

## Occurrence of Juveniles of Two Bathymasterid Species from Hokkaido, Japan

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The bathymasterid genus *Bathymaster* is a compact group represented by four species (*B. signatus* Cope 1873; *B. leurolepis* McPhail 1965; *B. derjugini* Lindberg 1930; and *B. caeruleofasciatus* Gilbert and Burke 1912) distributed around the littoral zone of the northern North Pacific, with the first three species being known from Japanese waters (Sato, 1940; McPhail, 1965; Shinohara et al., 1992). Information on larvae and juveniles of these fishes is limited. Kashkina (1970) and Grigor'ev (1992) reported juvenile specimens as *Bathymaster* sp. from the Bering sea and Sea of Okhotsk, Matarese et al. (1989) described the identification of juvenile bathymasterids, and Shiogaki (1993) described post-flexion larva of *B. derjugini* taken from Japan.

During the cruise to eastern Hokkaido of the T/S Hokusei-Marui of Hokkaido University in April 1992, four juvenile specimens of *B. derjugini* and *B. leurolepis* were obtained by larva net. Subsequently, two juvenile specimens of *B. leurolepis* were found in a collection of larvae obtained off the coast of Utsunomiya, southwestern Hokkaido, Japan by fish luring light in April 1984 (Fig. 1). This paper documents and describe these juveniles in detail.

### Materials and Methods

The specimens are preserved in 5% formalin and maintained in the larval collection of the Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University (HUMZ-L). Observations were made under binocular microscope. The standard length of specimens was measured by calipers, and detailed measurements of body parts by Toolmaker's microscope. The following abbreviations are used; standard length (SL), head length (HL), body depth (BD), preanus length (PAL), snout length (SnL), eye diameter (ED), dorsal fin rays (D), anal fin rays

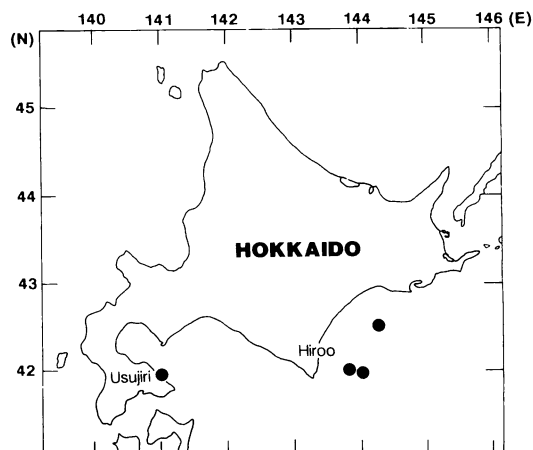


Fig. 1. Collection localities (●) of bathymasterid juveniles.

(A), pectoral fin rays ( $P_1$ ), myomeres (MN), gill rakers (GR), and vertebrae (V).

### *Bathymaster derjugini* Lindberg, 1930 (Fig. 2A)

**Material.** Three specimens (juvenile stage). HUMZ-L 5397, 32.7 mm SL,  $41^{\circ}60.0'N$ ,  $144^{\circ}00.2'E$  (off Hiroo, Hokkaido, Japan), Apr. 4, 1992, larva net; HUMZ-L 5398, 37.0 mm SL, collected with HUMZ-L 5397; HUMZ-L 5399, 30.9 mm SL,  $42^{\circ}30.1'N$ ,  $144^{\circ}15.0'E$  (off Hiroo, Hokkaido, Japan), Apr. 5, 1992, larva net.

**Diagnosis.** Long caudal peduncle. Large pectoral fin extending just beyond anus. Melanophores around urostyle. Caudal vertebrae 34. Minute external melanophores on operculum.

**Description.** Proportional measurements and counts are shown in Table 1. Body elongated, laterally compressed. Anus anterior to midpoint of body, just before anal fin origin. Caudal peduncle long. Posterior margin of upper jaw extending to a vertical through anterior margin of pupil. Many sensory pores on head; infraorbital pores 12, supraorbital pores 5, interorbital pore 1, preopercular pores 6, mandibular pores 3. All fins formed; pectoral fin large, posterior margin extending beyond anus; pelvic fin jugular. Branchiostegal membrane separated from isthmus, with 6 rays. Gill rakers on outer side of first arch  $5+14$ , moderately long; those on inner side  $3+10$ , short with small spines on their tips.

Large melanophores thickly covering occiput, ab-

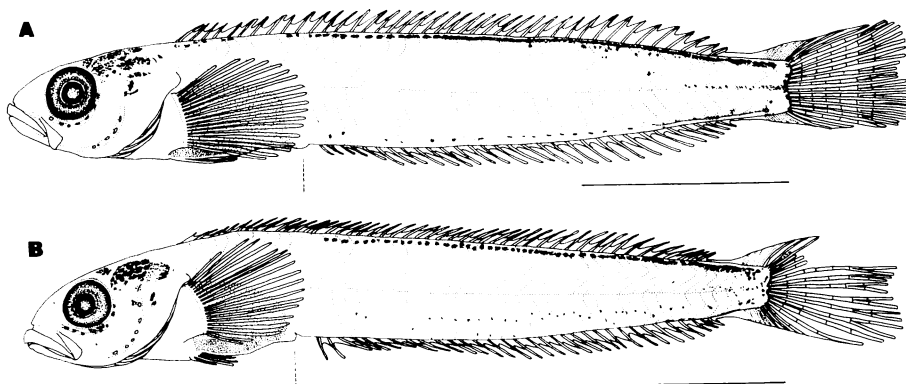


Fig. 2. Lateral views of bathymasterid juveniles. A) *Bathymaster derjugini*, HUMZ-L 5398, 37.0 mm SL; B) *B. leurolepis*, HUMZ-L 5396, 36.3 mm SL. Scale indicates 10 mm.

domen. Single row of large melanophores on each side of dorsal midline. No pigment row on ventral side of abdomen. Melanophores scattered along base of anal fin, becoming dense on caudal peduncle. Small melanophores along lateral midline of caudal peduncle, base of caudal fin and urostyle (Fig. 3). Internal melanophores on vertebrae of posterior caudal region. A few large, internal melanophores and one or two minute, external melanophores on operculum (Fig. 4).

**Remarks.** The specimens are considered to belong to the genus *Bathymaster* on the basis of the following characters; long caudal peduncle, large pectoral fin extending beyond anus, and melanophores around urostyle (Matarese et al., 1989; Shio-gaki, 1993).

According to Sato and Ueno (1953) and Matarese

(1990), adult *B. derjugini* differ from other members of the genus in having a black blotch on the operculum, and lower counts of dorsal fin rays (fewer than 45) and caudal vertebrae (fewer than 35) (Table 2). The present specimens were identified as *B. derjugini* owing to their agreement with the above meristic characters, in addition to having some minute external melanophores on the operculum (Fig. 4). In fact, the presence of such melanophores is probably a good character by which to identify juveniles of this species.

On the basis of the above characters, a specimen of *Bathymaster* sp. reported by Grigor'ev (1992) may be identified as *B. derjugini* (Table 2). However, two juveniles reported by Kashkina (1970) could not be identified to species owing to their meristic counts overlapping with those of other bathymasterid species (Table 2).

Table 1. Proportional measurements and meristic counts of *Bathymaster derjugini* and *B. leurolepis*

HUMZ-L	<i>B. derjugini</i>			<i>B. leurolepis</i>		
	5399	5397	5398	5396	3076	3075
Standard length (mm)	30.9	32.7	37.0	36.3	37.5	41.2
Proportional measurements (% of SL)						
Head length	23.0	23.1	22.9	21.5	23.1	22.8
Body depth	13.9	13.9	14.9	14.0	14.7	16.4
Peanus length	38.6	36.7	38.7	35.3	40.4	38.1
Snout length	5.7	5.5	5.8	4.4	6.4	5.3
Eye diameter	7.5	8.5	7.6	7.2	7.4	7.6
Counts						
Dorsal fin rays	41	42	41	45	46	45
Anal fin rays	31	32	31	33	33	34
Pectoral fin rays	19	18	19	18	18	18
Myomeres	14 + 34	14 + 34	14 + 34	15 + 36	16 + 36	15 + 37

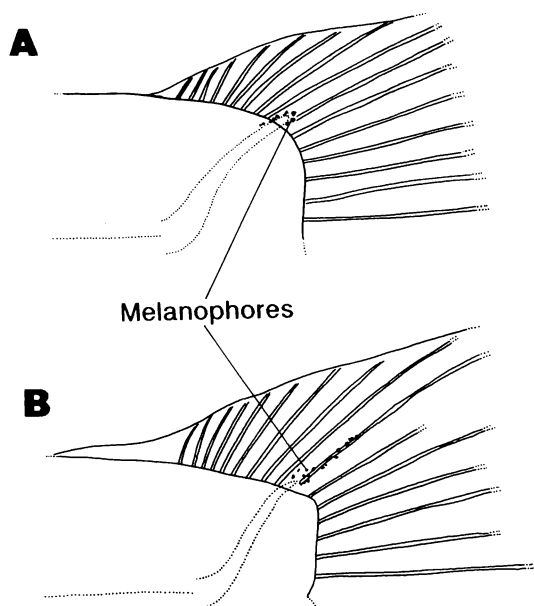


Fig. 3. Melanophores around urostyle. A) *Bathymaster derjugini*; B) *B. leurolepis*.

Shiogaki (1993) described a row of melanophores along the ventral midline of the abdomen, but such was not observed in the larger specimens examined here, possibly having been lost with growth.

*Bathymaster leurolepis* McPhail, 1965  
(Fig. 2B)

**Material.** Three specimens (juvenile stage). HUMZ-L 3075, 41.2 mm SL, Usujiri, Hokkaido, Apr. 26, 1984, fish

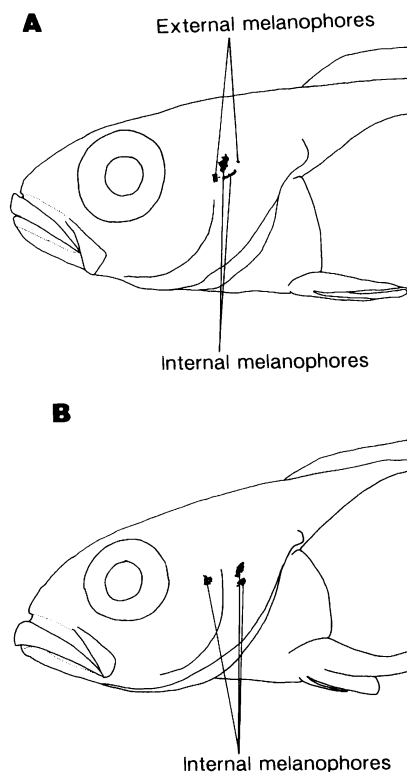


Fig. 4. Comparison of melanophores on operculum. A) *Bathymaster derjugini*; B) *B. leurolepis*.

luring light; HUMZ-L 3076, 37.5 mm SL, collected with HUMZ-L 3075; HUMZ-L 5396, 36.3 mm SL, 42°00.1'N, 143°50.1'E (off Hiroo, Hokkaido, Japan), Apr. 4, 1992, larva net.

**Diagnosis.** Long caudal peduncle. Large pecto-

Table 2. Comparison of some meristic characters of bathymasterid adults and juveniles

Species	Stage	Counts					Sources
		D	A	P <sub>1</sub>	V(MN)	GR	
<i>B. derjugini</i>	J	41-42	31-32	18-19	14 + 34	5 + 14	Present work
<i>B. leurolepis</i>	J	45-46	33-34	18	15-16 + 36-37	5 + 12	Present work
<i>B. sp. 1</i>	J	45-46	32-33	20	—	—	Kashkina, 1970
<i>B. sp. 2</i>	J	43	31	18	48	— + 13	Grigor'ev, 1992
<i>B. derjugini</i>	A	42	31-33	18	—	5-6 + 14	Sato and Ueno, 1953
<i>B. derjugini</i>	A	43-44	31-33	19-21	14-15 + 33-34	5-6 + 14	Matarese, 1990
<i>B. leurolepis</i>	A	45	31	18	—	5 + 12	Sato and Ueno, 1953
<i>B. leurolepis</i>	A	45-47	32-34	17-18	15 + 35-37	4-5 + 12-14	Matarese, 1990
<i>B. caeruleofasciatus</i>	A	44-48	33-36	16-19	14-16 + 35-39	5 + 12-14	Matarese et al., 1989
<i>B. signatus</i>	A	49	34	21	—	7 + 18	Sato and Ueno, 1953
<i>B. signatus</i>	A	46-49	33-36	19-21	15-16 + 34-39	— + 16-18	Matarese et al., 1989

A, adult; J, juvenile.

ral fin extending beyond anus. Melanophores around urostyle. Combination of 18 pectoral fin rays and 45–46 dorsal fin rays. Upper jaw extending to middle of eye.

**Description.** Proportional measurements and counts are shown in Table 1. Body elongated, laterally compressed. Anus anterior to midpoint of body. Caudal peduncle long. Posterior margin of upper jaw extending to a vertical through middle of eye. Many sensory pores on head; infraorbital pores 13, supraorbital pores 5, interorbital pore 1, preopercular pores 6, mandibular pores 4. All fins formed; pectoral fin large, posterior margin extending beyond anus; pelvic fin jugular. Branchiostegal membrane separated from isthmus, having 6 rays. Gill rakers 5 + 12 on outer and 0 + 9 on inner sides of first arch.

Large melanophores thickly covering occiput, abdomen. Single row of large melanophores on each side of dorsal midline. No pigment row on ventral side of abdomen. Melanophores scattered on infraorbital region and base of anal fin, becoming dense on caudal peduncle. Small melanophores along lateral midline of caudal peduncle, base of caudal fin and urostyle (Fig. 3). One internal melanophore on preoperculum and two on operculum (Fig. 4).

**Remarks.** In the artificial key suggested by Sato and Ueno (1953), adult *Bathymaster leurolepis* was distinguished from those of *B. derjugini* and *B. signatus* on the basis of the following combination of characters: 18–19 pectoral fin rays and 44–49 dorsal fin rays. McPhail (1965) separated *B. leurolepis* from *B. caeruleofasciatus* owing to the former having a shorter upper jaw and lacking scales on the pelvic fin. However, pelvic fin scales are undeveloped and differences in upper jaw length not apparent in larvae and early juveniles of these two species (Matarese, pers. comm.). The distinguishing of juveniles of *B. leurolepis* from those of *B. caeruleofasciatus* is therefore difficult, with further investigation of diagnostic characters of juveniles of the two species being warranted. In the present paper, we followed Sato and Ueno (1953) and McPhail (1965), identifying the present juveniles as *B. leurolepis* (having 18 pectoral fin rays, 45–46 dorsal fin rays and a shorter upper jaw). Furthermore, the appearance of juveniles of *B. leurolepis* from Hokkaido is supported by the known

zoogeographic ranges of the two species; the former being widely distributed from northern Japan to the Gulf of Alaska, with *B. caeruleofasciatus* being restricted to the northeastern Pacific (McPhail, 1965).

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## 北海道から得られたメダマウオ科 2 種の稚魚

脇本久義・尼岡邦夫

北海道沿岸から採集されたスミツキメダマウオ *Bathymaster derjugini* とマダラメダマウオ *B. leurolepis* の稚魚を記載した。スミツキメダマウオは他の種と比較してより少ない尾椎骨数 (34) によって査定され、またマダラメダマウオは胸鰭鰭条数が 18、背鰭鰭条数が 45-46、そして短い上顎をもつという形質の組み合わせにより査定された。また本研究において、スミツキメダマウ

オの稚魚の鰓蓋上に黒色素胞が観察された。これは成魚の鰓蓋上に存在する黒斑が発現したものと考えられ、稚魚期におけるスミツキメダマウオの分類形質としての有効性が示唆された。また、Grigor'ev (1992) によって報告された未同定のメダマウオ属稚魚は、その計数形質によりスミツキメダマウオであると考えられたが、Kashkina (1970) が報告した未同定の稚魚はその計数形質が全ての種と重複するため、査定は不可能であった。

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