

# An Additional Record of *Bassozetus levistomatus* Machida, 1989 from the Western North Pacific (Teleostei, Ophidiiformes, Ophidiidae)

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**Abstract** An ophidiid fish specimen (592 mm in standard length) was collected from 5,531–5,606 m depth off Fukushima Prefecture, Japan in 2013 and identified as the rare *Bassozetus levistomatus* Machida, 1989 by its unique absence of basibranchial tooth patches and vomerine teeth, and combination of following counts: dorsal-fin rays 122; anal-fin rays 99; pectoral-fin rays 28–29; long gill rakers 11. The specimen is the second record from the Western North Pacific and only the third from the Pacific Ocean. We document its morphology in detail and discuss the morphological characteristic of the species with reexamination of the holotype.

**Key words:** Additional specimen, deepest record, holotype, Japan, Neobythitinae.

## Introduction

The deep-sea genus *Bassozetus* Gill, 1883 is a member of the ophidiid subfamily Neobythitinae that is characterized by its possession of 21–29 pectoral-fin rays not reaching to anus, pelvic fin with one ray, 9–22 long gill rakers on the anterior arch, large head, its length about a half the pre-anal length, elongate body tapering caudally, eye diameter much smaller than snout length, opercular spine weak or absent (Nielsen and Merrett, 2000). According to Nakabo and Kai (2013), there were 4 species, *Bassozetus glutinosus* (Alcock, 1890), *Bassozetus levistomatus* Machida, 1989, *Bassozetus robustus* Smith and Radcliffe in Radcliffe, 1913 and *Bassozetus zenkevitchi* Rass, 1955, in Japanese waters. Two species of them, *B. glutinosus* and *B. robustus*, were recently reported by Tomiyama *et al.* (2011) and Takami *et al.* (2011), respectively.

*Bassozetus levistomatus* was originally described from a single specimen collected in the Izu-Bonin Trench, southern Japan (Machida, 1989). Subsequently, Nielsen and Merrett (2000) reviewed the genus and reported nine additional

specimens (180<sup>+</sup>–805 mm SL) of this species from the Pacific (one specimen from off California, USA), Indian and Atlantic Oceans.

A large specimen of *B. levistomatus* was collected by the R/V *Soyo-maru* of the Fisheries Research Agency (FRA) from abyssal waters off Fukushima Prefecture, northern Honshu Island, Japan in the summer of 2013. The specimen represents the second record from the Western North Pacific, the third from the Pacific Ocean and the deepest record for the species. We here describe morphological characters of the present specimen and discuss several taxonomic characters of the species.

## Materials and Methods

Counts and measurements mainly follow Nielsen and Merrett (2000), except for snout length, eye diameter, postorbital length and pectoral-fin length that follow Hubbs and Lagler (1958). Vertebrae and median-fin rays were examined from radiographs. Scales on head and body, and sagittal otolith were observed by SEM (scanning electron microscopy) with Digital



Fig. 1. *Bassozetus levistomatus* from Japan.—A, NSMT-P 114823, 592 mm SL, male; B, NSMT-P 29533, holotype, 471 mm SL, female. Photograph of NSMT-P 114823 taken by S. Chiba. Bars indicate 5 cm.

Microscope VHX-D500/D510 (Keyence, Tokyo) without metallic coat. Standard length was abbreviated as SL. All specimens examined here are deposited in Department of Zoology, National Museum of Nature and Science, Tsukuba (NSMT).

***Bassozetus levistomatus* Machida, 1989**

[Japanese name: Soko-fukumen-itachiuo]

(Figs. 1–5, Table 1)

*Bassozetus levistomatus* Machida, 1989: 187 (original description, type locality: Izu-Bonin Trench, Japan); Nakabo, 1993: 376 (keys, Izu-Ogasawara Trench, Japan); Nielsen and Cohen, 1999: 57 (keys and list, all oceans); Nakabo, 2000: 442 (keys: Izu-Ogasawara Trench, Japan); Nielsen and Merrett, 2000: 34 (description, Pacific, Indian and Atlantic Oceans); Nakabo, 2002: 442 (keys, Izu-Ogasawara Trench, Japan); Nielsen and Robins, 2003: 968 (list, circum-tropical); Garrido-Linares and Acero P., 2006: 294 (list, Atlantic); Nakabo and Kai, 2013: 521 (keys, Izu-Ogasawara Trench, off California, Arabian sea, north of Madagascar, Caribbean sea and 20°N–55°N in the

eastern Atlantic).

**Material examined.** NSMT-P 114823, 592 mm SL, male, off Fukushima Prefecture, northern Japan, Pacific Ocean (37°30.90'N, 145°56.27'E–37°28.84'N, 145°03.34'E), 5,531–5,606 m depth, R/V *Soyo-maru*, crab trap “Kanikago” (= crab basket), 3–4 Aug. 2013, collected by K. Fujimoto and J. Inoue.

**Diagnosis.** Dorsal-fin rays 115–126; anal-fin rays 93–105; pectoral-fin rays 27–29; long rakers on anterior gill arch 9–11; single pelvic-fin ray relatively short, 8.1–13.5% SL; scales on head smaller than on body; basibranchial tooth patches absent; vomer usually edentate except for single large specimen (735 mm SL) with 5 mm circular tooth patch.

**Description.** Selected counts and measurements are shown in Table 1. Head large, swollen with internal mucus: its length about half preanal length. Body elongate, slender posteriorly and compressed. Head and body covered by small



Fig. 2. Photographs showing present specimen of *Bassozetus levistomatus* (NSMT-P 114823) on shipboard (upper), right side of head and anterior body (middle), and ventral aspect (lower). Photographs taken by J. Inoue and S. Chiba.

cycloid scales: scales on head much smaller than on body (Fig. 3) 28 in oblique row. Lateral line indistinct. Snout blunt. Two nostrils between snout tip and eye: anterior nostril small without fleshy raised rim; posterior nostril at midpoint between snout tip and eye, its diameter larger than anterior nostril. Eye circular and extremely small, smaller than posterior nostril. Mouth large and subterminal: upper jaw longer than half head length; posterodorsal portion of upper jaw sheathed by cheek skin. Upper jaw and dorsal portion of lower jaw without scales. Granular tooth bands on both jaws and palatine. Vomer

edentate, completely covered with oral epithelium. Basibranchial tooth patches absent. Preopercle soft: its posterior margin with weak serration. Opercular spines absent. Gill opening wide, upper end above pectoral-fin base. No tubular pore above gill opening (Fig. 4). Anterior gill arch with long and rudimentary rakers: long rakers comb-like on epibranchial and ceratobranchial; rudimentary rakers knob-like on epibranchial and hypobranchial. Pseudobranchial filaments 2: anterior rudimentary; posterior longer and distinct. Pectoral fin relatively long, but its posterior tip not reaching to above anus: all rays



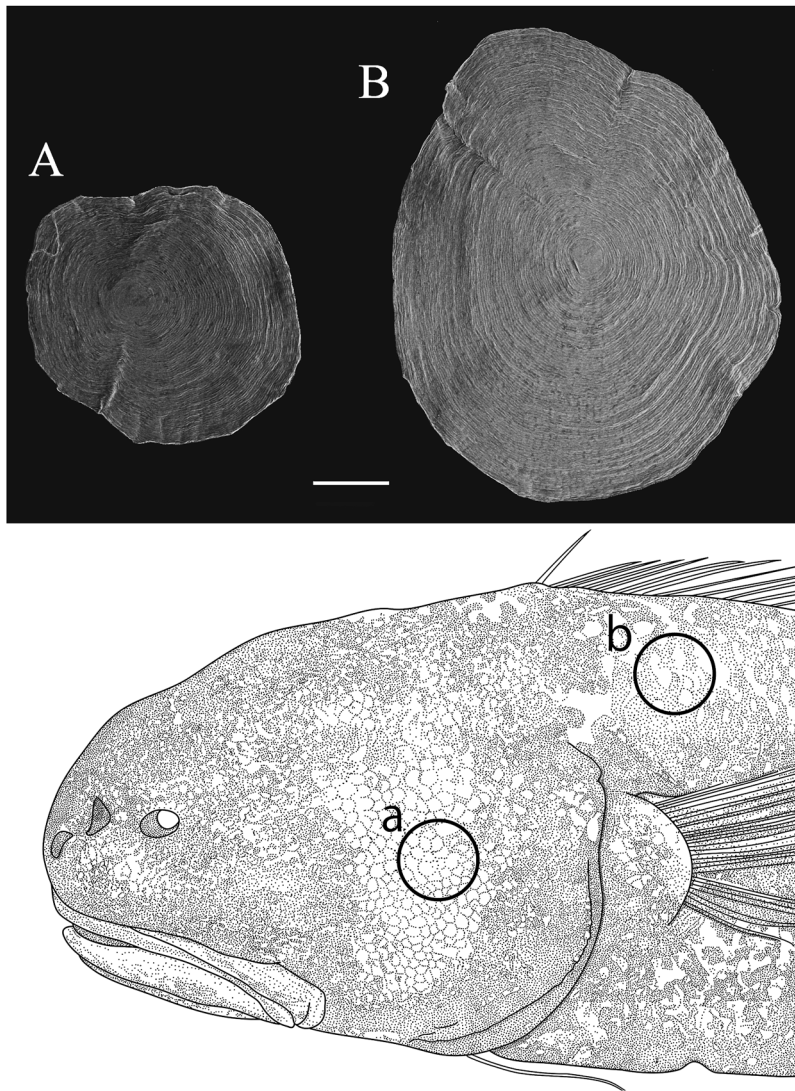


Fig. 3. SEM images of scales on head (A) and body (B) of *Bassozetus levistomatus* NSMT-P 114823, 592 mm SL. Under illustration shows areas removed scales on head (a) and body (b). Bar indicates 1 mm.

unbranched. Dorsal and anal fins with long bases, continuous with caudal fin posteriorly: both fin rays unbranched. Dorsal-fin origin anterior to pectoral-fin base. Anal fin originating below about 25th dorsal-fin ray. Pelvic fin relatively long, its length about half distance between pelvic-fin base and anal-fin origin: pelvic-fin origin inserted below hind margin of preopercle. Caudal fin slender, its rays branched. Anus adjacent to anal-fin origin.

*Sagittal otolith* (Fig. 5). Thick and rounded.

Dorsal and ventral margins rounded. Posterodorsal portion slightly protruding posteriorly. Shallow sulcus centrally. Ostial channel absent.

*Color when fresh* (Figs. 1A, 2). Ground color of head and body pale brown. Areas with skin damaged such as cheek region and posterior portion of body, whitish. Posteroventral portion of opercular region black. Abdomen and pectoral fin dark brown. When captured, head and abdomen somewhat blue.

*Color in alcohol*. Ground color of head and

Table 1. Selected counts and measurements of *Bassozetus levistomatus*.

|                                                   | Present specimen<br>NSMT-P 114823 | Holotype<br>NSMT-P 29533 | Nontypes*<br>(9 specimens) |
|---------------------------------------------------|-----------------------------------|--------------------------|----------------------------|
| SL (mm)                                           | 592                               | 471                      | 185–805                    |
| Counts                                            |                                   |                          |                            |
| Dorsal-fin rays                                   | 122                               | 115                      | 118–126                    |
| Anal-fin rays                                     | 99                                | 93                       | 93–105                     |
| Caudal-fin rays                                   | 8                                 | 10                       | 8–9                        |
| Pectoral-fin rays                                 | 28 (left)/29 (right)              | 29/28                    | 27–29                      |
| Pelvic-fin rays                                   | 1                                 | 1                        | 1                          |
| Precaudal vertebrae                               | 14                                | 13                       | 14–16                      |
| Caudal vertebrae                                  | 51                                | 51                       | —                          |
| Total vertebrae                                   | 65                                | 64                       | 64–68                      |
| Basibranchial tooth patches                       | 0                                 | 0                        | 0                          |
| Long rakers on anterior gill arch                 | 11                                | 11                       | 9–11                       |
| Rudimentary rakers on anterior gill arch          | 5                                 | 7                        | 6–7                        |
| Pseudobranchial filaments                         | 2                                 | 2                        | —                          |
| Branchiostegal rays                               | 8                                 | 8                        | —                          |
| Number of dorsal fin ray above anal-fin origin    | 27                                | —                        | 25–36                      |
| Number of vertebra below dorsal-fin origin        | 3                                 | —                        | 3–4                        |
| Number of vertebra above anal-fin origin          | 17                                | —                        | 17–23                      |
| Measurements                                      |                                   |                          |                            |
| As % of SL                                        |                                   |                          |                            |
| Head length                                       | 21.0                              | 23.5                     | 21.0–23.5                  |
| Snout length                                      | 5.4                               | 5.5                      | —                          |
| Upper jaw length                                  | 11.5                              | 13.0                     | 11.5–13.0                  |
| Horizontal eye length                             | 1.8                               | 2.5                      | —                          |
| Postorbital length                                | 15.0                              | 15.5                     | —                          |
| Predorsal-fin length                              | 21.0                              | 21.5                     | 18.5–22.5                  |
| Pectoral-fin length                               | 13.5                              | 14.0                     | —                          |
| Pelvic-fin length                                 | 13.5                              | 9.6                      | 8.1–12.0                   |
| Prepelvic-fin length                              | 16.0                              | 17.5                     | 15.0–18.0                  |
| Length from base of pelvic fin to anal-fin origin | 27.0                              | 19.5                     | 19.0–32.0                  |
| Preal-fin length                                  | 40.5                              | 38.0                     | 33.5–45.5                  |
| Body depth at anal-fin origin                     | 15.5                              | 11.5                     | 10.5–19.0                  |

\*Data from Nielsen and Merrett (2000).

body dark brown, but damaged skinless areas creamy white. Posteroventral portion of opercular region black. Abdomen and pectoral fin dark brown.

**Distribution.** Known from the Caribbean Sea and off Spain in the Atlantic, off Kenya and Oman in the Western Indian Ocean, and off Japan and California in the Pacific at depths between 3,965 and 5,606 m (Nielsen and Merrett, 2000; present study).

**Remarks.** The 13 species of the genus *Bassozetus* may be separated into two groups by the presence or absence of basibranchial tooth patches (present in 10 and absent in three species) (Nielsen and Merrett, 2000). The present specimen matches the three species, *B. levistomatus*, *Bassozetus weneri* Nielsen and Merrett,

2000 and *Bassozetus zenkevitchi* Rass, 1955, in lacking basibranchial tooth patches. Of the three, it agrees only with *B. levistomatus* in lacking vomerine teeth (vomerine tooth patch present in the remaining two species). In addition, the present specimen clearly differs from the latter two by the following characters: dorsal-fin rays (122 in present specimen and 115–126 in other specimens of *B. levistomatus* vs. 131 in *B. weneri*), anal-fin rays (99 and 93–105 vs. 108) and total vertebrae (65 and 64–68 vs. 71); pectoral-fin rays (28–29 in present specimen and 27–29 in other *B. levistomatus* vs. 23–25 in *B. zenkevitchi*), long gill rakers (11 and 9–11 vs. 15–18) and body depth at anal-fin origin (15.5% and 10.5–19.0% vs. 8.1–11.0% SL) (Nielsen and Merrett, 2000). Only the pelvic-fin length does not agree with

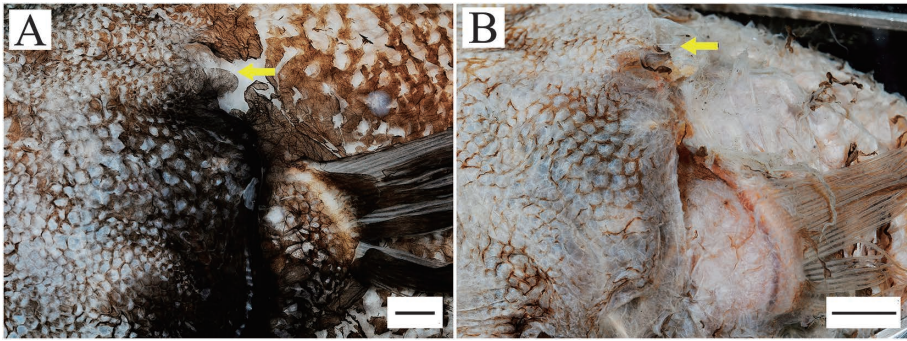


Fig. 4. Posterodorsal portion of head in *Bassozetus levistomatus*, arrows indicate damaged areas on operculum. —A, NSMT-P 114823; B, NSMT-P 29533, holotype. Bars indicate 10 mm.

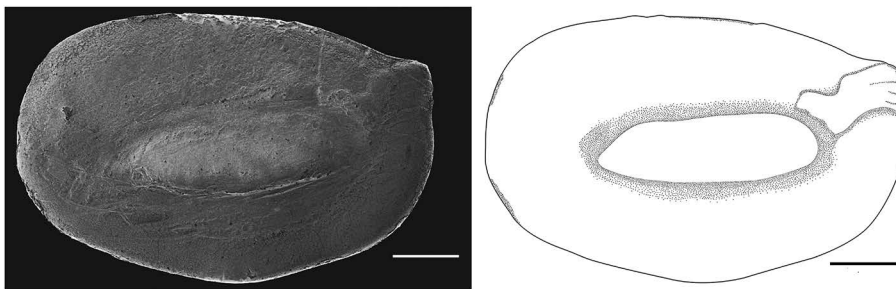


Fig. 5. SEM image and illustration showing mesial side of left sagittal otolith of *Bassozetus levistomatus* (NSMT-P 114823, 592 mm SL). Bars indicate 1 mm.

any of these three species, but the value is most similar to that of *B. levistomatus* (13.5% and 8.1–12.0% in other *B. levistomatus* vs. 17.5% in *B. werner*i, and 5.7–8.8% SL in *B. zenkevitchi*). In comparison with the holotype of *B. levistomatus*, most characters of the present specimen agree with those of the holotype (e.g., 2 pseudo-branchial filaments, snout length and scales on body larger than on head). We therefore feel justified in identifying the present specimen as *B. levistomatus* and consider the differences observed in pelvic-fin lengths as representing intraspecific variation.

Nakabo (1993, 2000, 2002) and Nakabo and Kai (2013) noted a single pore above the upper end of gill opening in *B. levistomatus*, that they considered to be a character that separates the species from *B. zenkevitchi*. We examined both the holotype and the present specimen in detail, but could only find damaged areas that may have

been mistaken for a pore in the former (Fig. 4). Hence, the presence or absence of the pore is not a suitable character for separates the two species.

Because Nielsen and Merrett (2000) reported a specimen from off the Pacific coast of California, the present specimen represents the second record from the western North Pacific and the third record from the Pacific Ocean. The habitat depth of *B. levistomatus* was previously reported as 3,965–5,200 m (Nielsen and Merrett, 2000). The present specimen expands its vertical distribution slightly to 3,965–5,606 m.

*Comparative material.* *Bassozetus levistomatus*. Holotype: NSMT-P 29533, 471 mm SL, Izu-Bonin Trench, southern Japan, Pacific Ocean (31°10.4'N, 141°44.0'E), 5,160 m depth, R/V *Soyo-maru*, 20 June 1973.

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