

A New *Acheilognathine* fish *Acheilognathus koreensis*, (Pisces : Cyprinidae) from Korea

Ik Soo Kim and Chi Hong Kim

Dept. of Biology, Chonbuk National University,
Chonju 560-756, Korea

A new species of cyprinid fish *Acheilognathus koreensis* is described from specimens collected in several rivers of southern part of Korea. In general aspect it is similar to *A. limbata* but differs from this by having large snout length, narrow interorbital width and characters of early developmental stage. The new species is distinguished from *A. signifer* by color pattern of dorsal and anal fin ray in male, and egg form and ovipositor length in female.

Introduction

In bitterlings of genus *Acheilognathus*, 6 nominal species had been identified from Korean peninsular (Uchida, 1939; Kim, 1982): *Acheilognathus limbata*, *A. signifer*, *A. intermedia*, *A. yamatsutae*, *A. tabira* and *A. rhombea*. Among them *A. limbata* is commonly found in from many rivers and reservoirs of Korea and Japan. However, based on hybridization experiments, the specimens of *A. limbata* in Korea and Japan were considered to be separate sibling species (Duyvene De Wit, 1964; Suzuki and Jeon, 1988; Kim and Kim, 1989, 1990).

This study of recently investigated materials indicates that they differ from previously described *Acheilognathus* species. Herein we describe them as a new species, *A. koreensis* and discuss their relationship and distribution with *Acheilognathus* sibling species in Korea and Japan. Type specimens were deposited in 10% formalin at the laboratory of Department of Biology, Chonbuk National University (CUB). Method for counts and measurements follows Hubbs and Lagler (1964).

Acheilognathus koreensis, n. sp.

(New Korean name : Kal-Napcharu)

(Figs 1,2)

Materials: Holotype; CUB(Department of Biology, Chonbuk National University) 15546, a male 65.9 mm in standard length(SL), collected in the Chonchon stream, the tributary of the Kum River at Chonchon-myon, Changsu-gun, Chollabuk-do, on May 1, 1989. Paratype; The specimens of male and females(CUB 15547-15561), 40.5-63.9 mm in SL collected at the same locality and date as holotype.

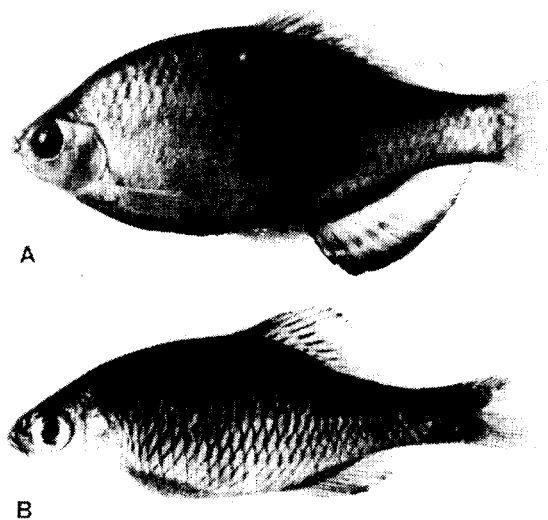
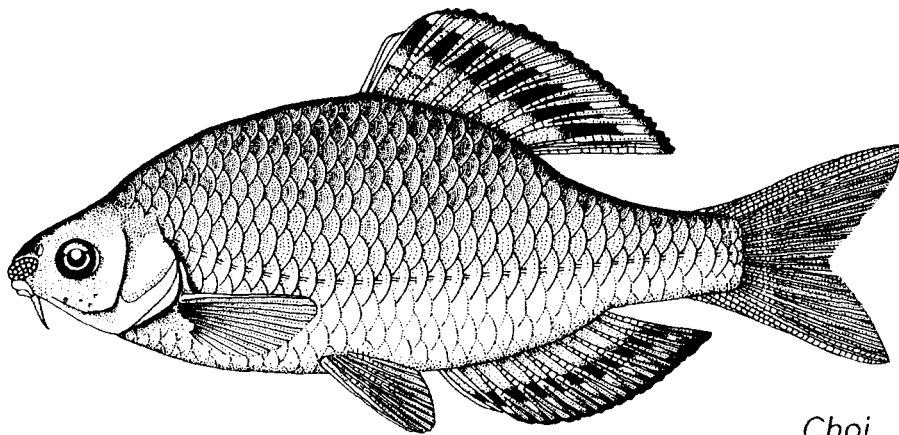


Fig. 1. *Acheilognathus koreensis* sp. nov. holotype, male, CUB. 15546(A) and paratype, female, CUB. 15547(B).



Choi.

Fig. 2. *Acheilognathus koreensis* sp. nov. holotype, male, CUB. 15546.

Diagnosis: Small body size(40-70 mm, adult); snout not short; interorbital space rather narrow, slightly elevated and flattened in the middle. Greenish color in male.

Description: Proportional measurements and counts and number of fin rays and scales for the holotype and paratypes are shown in Table 1. Body moderately deep, and compressed; head short, compressed; eye moderately large; mouth small, oblique, and reaching below the nostril; nostrils close together in front of the eye above; gill-opening rather large. Intestine with numerous convolutions. Scales large, cycloid and some narrowly imbricated on the side; lateral line complete and moderately crook down.

Table 1. Proportional measurements and meristic counts of *Acheilognathus koreensis* n. sp. Mean and standard deviation followed by range in parenthesis

Characters	Holotype	Paratype	
	Male	Male	Female
Number of specimens	1	9	6
Standard length(mm)	65.9	42.8-63.9	40.5-61.8
In %of standard length			
Body depth	39.4	39.7±1.5(37.0-41.8)	38.4±1.7(35.2-40.3)
Head length	25.0	25.0±1.0(23.6-26.5)	25.7±0.9(24.3-26.9)
Predorsal length	52.4	52.1±2.6(48.0-55.0)	54.0±2.1(51.8-58.0)
Prepectoral length	25.4	25.0±0.9(23.8-26.1)	25.4±0.9(24.4-26.9)
Preventral length	46.9	47.8±1.4(45.6-51.0)	47.2±0.8(46.2-48.7)
Preanal length	64.4	64.1±1.8(61.6-66.3)	63.2±1.2(61.9-65.7)
Caudal peduncle length	20.4	20.9±1.9(18.2-24.3)	21.2±0.8(20.0-24.0)
Caudal peduncle depth	13.2	13.6±1.0(12.2-15.6)	12.8±0.3(12.3-13.3)
In % of Head length			
Caudal peduncle length	81.6	83.6±4.0(75.8-90.0)	82.4±2.1(78.4-86.3)
Caudal peduncle depth	52.7	54.4±2.6(49.6-59.3)	49.8±1.7(47.0-53.6)
Eye diameter	33.3	33.4±1.4(31.5-35.6)	36.1±2.8(33.1-40.4)
Barbel length	25.8	26.6±3.1(21.6-31.7)	25.8±2.4(21.0-31.0)
Snout length	30.8	31.4±1.4(28.8-33.0)	30.1±1.6(27.8-33.0)
Interorbital width	36.6	36.2±0.6(34.5-38.8)	38.2±0.6(36.0-41.1)
Number of			
Dorsal fin rays	III, 8	III, 8	III, 8
Anal fin rays	III, 10	III, 10	III, 10
scales	36	34-36	35-36

Pigmentation and sexual dimorphism : Color plain, no stripes on the body, dark green above, white brown middle and yellow white below except abdomen ; dorsal margined narrowly with black, and crook up ; a white band below the margin as wide as a half of the pupil, the lower part so shaded as to form an indistinct broad dark band below the white ; anal, similar to dorsal, but stripes less distinct. The males usually shows larger body size and a little higher body than in females. During the breeding season, in the male, distinct nuptial color ; pearl organs appears on each side of the snout and around the orbit, and in the female, ovipositor appears as long as the head length.

Distribution and Habitat : The type locality is Chon-chon stream, the tributary of the Kum River. The present new species seems to be distributed in the tributary of the Kum River, Somjin R., Nagdong R., and Tamjin R., in Korea (Fig.3). Individuals were found on the pebble and muddy bottom where the bivalves of freshwater live at the slow current of the stream.

Remarks : This new species had been considered as the same species of *A. limbata* (Uchida, 1939 ; Nakamura, 1969 ; Chyung, 1977). However Duyvene De Wit (1964) considered that the *A. limbata* specimens of Korea and Japan might be separate cryptic or sibling species based on their hybridization experiments. Suzuki and Jeon (1988) reported that the present species should be separated at species level from *Acheilognathus limbata* in Japan by analysing egg developme-

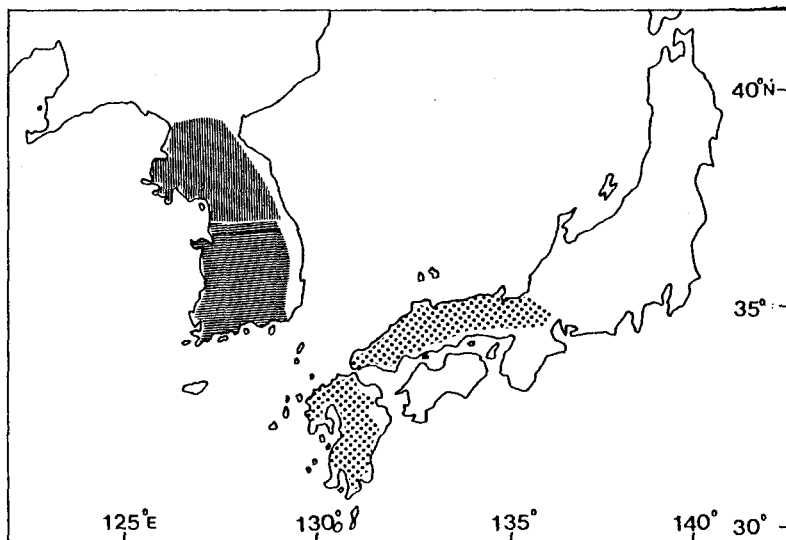


Fig. 3. Distribution of *Acheilognathus koreensis*(≡), *A. signifer*(≡) and *A. limbata*(≡) in Korea and Japan.

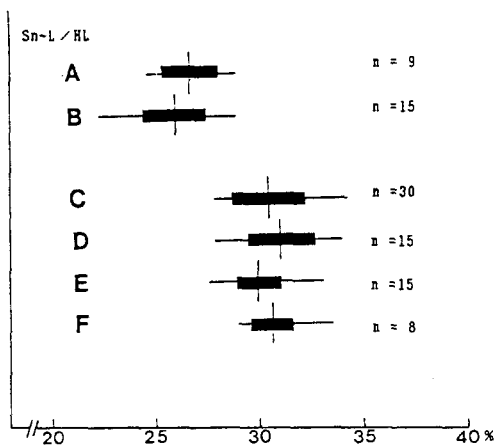


Fig. 4. Comparison of the rate of snout length (Sn - L) in head length(HL) of *Acheilognathus limbata* from Japan (A, Hiroshima ; b, Nagasaki) and *Acheilognathus koreensis* from Korea (C, Somjin R. ; D, Kum R. ; E, Nagdong R. ; and F, Tamjin R.). The diagram indicates the mean (vertical line), standard deviation(rectangle), and range(horizontal line).

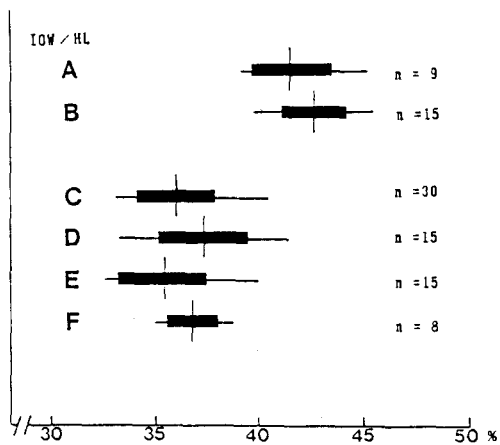


Fig. 5. Comparison of the rate of interorbital width(IOW) in head length(HL) of *Acheilognathus limbata* from Japan (A, Hiroshima ; B, Nagasaki) and *Acheilognathus koreensis* from Korea (C, Somjin R. ; D, Kum R. E, Nagdong R. ; and F, Tamjin R.). The diagram indicates the mean (vertical line), standard deviation(rectangle), and range(horizontal line).

nt and minute tubercles on the skin surface of larvae of both species. However there are some pending questions waiting for solution because there have been no concrete taxonomical discussion. Recently it was found that the present new species differs from *A. limbata* in Japan by two characters of snout length and interorbital width percent in head length and egg form and its development (Kim and Kim, 1990). In the comparisons with two populations of the *A. limbata* from Japan this new species can be distinguished easily from them in having the longer snout length (*A. limbata*: 25.9-26.6; *A. koreensis*: 29.7-31.0, percent of head length, mean) and the narrow interorbital width (*A. limbata*: 41.4-42.4; *A. koreensis*: 35.3-37.2, percent of head length, mean)(Fig.4, 5).

The present species, from the view point of general morphology, resembles *A. signifer* Berg. However, *A. koreensis* differs from *A. signifer* by the color pattern of dorsal and anal fin ray of male, egg form, egg development, and the length of ovipositor of female (Kim and Kim, 1989). So we considered that *A. koreensis* is an allopatric sibling species that is reproductively isolated from *A. limbata* and *A. signifer*(Fig. 3).

Etymology: The name *koreensis* refers to Korean peninsular where the species is distributed.

Acknowledgement

The authors are grateful to Dr. S. Kimura, professor of Kyushu University, Japan, who have very kindly sent us many Japanese specimens of *A. limbata*.

References

- Chyung, M. K., 1977. The fishes of Korea. Iljisa, Seoul, 727 pp.(In Korean).
- Duyvene de Wit, J.J., 1964. Hybridization experiments in acheilognathine fishes (Cyprinidae, Teleostei). Crossing between female *Tanakia tanago*, *Rhodeus ocellatus*, and *Acheilognathus limbatus*, and male *Acheilognathus*. *Copeia*, 1964 : 156-159.
- Hubbs, C. L. and K. F. Lagler, 1964. Fishes of the Great Lakes Region. Univ. of Michigan press, Ann. Arbor, 213 pp.
- Kim, I. S., 1982. A taxonomic study of the Acheilognathinae fishes (Cyprinidae) in Korea. Ann. Rep. Biol. Res. Chonbuk Nat. Univ., 3: 1-18. (In Korean).
- Kim, I. S. and C. H. Kim, 1989. A study on the egg development and taxonomy of two bitterlings, *Acheilognathus limbata* and *A. signifer* (Pisces, Cyprinidae) from Korea. Korean J. Zool., 32 : 22-33.
- Kim, I. S. and C. H. Kim, 1990. A Taxonomic study of the Korean bitterling, *Acheilognathus* sp.(Pisces, Cyprinidae). Korean J. Zool., 33 : 241-245. (In Korean).
- Nakamura, M, 1969. Cyprinid fishes of Japan. Spec. Publ. Res. Inst Nat. Resources, 4 : 1-149 (In Japanese).

- Suzuki, N. and S. R. Jeon, 1988. Development of the bitterling, *Acheilognathus limbata* (Cyprinidae) from Korea and Japan, with notes on minute tubercles on the skin surface and on the genetic implication in hybrid embryos. Kor. J. Lim., 4: 211-229.
- Uchida, K, 1939. The fishes of Tyosen(Korea). Part 1. Nematognathi and Eventognathi. Bull. Fish. Exp. St. Government-General of Tyosen, 67: 80-177. (In Japanese).

한국산 납자루속(잉어과) 어류의 1신종 기재

김익수 · 김치홍

(전북대학교 자연과학대학 생물학과)

한국의 금강, 섬진강, 낙동강, 탐진강 등에 서식하는 납자루속 어류의 표본을 조사한 바 일본산 *Acheilognathus limbata*(Temminck et Schlegel)와 이종동명으로 확인되어 이를 신종 *Acheilognathus koreensis*라고 기재하고, 국명으로는 칼납자루로 명명한다. 본 신종은 일본산 *Acheilognathus limbata*(Temminck et Schlegel)와 비슷하지만 난의 형태가 장타원형이며 초기발생과정도 현저히 다르고 계측 형질인 두장에 대한 문장의 비가 크고, 양안 간격의 비는 보다 적어서 뚜렷한 차이가 있다. 또한 본 종은 유사종인 한국산 *Acheilognathus signifer* Berg 묵납자루와도 반문 형태와 초기 발생과정 등이 서로 달라서 잘 구별되고 있다.