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Larvae of the Genus *Parabothus* (Bothidae) Collected from Japan

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Of the 15 bothid genera inhabiting waters around Japan, larvae of 11 genera are presently known (Amaoka, 1970, 1971, 1972, 1973, 1974, 1976; Ozawa and Fukui, 1986). In 1985 and 1989, two unique bothid larvae were collected in Sagami Bay and Tsushima Strait. These specimens were identified as larvae of the genus *Parabothus,* whose larval form was not previously known, and are here described as *Parabothus* spp.

Materials and methods

Specimen A was collected by an oblique tow (depth 75 m) of a 70 cm ring net, in the eastern part of Tsushima Strait (34°51.0′N, 130°48.1′E) on October 20, 1985. Specimen B was collected by an oblique tow (depth 250 m) of a 10-feet Isaacs-Kidd plankton trawl along the continental slope in the northern part of Sagami Bay (35°16.3′N, 139°21.4′E), on December 12, 1988. Specimens were fixed in 10% buffered sea water formalin and later transferred to 80% ethyl alcohol for preservation. Measurements and observations were later made in the laboratory. Methods of counts and measurements follow those of Ozawa and Fukui (1986). For osteological observations, specimen B was stained with alizarin red S. The specimens are deposited at

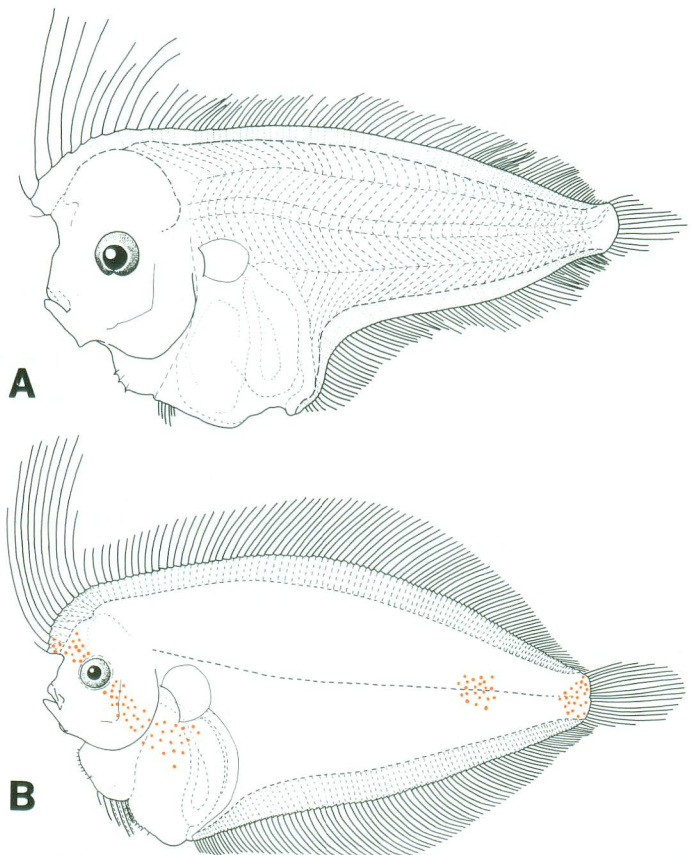

Fig. 1. Larvae of *Parabothus* spp. A, specimen A, NSMT-PL7, 8.8 mm SL; B, specimen B, NSMT-PL8, 22.8 mm SL.

the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo (NSMT).

Descriptions

1. Specimen A (Fig. 1A). NSMT-PL 7, 10.0 mm in total length, 8.8 mm in SL. D 97 (incomplete); A 75 (incomplete); P_2 6; C 14 (damaged); vertebrae 10+33=43.

Measurements in mm: head 2.34; depth 4.03; snout 1.06; eye 0.62; depth of caudal peduncle 0.70; elongated dorsal fin rays 1.59(damaged)–2.68; longest of remaining dorsal fin rays 0.93; urohyal 0.87; posterior basipterygial process 1.01.

Body moderately slender and strongly compressed, highest at about anterior 28% of SL, with a depth of 53% SL. Head length 27% SL. Anus located at anterior 40% of SL. Eye almost circular, its diameter 26% head length. Choroid tissue under eye absent. Air bladder absent.

Fin rays incomplete. Dorsal fin originating anteriorly above eye. Third to 11th dorsal fin rays elongated into filaments, third ray longest, its length 31% SL. Origin of anal fin located at anterior 42% of SL. No melanophores present. Urohyal located above and before pelvic fin, its length 44% head length. Nine spines present on urohyal. Posterior basipterygial process gently curved, its length 63% head length. No spines on posterior basipterygial process.

2. Specimen B (Fig. 1B). NSMT-PL 8, 27.5 mm in total length, 22.8 mm in SL. D 108; A 86; P_2 6; C 17; vertebrae 10+32=42.

Measurements in mm: head 4.81; depth 12.0; snout 1.59; eye 1.31 (horizontal), 1.37 (vertical); depth of caudal peduncle 2.18; elongate dorsal fin rays 4.85 (damaged)–8.44; urohyal 2.0; posterior basipterygial process 2.8.

Body moderately elongate and strongly compressed, highest at about anterior 25% of SL, with a depth of 53% SL. Head length 21% SL. Anus located at anterior 25% of SL. Eye almost circular, its diameter 27–28% head length. Right eye positioned slightly dorsally (onset of eye migration). No choroid tissue under eye. Air bladder absent.

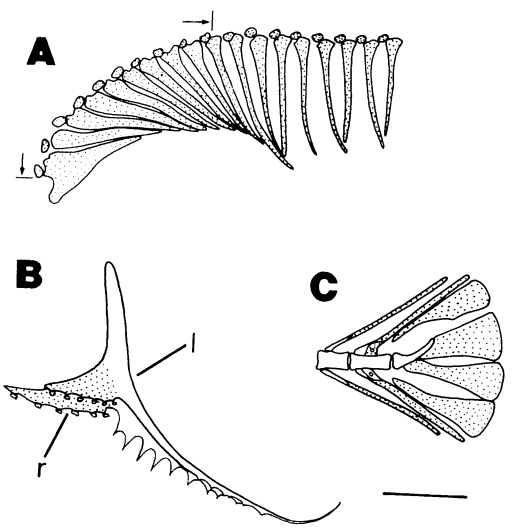

Fig. 2. Skeleton of specimen B, NSMT-PL8, 22.8 mm SL. A, lateral view of pterygiophores of the anteriormost part of dorsal fin, arrows showing the region where pterygiophores support elongate dorsal fin rays; B, lateral view of pelvic bones and the posterior basipterygial process; C, lateral view of the caudal skeleton. r, right side; l, left side. Dots indicate cartilage. Scale is 1 mm.

All fin rays except pectorals complete. Dorsal fin originating anteriorly above eye. Second to 11th dorsal fin rays greatly elongated into filaments, length of longest ray 37% SL. Origin of anal fin located at anterior 25% of SL. Urohyal located above and before pelvic bone, its length 42% head

Table 1. Comparisons of meristic characters between larval specimens A (NSMT-PL7) and B (NSMT-PL8), and four species of *Arnoglossus* and *Parabothus*. *Incomplete.

	Count		
	Drsal fin rays	Anal fin rays	Vertebrae
Specimen A	97*	75*	10+33
Specimen B	108	86	10+32
A. japonicus: Amaoka (1969)	99–106	76–83	10+32–33
A. polyspilus: Amaoka (1969)	100–114	78–91	10+30–32
P. coarctatus: Amaoka (1969)	106–117	87–95	10+32–33
P. kiensis: Amaoka (1969)	104–113	83–90	10+31–32

length. Nine spines present on urohyal. First ray of right pelvic fin located at base of 3rd left pelvic fin ray (Fig. 2B).

No melanophores present. In fresh condition, three conspicuous erythrophore patches on body, an oblique band from base of 2nd dorsal ray to below pectoral fin, a round blotch on mid lateral side of posterior 1/4 of body, and a similar blotch on caudal peduncle.

First and second pterygiophores of dorsal fin rays conjoined. Pterygiophores of elongate dorsal fin rays stouter than others (Fig. 2A). Posterior basipterygial process gently curved, its length 58% of head length. Ten strong spines present on right side of posterior basipterygial process and five weak spines on left side (Fig. 2B). Pelvic bones and hypural bones stained poorly with alizarin red S, still being largely cartilaginous, particularly in the ray-associated portions (Fig. 2C).

Discussion

Meristic characters and relative positions of the left and right pelvic fins of the present specimens were characteristic of four bothid species known from waters around Japan, these being *Parabothus coarctatus, P. kiensis, Arnoglossus japonicus* and *A. polyspilus* (Table 1). The larvae of numerous *Arnoglossus* species hitherto described show the following distinctive generic characters: moderately elongate body, an extremely elongate dorsal fin ray, and no spines on the urohyal (Kyle, 1913; Ochiai and Amaoka, 1963; Pertseva-Ostroumova, 1965; Amaoka, 1973, 1974; Ozawa and Fukui, 1986). These characters were absent in specimens A and B. Therefore the latter could be readily identified as members of the genus *Parabothus*. However, they could not be identified as either of the two known *Parabothus* species, because their meristic counts fell into the region of overlap between the two species (Table 1). Smith (1967) reported a supposed larval specimen of this genus, which seems to be a misidentification because it had characteristics reminiscent of *Laeops* rather than the former; viz., protruded gut, a single elongate dorsal ray, and melanophores present on both dorsal and anal fins (Hubbs and Chu, 1934; Amaoka, 1972).

Bothid larvae are known to characteristically have but a single elongate dorsal fin ray (Ahlstrom et al., 1984; Ozawa and Fukui, 1986). It is thus peculiar that the larvae of *Parabothus* have 9 or 10 elongated dorsal fin rays, which may give a further clue to the phylogenetic relationships of the family.

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日本近海で採集されたダルマガレイ科スミレガレイ属の仔魚

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対馬海峡と相模湾の湾奥部でプランクトンネットにより採集したスミレガレイ属 *Parabothus* 仔魚2個体の形態について観察した．これらの個体はそれぞれ9本と10本の背鰭伸長鰭条を有しており，従来，基本的に背鰭第2条のみが伸長するとされてきたダルマガレイ仔稚魚に，多数の伸長鰭条を有する種が存在することが明らかになった．

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