

Revision of the Scientific Name for “Min-be-do-ra-chi” Identified Previously as *Zoarchias glaber* in Korea

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Abstract

The Korean stichaeid fish “Min-be-do-ra-chi”, reported previously as *Zoarchias glaber*, is reviewed taxonomically and described on the basis of a single specimen collected from Jeju Island, Korea. “Min-be-do-ra-chi” was identified as *Z. major* by the following morphological characteristics: U-shaped markings on the dorsal and anal fins, 31 dorsal fin spines, 78 dorsal fin soft rays, 87 anal fin soft rays, and 109 vertebrae. In contrast, *Z. glaber* has triangular markings on the dorsal and anal fins, 92–96 anal fin soft rays, and 112–122 vertebrae. Therefore, our results suggest that the scientific name of this species reported previously as *Z. glaber* should be changed to *Z. major*.

Key words: *Zoarchias major*, *Zoarchias glaber*, Comments, Scientific name, Description

Introduction

The genus *Zoarchias* Jordan and Snyder, 1902 (order Perciformes, family Stichaeidae) is distributed only in the western North Pacific near Korea, China, and Japan. Eight valid species are known (Mecklenburg and Sheiko, 2004; Kimura and Sato, 2007). Among them, *Zoarchias glaber* Tanaka, 1908 and *Zoarchias uchidai* Matsubara, 1932, are recognized in Korea (Kim and Kang, 1991; Kim et al., 2005). This genus is morphologically characterized by a slender and elongate body, dorsal and anal fins confluent with a pointed caudal fin, and no pelvic fins or dermal flap on the head (Kimura and Sato, 2007). One of the Korean species, known by the Korean name “Min-be-do-ra-chi”, was first reported by Kim and Kang (1991) based on seven specimens collected from Jeju Island, Korea, and was assigned to *Z. glaber*. However, Kimura and Sato (2007) re-examined the Korean specimens described by Kim and Kang (1991) and identified the specimens as *Z. major* rather than *Z. glaber*. Kimura and Sato (2007) suggested that *Z. major* can be easily distinguished from *Z. glaber* by the

shape of the markings on the dorsal and anal fins (U-shaped in *Z. major* vs. triangular in *Z. glaber*). Therefore, the identity of the species collected from Korea should be clarified based on known specimens and their morphological characteristics. In the present study, “Min-be-do-ra-chi”, reported previously as *Z. glaber*, is reviewed and described from a new specimen collected in Korea.

Material and Methods

A single *Z. major* specimen was collected from the coastal waters of Jeju Island, Korea. Counts and measurements followed Hubbs and Lagler (2004) and Kimura and Sato (2007), using digital Vernier calipers (to the nearest 0.1 mm) and analyses of dorsal and anal fin rays and vertebrae were performed using soft X-ray photographs (M100; SOFTEX, Japan). The specimen was deposited at the National Institute of Biological

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Fig. 1. Photographs of *Zoarchias major* and *Zoarchias glaber*. (A) *Z. major* collected from Korea, NIBR-P0000020408, 91.9 mm TL; (B) *Z. major* collected from Japan, FRLM 5021, 71.7 mm TL; (C) *Z. glaber* collected from Japan, FRLM 15388, 78.0 mm TL.

Resources (NIBR). International abbreviations follow Fricke and Eschmeyer (2014).

Results and Discussion

Zoarchias major Tomiyama, 1972

(Korean name: Min-be-do-ra-chi)

Zoarchias major Tomiyama, 1972: 14 (type locality: Ikejima, Japan); Mecklenburg and Sheiko, 2004: 24; Kimura and Sato, 2007: 67; Hatooka, 2013: 1250.

Zoarchias glaber (not Tanaka): Kim and Kang, 1991: 512; Kim et al., 2005: 393.

Examined material. NIBR-P0000020408, one specimen, Hamdeok-ri, Jocheon-eup, Jeju, Jeju Island, Korea.

Comparative materials. *Zoarchias major*: FRLM 5016, one specimen, Saiki, Oita Pref., Japan, 18 Mar 1985; FRLM 5018 and 5021, two specimens, Saiki, Oita Pref., Japan, 19 Apr 1985; FRLM 5023, one specimen, Saiki, Oita Pref., Japan, 22 Apr 1985; FRLM 5026, 5027, and 5031, three specimens, Saiki, Oita Pref., Japan, 28 Mar 1985; FRLM 5032-5034, three specimens, Saiki, Oita Pref., Japan, 29 Mar 1985. *Zoarchias glaber*: FRLM 15387-15393, seven specimens, Miura, Kanagawa Pref., Japan, 24 May 1994

Description. Counts and measurements are shown in Table 1. Body elongated, compressed, and tapering posteriorly. Head small, with dermal flap absent. Snout slightly pointed; ridge absent on top of snout. Mouth large, with posterior tip of upper jaw extending to posterior margin of eye. Single pair of tubular nostrils. Interorbital region narrow and slightly con-

cave. Small conical teeth on upper and lower jaws, vomer, and palatines. Gill opening wide and both gill membranes free from isthmus. Small cycloid scales embedded and scattered sparsely on body, except for on the head and nape. Origin of dorsal fin located above pectoral fin. Dorsal fin spines very short and sharp. Origin of anal fin located below spiny portion of the dorsal fin and just behind the anus. Caudal fin pointed slightly and smoothly confluent with dorsal and anal fins. Pectoral fins small, fan-like, rounded. Pelvic fins absent.

Coloration. Head and body with brownish markings on yellowish-brown background after fixation. Dark, square-shaped markings along lateral midline. Black spot on anteriormost dorsal fin. Numerous brown, U-shaped markings on dorsal and anal fins (Fig. 1A).

Distribution. *Z. major* occurs in the coastal waters of Jeju Island, Korea (present study; Kim and Kang, 1991) and off Japan (Kimura and Sato, 2007; Hatooka, 2013).

Remarks. *Z. major* has been reported previously as *Z. glaber* in Korea (Kim and Kang, 1991; Kim et al., 2005). However, the present study suggests the species reported as *Z. glaber* in Korea is *Z. major*, as determined by the number of dorsal fin spines (31) and the variety of U-shaped markings on the dorsal and anal fins. In particular, the shapes of the markings on the dorsal and anal fins are highly consistent with those pictured in the original description (Tomiyama, 1972). Kimura and Sato (2007) also suggested that the specimens of Kim and Kang (1991) (and pictured in Kim et al., 2005) are *Z. major* rather than *Z. glaber* based on the shapes of the markings on the dorsal and anal fins. *Zoarchias major* is similar to *Z. glaber* in body coloration and markings on the body, but *Z. major*, including the specimens of Kim and Kang (1991), differs from *Z. glaber* not only in the shapes of markings on the dorsal and

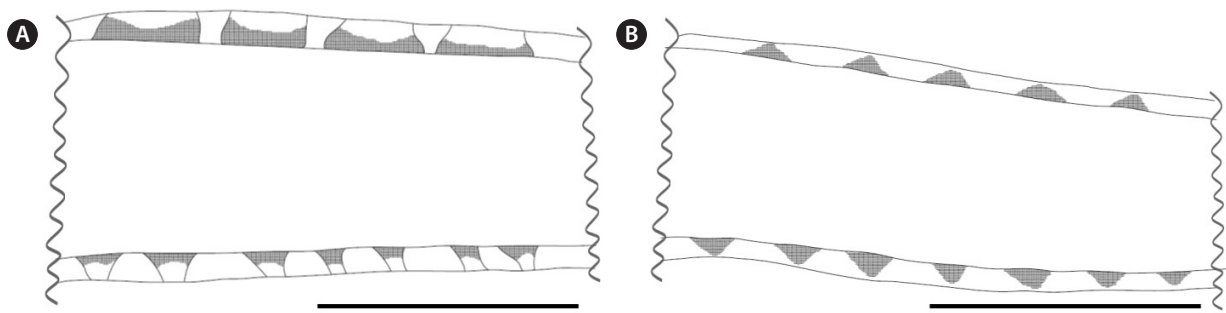


Fig. 2. Patterns of dorsal and anal fin markings in (A) *Zoarchias major* left and (B) *Zoarchias glaber* right Scale bars indicate 10 mm.

anal fins (U-shaped in *Z. major* vs. triangular in *Z. glaber*) (Fig. 2), but also in the number of anal fin soft rays (82–91 vs. 92–96, respectively) and the number of vertebrae (108–118 vs. 119–122, respectively) (Fig. 1; Table 1). In addition, *Z. major* shares the U-shaped markings on the dorsal and anal fins with four other *Zoarchias* species (*Zoarchias hosoyai*, *Zoarchias microstomus*, *Zoarchias neglectus*, and *Zoarchias uchidai*), but *Z. major* is distinguishable from *Z. hosoyai* by the ridge on top of the snout (absent in *Z. major* vs. present in

Z. hosoyai), the number of dorsal fin spines (26–36 vs. 21–22, respectively), and the number of vertebrae (104–118 vs. 102–103, respectively); from *Z. neglectus* by the number of dorsal fin spines (26–36 vs. 22–25, respectively); from *Z. microstomus* and *Z. uchidai* by the number of dorsal fin spines (26–36 in *Z. major* vs. 15–18 in *Z. microstomus* and *Z. uchidai*) and the location of the anal fin origin (below the spiny portion of the dorsal fin vs. below the soft-rayed portion of the dorsal fin, respectively) (Kimura and Sato, 2007; Table 1).

Table 1. Counts and measurements of *Zoarchias major* and *Zoarchias glaber*

	<i>Zoarchias major</i>					<i>Zoarchias glaber</i>
	Present study		Tomiyama (1972)	Kim and Kang (1991)	Kimura and Sato (2007)	Present study
	Korea	Japan				
Number of specimens	1	10	5	7	50	7
Total length (mm)	91.9	59.3-81.4	63.0-108.0	37.9-54.7	43.0-108.0	74.9-86.5
Counts						
Dorsal fin spines	31	31-36	28-31	31-35	26-36 (49)	32-37
Dorsal fin soft rays	78	74-79 (8)	78-81	77	72-85 (39)	81-85
Anal fin rays	I, 87	I, 87-89 (8)	I, 86-87	I, 87	I, 82-91 (40)	I, 92-96
Abdominal vertebrae	20	21-23	-	19-20	19-22 (48)	22-23
Caudal vertebrae	89	90-93	-	89-92	86-97 (47)	96-99
Total vertebrae	109	112-115	-	108-112	108-118 (47)	119-122
Measurements						
In % of total length						
Head length	15.7	12.7-14.2	16.4 (1)	13.9-14.7	12.5-16.8 (48)	13.2-14.0
Predorsal length	13.9	11.4-12.8	-	-	11.6-15.3 (48)	11.8-13.1
Preal length	35.7	31.7-33.9	-	33.3-37.0	30.5-35.1 (48)	30.0-32.6
Body depth	9.1	7.0-9.5	9.0 (1)	-	7.5-10.1 (46)	6.9-8.1
Postorbital length	10.3	7.3-8.4	-	-	-	7.1-8.0
In % of head length						
Eye diameter	18.8	16.0-20.9	16.9 (1)	23.8-27.0	13.5-23.7 (46)	18.3-21.9
Snout length	20.8	16.3-22.0	20.3 (1)	-	15.6-23.1 (46)	18.6-21.0
Infraorbital width	17.4	10.9-17.5	-	-	9.2-18.4 (46)	10.6-15.9
Interorbital width	13.9	10.5-16.5	5.8 (1)	15.9-20	12.0-21.0 (45)	8.3-13.9
Upper jaw length	50.0	39.4-49.5	-	-	34.4-65.2 (46)	45.1-52.2
Pectoral fin length	42.4	33.0-43.6	-	-	-	37.4-43.4

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