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Revision of the genus *Niwaella* in China (Pisces, Cobitidae), with description of two new species

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Revision of the genus *Niwaella* in China (Pisces, Cobitidae), with description of two new species

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(Accepted 23 September 2004)

Abstract

Loaches of the genus *Niwaella*, family Cobitidae, are distributed only in East Asia. At present only in Japan and South Korea have fishes of the genus *Niwaella* been found. Herein we revise the genus *Niwaella* in China. Son and He (2001) transferred the species *Cobitis laterimaculata* to the genus *Niwaella*, but their specimens were not *N. laterimaculata*, but a new species, *N. longibarba* sp. n., collected from Cao'ejiang River, Huangzezhen, Chengxian County, Zhejiang Province. The new species is distinguished from *N. laterimaculata* by its colour pattern of a row of slightly large, and long, scattered dark brown vertical bars on the dorsolateral surface, two or three striations on the caudal fin, and long barbels and undeveloped mental lobes. In this paper we also describe another new species, *N. xinjiangensis* sp. n., collected from Xinjiang River, Guangfeng County, Jiangxi Province, May 1990, with diagnostic colour pattern of 17–20 large and long, dark brown vertical bars on the dorsolateral surface, a dark stripe or rounded black spots along the lateral midline and some blotches below the lateral midline; it is a large-sized species, with shorter barbels, and longer caudal peduncle. Thus five species of the genus *Niwaella* are known, three are endemic to eastern China and two are endemic to either Japan or South Korea.

Keywords: China, Cobitidae, East Asia, loaches, new species, *Niwaella*, taxonomy

Introduction

Loaches of the genus *Niwaella* Nalbant, 1963, of the family Cobitidae are small loaches, inhabiting stony bottoms in clear running water in the upper reaches of rivers. Since Nalbant (1963, p 362–363) established the genus *Niwaella* based on the species of *Cobitis delicata* (Niwa, 1937), Sawada and Kim (1977) and Son and He (2001) subsequently transferred the species *Cobitis multifasciata* Wakiya and Mori, 1929 and *Cobitis laterimaculata* Yan and Zheng, 1984, respectively, to the genus *Niwaella*, on the basis of suborbital spine, pigmentation pattern, the position of the dorsal fin, the external structure of the mouth, lack of sexual dimorphism and secondary sexual characters, which were diagnostic of species of *Niwaella*. However, Son and He (2001) wrongly described the

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specimens collected from the Cao'ejiang River, Huangzezhen, Chengxian County, Zhejiang Province, as the species *Cobitis laterimaculata* (= *N. laterimaculata*). Therefore, there was no correctly described species of *Nivvaella* in China. The present paper revises the genus *Nivvaella* and describes two new species from eastern China.

The genus type species *Nivvaella delicata* (Figure 1A) is without individualized mental lobes, and the subdorsal scales are slightly oval with a large, almost central focal area. Large dark blotches occur on the dorsolateral surface, and a dark stripe runs along the lateral midline. It is distributed only in Japan (Nalbant 1963). *Nivvaella multifasciata* (Figure 1B) is an endemic South Korean species, distinguished by less-developed mental lobes, the vertebral number comprises 49–53, the proportion of predorsal distance to standard length ranges from 61.5% to 64.4% (Sawada and Kim 1977), and a row of slender and long, dark brown vertical bars on the dorsolateral surface. It is distributed only in Nagdong River.

The genus *Cobitis* is similar to *Nivvaella* in size and shape of the body, the colour pattern on the head, and also in the number and position of barbels, presence of suborbital spine and in the head lacking scales. However, the notable morphological features of the genus *Nivvaella* differentiating it from *Cobitis* are the small head, sucker-like mouth with relatively short, subequal barbels, suborbital spine relatively thick and curved, adipose crests developed, the position of the dorsal fin, no sexual dimorphism, and the second pectoral ray without an osseous process at the base in males, the pattern of pigmentation, and six branched rays in the dorsal fin.

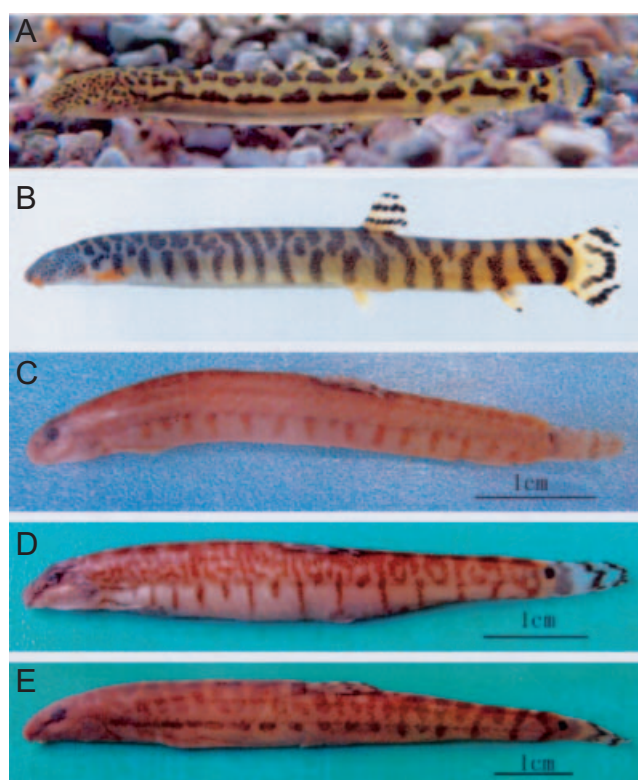


Figure 1. Loaches of the genus *Nivvaella*. (A) *N. delicata*; (B) *N. multifasciata*; (C) *N. laterimaculata*; (D) *N. longibarba* sp. n.; (E) *N. xinjiangensis* sp. n.

Material and methods

The study was based on the specimens preserved in 10% formalin, kept in the Freshwater Fishes Museum (FFM), Institute of Hydrobiology (IHB), Chinese Academy of Sciences (CAS), Wuhan, Hubei Province. Specimens of *Niwaella laterimaculata* were collected in Yongjiang River, and had previously been identified as *Cobitis laterimaculata* Yan and Zheng, 1984. *Niwaella longibarba* sp. n. was collected in Cao'ejiang River, and *Niwaella xinjiangensis* sp. n. was collected in Xinjiang River.

Eleven morphometric variables were measured according to Hubbs and Lagler (1964) (Table I), with the exception of PVL. All measurements are in mm. Specimens were sexed by examination of gonad. Scales were prepared from the subdorsal region between the dorsal fin and lateral line. Micrographs were taken using a Leica GZ6 with Leica CD180 Stereo Microscope System.

Systematic account

Family COBITIDAE Subfamily COBITINAE Genus *Niwaella* Nalbant, 1963

Niwaella Nalbant 1963, p 362–363 (type species: *Cobitis delicata* Niwa, 1937) (Gifu Prefecture, Kuzuri Honsu, Japan).

Table I. Statistical parameters for the morphometric characters of three Chinese species of *Niwaella* (mm).

Variable	<i>N. laterimaculata</i>			<i>N. longibarba</i> sp. n.			<i>N. xinjiangensis</i> sp. n.		
	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD
SL	42.5–46.9	44.4	1.86	43.2–65.5	53.2	5.60	68.2–52.8	59.8	4.85
BD	5.3–6.9	6.02	0.52	5.5–8.5	6.74	1.82	7.4–10.1	8.8	0.83
SL/BD	6.7–8.3	7.4	0.47	6.3–9.2	7.7	0.42	5.8–7.7	6.7	0.54
HL	6.8–8.3	7.2	0.59	6.9–10.9	8.5	1.10	9.1–11.4	10.3	0.83
SL/HL	5.6–6.4	6.1	0.24	5.3–6.2	5.9	0.21	5.2–6.1	5.7	0.27
CPL	4.3–5.8	4.9	0.49	5.9–8.2	6.7	0.61	6.9–10.5	8.3	0.52
SL/CPL	7.3–10.7	9.0	1.00	6.7–9.1	7.9	0.80	6.4–8.0	7.2	0.52
CPD	4.1–5.1	4.5	0.41	4.1–5.5	5.0	0.39	5.3–6.2	5.7	0.35
SL/CPD	9.0–10.6	9.8	0.60	9.5–11.8	10.6	0.65	9.1–12.2	10.3	0.58
PVL	15.5–18.2	16.8	0.81	14.1–25.8	18.9	3.20	18.9–24.8	21.2	1.92
SL/PVL	2.5–2.7	2.6	0.09	2.4–2.9	2.6	0.09	2.7–3.0	2.8	0.07
SL2	3.0–3.5	3.2	0.17	2.5–4.4	3.5	0.48	3.5–5.6	4.6	0.52
HL/SL2	2.1–2.4	2.2	0.06	2.2–2.8	2.4	0.27	1.9–2.7	2.2	0.17
ED	0.9–1.1	1.0	0.12	1.0–2.0	1.4	0.40	1.2–1.6	1.4	0.14
HL/ED	5.3–7.0	6.3	0.66	5.3–7.1	5.9	0.61	6.7–8.5	7.4	0.56
IW	1.0–1.3	1.1	0.10	1.1–1.7	1.4	0.18	1.3–1.9	1.6	0.16
HL/IW	6.2–8.3	6.8	0.62	5.6–7.5	6.3	0.54	5.1–7.2	6.3	0.56
CPD/CPL	0.9–1.2	1.1	0.11	1.1–1.8	1.3	0.13	1.2–1.7	1.4	0.12

BD, body depth; CPD, caudal peduncle depth; CPL, caudal peduncle length; ED, eye diameter; IW, interorbital width; PVL, pectoral fin and ventral fin distance; HL, head length; SD, standard deviation; SL, standard length; SL2, snout length; TL, total length.

Brief description

Body small, elongated and laterally compressed. Abdomen rounded, dorsal surface and abdomen almost parallel. Head small, slightly compressed, snout bluntly rounded. Anterior nasal tube slightly distant from the posterior orifice, and near eyes. Mouth small, inferior, on surface of lips with numerous transverse wrinkles, the upper lip broad, continuous with the lower lip; whole aspect of mouth resembles a sucker. Six barbels, of which two are rostral, two maxillary and two maxillo-mandibular; barbels short and subequal. Eyes located on upper part and middle of head. Eye interorbital width equal to or slightly longer than eye diameter. Suborbital spine relatively thick and curved, reaching the inferior of the middle of eye. Anus close to anal fin. Caudal peduncle truncated, adipose crests developed. Tip of caudal fin slightly emarginate.

Lateral line short, not exceeding length of pectorals. No scales on head and sides of head. Body scales are small, sometimes hardly visible, round, or oval, with a large, almost central or eccentric (being closer to the base) focal area. There are 23–26 radial grooves and few supplementary radial grooves. The radial grooves in the front and on the side of scale are broad and sparse, while at the base of scale are close spaced. The circular striae are relatively scarce.

Dorsal fin situated on second half of body, anal fin situated on second half of the space between pelvic fin and tail fin. Pelvic fin approximately on the same line, or slightly behind of, insertion with dorsal fin. Six branched rays in the dorsal fin, five branched rays in the anal fin.

Body pale yellowish. Head sprinkled with many black spots, a black stripe visible from nape through eye to first barbel insertion. Dorsal body colour pattern has angular black stripes. Small scattered dark speckles or large dark blotches on the dorsolateral surface, and a dark stripe or rounded black spots along the lateral midline, or some blotches below the lateral midline. There are three or four striations on the caudal fin and dorsal fin, and a conspicuous dark spot or thick dark striation on upper part of caudal base.

No sexual dimorphism; the second pectoral ray has no osseous process at the base in males.

Remarks

This genus comprises few species in the subfamily Cobitinae. The characters typical of the group are: (1) sucker-like mouth with short and subequal barbels; (2) on surface of lips numerous transverse wrinkles; (3) suborbital spine relatively thick and curved, opposite the caudal processes; (4) dorsal fin situated on second half of body; (5) a strong carina between dorsal and caudal fins; (6) six branched rays in the dorsal fin; (7) five branched rays in the anal fin; (8) scales small, round or oval, with a large focal area, 23–26 radial grooves and few supplementary radial grooves, circular striae scarce; (9) no sexual dimorphism and the second pectoral ray without an osseous process at the base in males.

Distribution and habitat

At present *Nivvaella* are known in China, Japan and South Korea. In China three species are known, in Xinjiang River, Cao'ejiang River and Yongjiang River, respectively. Those loaches usually inhabit the upper parts of rivers and streams with stony bottoms, especially clear forming rapids.

Key to the species of *Niwaella*

- 1 A dark stripe or a row of transverse black bars along the lateral midline, and/or some blotches below the lateral midline (Japan) *N. delicata*
- A row of slender and long dark vertical bars along the lateral midline, and/or a short dark stripe beyond the pectoral fin 2
- 2 Large and long dark brown vertical bars on the dorsolateral surface; a slightly large and long vertical bar at the base of the caudal fin (South Korea) *N. multifasciata*
- Moderately large vertical bars or small scattered dark speckles on the dorsolateral surface; a dark spot at the base of the caudal fin 3
- 3 Caudal peduncle truncated, length of caudal peduncle 7.3–10.7 of standard length; 16–20 dark blotches below the lateral midline 4
- Caudal peduncle long, length of caudal peduncle 6.4–8.0 of standard length; a dark stripe along the lateral midline beyond the dorsal fin, and then gradually below the lateral midline (Xinjiang River, China). *N. xinjiangensis* sp. n.
- 4 Barbels shorter than eye diameter; developed mental lobes, two lobes equal, tip pointed; small scattered dark speckles on the dorsolateral surface (Yongjiang River, China) *N. laterimaculata*
- Barbels thin and slightly shorter to eye diameter; undeveloped mental lobes, upper lobe shorter than lower, tip blunt; large dark blotches on the dorsolateral surface (Cao'ejiang River, China). *N. longibarba* sp. n.

***Niwaella laterimaculata* (Yan and Zheng, 1984)**
(Figures 1C, 2A, 3A, 4A)

Cobitis laterimaculata Yan and Zheng 1984, p 82–84 (Xikou, Fenfhua County, Zhejiang Province); Zheng 1991, p 145–146 (Jinhua City; Xikou, Longquan, Fenfhua County).

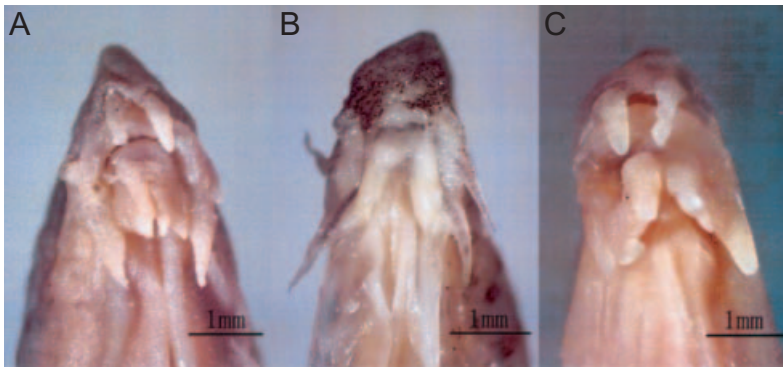


Figure 2. Ventral view of the mouth with barbels and mental lobes. (A) *N. laterimaculata*; (B) *N. longibarba* sp. n.; (C) *N. xinjiangensis* sp. n.

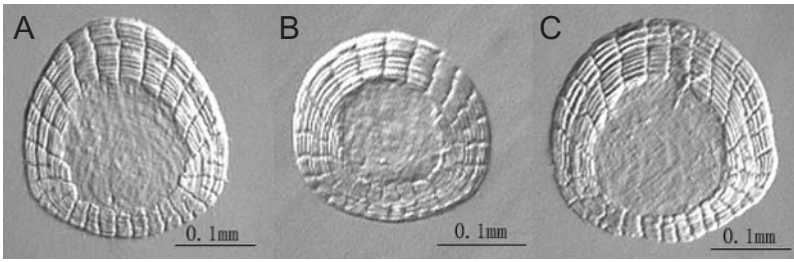


Figure 3. Subdorsal scales. (A) *N. laterimaculata*; (B) *N. longibarba* sp. n.; (C) *N. xinjiangensis* sp. n.

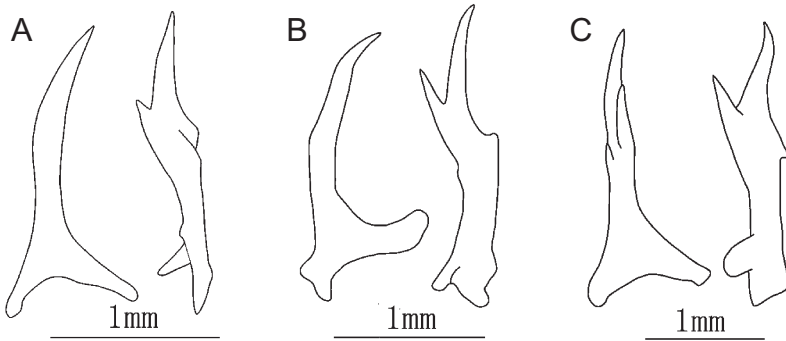


Figure 4. Suborbital spine. (A) *N. laterimaculata*; (B) *N. longibarba* sp. n.; (C) *N. xinjiangensis* sp. n.

Material examined

Five paratype specimens, nos 827009, 827012, 827017–8, 827020, 57.2–50.1 mm TL, 50.3–42.7 mm SL, collected from the Yongjiang River at Xikou, 29°38.6'N, 121°23.4'E, Fenghua County, Zhejiang Province, China, July 1982. Kept in IHB, CAS, Wuhan, Hubei Province. Nine specimens nos 743762–3, 743765, 743771–2, 743775–6, 743780, 48.6–56.1 mm TL, 42.5–46.9 mm SL, collected from the same locality as the type specimens, 1974.

Brief description

Vertebra 4 + 38–42. Morphometric characters are given in Table I. Small-sized species. Caudal peduncle shorter than other species of the genus *Nivaeella*, depth of caudal peduncle 0.9–1.2 (1.1) of its length. Small head, length of head 5.6–6.4 (6.1) of standard length. Well-developed mental lobes, lip slightly blunt. Six barbels, of which two rostral, two maxillary and two maxillo-mandibular. Barbels shorter than eye diameter (Figure 2A).

Dorsal fin slightly long, situated halfway between nape and the base of caudal fin. Pelvic fin is approximately on the same line with dorsal fin. Anal fin short and small, situated one-third of distance between pelvic fin and tail fin. Caudal peduncle truncated, adipose crests developed. Lateral line short, exceeding length of pectorals.

No scales on the head and sides of head. On the body, the scales are small, round or oval, with a large eccentric focal area (being closer to the base), and 23–26 radial grooves, few supplementary radial grooves. The radial grooves on the front and on the side of the scale are broad and sparse, while at the base of the scale are closely spaced. The circular striae are relatively scarce (Figure 3A). Suborbital spine curved opposite the caudal processes (Figure 4A).

Pigmentation pattern

Body pale yellowish. Head sprinkled with many black spots, a black stripe visible from nape through eye to first barbel insertion. Dorsal body colour pattern of 17–20 angular black stripes, sometimes the stripes are small and striated. Small scattered dark speckles on the dorsolateral surface and 16–20 blotches below the lateral midline. There are four or five striations on the caudal fin and dorsal fin, and a conspicuous dark spot on upper part of the caudal base.

Sexual dimorphism

Not evident.

Distribution

Previously the species was known only in Yongjiang River.

***Niwaella longibarba* sp. n.** (Figures 1D, 2B, 3B, 4B, 5)

Niwaella laterimaculata: Son and He (not Yan and Zheng) 2001, p 1–5 (Huangzhezhen, Shengxian County, Zhejiang Province).

Material examined

Holotype: no. 9607011, female, 57.7 mm TL, 48.7 mm SL. Type locality: The Cao'ejiang River, Huangzhezhen, 29°36.3'N, 120°54.4'E, Chengxian County, Zhejiang Province, 10 July 1996.

Paratypes: nos 9607012–55, male and female, 51.2–75.6 mm TL, 43.1–65.5 mm SL, 34 specimens from type locality.

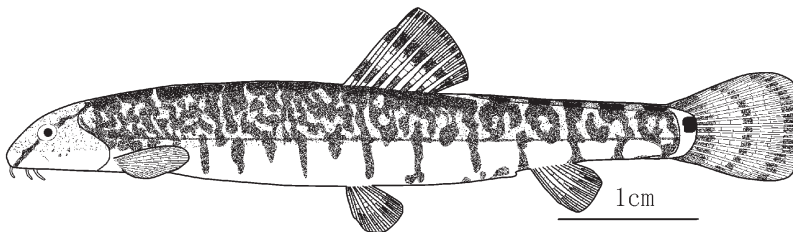


Figure 5. *Niwaella longibarba* sp. n., holotype, female, no. 9607011.

Other material examined. Nos 471035, 471045–46, male and female, 53.4–46.1 mm TL, 46.7–39.1 mm ST, three specimens from the Cao'ejiang River, Chengxian County, 33°44.9'N, 105°46.0'E, Zhejiang Province, 1947.

All specimens kept in FFM, IHB, CAS, Wuhan, Hubei Province.

Etymology

The specific name *longibarba* is Latin for “with long barbel”, and refers to the long maxillo-mandibular barbels.

Description

D. iii-6; A. iii-5; V. i-6; P. i-7. Vertebral 4 + 41–42. Morphometric characters are given in Table I.

Body elongated and laterally compressed. Dorsal surface and abdomen almost parallel. Head small, slightly compressed, snout bluntly rounded, length longer than that of space between eye and nape. Mouth small, inferior, with undeveloped mental lobes. Barbels slender, shorter than or slightly equal to eye diameter (Figure 2B). Eye interorbital width equal to or longer than diameter.

Dorsal fin moderately long, situated on front half of the space between nape and caudal fin, length shorter than that of head. Dorsal fin short and with tip rounded, the second branched ray the longest, not reaching one-quarter of the distance between pectoral fin and pelvic fin. Pelvic fin short and small, and approximately on the same line with the dorsal fin, reaching one-third of the distance between pelvic fin and anal fin. Anal fin short and small, situated on posterior half of the space between pelvic fin and caudal fin, tip blunt. Caudal fin long, tip emarginate. Anus close to anal fin. Caudal peduncle long, adipose crests developed. Lateral line short, exceeding length of pectorals.

No scales on the head and sides of head. Body scales are small, round, with a large, almost central focal area, 24–25 radial grooves and few supplementary radial grooves. The radial grooves in the front and on the side of scale are broad and sparse, at the base of scale closely spaced. The circular striae relatively scarce (Figure 3B). Suborbital spine curved opposite the caudal processes, and the mediorostral process is more developed in this species than others (Figure 4B).

Pigmentation pattern

Body pale yellowish. Head sprinkled with many black spots, a black stripe was visible from nape through eye to first barbel insertion. Dorsal body colour pattern 14–16 angular black stripes, moderately large, long diffuse dark vertical bar on the dorsolateral surface and 16–19 blotches below the lateral midline. There are two or three striations on the caudal fin and dorsal fin, and a conspicuous dark spot on upper part of the caudal base.

Sexual dimorphism

Not evident.

Remarks

This new species is similar to *N. laterimaculata* in appearance, but differs from the latter in its colour pattern of a row of moderately large and long scattered dark brown vertical bars

Table II. Comparison of diagnostic characters of three Chinese species of *Niwaella*.

Characters	<i>N. laterimaculata</i>	<i>N. longibarba</i> sp. n.	<i>N. xinjiangensis</i> sp. n.
Caudal peduncle	Short, the ratio of depth to length is 0.9–1.2 (1.1)	Shorter, the ratio of depth to length is 1.1–1.8 (1.4)	Long, the ratio of depth to length is 1.2–1.7 (1.4)
Mental lobes	Well developed	Undeveloped	Developed
Maxillo-mandibular length	Shorter than eye diameter	Shorter or almost equal to eye diameter	Shorter than eye diameter
Origin of dorsal fin	Midway between nape and caudal fin	Nearer nape than caudal fin	Nearer nape than caudal fin
Scales	Round, or oval, with a large, eccentric focal area, being closer to the base, 23–26 radial grooves	Round, with a large, almost central focal area, 24–25 radial grooves	Round or square, with a large eccentric focal area, being closer to the base, 24–25 radial grooves, Slightly curved
Suborbital spine	Curved	More curved	17–20 large and long dark brown vertical bars on the dorsolateral surface and a dark stripe along the lateral midline beyond the dorsal fin, and then gradually below the lateral midline
Pigmentation pattern	Small scattered dark speckles on the dorsolateral surface and 16–20 blotches below the lateral midline	Moderately large and long scattered dark vertical bar on the dorsolateral surface and 16–19 blotches below the lateral midline	

on the dorsolateral surface, versus small and densely scattered dark speckles on the dorsolateral surface, and by its two or three striations on the caudal fin, versus four or five. It is also distinguished from *N. laterimaculata* by its long barbels and undeveloped mental lobes, versus shorter barbels and developed mental lobes (Table II).

Distribution

Previously the species was known only in the Cao'ejiang River. Son and He (2001) misspelled the Cao'ejiang as the Caozejiang, and Chengxian County as Shengxian County.

Niwaella xinjiangensis sp. n.
(Figures 1E, 2C, 3C, 4C, 6)

Material examined

Holotype: no. 90V1610, female, 67.4 mm TL, 58.2 mm SL. Type locality: The Xinjiang River, the main upper stream of the Boyanghu Lake (belongs to the Yangtze River System), Guangfeng County, 28°26.1'N, 119°10.2'E, Jiangxi Province, China, May 1990.

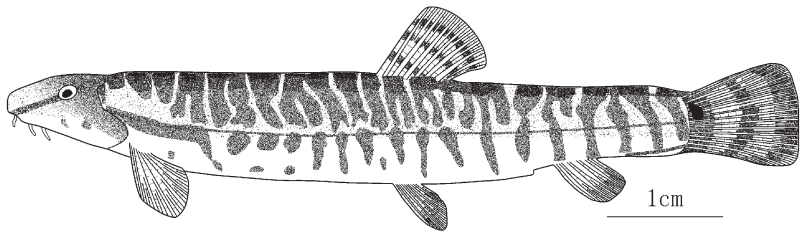


Figure 6. *Niwaella xinjiangensis* sp. n., holotype, female, no. 90V1610.

Paratypes: nos 90IV1093–8, male and female, 77.3–61.7 mm TL, 66.1–52.8 mm SL, six specimens, from type locality. nos 90V1606–9, 90V1611, 90V1613–5, male and female, 78.3–64.0 mm TL, 67.3–55.0 mm SL, eight specimens collected from the Xinjiang Stream, Shangrao City, 28°28.3'N, 118°1'E, Jiangxi Province.

All specimens kept in FFM, IHB, CAS, Wuhan, Hubei Province.

Etymology

This species is known only from Xinjiang River so far, and its name is Latin for “of Xinjiang”.

Description

D. iv-6; A. iii-5; V. i-6; P. i-7. Vertebral 4 + 40–43. Morphometric characters are given in Table I. Caudal peduncle longer than other species of the genus *Nivvaella*, depth of caudal peduncle 1.2–1.7 (1.4) in its length.

Body moderately small, elongated and laterally compressed. Dorsal surface and abdomen almost parallel. Small head, slightly compressed, snout bluntly rounded, its length longer than that of space between eye and nape. Mouth small, inferior, with developed mental lobes. Barbels thick, shorter than eye diameter (Figure 2C). Eye interorbital width equal to or longer than diameter. Lateral line short, exceeding length of pectorals.

Dorsal fin is moderately long, and the tip blunt, situated in front half of the space between nape and caudal fin. Pelvic fin short and small, and approximately on the same line with dorsal fin, exceeding one-third of the distance between pelvic fin and anal fin. Anal fin was short and small, situated in second half of the space between pelvic fin and caudal fin, and with tip blunt. Caudal peduncle long, tip emarginate, adipose crests developed.

Head naked, body scales are small, round or near square, with a large eccentric focal area (being closer to the base), and 24–25 radial grooves, with few supplementary radial grooves. The radial grooves in the front and on the side of scale are broad and sparse, at the base of scale closely spaced (Figure 3C). Suborbital spine slightly curved (Figure 4C).

Pigmentation pattern

Body pale yellowish. Head sprinkled with many black spots, a black stripe visible from nape through eye to first barbel insertion. Dorsal body colour pattern of angular black stripes, 17–20 large, long, dark brown vertical bars on the dorsolateral surface and a dark stripe along the lateral midline beyond the dorsal fin, and then gradually below the lateral midline. There are three or five striations on the caudal fin and dorsal fin, and a conspicuous dark spot on the upper part of the caudal base.

Sexual dimorphism

Not evident.

Remarks

This new species is easily distinguished from other *Nivvaella* species by its colour pattern of 17–20 large, long, dark brown vertical bars on the dorsolateral surface, a dark stripe or rounded black spots along the lateral midline and some blotches below the lateral midline; large-sized species, shorter barbels; longer caudal peduncle (Table II).

Distribution

Previously the species was known only in Xinjiang River.

Discussion

Prior to this study, there was no correctly described species of *Niwaella* from China. Yan and Zheng (1984) described *N. laterimaculata* as a species of *Cobitis* without consideration of sexual dimorphism, colour pattern, suborbital spine and carina, and the six branched rays in the dorsal fin, which are differentiating characters between *Cobitis* and *Niwaella*. Son and He (2001) transferred the species *Cobitis laterimaculata* to the genus *Niwaella*, but they did not examine type specimens of *N. laterimaculata*, and wrongly described specimens collected from the Cao'ejiang River, as *N. laterimaculata*. However, *N. laterimaculata* is only distributed in the Yongjiang River, and is distinguished from *N. longibarba* by its colour pattern of small and densely scattered dark speckles on the dorsolateral surface, versus a row of moderately large, long, scattered dark brown vertical bars on the dorsolateral surface, and by its four or five striations on the caudal fin, versus two or three. It is also distinguished from *N. longibarba* by its shorter barbels and developed mental lobes, versus long barbels and undeveloped mental lobes.

The main distinguishing characteristics between the species studied are summarized in Table II. Morphological analysis revealed the three species should be divided into three different groups at species level. Each species can be distinguished by a combination of morphological characters.

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References

- Hubbs CL, Lagler KF. 1964. Fishes of the Great Lakes region Ann Arbor: University of Michigan Press. 213 p.
- Nalbant TT. 1963. A study of the genera of Botiinae and Cobtinae (Pisces, Ostariophysi, Cobitidae). Travaux du Museum d'Histoire Naturelle "Grigore Antipa" 4:343–379.
- Niwa H. 1937. A new species of Cobitidae from Japan (*Cobitis delicata*). Zoological Magazine (Japan: Tokyo) 49(2):71–74.
- Sawada Y, Kim IS. 1977. Transfer of *Cobitis multifasciata* to the genus *Niwaella* (Cobitidae). Japanese Journal of Ichthyology 24(3):155–160.
- Son YM, He SP. 2001. Transfer of *Cobitis laterimaculata* to the genus *Niwaella* (Cobitidae). Korean Journal of Ichthyology 13(1):1–5.
- Wakiya Y, Mori T. 1929. On two new loaches of the genus *Cobitis* from Korea. Journal of Chosen Natural History Society 9:31–33.
- Yan JP, Zheng ML. 1984. *Cobitis laterimaculata*, a new species of loaches (Pisces, Cobitidae). Acta Zoologica Sinica 30(1):82–84.
- Zheng ML. 1991. Cobitidae. In: Mao JR, editor. Fauna of Zhejiang: fresh water fishes Hangzhou: Zhejiang Science and Technology Publishing House. p 145–146.