008); and nomenclature of mouth and lamina circularis structures is adopted from Rendahl (1944). Osteological characters were taken from three cleared and stained specimens prepared following Taylor & Van Dyke (1985). Length of metapterygoid-quadrate fenestra is the maximum distance along the axis passing through the centres of metapterygoid and quadrate and was measured using an ocular micrometer. All drawings were prepared with the aid of a camera lucida on an Olympus SZX7 microscope.

The relevant information for the genera *Bibarba*, *Paralepidocephalus* and *Protocobitis* were obtained from Chen & Chen (2007), Li (2004), Yang et al (1994) and Zhu et al. (2008).

Microcobitis, new genus

Type species. *Cobitis misgurnoides* Rendahl, 1944.

Diagnosis. Within the family Cobitidae, *Microcobitis* differs from the genera *Acanthopsoides*, *Bibarba*, *Canthophrys*, *Cobitis*, *Enobarbus*, *Iksookimia*, *Kichulchoia*, *Lepidocephalichthys*, *Lepidocephalus*, *Neoecirrhichthys*, *Niwaella*, *Paralepidocephalus*, *Pangio*, *Protocobitis* and *Sabanejewia* by having the lower lip extended into four barbel-like lobes (labial barbels) (Fig. 2) (vs. not extended or extended into two lobes). Four labial barbels are found in all species of the genera *Misgurnus*, *Koreocobitis* and *Paramisgurnus* as well as in one species each of *Kottelatlimia* (*K. katik*) and *Acantopsis* (*A. sp.*). The remaining species of *Kotte-*

latlimia and *Acantopsis* have two labial barbels. *Microcobitis* differs from *Misgurnus* and *Paramisgurnus* by having the groove of the erectile suborbital spine (lateral ethmoid) open (vs. covered by skin) and by its small body size (maximum 41 mm SL vs. 130-300 mm SL). It differs from *Koreocobitis*, *Misgurnus* and *Paramisgurnus* by the absence of an elongated lateral protuberance between level of dorsal and anal fin in both sexes (vs. presence in adult males). *Microcobitis* differs from *Acantopsis* and *Cobitis arenae* by having the suborbital spine under the eye (vs. in front of the eye). It further differs from *Acantopsis* by its shorter snout (29-40 % HL vs. 58-68 % HL) and by having a lamina circularis on the second pectoral-fin ray in adult males (vs. absence). *Microcobitis* differs from *Kottelatlimia* by having a smooth, semi-circle-shaped and horizontally oriented lamina circularis that represents a single projection from the proximal-most segment of the dorsal ramus (upper hemitrichium) of the second ray (Fig. 3) (vs. a serration along the posterior edge of middle segments of the first branched pectoral-fin ray) and by the absence of supraorbitals (vs. presence). Moreover, *Microcobitis* differs from all other genera of Cobitidae by the presence of a narrow cartilaginous epiphysial bar located between the medial processes of the frontals (vs. absence) and by the presence of a tear-drop shaped pre-epiphysial fontanelle located between the frontals and in front of the epiphysial bar (vs. absence) (Fig. 4).

Etymology. The name is derived from the Greek word 'micros', small, used as prefix here, and the generic name *Cobitis*, the type genus of Cobitidae, in which *Microcobitis* was originally placed due to the similar shape of the lamina circularis in males. Gender feminine.

Distribution. Presently reported from river basins in Central Vietnam. *Microcobitis* has also been reported to occur in some tributaries of the Mekong in Laos on the western slope of the Annamite range (M. Kottelat, pers. comm.).

Remarks. Most species of Cobitidae show a pronounced sexual dimorphism, especially modifications of the pectoral-fin rays in adult males, which are absent in juveniles and females. Usually, the second fin ray is thicker and longer than in females, but in *Cobitis*, *Iksookimia*, *Misgurnus* and *Paramisgurnus*, the males additionally bear a



Fig. 1. *Microcobitis misgurnoides*, male, about 25 mm SL; Vietnam: river Thua Luu; same locality as ZFMK 27528-27554.

plate- or finger-like extension (lamina circularis) at the base of the second pectoral-fin ray. Males of *Microcobitis* bear a lamina circularis that is very similar to that of some species of *Cobitis*, which led Rendahl (1944) and later authors to the conclusion that *M. misgurnoides* belongs to *Cobitis*. The shape of the lamina circularis in *Cobitis* is species-specific and includes triangular, axe-shaped and elongated types. The lamina circularis in *Microcobitis* resembles the axe-shape type, but differs from similar ones in *Cobitis* by its nearly oval shape (vs. axe-shaped) and a relatively small

distal part that is not connected to the fin ray (length of free distal part 4-5 times in length of connected part; vs. 0.8-2 times in *Cobitis*). Most species of *Cobitis* have three distinct longitudinal

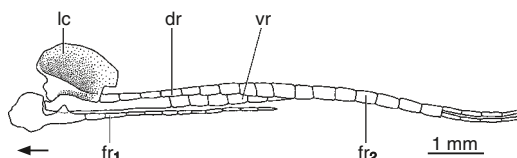


Fig. 3. *Microcobitis misgurnoides*, ZFMK 275228, 27.3 mm SL; dorsal view of first two pectoral-fin rays of left side. Abbreviations: **dr**, dorsal ramus (upper hemitrichium) of second ray; **fr₁**, first ray; **fr₂**, second ray; **lc**, lamina circularis; **vr**, ventral ramus (lower hemitrichium) of second ray.

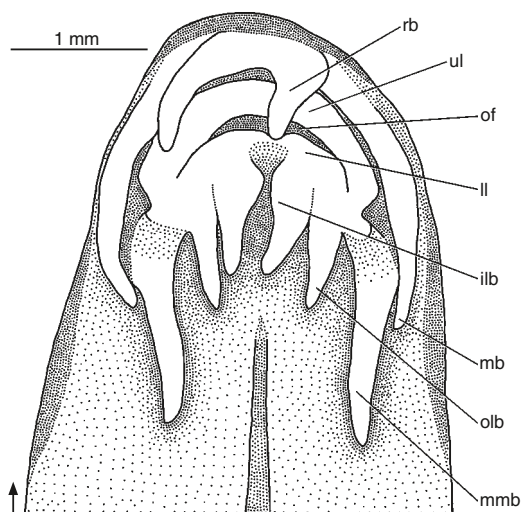


Fig. 2. *Microcobitis misgurnoides*, ZFMK 27531, 25.4 mm SL; ventral view of mouth. Abbreviations: **ilb**, inner labial barbel; **ll**, lower lip; **mb**, maxillary barbel; **mmb**, maxillo-mandibular barbel; **of**, oral fissure; **olb**, outer labial barbel; **rb**, rostral barbel; **ul**, upper lip.

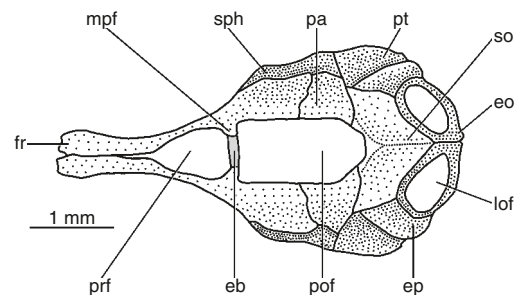


Fig. 4. *Microcobitis misgurnoides*, ZFMK 275229, 27.0 mm SL; dorsal view of neurocranium; ethmoid region omitted from image. Abbreviations: **eb**, epiphyssial bar; **eo**, exoccipital; **ep**, epitotic; **fr**, frontal; **lof**, lateral occipital foramen; **mpf**, medial process of frontal; **pa**, parietal; **pof**, post-epiphyssial fontanelle; **prf**, pre-epiphyssial fontanelle; **pt**, pterotic; **sph**, sphenotic; **so**, supra-occipital.

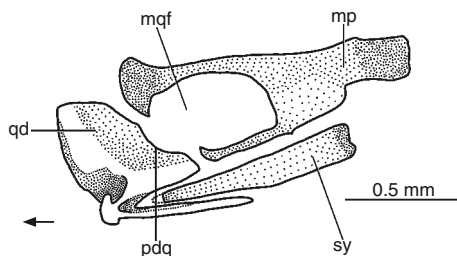


Fig. 5. *Microcobitis misgurnoides*, ZFMK 275228, 27.3 mm SL; shape of metapterygoid-quadrate-fenestra. Cartilage has been omitted from image. Abbreviations: **mp**, metapterygoid; **mqf**, metapterygoid-quadrate fenestra; **pdq**, postero-dorsal notch of quadrate; **qd**, quadrate; **sy**, symplectic.

rows of blotches; one along the dorsal midline, one along the lateral midline and one at about half distance between these two. The interspaces between these rows are irregularly dotted, marmorated or without pigmentation. In *Microcobitis*, the intermediate row of blotches is missing or very irregular, while the whole area between dorsal and lateral row of blotches is filled with irregular dots.

Microcobitis has a narrow cartilaginous epiphysial bar and a pre-epiphysial fontanelle. Both structures are present in other species of Cypriniformes (e.g. in Psilorhynchidae and Cyprinidae) (Britz & Kottelat, 2008; Conway & Mayden, 2008), but not in any other species of Cobitidae.

As revealed by a recent genetic study, *Microcobitis* is closely related to the genera *Cobitis*, *Iksookimia*, *Kichulchoia*, *Koreocobitis*, *Misgurnus*, *Nivaella*, *Paramisgurnus* and *Sabanejewia*. All these genera together form a monophyletic lineage within the family Cobitidae (Šlechtová et al., 2008). This monophyletic lineage includes all species with a lamina circularis in males, suggesting that this is the defining synapomorphy (although secondarily reduced in some species). Within this lineage, *M. misgurnoides* differs from all species of the other genera by reaching a maximum size of 41 mm SL (vs. ranging from 60 to 300 mm SL in the other included species), by having 35-36 vertebrae (vs. 40-52), a small metapterygoid-quadrate-fenestra (maximum length up to 50 % of length of metapterygoid vs. metapterygoid-quadrate-fenestra either absent or maximum length more than 60 % of length of metapterygoid) (Fig. 5), by having a shallow postero-dorsal notch of quadrate (length not more than half the height vs. deep, as long as high or longer) and by having

usually five, rarely four hypurals (vs. three or four hypurals). Interestingly, *Microcobitis* shares these five character states with one or more species in the genera *Kottelatlimia*, *Lepidocephalichthys* and *Pangio*, which are phylogenetically not closely related, suggesting a parallel evolution in several characters.

Material examined. *Cobitis misgurnoides*: ZFMK 27558-27578, 21, 22.5-28.0 mm SL; Vietnam: Thua Thien Hue Prov.: unnamed stream 1.5 km west of Thua Luu. – ZFMK 27584-27597, 14, 21.9-26.5 mm SL; Vietnam: Quang Tri Prov.: stream Bau Dung. – ZFMK 27598, 1, 32.0 mm SL; Vietnam: Quang Binh Prov.: stream running to river Giang. – ZFMK 27528-27554, 29, 23.8-34.4 mm SL; ZFMK 41774-41776, 3 (cleared & stained), 30.4-32.2 mm SL; Vietnam: Thua Thien Hue Prov.: river Thua Luu.

Comparative material. *Acanthopsoides delphax*: IAPG uncat., 1; Thailand: Chiang Mai Prov.: Nam Mae Chaem. *A. gracilentus*: IAPG uncat., 3; Thailand: Phayao Prov.: tributary of Nam Mae Ing. *A. hapalius*: IAPG uncat., 10; Thailand: Ubon Ratchathani Prov.: River Huai Chaera Mae. *A. robertsi*: IAPG uncat., 1; Malaysia: Sarawak Prov.: River Noren. – IAPG uncat., 1; Malaysia: Sarawak Prov.: River Sebako.

Acantopsis sp.: IAPG uncat., 1; Thailand: Ubon Ratchanthani Prov.: River Huai Yang. *A. sp.*: IAPG uncat., 2; ornamental fish trade.

Canthophrys gongota: IAPG A0175, 1; ornamental fish trade. – IAPG A0497-0499, 3; Bangladesh: Dhaka Prov.: fish market in Sutabala.

Cobitis arenae: IAPG A3379-3383, 5; Vietnam: Quang Nam Prov.: River Vinh Dien. *C. bilineata*: IAPG uncat., 2; Italy: Trient Prov.: Lago di Ledro. – SJB 2529-2531, 3; Italy: Lombardy Prov.: Lake Garda. *C. bilseli*: IAPG uncat., 2; Turkey: Konya Prov.: Lake Beysehir. *C. calderoni*: BMNH 1986.7.772-78, 7; Spain: Castilla y Leon Prov.: River Ucero. *C. dalmatina*: IAPG uncat., 2; Croatia: Dalmatia Prov.: River Cetina. *C. elazigensis*: IAPG uncat., 2; Turkey: Malatya Prov.: River Muhrat Nehri. *C. elongata*: IAPG uncat., 7; Bulgaria: Pleven Prov.: River Vit. *C. hangkugensis*: IAPG uncat., 2; South Korea: Jeon La Nam Do Prov.: River Jin Am Gan. *C. laoensis*: IAPG uncat., 4; Vietnam: Quang Nam Prov.: River Hoc Sen. *C. levantina*: IAPG uncat., 1; Turkey: Hatay Prov.: River Orontes. *C. lutheri*: IAPG uncat., 1; South Korea, Chung Cheong Bun Do Prov.: River Mi Ho Cheon. *C. ohridana*: IAPG uncat., 7; Montenegro: Podgorica Prov.: River Moraca. *C. pacifica*: 2; South Korea: Gang Won Do Prov.: River Su Yog Cheon. *C. paludica*: IAPG uncat., 2; Spain: Huelva Prov.: River Murtiga. *C. rara*: IAPG uncat., 1; PR China: ornamental fish trade. *C. strumicae*: IAPG uncat., 5; Bulgaria: Pleven Prov.: River Vit. *C. taenia*: IAPG uncat., 6; Germany: Schleswig-Holstein Prov.: Kleiner Plöner See. – IAPG uncat., 6; Germany: Niedersachsen Prov.: Stream Haaren. *C. vettonica*: SJB

5004-5005, 2; Spain: Caceres Prov.: River Arrago.

Enobarbus maculatus: BMNH 1868.10.27.36, 1; India: Tamil Nadu Prov.: surrounding of Chennai.

Iksookimia koreensis: IAPG uncat., 3; South Korea: Gyeong Gi Do Prov.: River Han Tan Gong. – IAPG uncat., 6; South Korea: Gyeong Gi Do Prov.: River Han Tan Gong. *I. longicorpa*: IAPG uncat., 2; South Korea: Gyeong Sang Nam Do Prov.: River Jin Geon Cheon. *I. pumila*: IAPG uncat., 2; South Korea: Chollabuk Do Prov.: River Paikchon. *I. yongdokensis*: IAPG uncat., 1; South Korea: Gyeong San Bun Do Prov.: River Chuk San Cheon.

Kichulchoia brevifasciata: IAPG uncat., 2; South Korea: Chollanam Do Prov.: Koup Stream.

Koreocobitis rotundicauda: IAPG uncat., 2; South Korea: Gang Won Do Prov.: River Jeon Cheon.

Kottelatlimia katik: ZRC 50400, 8; Malaysia: Johor Prov.: unnamed peat swamp. *K. pristes*: IAPG uncat., 5; Malaysia: Sarawak Prov.: unnamed forrest stream. – IAPG A 2700-2708, 9; ornamental fish trade.

Lepidocephalichthys berdmorei: IAPG uncat., 3; Thailand: Mae Hong Son Prov.: River Huai Mae Pang. – IAPG uncat., 5; Thailand: Mae Hong Son Prov.: River Nam Mae Sariang. *L. hasselti*: IAPG uncat., 3; Thailand: Phayao Prov.: River Mae Nam Yom. *L. irrorata*: IAPG A1006-111, 3; ornamental fish trade. *L. thermalis*: IAPG A280, 281, 398, 119, 4; ornamental fish trade.

Lepidocephalus macrochir: IAPG uncat., 3; Thailand: no details known.

Misgurnus anguillicaudatus: IAPG A2218-2219, 2; China: Guangxi Prov.: market in Pingxiang. *M. fossilis*: IAPG uncat., 1; Czech Republic: South Moravian Prov.: River Morava. – IAPG A0442-0456, 15; Germany: Schleswig-Holstein Prov.: River Eider. *Misgurnus* sp.: IAPG uncat., 1; South Korea: Gang Won Do Prov.: River Cheon Jin Cheon. – IAPG uncat., 2; South Korea: Gyeong Gi Do Prov.: River Han Tan Gong. – IAPG uncat., 4; South Korea: Gyeong San Bun Do Prov.: River Chuk San Cheon.

Niwaella delicata: BMNH 1998.8.21.3-8, 4; Japan: Gifu Prov.: River Kiso. – FRLM 29280-29281, 29778, 29796-29797, 5; Japan: Mie Prov.: River Miya. *N. multifasciata*: IAPG uncat., 2; South Korea: Gyeong Sang Nam Do Prov.: River Im Cheon Gang.

Pangio anguillaris: IAPG uncat., 20; Thailand: Ubon Ratchathani Prov.: River Huai Chaera Mae. *P. doriae*: IAPG uncat., 4; Malaysia: Sarawak Prov.: River Noren. – IAPG A0001-0002, 2; ornamental fish trade. *P. cuneovirgata*: IAPG A2709-2710, 2; Indonesia: no details known. *P. semicineta*: IAPG uncat., 5; Indonesia: Jambi Prov.: River Batanghari. – IAPG uncat., 12; ornamental fish trade. *P. oblonga*: IAPG uncat., 14; ornamental fish trade. *P. semicineta*: IAPG uncat., 13; Malaysia: Johor Prov.: unnamed forrest stream. *P. shelfordii*: IAPG uncat., 8; Malaysia: Sarawak Prov.: River Noren. – IAPG uncat., 1; Malaysia: Sarawak Prov.: River Sebako. – IAPG uncat., 2; Malaysia: Sarawak Prov.: River Engkabang. *P. sp.*: IAPG uncat., 3; Malaysia: Sarawak Prov.: River Noren.

Paramisgurnus dabryanus: SJB 4636-4637, 2; ornamental fish trade. – IAPG A409, 1; China: Hubei Prov.: market in Wuhan.

Sabanejewia balcanica: IAPG uncat., 5; Romania: Caras-Severin Prov.: River Nera. – IAPG uncat., 2; Bulgaria: Pleven Prov.: River Vit. *S. baltica*: IAPG uncat., 6; Ukraine: Lviv Prov.: River Dnjester. *S. vallachica*: IAPG uncat., 5; Romania: Prahova Prov.: River Ialomitza.

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