

Transfer of *Cobitis multifasciata* to the Genus *Niwaella* (Cobitidae)

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Abstract The external structure of the mouth, the structure of the pectoral fin, the position of the dorsal fin, and the number and composition of vertebrae of *Cobitis multifasciata* were compared with those of *Niwaella delicata*, *C. taenia taenia* and other related species. In these features, *C. multifasciata* was more similar to *Niwaella delicata* than to *C. taenia taenia* and its congeneric species. It was concluded that the genus of *C. multifasciata* should be transferred to *Niwaella* from *Cobitis*.

Wakiya and Mori (1929) described a member of the family Cobitidae as *Cobitis multifasciata*, which is entirely restricted to the Nagdong River of Korea. This species is characterized by having many dark brown cross bands on the sides, the dorsal fin situated on the posterior half of the body, fleshy continuous lips, and shorter head and barbels. Nalbant (1963) pointed out that *C. multifasciata* does not belong to *Cobitis* because of differences in the position of the dorsal and pelvic fins, and the type of pigmentation, and that its morphology is more similar to that of the genus *Acanthopthalmus* than to that of *Cobitis*. Then, Bănărescu and Nalbant (1968) recognized *C. multifasciata* as a second species of the genus *Niwaella*, although they gave no reasons for the transfer.

The present authors studied whether *C. multifasciata* belongs to the genus *Niwaella* or not, on the basis of a comparative examination of the external and internal characters among the present species, *Niwaella delicata*, *Cobitis taenia taenia*, and other related species.

Material and methods

Specimens examined for the present study are as follows.

Niwaella multifasciata (Wakiya and Mori), HUMZ 57225~57231, 7 specimens, 63.7~109.1 mm in total length, collected from the Nagdong River, Hayang, Gyeonsang Bug Do, Korea, on August 27, 1976; HUMZ 57301 and 57302, 2 specimens, 103.9 and 101.6 mm in total length respectively, the Nagdong River, Bonghwa, Gyeonsang Bug Do, Korea,

August 29, 1975; HUMZ 57329, 1 specimen, 75.5 mm in total length, the Nagdong River, Milyang, Gyeonsang Nam Do, Korea, August 29, 1976.

Niwaella delicata (Niwa), HUMZ 50425~50436, 12 specimens, 50.0~82.6 mm in total length, the Hida River, Masuda, Gifu Prefecture, Japan, September 6, 1974.

Cobitis taenia taenia Linnaeus, HUMZ 50447~50455, 9 specimens, 59.0~145.9 mm in total length, the Fukagawa River, Nagato,

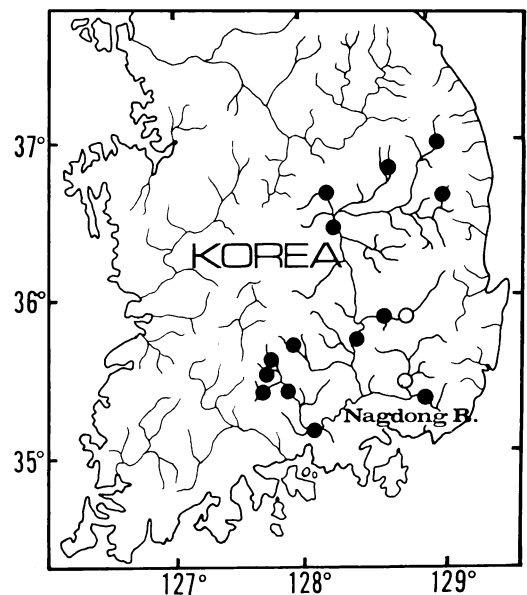


Fig. 1. Map showing collecting localities of *Niwaella multifasciata*. Solid circles, localities from Wakiya and Mori (1929), Uchida (1939), Dr. Ki Chul Choi (per. comm.); open circles, localities where we collected.

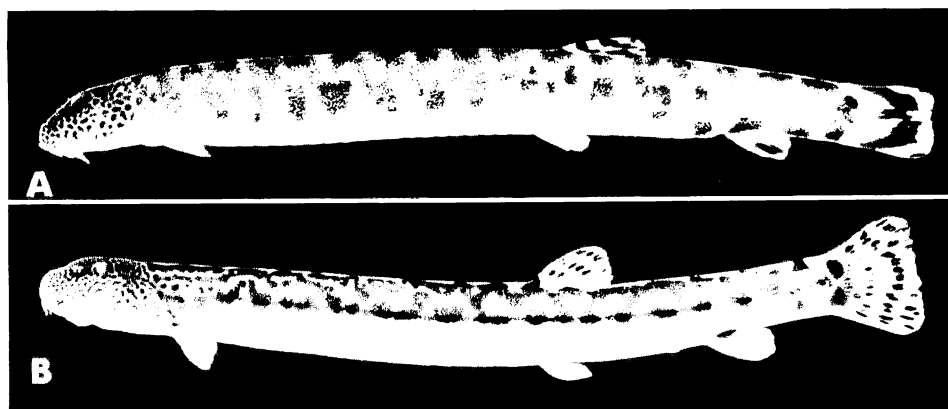


Fig. 2. A, *Niwaella multifasciata* (Wakiya and Mori), HUMZ 57225, 99.3 mm in SL; B, *Niwaella delicata* (Niwa), HUMZ 50427, 74.7 mm in SL.

Yamaguchi Prefecture, Japan, August 31, 1974; NSMT-P 13681~13685, 12 specimens, 65.8~111.6 mm in total length, the Bega River near Timisoara Banat, Rumania, August 11, 1968.

Cobitis taenia striata Okada and Ikeda, HUMZ 50694~50704, 10 specimens, 64.4~81.3 mm in total length, the Yumesaki River, Himeji, Hyogo Prefecture, Japan, September 2, 1974; HUMZ 50720~50722, 3 specimens, 72.3~84.1 mm in total length, the Hayashida River, Himeji, Hyogo Prefecture, Japan, September 4, 1974.

Cobitis biwae Jordan and Snyder, HUMZ 50675~50693, 18 specimens, 53.8~109.4 mm in total length, the Yumesaki River, Himeji, Hyogo Prefecture, Japan, September 2, 1974.

Cobitis takatsuensis Mizuno, HUMZ 52549~52559, 11 specimens, 53.0~63.8 mm in total length, the Takatsu River, Shimane Prefecture, Japan, September 10, 1970.

Cobitis koreensis Kim, HUMZ 57433~57444, 12 specimens, 68.9~97.5 mm in total length, the North Han River, Chungseong, Gangweon Do, Korea, August 29, 1976.

Cobitis rotundicaudata Wakiya and Mori, HUMZ 57224, 1 specimen, 132.4 mm in total length, the Nagdong River, Hayang, Gyeonsang Bug Do, Korea, August 27, 1976; HUMZ 57303 and 57304, 2 specimens, 100.5 and 88.9 mm in total length respectively, the Han River, Gangweon Do, Korea, August 10, 1974.

Abbreviations for repositories of examined

material: HUMZ for Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University; NSMT-P for Department of Zoology, National Science Museum, Tokyo.

The osteological observations were based on alizinin-stained specimens. The vertebral counts were taken from radiographs. The caudal vertebrae are defined as those having haemal spine and the urostyle vertebral is counted as one.

Observation and comparison of several features

Relationships of the present species to other material fishes belonging to genera *Niwaella* and *Cobitis* were studied on the basis of comparison of the following four features: the external structure of the mouth, the structure of the pectoral fin, the position of the dorsal fin, and the number and composition of vertebrae.

The external structure of the mouth (Fig. 3, A)

The mouth is small and inferior. Lips are fleshy with numerous transversal wrinkles on the surface. The upper lip is broad, continuous with the lower lip. The lower lip is slightly broader and thick, with or without less-developed mental lobes. The mouth has three pairs of barbels; one pair rostral, one pair maxillary, and one pair maxillo-mandibular. The barbels are relatively short and subequal. In the number of barbels, the present observation differs from that of

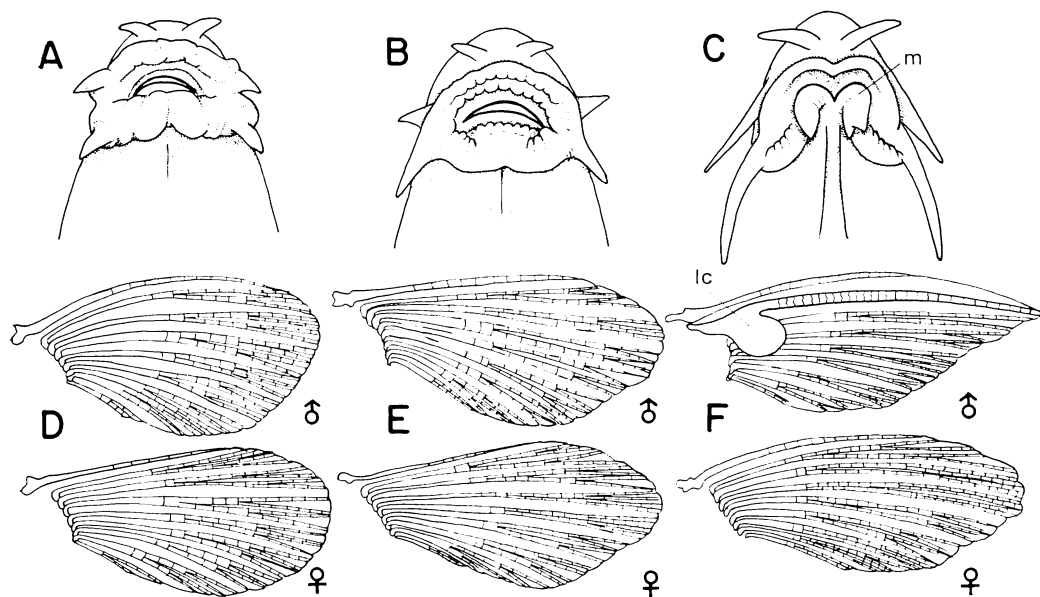


Fig. 3. The mouth and pectoral fin of three species of loaches. A and D, *Niwaella multifasciata*; B and E, *N. delicata*; C and F, *Cobitis taenia taenia*. m, mental lobe; lc, lamina circularis.

Wakiya and Mori (1929) and Uchida (1939). In their descriptions, the number of barbels was described as 4 pairs because the mental lobe was regarded as the barbel.

The present species resembles *N. delicata* in having fleshy continuous lips and short, subequal barbels, but differs from the latter by the presence of less-developed mental lobes (Figs. 3, A and B). On the other hand, it differs from *C. taenia taenia* and its congeneric species in all features except for the number of barbels (Fig. 3, C). The mouth, having fleshy continuous lips and short subequal barbels, is unlike any species of the subfamily Cobitinae.

The structure of the pectoral fin (Fig. 3, D)

The pectoral fin is relatively small and round in shape, and nearly identical in male and female. Except for the first ray, all fin rays branch and are similar to each other in shape. The lamina circularis is absent.

The present species closely resembles *N. delicata* and female of *C. taenia taenia* and its congeneric species in the shape of fins and the absence of lamina circularis (Figs. 3, D and F). It, however, is distinguished from male of *C. taenia taenia* as well as its congeneric species by the absence of a long and thick

unbranched second ray, the absence of lamina circularis and the shape of the fin (Figs. 3, D and F).

The pectoral fin, which has nor lamina circularis nor a long and thick unbranched second ray, is also found in fishes of the subgenera *Sabajenewia* and *Acanestrinia* of the genus *Cobitis* (Bănărescu and Nalbant, 1957; Băcescu, 1961; Nalbant, 1963). However, they differ from the present species in the external structure of the mouth, the position of the dorsal fin, and the geographical distributions (Bănărescu and Nalbant, 1957; Băcescu, 1961; Nalbant, 1963; Bănărescu, 1964). Therefore, fishes of these subgenera seem to be relatively unrelated to the present species. Nalbant and others (1970) interpreted the presence of lamina circularis as a primitive condition in the genus *Cobitis*. If this is correct, then pectoral fins without lamina circularis found in *Niwaella*, *Sabajenewia* and *Acanestrinia* may have been independently developed in each genus or subgenus.

The position of the dorsal fin (Figs. 2, A, and 4)

The dorsal fin is situated on the posterior half of the body. The proportion of predorsal distance to standard length ranges from 61.5

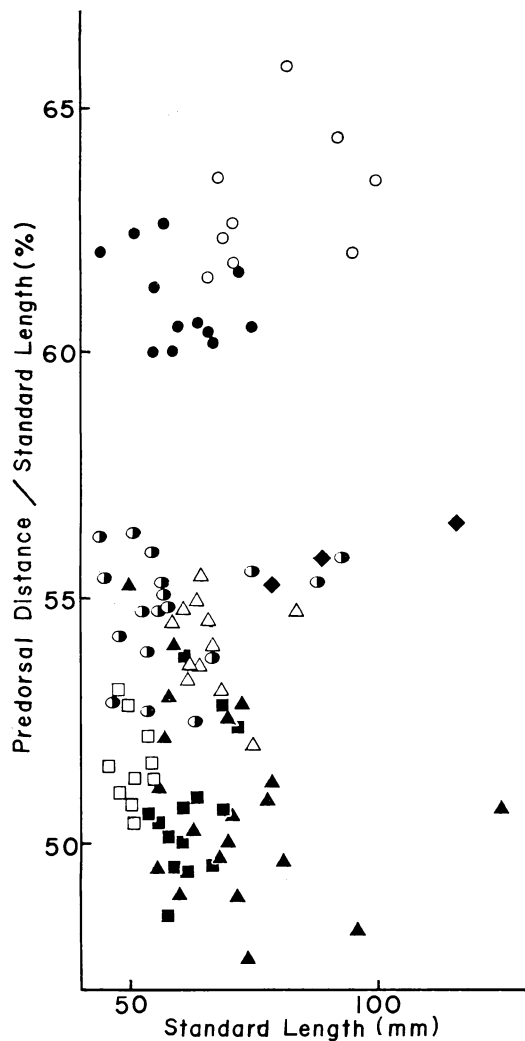


Fig. 4. Predorsal distance in relation to standard length in *Niwaella* and *Cobitis*. *Niwaella multifasciata* (○), *N. delicata* (●), *Cobitis taenia taenia* (▲), *C. taenia striata* (■), *C. biwae* (◐), *C. takatsuensis* (□), *C. koreensis* (△), *C. rotundicaudata* (◆).

% to 64.4%.

The present species closely resembles *N. delicata* in this proportion (Fig. 4). On the other hand, *C. taenia taenia* and its congeneric species differ from the present species in having the dorsal fin on the middle part of the body, as shown by their proportional range of 47.6% to 56.3% (Fig. 4).

Dorsal fins situated on the posterior half of body are also found in fishes of the genus *Acanthopthalmus* (Nalbant, 1963). It is thought, however, that they are unrelated to the present species because of differences in several osteological and external characters (Ramaswami, 1953; Filek, 1962; Nalbant, 1963).

The number and composition of vertebrae (Table 1, Figs. 5 and 6)

The vertebral number comprises 49 to 53 (mode 52) in total, 31 to 34 (mode 31) in abdominal, and 17 to 22 (mode 21) in caudal (Table 1, Fig. 5). Abdominal vertebrae display much higher counts than those of caudal ones (Fig. 6).

The present species resembles *N. delicata* in the total vertebral number and the number of abdominal and caudal vertebrae, although the former may be somewhat different from the latter in the mode of frequency distribution (Table 1, Fig. 5). On the other hand, the present species clearly differs from *C. taenia taenia* and its congeneric species in total and abdominal vertebral numbers (Table 1, Figs. 5 and 6).

Fishes of the subgenus *Acanestrinia* of the genus *Cobitis* resemble the present species in total vertebral number, although their abdominal and caudal numbers remain unknown (Băcescu, 1961; Laboratory of Ichthyology, Hupeh, 1976). However, they seem to be

Table 1. Frequency distributions of total vertebral number in *Niwaella* and *Cobitis*.

Species	Vertebral number													Total				
	38	39	40	41	42	43	44	45	46	47	48	49	50		51	52	53	
<i>Niwaella multifasciata</i>												1	2	5	2	10		
<i>N. delicata</i>												1	2	1	5	2	1	12
<i>Cobitis taenia taenia</i>		1	2	3	4	6	5											21
<i>C. taenia striata</i>		1	2	1	5	3	1											13
<i>C. biwae</i>				1	2	7	7	1										18
<i>C. takatsuensis</i>						1	9	1										11
<i>C. koreensis</i>						2		4	6									12
<i>C. rotundicaudata</i>									1	1	1							3

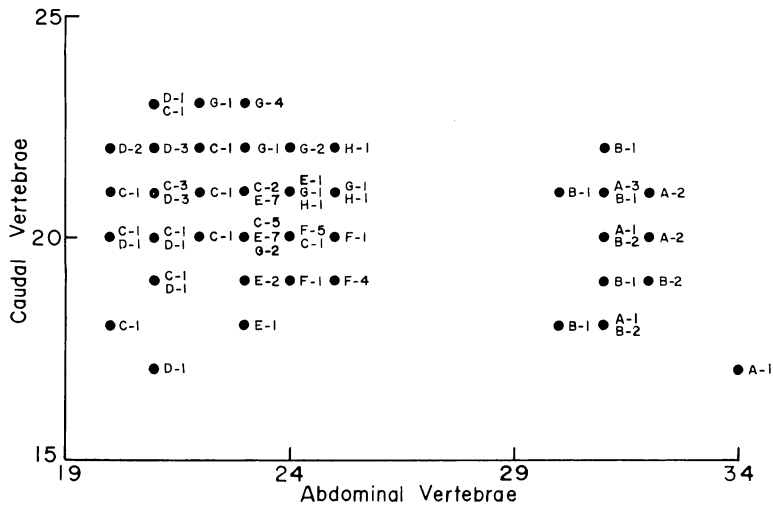


Fig. 5. Vertebral composition of 8 species-subspecies of loaches. Numerals indicate the number of specimens. A, *Niwaella multifasciata*; B, *N. delicata*; C, *Cobitis taenia taenia*; D, *C. taenia striata*; E, *C. biwae*; F, *C. takatsuensis*; G, *C. koreensis*; H, *C. rotundicaudata*.

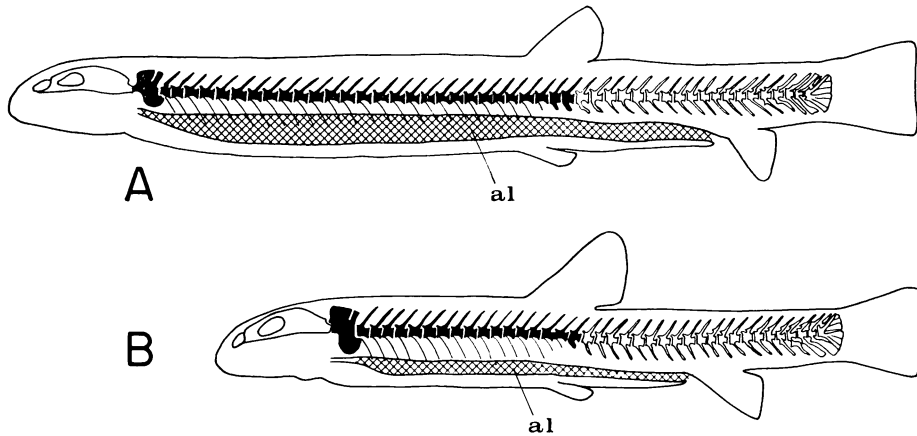


Fig. 6. Diagram showing relationship between the abdominal vertebrae and the caudal vertebrae. A, *Niwaella multifasciata*; B, *Cobitis taenia taenia*. al, alimentary canal. Vertebrae colored black indicate abdominal ones.

relatively unrelated to the present species because of differences in dorsal fin position and the external structure of the mouth (Nichols, 1943; Bănărescu and Nalbant, 1957; Băcescu, 1961).

The four features mentioned above suggest that the present species is more closely related to *N. delicata* than to any species of the genus *Cobitis*. Therefore, the authors conclude that the present species should be transferred from the genus *Cobitis* to the genus *Niwaella*.

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ヨコジマドジョウの属の移動

澤田 幸雄・金 益秀

ヨコジマドジョウは韓国の洛東江水系にのみ分布するドジョウ科の1種で、本種は Wakiya and Mori (1929) によってシマドジョウ属 (*Cobitis*) の1種として記載された。しかし Nalbant (1963) は本種がシマドジョウ属魚類よりも *Acanthopthalmus* 属魚類に類似することを指摘した。さらにその後 Bănărescu and Nalbant (1968) は、具体的な理由を与えることなく、本種をシマドジョウ属からアジメドジョウ属 (*Niwaella*) に移した。本種の分類学上の位置を決定するために、口部や胸鰭の形態、背鰭の位置および脊椎骨の数と構成について、本種をアジメドジョウ属およびシマドジョウ属魚類と比較検討した。その結果、これらの特徴においては、本種はアジメドジョウ属魚類にもっとも類似することが判明した。したがって本種はアジメドジョウ属に帰属されるべきである。

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