

First Record of Two Sinistral Flounders (Pleuronectiformes) from Korea

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Two species, *Psettina tosana* and *Pseudorhombus oculocirris*, were collected firstly off the Saryang Island, South Sea of Korea. *P. tosana* is clearly distinguished from its related species, *P. gigantea* and *P. ijimae*, in having 9~10 pectoral fin rays, fewer number of lateral line scales, colorless snout region, and no gill rakers on the upper limb of gill arch. *P. oculocirris* much differs from *P. pentophthalmus* in having flat-tish and free rays of anterior dorsal fin, lots of scales in the lateral line, and tubular anterior nostril with flap on ocular side only.

Key words : Bothidae, Paralichthyidae, first record, Korea

Introduction

The South Sea of Korea is characterized by a large number of islands and the Tsushima Warm Current comprising many kinds of fishes (Chyung, 1977; Kim *et al.*, 2005). Among the order Pleuronectiformes (flatfishes) from Korea, six and five species have been hitherto recognized into the families Bothidae and Paralichthyidae, respectively (Kim *et al.*, 2005). In the process of investigating the fish fauna from Korea, we examined several species of sinistral group obtained from the southern coast of Korea, and found two unrecorded species, *Psettina tosana* Amaoka and *Pseudorhombus oculocirris* Amaoka from Korea. We herein report these species as the first record from Korea, with detailed description of their morphology.

Materials and Methods

Counts and measurements were made according to Hubbs and Lagler (1964), and the number

of fin rays and vertebrae were counted by radiographs of soft x-ray. Fish specimens examined were deposited in the Department of Biology, Kunsan National University (BKNU), Korea.

Taxonomic accounts

Family Bothidae

Genus *Psettina* Hubbs, 1915

(Korean name: Dong-baek-ga-ja-mi-sok)

Psettina Hubbs, 1915: 456 (type species: *Engyprosopon ijimae* Jordan and Starks, 1904).

1. *Psettina tosana* Amaoka, 1963

(New Korean name: Sa-ryang-neop-chi)

(Figs. 1, 2; Table 1)

Psettina tosana Amaoka, 1963: 59, fig. 5 (type locality: Mimase, Kochi Pref., Japan); 1969: 184, fig. 72; Kamohara, 1964: 82; Amaoka in Masuda *et al.*, 1984: 349; Nakabo in Nakabo, 2002: 1367.

Materials examined. BKNU 2241~2242, two specimens, 66.2~80.9 mm in standard length (SL), off the Saryang Island, Saryang-myeon,

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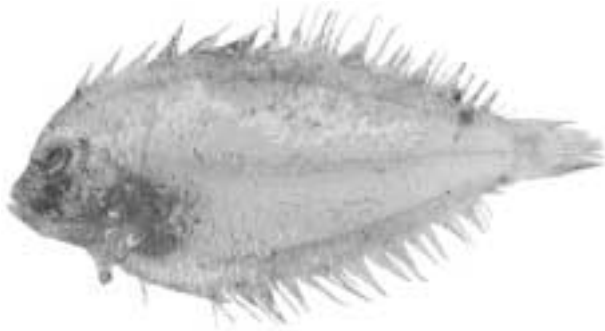


Fig. 1. *Psettina tosana* Amaoka, BKNU 2242, 80.9 mm SL.

Tongyeong-si, Gyeongsangnam-do, Korea, 34° 54'10"N, 128° 9'40"E, 3 February 2007.

Description. Dorsal fin rays 86~96; anal fin rays 71~73; pectoral fin rays 9~10 on ocular side, 7~8 on blind side; caudal fin rays 17; gill rakers on first arch 0+7 on ocular side; vertebrae 9~10+28~29=37~39.

In percentage of SL: head length (HL) 24.4~24.7 (24.6±0.2); body depth 38.5~47.2 (42.9±6.1); snout length 7.5~7.9 (7.7±0.2); eye diameter 6.3~7.4 (6.9±0.7) on upper eye, 6.7~7.4 (7.0±0.5) on lower eye; interorbital width 0.6~0.9 (0.8±0.3); predorsal length 2.7~2.9 (2.8±0.1); prepectoral length 25.2~25.9 (25.5±0.4); prepelvic length 13.4~14.7 (14.0±0.9) on ocular side, 20.0~20.4 (20.2±0.3) on blind side; preanal length 24.6~26.0 (25.3±1.0); upper jaw length 6.7~7.6 (7.1±0.6) on ocular side, 7.0~7.1 (7.0±0.06) on blind side; lower jaw length 10.0~10.3 (10.1±0.2) on ocular side, 10.6~11.1 (10.9±0.3) on blind side; pectoral fin length 22.0~22.8 (22.4±0.6) on ocular side, 6.7~7.4 (7.1±0.5) on blind side; pelvic fin length 13.6~14.6 (14.1±0.7) on ocular side, 9.7~10.5 (10.0±0.6) on blind side; base of pelvic fin 8.5~8.9 (8.7±0.3) on ocular side, 3.2~3.7 (3.4±0.4) on blind side. In percentage of HL: snout length 30.5~32.1 (31.3±1.1); eye diameter 25.9~29.8 (27.8±2.7) on upper eye, 27.2~30.0 (28.6±2.0) on lower eye; interorbital width 2.5~4.0 (3.2±1.1); upper jaw length 27.0~30.9 (28.9±2.7) on ocular side, 28.4~28.5 (28.4±0.1) on blind side; lower jaw length 40.3~42.0 (41.1±1.2) on ocular side, 43.0~45.4 (44.2±1.7) on blind side.

Body very compressed and elliptical, highest at middle part of body, its depth slightly less than half of its length. Head small. Mouth small and oblique, its maxilla extending below anterior

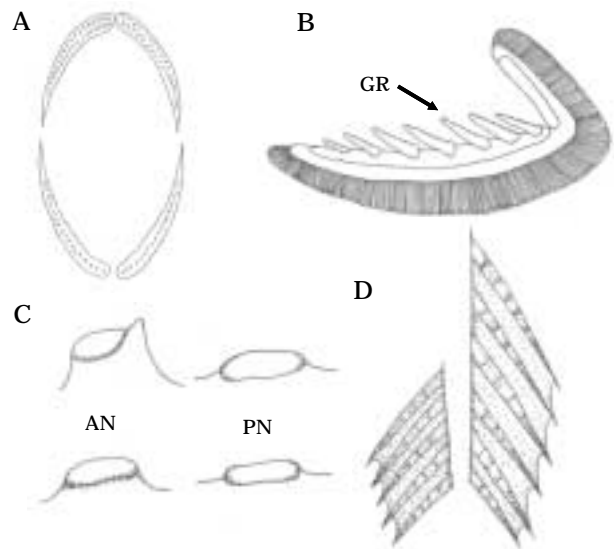


Fig. 2. Morphological characters of *Psettina tosana*. BKNU 2242, 80.9 mm SL. A: Teeth row of upper (top) and lower (bottom) jaws; B: Gill rakers (ocular side); C: Nostrils of ocular side (top) and blind side (bottom); D: pelvic fin of ocular side (right) and blind side (left). GR, gill rakers; AN, anterior nostril; PN, posterior nostril.

part of lower eye, and its inside pale. Lower eye slightly ahead of upper one. Snout shorter than eye diameter. Dorsal and ventral contours arched without any curved part except head region. Lateral line absent on blind side, but clearly visible and deeply curved above base of pectoral fin on ocular side. Scales large and very deciduous, those ctenoid on ocular side but cycloid on blind side. Snout, jaws, and base of pectoral fins naked, but all other fins scaled at base. Coniform teeth very small and ciliary type, those on upper jaw set in two series but lower one uniserial (Fig. 2A). Gill rakers on first arch short and serrated minutely on upper margin but lower part not, and raker of upper limb absent (Fig. 2B). Origin of dorsal fin on blind side just over anterior nostril. Anterior nostril on ocular side semitubular or tubeless without flap, and posterior nostril on ocular side and two nostrils on blind side tubeless without flap (Fig. 2C). Caudal peduncle very short, smaller than one third of caudal peduncle depth. Pectoral fin on ocular side much longer than that of blind side. Pelvic fin on ocular side longer than that of blind side. Base of pelvic fin on ocular side much longer than that of blind side (Fig. 2D). Anal fin originating at a vertical through basal part of pectoral fin. Shape and structure

Table 1. Comparison of taxonomic characters between *Psettina tosana*, *P. gigantea*, and *P. iijimae*

Characters	Present study	Amaoka (1963)		
		<i>P. tosana</i>	<i>P. gigantea</i>	<i>P. iijimae</i>
Dorsal fin rays	86~96	89~99	90~103	81~93
Anal fin rays	71~73	69~79	69~80	62~71
Pectoral fin rays (ocular)	9~10	8~11	11~12	11~13
Lateral line scales (ocular)	–	45~53	56~61	53~61
Gill rakers	0+7	0+6~8	0+6~8	2~5+4~6
No. of vertebrae	9~10+28~29	10+28~30	10+28~30	10+26~28
Color of snout	Pale	Pale	Dark	–
Origin of dorsal	Blind side	Blind side	Blind side	Blind side
Teeth	Upper-biserials Lower-uniserial	Upper-biserials Lower-uniserial	Upper-biserials Lower-uniserial	Uniserial (both)

of dorsal and anal fins similar each other. Vent opens on blind side, in front of origin of anal fin.

Body color. In fresh specimens, bright reddish brown on ocular side, slightly yellowish white on blind side. Dorsal, anal, and caudal fins slightly brownish gray without any spot. In formalin, general ground color of body pale on ocular side, milky white on blind side. Dorsal, anal, and caudal fins on ocular side grayish with minute dark spots on their rays, but those on blind side pale. Mouth part and snout region pale, without any distinct pattern.

Remarks. Amaoka (1963, 1969) and Amaoka in Masuda *et al.* (1984) described that although it closely resembles *P. gigantea* and *P. iijimae* in their morphology, *Psettina tosana* differs from the former in having fewer lateral line scales and pectoral fin rays on the ocular side, and also differs from the latter in having uniserial teeth row on upper jaw and no gill rakers on upper limb of gill arch (Table 1). Nakabo in Nakabo (2002) mentioned that snout and jaws of *P. tosana* is not black, but black in *P. gigantea*. Therefore, *P. tosana* differed from both *P. gigantea* and *P. iijimae* in having smaller number of pectoral fin rays and lateral line scales, absence of gill raker on upper limb of gill arch, two teeth rows on upper jaws and not black at snout region (Table 1). The present specimens agree well with *P. settina tosana* described by Amaoka (1963), Amaoka in Masuda *et al.* (1984), and Nakabo in Nakabo (2002).

Family Pleuronectidae

Genus *Pseudorhombus* Bleeker, 1862

(Korean name: Byeol-neop-chi-sok)

Pseudorhombus Bleeker, 1862: 5 (type species:

Rhombus polyspilos Bleeker, 1853).

2. *Pseudorhombus oculocirris* Amaoka, 1969

(New Korean name: Nam-hae-neop-chi)

(Figs. 3, 4; Table 2)

Pseudorhombus oculocirris Amaoka, 1969: 30, figs. 15, 16 (type locality: Mimase, Kochi Pref., Japan); Amaoka in Masuda *et al.*, 1984: 347; Nakabo in Nakabo, 2002: 1356.

Materials examined. BKNU 2175, 2507~2524, 19 specimens, 147.0~205.6 mm SL, off the Saryang Island, Saryang-myeon, Tongyeong-si, Gyeongsangnam-do, Korea, 34° 54'10"N, 128° 9'40"E, 21 October 2006; BKNU 2243, 2267~2270, five specimens, 145.6~162.7 mm SL, Samcheonpo fish market, Sacheon-si, Gyeongsangnam-do, Korea, 9 November 2006.

Description. Dorsal fin rays 70~76; anal fin rays 54~60; pectoral fin rays 11~12 on ocular side, 10~11 on blind side; caudal fin rays 16~19; lateral line scales 82~85; gill rakers 5+19 on



Fig. 3. *Pseudorhombus oculocirris* Amaoka, BKNU 2175, 158.2 mm SL.

Table 2. Comparison of taxonomic characters between *Pseudorhombus oculocirris*, and *P. pentophthalmus*

Characters	Present study	Amaoka (1969)	
		<i>P. oculocirris</i>	<i>P. pentophthalmus</i>
Dorsal fin rays	70~76	72~76	71~76
Anal fin rays	54~60	54~57	53~57
Pectoral fin rays (ocular)	11~12	11~13	11~12
Lateral line scales (ocular)	82~85	70~82	67~75
Gill rakers	5+19	4~7+17~20	5~7+16~19
Form of nostrils (ocular)	An: tubular, with flap Po: tubeless, no flap	Po: tubeless, no flap An: tubular, with flap	An: tubular, with flap Po: tubular, with flap
Anterior rays of dorsal fin	Free, elongated	Free, elongated	not free, not elongated
Shape of anterior dorsal fin ray	Flattish	Flattish*	Not flattish*

An: anterior, Po: posterior, *: Amaoka in Masuda *et al.*, 1984.

ocular side; vertebrae 10+25~26=35~36.

In percentage of SL: HL 23.1~30.6 (28.5 ± 2.2); body depth 44.1~53.3 (49.3 ± 2.9); snout length 7.1~8.2 (7.8 ± 0.4); eye diameter 5.4~6.6 (6.0 ± 0.3) on upper eye, 5.6~6.7 (6.1 ± 0.4) on lower eye; interorbital width 0.6~1.2 (0.8 ± 0.2); predorsal length 5.6~6.8 (6.1 ± 0.6); prepectoral length 28.0~30.3 (29.2 ± 1.0); prepelvic length 26.0~28.2 (26.8 ± 0.8); preanal length 33.3~37.3 (35.3 ± 1.4); upper jaw length 13.4~15.1 (14.3 ± 0.5) on ocular side, 12.8~14.4 (13.7 ± 0.5) on blind side; lower jaw length 15.6~17.6 (16.8 ± 0.6) on ocular side, 16.1~17.8 (17.2 ± 0.6) on blind side; length of pectoral fin 15.2~18.4 (17.0 ± 1.0) on ocular side, 11.2~14.5 (12.3 ± 1.2) on blind side; pelvic fin length 7.1~9.5 (8.2 ± 1.0) on ocular side, 6.8~11.0 (9.5 ± 1.2) on blind side; base of pelvic fin 2.2~2.9 (2.6 ± 0.2) on ocular side, 1.7~3.1 (2.5 ± 0.4) on blind side. In percentage of HL: snout length 25.5~35.7 (27.6 ± 3.1); eye diameter 17.8~25.3 (21.2 ± 2.3) on upper eye, 18.3~25.4 (21.5 ± 2.3) on lower eye; interorbital width 2.0~5.0 (2.8 ± 0.8); upper jaw length 45.5~60.5 (50.6 ± 4.2) on ocular side, 45.1~59.8 (48.2 ± 4.3) on blind side; lower jaw length 55.7~73.4 (59.2 ± 5.2) on ocular side, 57.1~75.1 (60.6 ± 5.2) on blind side.

Body ovoid and compressed, highest in middle part of body, its depth about half of its length. Dorsal and ventral contours evenly arched, without any curved part except head region. Caudal peduncle short, about one third of caudal peduncle depth. Upper and lower eyes located on same vertical position. Snout rather long, much longer than eye diameter. Interorbital region narrow without scale. Nostrils small, anterior one tubular with a small flap posteriorly but posterior one

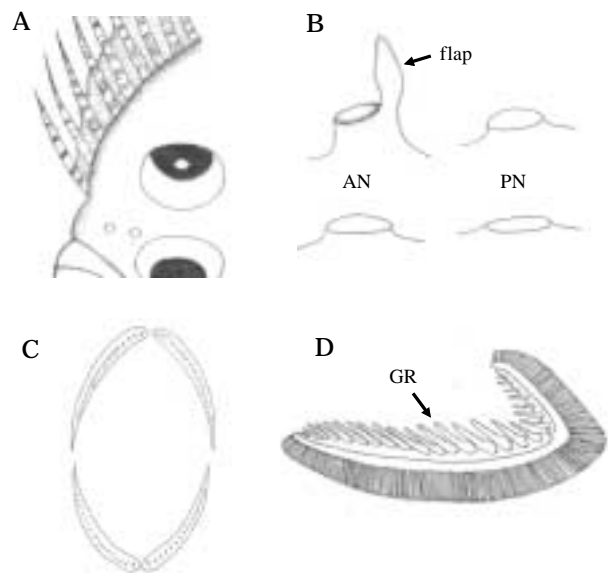


Fig. 4. Morphological characters of *Pseudorhombus oculocirris*, BKNU 2,518 mm SL. A: Anterior dorsal fin rays; B: Nostrils of ocular side (top) and blind side (bottom); C: teeth row of upper (top) and lower (bottom) jaws; D: Gill rakers (ocular side). GR, gill rakers; AN, anterior nostril; PN, posterior nostril.

tubeless on ocular side, and both anterior and posterior nostrils tubeless without flap on blind side (Fig. 4B). Nostrils on ocular side located in front of interorbital region, and those on blind side just below origin of dorsal fin. Mouth oblique and rather large, posterior end of maxilla beyond middle part of lower eye, and its posterior region covered with ctenoid scales. Inner side of mouth pale. Coniform teeth uniserial and very small at upper and lower jaws, gradually becoming smaller posteriorly (Fig. 4C). Scales small and decidu-

ous, ctenoid on ocular side, cycloid on blind side. Snout, tips of both jaws, and anterior interorbital region naked. Dorsal fin beginning above nostril on blind side. In anterior rays, some flattish and their upper part free from fin membrane. Free part expanded over a half of entire length of first and second filament. Free area in filaments gradually decreasing posteriorly (Fig. 4A). Dorsal and anal fins scaled at their lower part of rays. Lateral line clearly visual on both sides and deeply curved above pectoral fin base. All fin rays unbranched except pectoral and caudal. Anal fin beginning under rear of basal part of pectoral fin. Pectoral fin on ocular side longer than that of blind side one, its middle rays branched, but outer rays simple. Length of pelvic fin on ocular side shorter than that of blind side. Length of pelvic fin base almost equal on both sides. Dorsal and anal fin rays similar in their shape and structure, and last four or five rays of them branched. Vent opens on ocular side, in front of origin of anal fin.

Body color. In fresh specimens, body color darkish brown on ocular side, with several darker circular spots which smaller than their eye diameter, but yellow-whitish in blind side. Dorsal, anal and caudal fins dark blackish without any spot. In formalin, general ground color of body brownish in ocular side, with several darker circular spots but blind side pale.

Remarks. The present specimens agree well with previous species description for *P. oculocirris* by Amaoka (1969) although there is a small difference in the number of lateral line scales between them (Table 2).

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한국산 가자미목 어류 2 미기록종 이 충렬 · 이철상*

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최근 우리나라의 남해 연안에서 출현하고 있는 가자미목 어류 2종을 조사한 결과 지금까지 국내에서 서식이 보고되지 않은 붕넙치과의 *Psettina tosana*와 넙치과의 *Pseudorhombus oculocirris*로 동정되었다. *P. tosana*는 형태적으로 *P. gigantea*와 *P. ijimae*와 비슷하나 *P. tosana*는 가슴지느러미 연조가 9~10이고, 측선린수가 적으며, snout 주변이 검지않아 *P. gigantea*와 다르고, 새궁의 상지에 새파가 없고, 하악의 치열이 1열인 점이 *P. ijimae*와는 구별되었다. 한편 *P. oculocirris*는 *P. pentophthalmus*에 비하여 측선비늘 수가 많고, 유안측의 전비공만 tubular 타입에 flap이 존재하고, 등지느러미 앞쪽의 유리된 연조가 약간 납작하고, 길다는 점이 특징적이다.