

## Redescription of the Zoarcid Fish *Lycozoarces regani*

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**Abstract** The genus *Lycozoarces* has included two nominal species: *L. regani* Popov and *L. hubbsi* Popov. *L. regani* was based on the female and *L. hubbsi* on the male, and differences between them are due to sexual dimorphism. *L. hubbsi* is a junior synonym of *L. regani*. Meristic and morphometric data and color notes are presented. A specimen from the Okhotsk coast of Hokkaido represents the first record of *L. regani* from Japan.

The genus *Lycozoarces* Popov, 1933, is one of the most distinctive genera of the Zoarcidae in having the branchiostegal membranes broadly united and forming a fold across the isthmus.

Two nominal species, *Lycozoarces regani* Popov, 1933, and *L. hubbsi* Popov, 1935 were considered distinct by Taranetz (1937) and Lindberg and Krasnyukova (1975), whereas *L. regani* was considered to be a synonym of *L. hubbsi* by Schmidt (1950) and Matsubara (1955). The present author has questioned the validity of these two forms, because none of the authors have clearly stated the reasons for their taxonomical treatment. Recently, the present author obtained two specimens identical with *L. regani* and two specimens identical with *L. hubbsi*, all from the Okhotsk Sea, collected by trawl. On the basis of these specimens, the validity of the two species is discussed from the viewpoint of sexual dimorphism and priority.

All specimens used in this study are deposited in the Laboratory of Marine Zoology, Hokkaido University (HUMZ). Measurements follow Hubbs and Lagler (1958). Vertical fin rays and vertebrae were counted from radiographs.

### Genus *Lycozoarces* Popov, 1933

*Lycozoarces* Popov, 1933: 151, type species, *Lycozoarces regani* Popov, 1933; Popov, 1935: 303; Taranetz, 1937: 166; Schmidt, 1950: 109; Matsubara, 1955: 783; Lindberg and Krasnyukova, 1975: 124.

**Diagnosis.** Body elongate and compressed. Head large. Lips fleshy. Teeth on jaws, vomer, and palatines. Branchiostegal mem-

branes widely connected and forming a very wide fold across isthmus. Pores on head well developed. Lateral line distinct, mediolateral. Pelvic fin present.

*Lycozoarces regani* Popov, 1933  
(Japanese name: Sedaka-genge)  
(Fig. 1)

*Lycozoarces regani* Popov, 1933: 151, fig. 1 (type locality, Tatar Strait); Taranetz, 1937: 166; Lindberg and Krasnyukova, 1975: 124, figs. 100, 101.

*Lycozoarces hubbsi* Popov, 1935: 303, 1 unnumbered fig; Taranetz, 1937: 166; Schmidt, 1950: 109, pl. 10, fig. 2; Matsubara, 1955: 783; Ueno, 1971: 87; Lindberg and Krasnyukova, 1975: 125, fig. 102.

Material examined: HUMZ 53939 (156.2 mm TL, male), 45°14.5'N, 143°39'E, off Esashi, Okhotsk coast of Hokkaido, depth 175 meters, June 1, 1976; HUMZ 58061 (160.8 mm TL, female), 55°30'N, 139°00'E, depth 117 meters, September 7, 1976; HUMZ 60295 (164.0 mm TL, female), 55°19'N, 142°34'E, depth 178 meters, October 23, 1976; HUMZ 61070 (175.8 mm TL, male), 55°23'N, 139°12'E, depth 120 meters, October 16, 1976.

**Description.** Dorsal 66~68; anal 51~53; pectoral 13~15; pelvic 3; caudal 11~13; vertebrae 16~17+52~54=69~71; gill rakers on first arch 4+13; branchiostegals 6. In TL: head length 4.8~5.2, snout to anal-fin origin 2.3~2.5, predorsal length 4.2~5.2, depth of body at origin of anal fin 5.7~7.0, pectoral fin 7.1~8.7, highest dorsal ray 5.9~6.3 in male and 15.2~15.9 in female. In HL: pectoral fin 1.4~1.7, upper jaw 1.7~2.4, snout 5.4~6.4, interorbital width 6.5~10.4.

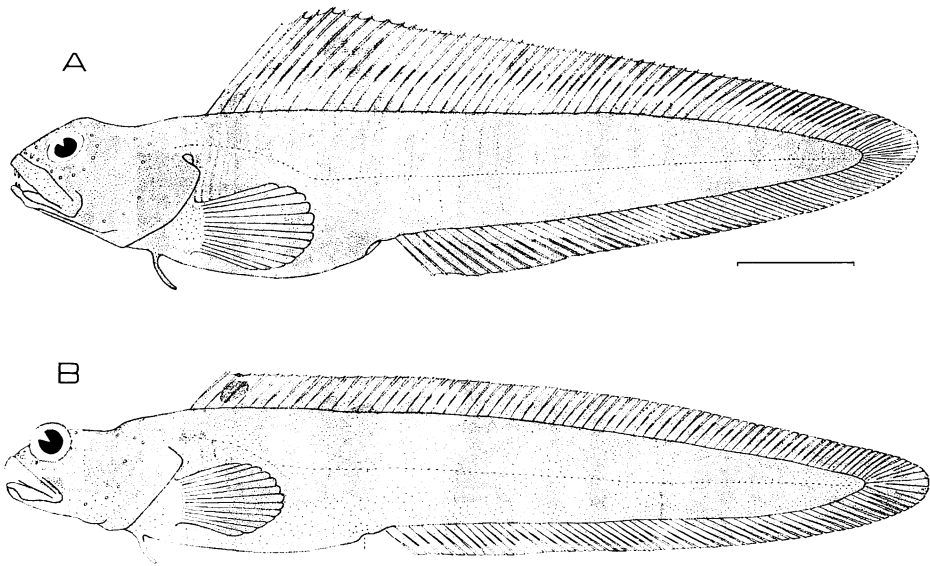


Fig. 1. Illustrations showing male (A) and female (B) of *Lycozoarces regani*. A: HUMZ 53939 (156.2 mm TL). B: HUMZ 60295 (164.0 mm TL). Scale indicates 20 mm. The difference in the position of eye is due to artifact.

Table 1. Comparison of the specimens examined in this study with those of *Lycozoarces regani* and *L. hubbsi* described by Lindberg and Krasnyukova (1975).

Character	<i>L. regani</i>	<i>L. hubbsi</i>	HUMZ			
			53939	61070	58061	60295
Total length (mm)	76~142	?~180	156.2	175.8	160.8	164.0
No. of specimens	8	2	1	1	1	1
Sex	—	—	male	male	female	female
In TL:						
Head length	4.2~5.0	4.0~4.5	5.0	4.8	5.2	5.2
In HL:						
Eye diameter	2.8~3.7	4.0~4.1	4.5	4.6	3.8	3.5
In eye diameter:						
Interorbital width	2.0~4.0	2.2~2.4	1.5	1.7	2.7	2.7
Pelvic fin length	0.9~1.3	ca. 1.0	0.8	0.8	1.1	1.3
In depth of body:						
Dorsal ray length	1.4~2.1	0.8~0.9	1.0	1.0	2.7	2.3
Counts:						
Dorsal rays	64~69	64~67	66	68	68	67
Anal rays	49~54	49~53	52	53	52	51
Pectoral rays	15	15	13	15	15	15
Caudal rays	13~14	13~14	13	13	11	13
Vertebrae	66~71	65~68	70	69	71	69

Body more or less elongate, compressed, and completely scaleless. Head large, about 1/5 of total length. Snout short and blunt. Upper jaw edge extending below posterior half of

eye or beyond posterior margin of eye. Eye round or slightly oblong, its diameter more than 1/5 of head length. Interorbital space narrow and convex. Gill rakers various in

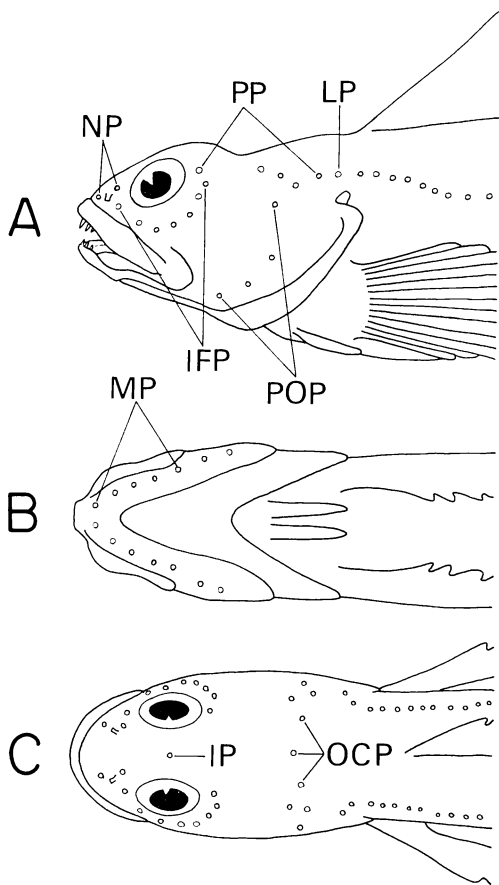


Fig. 2. Schematic illustrations showing the arrangement of head pores in *Lycozoarces regani*. IFP, infraorbital pore; IP, interorbital pore; LP, lateral line pore; MP, mandibular pore; NP, nasal pore; OCP, occipital pore; POP, preopercular pore; PP, postorbital pore. A~C: HUMZ 53939 (156.2 mm TL, male).

shape, conical or with tips divided into 3 or 4 lobes. A small slit behind last gill arch. Pseudobranchia consisting of 13 filaments. Palatal membrane developed. Teeth conical; those on upper jaw in 2 irregular rows of about 7 teeth anteriorly, in a single row of about 11 teeth laterally; those on lower jaw in 3 or 4 rows of about 9 teeth anteriorly, in a single row of about 12 teeth laterally; vomer with 6 teeth; palatine with a single row of 9 teeth. Anteriormost teeth on upper jaw largest. Vomerine and palatine teeth as large as those on lateral portion of jaws. Lateral

line mediolateral, its pores evident in anterior half of body and obscure posteriorly. Head pores well developed; nasal pores 2, postorbital pores 4, infraorbital pores 7, preopercular pores 4, mandibular pores 4, interorbital pore 1, and occipital pores 3 (Fig. 2). Vertical fins confluent. Dorsal fin originating above posterior margin of operculum. Dorsal and anal fins very high in males; dorsal fin almost equal to head in males, about 1/4 of head in females. Caudal fin more or less well developed. Pectoral fin fan-shaped, its length less than postorbital head length. Pelvic fin consisting of 3 rays, its length greater than eye diameter.

Color of fresh specimens: Brownish, with irregular dark blotches on body and vertical fins; males darker in ground color than females; head dark in both sexes; pelvic fin, anal fin and belly blackish in males, and light in females; pectoral fin blackish and its base pure white; oral and gill cavities and peritoneum light.

**Remarks.** The specimen from off Esashi, Okhotsk coast of Hokkaido, represents the first record of this species from Japan; *L. regani* has been recorded from northern Tatar Strait, northern Okhotsk Sea, and off western Kamchatka.

### Discussion

The genus *Lycozoarces* Popov, 1933, can easily be distinguished from all other genera of the Zoarcidae by the branchiostegal membranes broadly united and forming a fold across the isthmus, and by the presence of the pelvic fins. Two nominal species are known in this genus.

In 1933, Popov established *Lycozoarces regani* with a short description and an illustration of a specimen from Tatar Strait. In 1935, he erected *Lycozoarces* as a new genus, although he had already used the name for *L. regani*. Also, he described *L. hubbsi* as a new species, separating it from *L. regani* by its higher dorsal and anal rays, longer upper jaw, and coloration. Tarantetz (1937) listed these two species (noting that *L. regani* might prove to be a synonym of *L. hubbsi*). Lindberg and Krasnyukova (1975) gave rather detailed descriptions of these species (Table 1). Schmidt (1950) considered *L. regani* a synonym of *L. hubbsi* because, after comparing his

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 Table 2. Comparison of the specimens examined in this study with those of *Lycozoarces hubbsi* of Schmidt (1950).

Characters	Schmidt (1950)*		HUMZ			
			53939	61070	58061	60295
Standard length (mm)	146~176	140~195	145.2	163.0	149.4	151.2
No. of specimens	3	2	1	1	1	1
Sex	male	female	male	male	female	female
% of SL:						
Depth of body	11.4~15.1	12.5~13.0	13.8	13.6	19.1	15.6
Head length	21.2~22.6	20.2~21.4	21.5	22.7	20.9	20.7
Predorsal length	21.3~22.8	20.0~20.7	22.7	25.8	21.4	20.9
Snout to anal-fin origin	41.7~42.7	39.2~43.5	45.4	43.2	46.6	43.5
Pectoral fin length	13.3~15.4	11.7~12.9	15.2	14.0	13.3	12.4
Dorsal ray length	13.4~15.4	8.6~ 9.0	18.3	17.1	7.1	6.8
Pelvic fin length	5.7~ 6.1	6.2~ 6.4	6.4	6.1	4.8	4.6
% of HL:						
Eye diameter	25.6~27.4	25.0~30.0	22.4	21.6	26.3	28.4
Interorbital width	5.0~ 6.4	5.0~ 5.1	15.4	12.7	9.6	10.5
Snout length	16.5~20.9	16.3~18.3	17.6	18.4	17.3	15.7
Upper jaw length	48.8~53.0	42.7~43.4	48.1	58.9	42.3	41.5
Counts:						
Dorsal rays	60~68		66	68	68	67
Anal rays	47~48		52	53	52	51
Pectoral rays	15		13	15	15	15
Caudal rays	11~13		13	13	11	13

\* Morphological characters other than fin-ray counts are cited from Table 19 in Schmidt (1950: 111).

material with Popov's specimen, he could not find any distinctive features of specific value; he indicated proportional measurements of *L. hubbsi* (Table 2). But he did not state why the differences between these two species given by Popov (1935) were not of specific value, and validated *L. hubbsi* despite that *L. regani* was described earlier than *L. hubbsi*. Probably he was not aware that Popov (1933) had adequately described *L. regani*. Matsubara (1955) included only *L. hubbsi* in the present genus, regarding *L. regani* as its junior synonym, as did Schmidt (1950). Thus there has been considerable confusion involving the date of publication of the generic name and the validity of the two species.

The present examination shows that the two male specimens agree well with *L. hubbsi* in such characters as the length of dorsal and anal rays (longer), length of the upper jaw (longer), and coloration (darker) (Table 1, Fig. 1A), and the two female specimens agree well with *L. regani* in the length of

dorsal and anal rays (shorter), length of the upper jaw (shorter), and coloration (lighter) (Table 1, Fig. 1B). In the Zoarcidae, generally, the male has a longer upper jaw, a longer head, higher dorsal and anal rays, smaller eyes, and darker coloration. Therefore, it is most reasonable to attribute the differences between these two nominal species to sexual dimorphism.

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Literature cited

- Hubbs, C.L. and K.F. Lagler. 1958. The fishes of the Great Lakes region. Bull. Cranbrook Inst. Sci., 26: 1~123, figs. 1~289, pls. 1~44.
- Lindberg, G.U. and Z.V. Krasnyukova. 1975. Fishes of the Sea of Japan and the adjacent areas of the Sea of Okhotsk and Yellow Sea. 4. Akad. Nauk SSSR, Leningrad, 463 pp., 329 figs. (In Russian).
- Matsubara, K. 1955. Fish morphology and hierarchy. Part I. Ishizaki Shoten, Tokyo, xi+789 pp., 289 figs. (In Japanese).
- Popov, A.M. 1933. Contribution to the ichthyofauna of the Sea of Japan. Issled. Morei SSSR, 19: 139~155, figs. 1~5. (In Russian).
- Popov, A.M. 1935. A new genus and species, *Lycozoarces hubbsi*, gen. n. sp. n. (Pisces, Zoarcidae), of the Okhotsk Sea. Compt. Rend. (Dokl.) Akad. Sci. URSS, N.S., 4, (6~7): 303~304, fig. 1.
- Schmidt, P. Yu. 1950. Fishes of the Sea of Okhotsk. Trudy Tikhookean. Kom. Akad. Nauk SSSR, 6: i~xiv, 1~392, figs. 1~51, pls. 1~20. (In Russian).
- Taranetz, A. Ya. 1937. Handbook for identification of fishes of Soviet Far East and adjacent waters. Bull. Pac. Sci. Inst. Fish. Oceanogr., 11: 1~200, figs. 1~103, map. 1. (In Russian).
- Ueno, T. 1971. List of the marine fishes from the waters of Hokkaido and its adjacent regions. Rep. Hokkaido Fish. Exp. St., 13: 61~102, figs. 1~2.

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セダカゲングの再記載

豊島 貢

セダカゲング属, *Lycozoarces* は左右の鰓膜が広くゆかし, 峡部を横切る被褶を形成することおよび腹鰭があることにより特徴づけられる。

本属に, *L. regani* Popov, 1933 および *L. hubbsi* Popov, 1935 の2種を認める意見 (Taranetz, 1937; Lindberg and Krasnyukova, 1975) と *L. regani* を *L. hubbsi* のシノニムとする意見 (Schmidt, 1950; 松原, 1955) があるが, いずれの場合もその根拠は明確ではない。

本研究では, オホーツク海から得た雌2個体, 雄2個体の標本をもとに上記2種の有効性について検討した。その結果, 2個体の雌は *L. regani* に, 2個体の雄は *L. hubbsi* に一致した。つまり, これまで記載されてきたこれら2種の相違は二次性徴によるものである。

*L. regani* は *L. hubbsi* よりも早く記載され, しかも短い明瞭な記載と図が与えられているので有効である。そこで, 本研究では, これまで *L. hubbsi* に与えられてきた和名をそのまま採用し, 本種を *L. regani* Popov, 1933 セダカゲングとして記載した。

なお, オホーツク海沿岸の北見枝幸沖からの標本は本種の日本初記録である。

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