

# First Record of the Annular Sole, *Brachirus annularis* (Soleidae, Pleuronectiformes) from Korea

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**ABSTRACT** This is the first report of *Brachirus annularis* (Pleuronectiformes: Soleidae) from Korea. A specimen of *B. annularis* (229.0 mm standard length) was firstly collected by drift gill net at a fishing ground locating between Jejudo and Geomundo Islands, the southern coast of Korea on 31 March, 2019. This species was characterized by having five large, deep colored patches on the ocular side of body, each patch outlined by dark brown ring, united dorsal and anal fins jointed with caudal fin, and short pectoral fin. We add this species to the Korean fish fauna and propose its new Korean names, “Eol-luk-seo-dae-sok” and “Eol-luk-seo-dae” for the genus and species, respectively.

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**Key words:** *Brachirus annularis*, Soleidae, first record, Jejudo, Korea

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## INTRODUCTION

The family Soleidae, which belongs to the order Pleuronectiformes, comprises 175 species in 32 genera worldwide (Nelson *et al.*, 2016), while seven soleid species in two genera have been reported in Korea up to the present (MABIK, 2017). All species of Soleidae have eyes on the right side of body, preopercle embedded in skin and without free margin, dorsal fin extending far forward on head, and the origin of dorsal fin anterior to eyes (Munroe, 2001; Nelson *et al.*, 2016).

Twenty-three species in genus *Brachiurus* have been reported worldwide (Froese and Pauly, 2019), of which two species were recorded in Japan (Nakabo and Doiuchi, 2013), but none in Korea yet.

Recently, a single specimen of unrecorded soleid species was collected by drift gill net at a fishing ground locating between Jejudo and Geomundo Islands, the southern coast of Korea. It was morphologically identified as *Brachirus annularis* according to Nakabo and Doiuchi (2013). Here,

we described its morphological characters based on a specimen and added the species to the Korean fish fauna.

Counts and measurements followed the method of Hubbs and Lagler (1964). The examined specimen was deposited at the Fish Genetics and Breeding Laboratory, Jeju National University (JNU), Korea.

### *Brachirus* Swainson, 1939

(Korean genus name: Eol-luk-seo-dae-sok)

*Brachiurus* (subgenus of *Solea*) Swainson, 1839: 187, 303  
(type species: *Pleuronectes orientalis*)

Very short predorsal length; caudal fin joined to dorsal and anal fins; eye and mouth generally small; pectoral fin present; opercular membrane not joined to distal tips of upper rays of pectoral fin on either side of body; opercular openings of both sides not restricted, confluent in front of pelvic fins; lips with or without labial papillae (Lapierre, 2007).

### *Brachirus annularis* Fowler, 1934

(New Korean name: Eol-luk-seo-dae)

(Fig. 1; Table 1)

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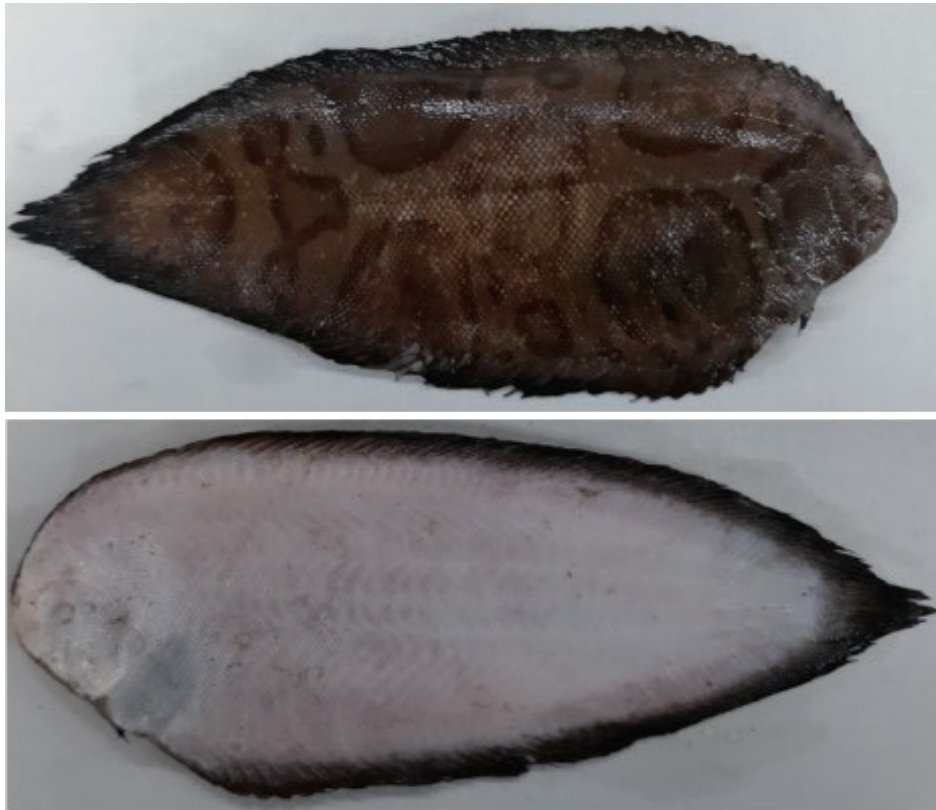


Fig. 1. *Brachirus annularis*, JNU1503, 161.0 mm SL, southern coast of Korea.

*Brachiurs annularis* Fowler, 1934: 346 (type locality: China Sea, vicinity of Taiwan); Randall and Lim, 2000: 646 (South China Sea); Nakabo, 2002: 1387 (Japan); Ho and Shao, 2011: 62 (Taiwan); Nakabo and Doiuchi, 2013: 1692 (Japan).

*Synaptura annularis*: Keith *et al.*, 1985: 292 (Australia); Gonzales *et al.*, 1994: 491 (Japan); Nair, 2006: 118 (India).

**Material examined.** JNU1503, one specimen, 161.0 mm in standard length (SL), southern coast of Korea (between Jejudo Island and Geomundo Island), drift gill net, 31 March, 2019.

**Description.** Counts for the present specimen are shown in Table 1.

Measurements are presented as percentage against SL: Body depth 38.4; body width 8.3; head length 21.7; prepectoral fin length 19.1; preanal fin length 21.8; pre-ventral fin length 18.6; preanul length 20.1; length of longest dorsal fin ray 6.9; length of longest anal fin ray 7.3; upper jaw length 5.5; upper eye diameter 3.7; lower eye diameter 2.7; snout length 2.4; postorbital length 12.1.

Body oval, its depth about two-fifths of SL, covered

with ctenoid scales; contours evenly arched dorsal profile of head; predorsal length very short, origin of dorsal fin started almost at the tip of the snout; dorsal and anal joined to caudal fin rays; each eye on the ocular side separated by a wide scaly interorbital area with ctenoid scales; upper eye slightly in advance of the lower, larger than lower eye diameter; snout length smaller than eye diameter; anterior nostril elongated, tubular, immediately above upper jaw and posterior nostril covered by a small tubular fleshy papilla in front of the lower eye; fleshy papillae below the lower jaw of the blind side extending up to base of head and onto ocular side margin (Fig. 2); upper jaw not extending to the end of lower eye; lateral line straight on both sides, but the lateral line rounded on the head; pectoral fin very short, joined to opercular membrane; first and last elements of the pectoral fin on the ocular side elongated to like horns; pectoral fin on the blind side has seven rays covered by a flap of white skin; five rays on pelvic fin joined by a flap of skin; pelvic fin on blind side slightly smaller than ocular; all fin bases scales and all fin rays joined by flap of skin; posterior of caudal fin rounded.

**Coloration of specimen.** When fresh, the body uni-

**Table 1.** Comparison of morphological characters between present and previous studies on *Brachirus annularis*

| Morphological characters               | Present study | Fowler (1933) |     | Gonzales <i>et al.</i> (1994) | Nair (2006) |
|----------------------------------------|---------------|---------------|-----|-------------------------------|-------------|
| Total length (mm)                      | 182.6         |               |     |                               | 145.7       |
| Standard length (mm)                   | 161.0         | 151           | –   | 122                           | 132.6       |
| Counts                                 |               |               |     |                               |             |
| Dorsal fin rays                        | 71            | 70            | –   | 70                            | 76          |
| Pectoral fin rays (ocular /blind side) | 9/8           | 9/8           | 9/9 | 9/10                          | 9/8         |
| Pelvic fin rays (ocular/blind side)    | 5/5           | 5/5           | 5/5 | 5/5                           | 5/5         |
| Anal fin rays                          | 57            | 55            | –   | 57                            | 56          |
| Caudal fin rays                        | 18            | –             | –   | 18                            | 13          |
| Lateral line scales                    | 105           | 104           | 105 | 100                           | 106         |
| Scales above lateral line              | 33            | 29            | –   | 32                            | 33          |
| Scales below lateral line              | 32            | 37            | –   | 35                            | 28          |

**Fig. 2.** Shape of head and mouth of *Brachirus annularis*.

formly pale brown on ocular side and white on blind side; six large patches each outlined by dark brown ring on ocular side, two large patches on dorsal and ventral margin of body, and each one large patch on posterior region of body and head; several small blotches scattered among larger patches; dorsal, anal and caudal fins dark black on both sides, pectoral fin dark black on ocular side, but white on blind side. After fixation, body color in preservative uniformly light brown; all fins light brown, but pectoral fins white on blind side; body on blind side white.

**Distribution.** Known from Australia (Keith *et al.*, 1985), India (Nair, 2006), Taiwan (Ho and Shao, 2011), South China Sea (Randall and Lim, 2000), Japan (Gonzales *et al.*, 1994) and Korea (Jejudo Island, present study).

**Remarks.** The present specimen was characterized by

having five large, remarkable colored patches on ocular side of body, each outlined by a dark brown ring, united dorsal and anal fins jointed with caudal fin and short pectoral fin. The morphological characters of the specimen were compared with those of the previous studies (Fowler, 1833; Gonzales *et al.*, 1994; Nair, 2006), which revealed that all morphological characteristics examined clearly fit the previous species descriptions of *B. annularis* (Table 1). Thus, we identified our specimen as *B. annularis* based on the morphological characters.

This species morphologically resembles *Zebrias zebrius* and *Z. fasciatus* inhabiting the Korean water, but it is easily distinguishable from the latter by having the various annular patches on ocular side of the body (vs. horizontal lines in *Zebrias* spp.) and brown color on caudal fin (vs. yellow spots) (Nakabo and Doiuchi, 2013). We add this species to the Korean fish fauna and propose its new Korean name, “Eol-luk-seo-dae” because it has distinct, dark brown annular patches on ocular side of the body.

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## 한국산 납서대과 어류 1미기록종, *Brachirus annularis*

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**요 약** : 납서대과에 속하는 *Brachirus annularis* 1개체 (표준 체장 161.0 mm)가 제주도와 거문도 사이의 해역에서 2019년 3월에 처음으로 채집되었다. 이 종은 유안측에 불규칙한 형태의 반점과 얼룩무늬를 가지고 있으며, 꼬리지느러미는 등지느러미와 뒷지느러미와 연결되었고, 머리와 눈 그리고 가슴지느러미가 작은 형태를 띠는 특징을 갖는다. 따라서 유안측에 불규칙한 형태의 반점과 얼룩무늬를 가지는 특징에 기초하여 이 종의 속명과 국명은 각각 “얼룩서대속”과 “얼룩서대”라고 명명하였다.

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**찾아보기 낱말** : 납서대과, 얼룩서대, 미기록종, 제주도, 한국