

Occurrence in a Female of the Endemic Korean Spined Loach *Iksookimia longicorpa* (Pisces; Cobitidae) of a Laminar Circularis at the Base of Its Pectoral Fin

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ABSTRACT A 123.2 mm TL female of *Iksookimia longicorpa* with a laminar circularis at the base of its pectoral fin was collected in the Hoeya River, Korea, on May 5, 2008. The specimen had full-grown ovaries like those of normal females. Its pectoral fins were larger than those of normal females, but was smaller than those of males. The laminar circularis of the pectoral fin base was more similar to normal males in its shape but was less developed. The ovaries in the individual had about 3,148 mature eggs, with egg sizes approximately 1.26 ± 0.11 mm.

Key words : *Iksookimia longicorpa*, pectoral fin, laminar circularis

The family Cobitidae (Cypriniformes) comprises 16 genera and about 120 species of freshwater fishes, and Korean Cobitidae is composed of 16 species in 6 genera (Kim and Park, 2002). The spined loach, *Iksookimia longicorpa* is a benthic small fish, inhabiting on stony, pebbly and sandy bottoms at the upper and the middle courses of the Seomjin River, the Nakdong River and their adjacent streams. In Cobitidae, sexually-grown male has a pectoral fin with a laminar circularis at its the base, which has been known as a secondary sexual character (Kim and Park, 2002). Recently, we found that one female of *I. longicorpa* with a laminar circularis was found for the first time, which has never been reported in Cobitidae. Therefore, we report it compared to other normal males and females.

The observed specimen was collected from the Hoeya River, Namchang-ri, Onyang-eup, Ulju-gun, Gyeongsangnam-do, Korea, May 5, 2008. The specimen was fixed in 10% neutral buffered formaldehyde, and measurements were taken by dial caliper. Pectoral fin and laminar circularis were observed under stereoscopic microscope (Nikon SMZ-U, Japan) following by Taylor (1967) staining method. For histological study, the ovary was dehydrated through a standard ethanol series to 100%, cleared in xylene and then embedded in paraffin

(Paraplast, Oxford). 5 μ m sections were deparaffinized and stained with Ehrlich Haematoxylin in combination with eosin. Observation and evaluation were taken by light microscope (Carl Zeiss Axio Imager A1, Germany).

One female with a laminar circularis of *I. longicorpa* was collected in the pool of stony and pebbly bottoms with a slow velocity and water depth of 30~50 cm. This specimen was about 123.2 mm in total length and 14.8 g in body weight, and it was very similar to other normal *I. longicorpa* females in the external shape, which were collected all together (Fig. 1A). On the percent of the pectoral fin in its SL, the pectoral fin was longer, 14.3% (Fig. 1B, left), than those of other normal females, $11.4 \pm 0.56\%$ (n=20), but was shorter than those of other normal males having $17.8 \pm 0.92\%$ (n=20).

The pectoral fin of normal male of *I. longicorpa* was characterized by a beak-like projection at its distal end (Fig. 1D, left). However, the second ray at the pectoral fin of the collected female was not elongated like those of normal pectoral fin (Fig. 1B, left). Although the laminar circularis at the base of the pectoral fin (Fig. 1B, right) was similar to normal male's at a glance (Fig. 1D, right), but the size was small and less developed (Fig. 1B, right).

The ovary of the female included about 3,148 mature eggs with approximately 1.26 ± 0.11 mm (n=20) in the diameter (Fig. 2A). This features were very similar to normal females, which had $2,402 \pm 944$ (1,455~5,405,

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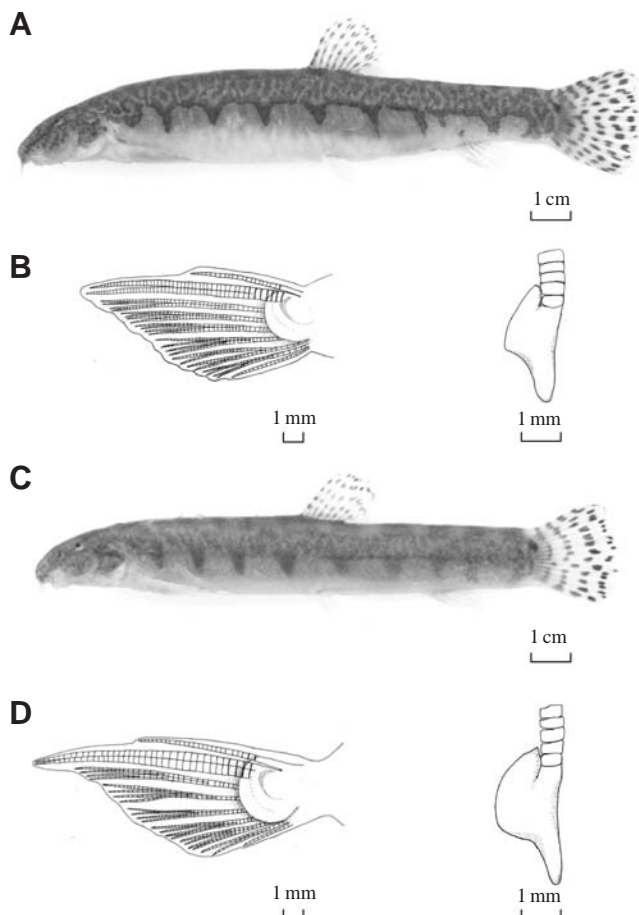


Fig. 1. Comparison of a female with a laminar circularis (A and B) and normal male (C and D) of *Iksookimia longicorpa* collected in the Hoeya River, Namchang-ri, Onyang-eup, Ulju-gun, Gyeongsangnam-do, Korea, May 5, 2008. External feature (A), pectoral fin (B, left) and laminar circularis (B, right) of abnormal female; External feature (C), pectoral fin (D, left) and laminar circularis (D, right) of normal male.

n=21) in the total number of eggs and 1.32 ± 0.12 ($1.24 \sim 1.43$, n=10) mm in the egg size. As in Fig. 2B, the oocytes may nearly reach mature development, late yolk granule stage. This stage was well in accord with results by Park (1996) reported that the late yolk granule was close to ovulation and by Kim and Ko (2005) issued that the spawning season was early to middle June. Finally, this female seems to be normal condition to be able to reproduce ripen ovum.

Natural hybrids among benthic small cobitid fishes were often found (Ueno and Ojima, 1976; Vasil'ev *et al.*, 1989; Kim and Lee, 1990; Hwang *et al.*, 1995), but the appearance of this female with a laminar circularis has not been reported until now in the field. Even in our long experiences, it was the first. Since it is the most rare, it is very difficult to explain exactly this phenomenon. In the future, physiological approaches may be required to give it clues.

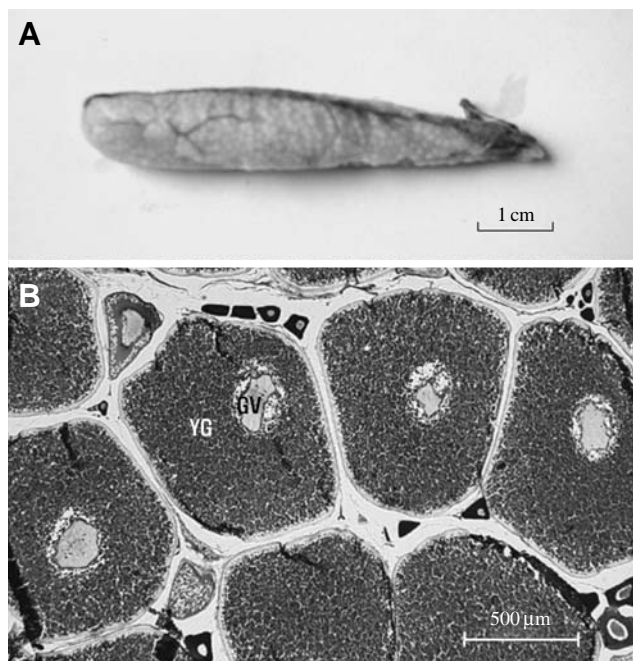


Fig. 2. Ovary (A) and it's the oocytes (B) of a female with a laminar circularis of *Iksookimia longicorpa* collected in the Hoeya River, Namchang-ri, Onyang-eup, Ulju-gun, Gyeongsangnam-do, Korea, May 5, 2008. A, The ovary includes normal full-grown eggs; B, The ovary consists of late yolk granule stage of oocytes. GV: germinal vesicle, YG: yolk granules.

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골질반을 가지고 있는 왕종개 *Iksookimia longicorpa* (Pisces; Cobitidae) 암컷의 출현

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요 약 : 가슴지느러미에 골질반을 가지고 있는 왕종개 암컷 1개체 (전장 123.2 mm)가 2008년 5월 5일 회야강에서 채집되었다. 이 암컷은 정상적인 암컷과 마찬가지로 성숙한 난소를 가지고 있었으나 가슴지느러미는 정상적인 다른 암컷보다는 큰 반면에 정상적인 다른 수컷보다는 작았고, 골질반은 다른 정상 수컷의 골질반과 유사하였지만 미약한 발달을 보였다. 난소는 포란수 3,148개, 난경 1.26 ± 0.11 mm의 성숙한 알을 가지고 있었다.

찾아보기 낱말 : 왕종개, 가슴지느러미, 골질반