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Two New Records of Juvenile *Oedalechilus labiosus* and *Ellochelon vaigiensis* (Mugiliformes: Mugilidae) from Jeju Island, Korea, as Revealed by Molecular Analysis

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Abstract

Eighteen specimens of juvenile Mugilidae were collected in October 2012 from the southern coastal waters of Jeju Island, and identified based on analysis of their mitochondrial DNA16S rRNA sequences. Seventeen specimens of *Oedalechilus labiosus* and a single specimen of *Ellochelon vaigiensis* were found, constituting a new record for these species among Korean ichthyofauna. *O. labiosus* is identified by the angle at the posterior end of its mouth, which contains a round notch, a darkish dorsal margin of the pectoral fin, the presence of 33-36 lateral line scales, and 23-24 vertebrae. *E. vaigiensis* is identified by dark dorsal and pectoral fins, the presence of 26 lateral line scales, and 25 vertebrae. The proposed Korean name for *Oedalechilus* is 'Sol-ip-sung-eo-sok' and that for *Ellochelon* is 'Nup-jeok-ggo-ri-sung-eo-sok.' The proposed Korean names for the species are 'Sol-ip-sung-eo' and 'Nup-jeok-ggo-ri-sung-eo' for *O. labiosus* and *E. vaigiensis*, respectively. We present a key for identification of the Mugilidae family of species from Korea, and include these two newly recorded species.

Key words: New records, *Ellochelon vaigiensis*, *Oedalechilus labiosus*, Mugilidae, Juvenile, 16S rRNA, Jeju Island

Introduction

Various subtropical fish can be found in the waters surrounding Jeju Island, Korea (Kim and Lee, 1994), and numerous fish previously unrecorded in these waters have recently been reported (Kim, 2009). The family Mugilidae (order Mugiliformes) is widely distributed in tropical and temperate waters, with 72 species divided into 17 genera described worldwide (Nelson, 2006), among which 15 species and 7 genera have been reported from Japan (Senou, 2002). Jordan and Starks (1905) were the first to report the presence of *Mugil cephalus* Linnaeus 1758 in Korea. Subsequently, Jordan and Metz (1913) and Mori (1952) reported the presence of *Chelon haematocheilus* (Temminck and Schlegel, 1845) and *Chelon affinis* (Günther, 1861), respectively. No other species were recorded until 2012, when *Chelon macrolepis* (Smith, 1846) and *Moolgarda seheli* (Forsskål, 1775) were collected near Jeju Island (Kwun et al., 2012a, 2012b), making a total of 5 species and 3 genera reported in Korea to date. Mugilid species are usually identified by their morphological characteristics, including the number of lateral line scales, the location and shape of the maxilla, and the development of the adipose eyelid (Thomson, 1997; Harrison and Senou, 1999; Senou, 2002). However, mugilid species are difficult to identify because their morphological characters are very similar (Thomson, 1997), and thus molecular analysis has recently been applied to the identification of juveniles of the species (Ke et al., 2009; Kwun et al., 2012b). Molecular methods have been used to identify larval and juvenile fish (Kim et al., 2008; Vandersea et al., 2008; Victor et al., 2009; Kwun and Kim, 2010; Kwun et

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al., 2012b), and have revealed a cryptic fish species (Colborn et al., 2001; Kwun et al., 2011).

In this study, mugilid juveniles were collected by scoop net in October 2012 from the southern coastal waters of Jeju Island. Among the specimens collected, we identified *Oedalechilus labiosus* (Valenciennes, 1836) and *Ellochelon vaigiensis* (Quoy and Gaimard, 1825) using molecular methods. Only two species of *Oedalechilus* Fowler, 1903 and a single species of *Ellochelon* Whitley, 1930 are recognized worldwide, and none has previously been reported in Korea. In this study, we report two unrecorded mugilid species from Jeju Island.

Materials and Methods

Eighteen specimens of mugilid juvenile were collected from Yerae Port, Seogwipo, Jeju Island, by scoop net in October 2012, and fixed in 99% ethanol as whole fish (Table 1). Counts and measurements were carried out according to Thomson (1997) and recorded to the nearest 0.1 mm using vernier calipers. All fin rays and vertebrae were counted using radiograph images (HA-100; Softex, Tokyo, Japan) and lateral line scales were counted under a stereo microscope (SZX-16; Olympus, Tokyo, Japan). The specimens were kept at the Pukyong National University (PKU) and the National Institute of Biological Resources (NIBR-P), Korea (Table 1).

Genomic DNA extraction and polymerase chain reaction (PCR) for molecular identification were performed according to Kwun and Kim (2010) and Kwun et al. (2012b). Genomic DNA was extracted from muscle tissues using Chelex 100 resin (Bio-Rad, Hercules, CA, USA). PCR was used to amplify the mitochondrial DNA 16S rRNA region using a universal primer set (Palumbi, 1996): 16Sar-L (5′-CGCCTGTTTATCAAAAACAT-3′), 16Sbr-H (5′-CCGGTCTGAACTCAGATCACGT-3′). The PCR was conducted using an MJ Mini Thermal Cycler PTC-1148 (Bio-Rad) with the PCR solution containing 10 μL of genomic DNA, 5 μL of 10× PCR buffer, 2.4 μL of 2.5 mM dNTPs, 1 μL of each primer, 0.5 μL of FR-Taq polymerase (BioMedics, Seoul, Korea), and distilled water to bring the final volume to 50 μL. The PCR was carried out under the following conditions: initial denaturation at 95°C for 5 min, 35 cycles of denaturation at 95°C for 1 min, annealing at 50°C for 1 min, extension at 72°C for 1 min, and a final extension at 72°C for 5 min. DNA was sequenced on an ABI 3730XL Sequencer (Applied Biosystems, Foster City, CA, USA) using the ABI PRISM BigDye Terminator v3.1 Ready Reaction Cycle Sequencing Kit (Applied Biosystems). The nucleotide sequences were deposited in the DDBJ/EMBL/GenBank databases (accession nos. KC741193-KC741194). Sequences were aligned using ClustalW (Thompson et al., 1994) in BioEdit ver. 7 (Hall, 1999), and sequences of *O. labiosus* (JQ060872) and *E. vaigiensis* (JQ060692) from the National Center for Biological Information (NCBI) database, and *C. macrolepis* (PKU 7595, KC741195) and *M. seheli* (PKU 7596, KC741196), were used for molecular comparisons (Table 1). *Girella punctata* and *Terapon jarbua* from the NCBI database were selected as outgroups (Table 1). Genetic distances were calculated using the Kimura two-parameter method (Kimura, 1980) and MEGA 5 (Tamura et al., 2011). A neighbor-joining (NJ) tree was constructed with the Kimura two-parameter method (Kimura, 1980) and 10,000 bootstrap replications using MEGA 5 (Tamura et al., 2011).

Results and Discussion

Oedalechilus Fowler, 1903

(new Korean name: Sol-ip-sung-eo-sok)

Oedalechilus Fowler, 1903: 748 (type species: *Mugil labeo* Cuvier, 1829).

Plicomugil Schultz in Schultz, Herald, Lachner, Welander and Woods, 1953: 320 (type species: *Mugil labiosus* Valenciennes, 1836).

Description

Preorbital containing deep notch and round posterior tip; slender maxilla, slightly curved downward, and with the posterior tip slightly visible when mouth is closed; upper lip thick and broad, lower lip thin; lip with file-like margins; teeth on

Table 1. List of specimens of the present study

Species	No. of specimens	Locality	Date	Voucher no.	Accession no.
Mugilidae sp. 1	16	Jeju, Jeju-do	5 Oct 2012	PKU 7610-7625	KC741193 (PKU 7610)
Mugilidae sp. 1	1	Jeju, Jeju-do	5 Oct 2012	NIBR-P19910	-
Mugilidae sp. 2	1	Jeju, Jeju-do	5 Oct 2012	NIBR-P19911	KC741194
Chelon macrolepis	1	Jeju, Jeju-do	5 Oct 2012	PKU 7595	KC741195
Moolgarda seheli	1	Jeju, Jeju-do	5 Oct 2012	PKU 7596	KC741196
Girella punctata	1	Goseong, Gyeongsangnam-do	29 Nov 2008	PKU 1160	HQ018813
Terapon jarbua	1	Jeju, Jeju-do	1 Jul 2011	PKU 6485	JQ178232

Fig. 1. *Oedalechilus labiosus*, PKU 7610 (27.5 mm standard length) collected from the southern waters of Jeju Island.

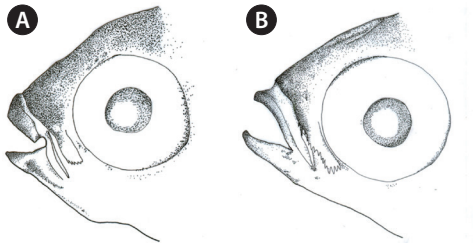

Fig. 2. Illustration of head of two Mugilidae species. (A) *Oedalechilus labiosus*, PKU 7610 and (B) *Ellochelon vaigiensis*, NIBR-P19911.

vomer and palatines; interorbital region slightly convex; adipose eyelid poorly developed; no spine on the margin of the operculum; pectoral fin length slightly longer than the head length; axillary scale small; caudal fin forked or emarginated; body covered with cycloid scales; 32-52 lateral line scales (Schultz et al., 1953; Thomson, 1997; Harrison and Senou, 1999).

Remarks

Only two species, *Oedalechilus labeo* and *O. labiosus*, have been reported in the genus *Oedalechilus*, and they are distinguishable by the number of lateral line scales (48-52 in *O. labeo* vs. 32-37 in *O. labiosus*) and their distributions (Mediterranean Sea for *O. labeo* vs. the Indo-Pacific Ocean for *O. labiosus*) (Thomson, 1997; Harrison and Senou, 1999).

Oedalechilus labiosus (Valenciennes, 1836) (Table 2, Fig. 1)

(new Korean name: Sol-ip-sung-eo)

Mugil labiosus Valenciennes in Cuvier and Valenciennes, 1836: 125 (type locality: Red Sea).

Mugil joloensis Seale, 1910: 500 (type locality: Philippines).

Oedalechilus labiosus: Thomson, 1997: 543; Harrison and Senou, 1999: 2100; Randall and Lim, 2000: 625; Shen, 2001: 440; Senou, 2002: 537.

Material examined

PKU 7610-7625, 16 specimens, 23.0-29.1 mm standard length (SL); NIBR-P19910, 1 specimen, 26.7 mm SL, Yerae Port, Seogwipo, Jeju Island, Scoop net, 5 Oct 2012 (Fig. 1).

Description

Counts are shown in Table 2. Measurements, expressed as a percentage (mean in parentheses) of the SL, include the following: body depth 24.5-29.2 (27.9); head length 26.6-30.9 (28.9); head width 16.1-19.4 (17.7); snout length 6.5-8.0 (7.2); interorbital width 11.5-15.0 (13.6); eye diameter 9.1-11.2 (10.0); upper lip height 1.7-2.6 (2.2); predorsal length 53.3-62.3 (57.6); pectoral fin length 20.0-23.3 (22.0); and caudal peduncle depth 11.7-12.8 (12.3).

Head broad, and depressed dorsally; body deep and compressed posteriorly; mouth terminal; posterior tip of maxilla beyond the anterior margin of the eye; symphysis blunt; posterior margin of preorbital with 5-6 spines (Fig. 2A); upper lip thicker than lower lip; posterior end of mouth angle with round notch (Fig. 2A); posterior tip of maxilla beyond mouth angle; 1 or 2 rows of curved conical teeth on each jaw; snout short and blunt; interorbital region slightly convex; adipose eyelid absent; 2 dorsal fins completely separated, and origin of 1st dorsal fin located in the middle of the body; posterior tip of pectoral fin extending beyond the vertical line from the origin of the pelvic fin, and posterior tip of the pelvic fin extending beyond the vertical line from the origin of the 1st dorsal fin;

Table 2. Comparison of meristic characters of *Oedalechilus labiosus* and *Ellochelon vaigiensis*

	Oedalechilus labiosus			*Ellochelon vaigiensis*		
	Present study	Thomson (1997)	Harrison and Senou (1999)	Present study	Thomson (1997)	Harrison and Senou (1999)
No. of specimens	17	22	-	1	72	-
Standard length (mm)	23.0-29.1	61-180	-	16.7	10-75	-
Dorsal fin rays	IV-8-9	IV-I, 8	IV-9	IV-8	IV-i-8	IV-9
Anal fin rays	III, 8-9	III, 9	III, 9	III, 8	III, 8	III, 7-9
Vertebrae	23-24	-	-	25	-	-
Lateral line scales	33-36	34-36	32-37	26	24-26	25-29
Transverse scales	11-12	12	11-12	9	8	8-10

Table 3. Nucleotide variable position in consensus sequences of the 16S rRNA

Species	Position																												
	1	1	1	3	5	5	6	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	1	1	1	3	5	5	6	0	3	8	0	0	0	4	4	4	4	5	5	6	6	6	6	6	7	7	7	8	
	2	6	7	5	4	5	1	9	8	4	1	4	5	2	3	4	5	4	5	1	3	4	8	9	2	4	8	0	
Mugilidae sp. 1 (KC741193)	T	T	T	C	T	-	C	C	G	T	A	A	T	T	T	C	G	G	T	C	A	T	C	T	-	T	C	-	
Oedalechilus labiosus (JQ060872)	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	-	•	•	-	
Mugilidae sp. 2 (KC741194)	•	C	C	•	•	-	•	•	•	•	•	•	•	•	•	T	•	A	•	•	G	•	•	•	-	•	•	-	
Ellochelon vaigiensis (JQ060692)	•	C	C	•	•	-	•	•	•	•	•	•	•	•	•	T	•	A	•	•	G	•	•	•	-	•	•	-	
Chelon macrolepis (KC741195)	C	C	•	T	•	G	•	T	A	•	•	C	C	A	•	•	A	A	C	A	G	C	•	•	A	G	T	-	
Moolgarda seheli (KC741196)	C	•	•	•	C	A	T	•	A	C	G	C	C	•	C	•	A	A	C	•	G	C	T	C	C	•	•	T	
	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
	8	8	9	9	9	0	0	0	0	0	1	2	3	4	5	5	6	6	6	6	7	7	7	7	7	7	7	8	
	1	5	0	7	8	4	5	6	7	9	6	9	8	5	2	9	0	1	8	9	0	1	2	3	4	5	9	0	
Mugilidae sp. 1 (KC741193)	A	A	T	A	C	T	C	T	C	-	T	C	G	A	T	T	G	G	C	-	-	-	-	C	T	C	C	C	
Oedalechilus labiosus (JQ060872)	•	•	•	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	-	-	-	-	•	•	•	•	•	
Mugilidae sp. 2 (KC741194)	•	•	C	•	•	C	•	•	•	-	•	•	•	•	C	•	•	A	A	-	-	-	-	•	•	T	T	•	
Ellochelon vaigiensis (JQ060692)	•	•	C	•	•	C	•	•	•	-	•	•	•	•	C	•	•	A	A	-	-	-	-	•	•	T	T	•	
Chelon macrolepis (KC741195)	G	•	•	•	T	•	T	C	•	C	C	T	T	•	C	C	A	•	A	-	-	-	-	T	•	A	•	T	
Moolgarda seheli (KC741196)	•	G	•	G	•	•	T	C	T	-	•	•	•	T	•	C	•	•	•	A	A	T	C	T	C	A	•	•	
	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4														
	8	0	1	1	1	1	2	2	2	3	3	5	5	9	9	-	-	-	-	-	-	-	-	-	-	-	-	-	
	8	7	0	3	4	6	4	3	4	7	8	1	5	5	7														
Mugilidae sp. 1 (KC741193)	T	A	G	T	T	C	-	A	A	-	-	A	G	C	A	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oedalechilus labiosus (JQ060872)	•	•	•	•	•	•	-	•	•	-	-	•	•	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mugilidae sp. 2 (KC741194)	•	•	•	•	•	•	-	•	•	-	-	•	•	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ellochelon vaigiensis (JQ060692)	•	•	•	•	•	•	-	•	•	-	-	•	•	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chelon macrolepis (KC741195)	•	•	A	C	A	T	-	T	•	-	-	G	A	T	•	-	-	-	-	-	-	-	-	-	-	-	-	-	
Moolgarda seheli (KC741196)	C	G	•	C	•	•	A	T	T	C	T	G	•	•	C	-	-	-	-	-	-	-	-	-	-	-	-	-	

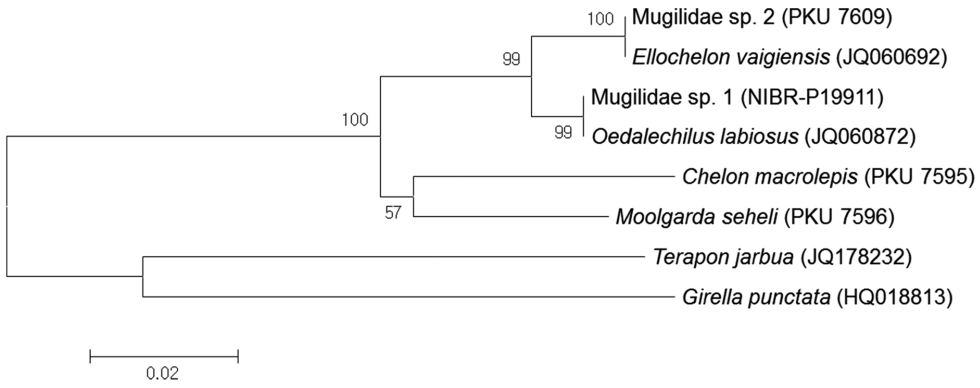

Fig. 3. Neighbor joining tree showing the relationships among four mugilids species including two mugilids juveniles (Mugilidae sp. 1 and 2). *Terapon jarbua* and *Girella punctata* are outgroups. Numbers at branches indicate bootstrap probabilities in 10,000 bootstrap replications. Bar indicates genetic distance of 0.02.

origin of the anal fin located in front of the vertical line from the origin of the 2nd dorsal fin; pectoral fin with small axillary scales; caudal fin emarginated; head and body covered with cycloid scales.

Coloration

When fresh, the head and body are silver-whit, darkening dorsally. Both lips are dark. All fins are semitransparent. Tiny melanophores are present on the membranes of the dorsal, caudal, and anterior region of anal fins, with no melanophores on the pelvic fin. Dorsally, the margin of the pectoral fin is dark. After alcohol fixation, the head and body turned a darker silver–white.

Molecular identification

Based on analysis of a 592-base pair (bp) mitochondrial DNA 16S rRNA sequence, Mugilidae sp. 1 corresponds to *O. labiosus* at a genetic distance of 0.000, but differs from Mugilidae sp. 2 and *E. vaigiensis* with a genetic distance of 0.020, *M. seheli* at 0.058, and *C. macrolepis* at 0.068. The differences are shown as DNA variations between position numbers 12 and 497 (Table 3). In the NJ tree, Mugilidae sp. 1 clustered with *O. labiosus*, which was corroborated by a high bootstrap value of 99% (Fig. 3).

Distribution

Oedalechilus labiosus is distributed throughout the Indo-Pacific Ocean including the Red Sea (Thomson, 1997; Harrison and Senou, 1999), Japan (Senou, 2002), Taiwan (Shen, 2001), the South China Sea (Randall and Lim, 2000), and the Philippines (Seale, 1910). In Korea it occurs in the southern waters of Jeju Island (found in this study).

Remarks

Based on the original description of *O. labiosus* (Cuvier and Valenciennes, 1836), the 17 specimens of Mugilidae sp. 1 collected from the southern waters of Jeju Island closely resemble this species, notably in having a deep body and an exposed posterior tip of the maxilla, and in the number of dorsal and anal fin rays. They also have a mouth angle with a round notch and 33-36 lateral line scales (Harrison and Senou, 1999; Senou, 2002), just like *O. labiosus*. According to the NCBI database, they had 100% sequence identity with sequences of *O. labiosus*. Therefore, our specimens were identified as *O. labiosus* based on both morphological and molecular evidence. The adult stage of *O. labiosus* has lips with file-like margins, and the ventral margin of the preorbital has a deep V-shaped notch, but these features were not evident in our juvenile specimens; this difference in morphological characteristics may be a consequence of ontogenetic variation. This characteristic is important in distinguishing the species from the five other mugilid species reported from Korea (i.e., file-like lips in *O. labiosus* vs. smooth in the five mugilid species) (Senou, 2002). We propose a Korean name of 'Sol-ip-sung-eo-sok' for the genus *Oedalechilus* and 'Sol-ip-sung-eo' for *O. labiosus*.

Ellochelon Whitley, 1930

(new Korean name: Nup-jeok-ggo-ri-sung-eo-sok)

Ellochelon Whitley, 1930: 251 (type species: *Mugil vaigiensis* Quoy and Gaimard, 1825).

Description

Posterior tip of preorbital broad and square; maxilla slender, curved downward, and the posterior tip visible when mouth is closed; lips thin; lower margin of upper lip smooth; teeth on vomer and palatines; interorbital region slightly convex; adipose eyelid poorly developed; caudal fin truncated; body covered with ctenoid scales (cycloid in juvenile); 24-29 lateral line scales; pectoral fin black (Thomson, 1997; Harrison and Senou, 1999; Senou, 2002).

Fig. 4. *Ellochelon vaigiensis*, NIBR-P19911 (16.7 mm standard length) collected from the southern waters of Jeju Island.

Remarks

Only one species, *E. vaigiensis*, is recorded in the genus *Ellochelon* (Eschmeyer, 2012), which differs from the genus *Chelon* in pectoral fin coloration (black in the former vs. not black in the latter) and caudal fin shape (truncated vs. forked) (Senou, 2002).

Ellochelon vaigiensis (Quoy and Gaimard, 1825) (Table 2, Fig. 4)

(Korean name: Nup-jeok-ggo-ri-sung-eo)

Mugil vaigiensis Quoy and Gaimard, 1825: 337 (type locality: Indonesia).

Mugil melanochir Valenciennes in Cuvier and Valenciennes, 1836: 143 (type locality: Indonesia).

Liza vaigiensis: Thomson, 1997: 537; Harrison and Senou, 1999: 2094; Kim et al., 2010: 143.

Ellochelon vaigiensis: Whitley, 1930: 250; Randall and Lim, 2000: 625; Senou, 2002: 537; Motomura et al., 2010: 79.

Material examined

NIBR-P19911, 1 specimen, 16.7 mm SL, Yerae Port, Seogwipo, Jeju Island, Scoop net, 5 Oct 2012 (Fig. 3).

Description

Counts are shown in Table 2. Measurements, expressed as a percentage of the SL, include: body depth 28.7; head length 32.9; head width 19.2; snout length 8.4; interorbital width 15.6; eye diameter 10.8; upper lip height 1.8; predorsal length 58.7; pectoral fin length 12.6; and caudal peduncle depth 18.0.

Head broad and depressed dorsally; body deep and compressed posteriorly; mouth terminal, with posterior tip of the maxilla reaching to the anterior margin of the eye; symphysis slightly pointed; posteroventral margin of the preorbital with numerous spines (Fig. 2B); both lips thin; posterior tip of the maxilla beyond the mouth angle; 1-2 rows of curved conical teeth on each jaw; snout short and slightly pointed; interorbital region slightly convex; adipose eyelid absent; 2 dorsal fins completely separated, and origin of the 1st dorsal fin located behind the midline of the body; posterior tip of the pectoral fin beyond a vertical line at the origin of the pelvic fin, and posterior tip of pelvic fin beyond a vertical line at the origin of the 1st dorsal fin; origin of anal fin located in front of a vertical line at the origin of the 2nd dorsal fin; pectoral fin without axillary scales; caudal fin truncated; head and body covered with cycloid scales.

Coloration

When fresh, the head and body are silver-white and darkish yellow dorsally. Both lips are dark. The dorsal and pectoral fins are black, and the pelvic, anal, and caudal fins are semi-transparent. The pelvic and anal fins are yellowish; the caudal fin is light yellow, with tiny melanophores on the membrane. After alcohol fixation, the head and body were darkish silver-white; and the yellow color of the pelvic, anal, and caudal fins graded to colorless.

Molecular identification

Based on analysis of a 592-bp mitochondrial DNA 16S rRNA sequence, Mugilidae sp. 2 corresponded to *E. vaigiensis* at a genetic distance of 0.000, and differed from Mugilidae sp. 1 and *O. labiosus* at a distance of 0.020, *C. macrolepis* at 0.068, and *M. seheli* at 0.071. Their differences were shown by DNA variations between positions 12 and 497 (Table 3). In the NJ-tree, Mugilidae sp. 2 clustered with *E. vaigiensis*, which was corroborated by a high bootstrap value of 100% (Fig. 3).

Distribution

Ellochelon vaigiensis is distributed throughout the Indo-Pacific Ocean (Thomson, 1997; Harrison and Senou, 1999), Japan (Senou, 2002; Motomura et al., 2010), the South China Sea (Randall and Lim, 2000), and Indonesia (Quoy and Gaimard, 1825; Cuvier and Valenciennes, 1836). In Korea, the species occurs in the southern waters of Jeju Island (this study).

Remarks

Based on the original description of *E. vaigiensis* (Quoy and Gaimard, 1825), the single specimen of Mugilidae sp. 2 collected from the southern waters of Jeju Island matches this species, having a smooth lip margin, the same coloration, and number of dorsal and anal fin rays. It has a black pectoral fin and 26 lateral line scales, also consistent with *E. vaigiensis* (Harrison and Senou, 1999; Senou, 2002). We found that the specimen had 100% sequence identity with *E. vaigiensis* sequences on the NCBI database. Our specimen was therefore identified as *E. vaigiensis*, based on both morphological and molecular evidence. Comparison of *E. vaigiensis* with the five mugilid species reported from Korea indicate that the species differs in the color of the pectoral fin (black in *E. vaigiensis* vs. light or dark gray in the five mugilid species) and the shape of the caudal fin (truncated in *E. vaigiensis* vs. forked or emarginated in the five mugilid species) (Senou, 2002). We propose the Korean names 'Nup-jeok-ggo-ri-sung-eo-sok' for the genus *Ellochelon* and 'Nup-jeok-ggo-ri-sung-eo' for *E.*

vaigiensis, following Kim et al. (2010).

Key to the species of family Mugilidae from Korea

1a. Posterior end of mouth angle with round notch. Margin of upper lip with file-like except during early life stage. ····· Sol-ip-sung-eo (new Korean name) *Oedalechilus labiosus*
1b. Posterior end of mouth angle without round notch. margin of upper lip smooth. ····· 2
2a. Pectoral fin black. Caudal fin truncate. ····· ····· Nup-jeok-ggo-ri-sung-eo *Ellochelon vaigiensis*
2b. Pectoral fin light or dark gray. Caudal fin emarginate or forked. ····· 3
3a. Posterior end of maxilla reaching to mouth angle. ····· ····· Sung-eo *Mugil cephalus*
3b. Posterior end of maxilla beyond mouth angle. ····· 4
4a. Posterior margin of scales on middle of body with membrane. When mouth closed, posterior tip of maxilla not exposed or slightly visible. ····· ····· Cho-seung-ggo-ri-sung-eo *Moolgarda seheli*
4b. Posterior margin of scales on middle of body without membrane. When mouth closed, posterior tip of maxilla exposed. ····· 5
5a. Keel in front of dorsal fin. ····· ····· Deung-jul-sung-eo *Chelon affinis*
5b. No keel in front of dorsal fin. ····· 6
6a. Lateral line scales 30-34. ····· ····· Keun-bi-neul-sung-eo *Chelon macrolepis*
6b. Lateral line scales 38-44. ····· ····· Ga-sung-eo *Chelon haematocheilus*

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