

Taxonomic Notes on the Rare Eelpout, *Davidijordania lacertina* (Perciformes, Zoarcidae)

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Abstract Morphological characters of the rare eelpout, *Davidijordania lacertina*, were revised based on a specimen collected from the Sea of Japan off South Korea in 1993. *Davidijordania lacertina* likely comprises a monophyletic group with *Davidijordania poecilimon* and *Davidijordania yabei* in sharing an apomorphic condition: dark stripes on the head. The Korean specimen is the first occurrence from outside Russia for the species.

Key words: Zoarcidae, *Davidijordania lacertina*, morphology, Sea of Japan, South Korea.

Introduction

The zoarcid *Davidijordania lacertina* was originally described by Pavlenko (1910) as *Lycenchelys lacertinus* on the basis of three syntypes from Peter the Great Bay. The genus *Davidijordania* was established for the species by Popov (1931). According to Anderson and Fedorov (2004), this genus contains the following four species: *Davidijordania brachyrhyncha* (Schmidt, 1904), *Davidijordania jordaniana* Schmidt, 1936, *Davidijordania poecilimon* (Jordan and Fowler, 1902) and *D. lacertina*. Recently, Anderson and Imamura (2008) described *Davidijordania yabei* based on 11 specimens from Japan and Russia. All species except for *D. poecilimon* are very rare (Sokolovskaya *et al.*, 1998; Fedorov *et al.*, 2003) and the genus is in need of revision (Anderson and Fedorov, 2004). Especially, detailed morphological data of the type species (*D. lacertina*) has been lacking.

Schmidt (1936) added Vladimir Bay (Russia) to the distribution of *D. lacertina*, but did not give detailed specimen data. Except for three syntypes (whereabouts unknown, see Anderson

and Fedorov, 2004), two additional specimens (69 and 170 mm in total length: TL) were reported from Peter the Great Bay (type locality) by Lindberg and Krasnyukova (1975). Recently, Balanov *et al.* (2006) reported two specimens (140–157 mm TL) from Peter the Great Bay and briefly described some morphological characters.

In 1993, a single specimen of *D. lacertina* was collected from the Sea of Japan off the Korean Peninsula near the border between the Republic of Korea and the Democratic People's Republic of Korea. We herein describe the external and internal morphologies of this specimen.

Materials and Methods

The specimen examined here is deposited in the Department of Biology, College of Natural Sciences, Chonbuk National University, Republic of Korea (CNUC); comparative specimens in the Hokkaido University Museum, Hakodate (HUMZ), the National Museum of Nature and Science, Tokyo (NSMT) and the National Museum of Natural History, Smithsonian Institution (USNM). Counts were made from radi-

ographs, and measurements with digital caliper to the nearest 0.1 mm following Anderson (1982). Standard length (SL) and head length (HL) are used throughout.

Osteological characters were observed from both radiographs and three-dimensional skull images constructed from X-ray CT scanning equipment for laboratory animals (LCT-100; Aloka, Tokyo).

Systematic Accounts

Order Perciformes

Suborder Zoarcoidei

Family Zoarcidae

Davidjordania lacertina (Pavlenko, 1910)

[New Korean name: Kin-munzagalchi]

[Japanese name: Naga-sarasagaji]

(Figs. 1–4, Table 1)

Lycenchelys lacertinus Pavlenko, 1910: 53, figs. 10–11 (original description, Peter the Great Bay); Soldatov and Lindberg, 1930: 499.

Davidjordania lacertina [sic]: Schmidt, 1936: 99 (Peter the Great Bay and Vladimir Bay); Lindberg and Krasnyukova, 1975: 174, fig. 135 (keys, description, Peter the Great Bay).

Davidjordania lacertina: Matsubara, 1955: 780 (key); Toyoshima, 1984: 305; Andrianov and Kussakin, 1998: 327 (list); Sokolovskaya *et al.*, 1998: 7 (list); Anderson and Fedorov, 2004: 4, 43 (list); Balanov *et al.*, 2006: 256 (description, Peter the Great Bay).

Material examined. CNUC 34536, 1 specimen, male, 161.5+mm SL (25.9 mm HL), Sea of Japan off Mukho-dong Donhae City, Kanwon-do, South Korea (37°31'N, 129°02'E), April 1993 (date unknown).

Description. Because tail tip is broken, standard and total lengths cannot be measured. Predorsal length about equal to HL (101.5% HL); prepectoral length slightly larger than HL (103.1%); preanal length slightly smaller than twice of HL (196.9%). Proportions in HL: body depth 40.9% at pelvic fin origin and 27.4% at anal fin origin; prepelvic fin length 88.0%; snout length 24.3%; eye diameter 18.9%; interorbital width 3.9%; gill slit length 24.3%; upper jaw

Table 1. Counts and proportional measurements of *Davidjordania lacertina* from South Korea and Russia.

	CNUC 34536	Balanov <i>et al.</i> (2006)
	n=1	n=2
SL (mm)	161+	138–154
Counts		
Precaudal vertebrae	22	22
Caudal vertebrae	94+	98
Total vertebrae	116+	120
Pectoral fin rays	17	15–16
Pelvic fin rays	3	3
Pseudobranch filaments	4	4–5
Vomerine teeth	4	3
Palatine teeth	13–14	10–11
Nasal pores	2	2
Interorbital pores	1	1
Suborbital pores	7	6–7
Postorbital pores	4	4–5
Occipital pores	2	3
Mandibular pores	4	4
Preopercular pores	4	4
Proportional measurements (% HL)		
Snout length	24.3	24.4–24.8
Eye diameter	18.9	20.5
Upper jaw length	48.7	45.4–46.7
Gill slit length	24.3	4.4–28.6

length 48.7%; postorbital head length 55.7%; pectoral fin length 55.6%; pelvic fin length 63.3%. Vertebrae more than 116 [=22 (abdominal vertebrae)+more than 94 (caudal)]; dorsal fin rays more than 108 (last ray remains on 89th caudal vertebra); anal fin rays more than 90 (last ray remains on 90th caudal vertebra); pectoral fin rays 17; pelvic fin rays 3; gill rakers 1+1+9=11; pseudobranch filaments 4; pyloric caeca 2, nub-like. Body elongate, compressed laterally, cross section elliptical. Scales absent on head, nape and fin membranes, but present on body including abdomen. Dorsal fin origin above posterior end of opercle. Opercular flap at upper margin of gill slit well developed. Pectoral fin origin at about level of body midline. Posterior margin of pectoral fin almost rounded. Pelvic fins present. Lateral line mediolateral, incomplete, ends in anterior part of abdomen. Head large, its dorsal profile convex at snout. Nostril tube small, not reaching upper lip when pressed forward.



Fig. 1. *Davidjordania lacertina*, CNUC 34536, 161+mm SL, from the Sea of Japan off Korea.

Mouth large, posterior end of upper jaw extending beyond a vertical line through posterior end of pupil. Eye ovoid, not entering dorsal profile of head. Interorbital space narrow, flattened. Gill slit wide, extending below a horizontal between 14th and 15th pectoral fin rays. Both jaws with enlarged conical teeth; anterior teeth in a patch, others in a single row. Four teeth on vomer; 14 teeth on palatine (13 in right). Head pores small, rudimentary: nasal pores 2; interorbital pore 1; suborbital pores 7; postorbital pores 4; occipital pores 2; preoperculo-mandibular pores 8.

Coloration in preservative. Dark stripes on dorsal and lateral surface of head (Figs. 1–2). Anterior 1/3 of upper lip heavily pigmented ventrally; anterior tip of lower lip slightly pigmented. Ventral midline and adjacent areas of head with dark pigment. Ventral half of body with isolated groups of large dark spots in which 3 form an angle and sometimes fused to one another.

Osteology. Six suborbital bones present, forming semicircle around eye, the first largest and

plate-like, the others tube-like. Premaxilla comprising a short ascending process and long, dentigerous premaxillary process (Fig. 3). Maxilla long and robust. Retroarticular firmly attached to anguloarticular. Mesopterygoid attached to ectopterygoid and separated from metapterygoid and quadrate. Metapterygoid with a notch for symplectic dorsoposteriorly. Metapterygoid articulating with hyomandibula and symplectic posteriorly. Hyomandibula with three articular heads dorsally, anterior two attached to neurocranium and posteriormost to opercle and not elongate. Preopercle crescent-shaped, with 3 pores (preoperculo-mandibular pores 6–8 in Fig. 2) opening from interior canal; 4 pores (preoperculo-mandibular pores 1–4) arising from dentary and 1 (pore 5) from anguloarticular. Opercle triangular. Ceratohyal-epihyal juncture smooth. Branchiostegal rays 4+2=6, anterior 4 on ceratohyal and remainder on epihyal. Posttemporal long, ventral ramus weak.

Remarks. The specimen can be identified as *D.*

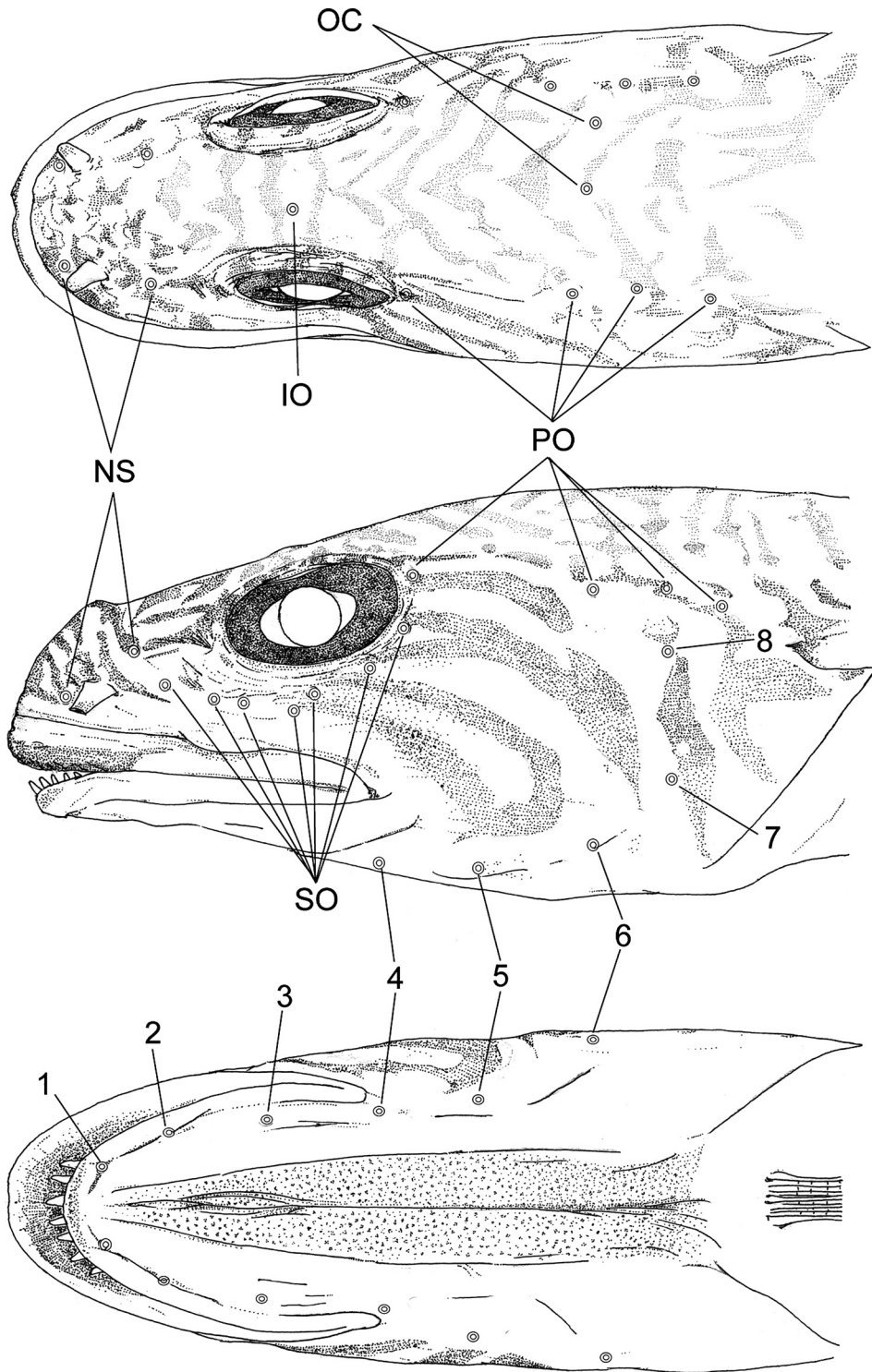


Fig. 2. Head pores and pigmentation of *Davidijordania lacertina*, CNUC 34536. IO, interorbital pore; NS, nasal pores; OC, occipital pores; PO, postorbital pores; SO, suborbital pores. Numbers indicate preoperculo-mandibular pores.

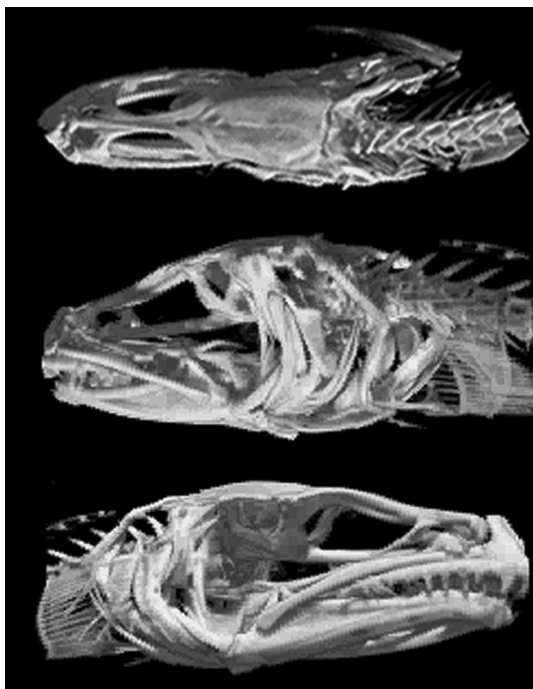


Fig. 3. CT scanning images of *Davidjordania lacertina*, CNUC 34536. Top, dorsal view; middle, left side of lateral view; bottom, right side of lateral view.

lacertina in having the following characters: snout length more than eye diameter; ventral half of body with isolated groups of large dark spots in which 3 form an angle and sometimes fused to one another.

Although Lindberg and Krasnyukova (1975) showed an illustration of a specimen of *D. lacertina* without dark stripes or dark blotches on the head, Pavlenko's original description (Fig. 4) showed that this species had the bands and blotches as shown in the present specimen. Toyoshima (1984) mistakenly described characters of this species as “[c]heek without band-like blotches” based on the illustration of Lindberg and Krasnyukova (1975), followed by Hatooka (2002). Balanov *et al.* (2006) reported the dark stripes on the head of their specimens, too.

Our specimen is different from the specimens of Balanov *et al.* (2006) in having only 2 occipital pores (vs. 3), but a left pore is abnormally absent (Fig. 2). Although the Korean specimen has



Fig. 4. Dorsal view of *Davidjordania lacertina*. From Pavlenko (1910: fig. 10).

slightly higher counts in pectoral fin rays and palatine teeth (Table 1), this is intraspecifically variable in zoarcids (see Anderson, 1982, 1994).

There are two morphological groups in the 5 species of *Davidjordania* (Anderson and Imamura, 2009). Group 1 (sensu Anderson and Imamura, 2008) containing *D. brachyrhyncha* and *D. jordaniana*, is defined by less than 110 vertebrae and slightly restricted gill slit. Group 2 (sensu Anderson and Imamura, 2008) containing *D. lacertina*, *D. poecilimon* and *D. yabei*, is defined by more than 112 vertebrae and large gill slit. In addition to these characters, dark stripes on the head separate Group 2 from Group 1. Group 2 is likely monophyletic because dark bands on the head are rare and may be apomorphic among the subfamily Gymnelinae (sensu Anderson, 1994) which includes *Davidjordania*.

Because *D. lacertina* is distributed in the Sea of Japan, the species is cited in books and treated

inclusive of the ichthyofauna and/or keys of Japanese fishes (e.g., Matsubara, 1955; Toyoshima, 1984), there are no collection records from Japanese waters (Hatooka, 2002). The Korean specimen is the first occurrence outside Russia for the species.

Comparative materials examined. *Davidijordania brachryncha*: HUMZ 70868, 1 specimen, 123 mm SL mm SL, Sea of Okhotsk (55°32'N, 137°37.5'E), 24 July 1917; *Davidijordania jordaniana*: USNM 92585, 1 specimen, 129.5 mm SL, Sea of Okhotsk, 1912 (date and month unknown); *Davidijordania poecilimon*: NSMT-P 64996, 1 specimen, 153.5 mm SL, Pacific coast off Honshu Island, Japan (36°30.9'N, 140°59.6'E–36°29.4'N, 140°58.5'E), 250 m depth, 18 April 1996.

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