First Record of the Rare Deepwater Assfish

*Bassozetus mozambiquensis* (Ophidiiformes: Ophidiidae) from the Western South Atlantic

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(Received 7 April 2021; Accepted 2 July 2021)

A single specimen of *Bassozetus mozambiquensis* Tomiyama, Takami, and Fukui, 2016, collected off southern Brazil in the western South Atlantic and held in the University of Hamburg ichthyological collection, was re-examined. Because the species was previously known only from the western Indian Ocean, solely on the basis of the holotype, the present specimen represents not only the first Atlantic record of the species, but also a ca. 8300 km westward extension of the distributional range. A detailed description of the Atlantic specimen and an updated diagnosis of the species are provided.

**Key Words**: Pisces, Neobythitinae, western South Atlantic, distribution, morphology.

**Introduction**

The deep-sea ophidiid genus *Bassozetus* Gill, 1883 currently comprises 16 valid species, excluding *Bassozetus elongatus* Smith and Radcliffe in Radcliffe, 1913, which has been synonymized under *Bassozetus compressus* (Günther, 1878) (Nielsen and Merrett 2000; Tomiyama et al. 2015, 2016, 2018, 2021). Species of the genus are mainly benthopelagic, inhabiting depths of ca. 1000–5500 m in tropical to subarctic waters worldwide, although *Bassozetus zenkevitchi* Rass, 1955 is usually collected from the water column shallower than ca. 2000 m, an indication of its pelagic life style (Nielsen et al. 1999; Nielsen and Merrett 2000; Tomiyama et al. 2015, 2016, 2018, 2021).

A single Atlantic specimen, previously reported as *Bassozetus robustus* Smith and Radcliffe in Radcliffe, 1913 by Nielsen and Merrett (2000), was re-identified as *Bassozetus mozambiquensis* Tomiyama, Takami, and Fukui, 2016, a species originally described from the Mozambique Channel, western Indian Ocean on the basis of the holotype, the only known specimen. The present specimen, the second only known of *B. mozambiquensis* and first Atlantic record of the species, is fully described below. In addition, an updated diagnosis of the species is provided on the basis of the basis of a detailed comparison of *B. mozambiquensis* with four other congeners, viz., *Bassozetus nielseni* Tomiyama, Takami, and Fukui, 2018, *Bassozetus squamosus* Tomiyama, Takami, and Fukui, 2021, *Bassozetus trachibranchus* Tomiyama, Takami, and Fukui 2021 and *B. robustus*, which were newly described or redescribed after the original description of the former.

**Materials and Methods**

Counts of caudal-fin rays and vertebrae, and definitions of long and short rakers on the first gill arch follow Cohen and Nielsen (1978). Eye diameter and number of oblique scale (missing during or after collection) rows between the anus and dorsal-fin base followed Nielsen and Merrett (2000) and Tomiyama et al. (2018). Preanus, prepelvic, preanal and tail lengths and distance between the pelvic and anal fins followed Tomiyama et al. (2015, 2021), other counts and measurements following Hubbs and Lagler (1958). Vertebral counts were based on radiographs. The fourth actinost and gonad were examined by dissection of the right pectoral-fin base and abdomen, respectively. Oblique scale rows of *Bassozetus* given in Nielsen and Merrett (2000) were treated as approximate values, following Dr. J. G. Nielsen (personal communication). Standard length is abbreviated as SL. The specimens examined in this study are deposited in the ichthyological collections of the Smithsonian Institution, National Museum of Natural History, Suitland, USA (USNM), and the Zoological Museum, Center of Natural History, University of Hamburg, Germany (ZMH).

**Taxonomic accounts**

*Bassozetus mozambiquensis*
Tomiyama, Takami, and Fukui, 2016
[English name: Mozambique Assfish]
(Figs 1–3; Table 1)
Bassozetus mozambiquensis Tomiyama, Takami, and Fukui 2016: 2, figs 1–3 (type locality: Mozambique Channel, western Indian Ocean); Tomiyama et al. 2018: 8 (in key); Tomiyama et al. 2021: 12.

Bassozetus compressus (not of Günther, 1878): Nielsen and Merrett 2000: 21, fig. 10 [in part (USNM 206917), description; Mozambique Channel, western Indian Ocean].

Bassozetus robustus (not of Smith and Radcliffe in Radcliffe, 1913): Nielsen and Merrett 2000: 43, fig. 21 [in part (one of ISH 1813–1968), description; off southern Brazil, western South Atlantic Ocean].

Material examined. ZMH 26332 (transferred from ISH 1813–1968), female, 478 mm SL, off southern Brazil, western South Atlantic Ocean, 29°57′S, 47°35′W, 1200 m depth, 27 February 1968, FRV Walther Herwig, bottom trawl.

Amended diagnosis. Dorsal-fin rays 116 or 117; long rakers on first gill arch 14 or 15; oblique scale rows 30 or 31; total vertebrae 63–65; pelvic-fin length 9.0–9.5% SL; a single well-developed median basibranchial tooth patch; sagitta with a smooth dorsal margin, an ostial channel, and lacking a small process on anterior margin (Tomiyama et al. 2016; this study).

Description of Atlantic specimen. Major counts and measurements are presented in Table 1. Body elongated, compressed; body depth and width greatest just behind posterior margin of opercle, gradually decreasing, becoming thin at tail tip. Head covered by loose skin, its length about half preanal length. Snout slightly expanded, its length 3.2 times eye diameter. Two rounded nostrils; anterior nostril near tip of snout; posterior nostril slightly larger, at about midpoint between anterior nostril and eye. Eye slightly horizontally elongate, its diameter 7.2% of head length. Mouth large; posterior margin of maxilla slightly anterior to vertical through midpoint between posterior margin of eye and preopercle; dorsal margin of maxilla sheathed by skin on cheek; tip of lower jaw not protruding beyond upper jaw when mouth closed. Tooth patches comprising small conical teeth on premaxilla, dentary, vomer, palatine, basibranchial, pharyngobranchial and inner surfaces of second and third upper-limb bases; vomerine tooth patch extending toward tip of upper jaw, V-shaped (Fig. 2A); single median basibranchial tooth patch well-developed, elongated (Fig. 2B). Preopercle lacking spines, posteriorly enlarged, almost reaching hind margin of opercle. Opercle thin, soft, with weak sub-epidermal posterodorsal spine. Gill slit wide; gill membranes fused ventrally with antimeres below eye, detached from isthmus. Single row of long and short rakers on first gill arch; long rakers distally pointed, on upper and lower limbs and angle, with minute spines along inner surface; short rakers distally rounded, on proximal regions of upper and lower limbs, with minute spines over entire surface. Similar short rakers arranged on second to fourth gill arches. Small tooth patches scattered on first to fourth gill arches, but not along outer ridges of second to fourth gill arches (Fig. 3); outer ridge of first gill arch indistinct. Two short pseudobranchial filaments. Anterior margin of anus below 22nd dorsal-fin ray. Urogenital opening distinct, located between anus and a small fleshy process slightly anterior to anal-fin origin. Dorsal-fin origin slightly anterior to vertical through posterior margin of opercle. Anal-fin origin below 24th dorsal-fin ray. Pectoral fin at level of eye; posterior portion of all rays broken. Anteroventral angle of fourth actinost not protruding. Pelvic-fin with one ray; its base slightly anterior to vertical through posterior margin of preopercle, close to ventral edge of body; left ray tip reaching slightly anterior to midpoint between pelvic-fin base and anus; right pelvic fin broken. Caudal-fin base very narrow; posterior portion of all rays broken. Scale pockets present on head and body; all scales missing. Lateral line absent. Sagitta missing.

Coloration in alcohol. Head blackish-brown under pale yellowish-brown membrane; trunk and tail pale yellowish-brown, except for slightly darkish abdomen. All fins pale yellowish-brown. Oral cavity grayish-brown; gill and abdominal cavities blackish-brown.

Distribution. Known from the Mozambique Channel, western Indian Ocean, and off southern Brazil, western South Atlantic Ocean, in depths between 1200–1600 m (Tomiyama et al. 2016; this study).

Remarks. The present specimen belongs to the genus Bassozetus, being distinguishable from the other genera by a combination of eye much smaller than snout, maxilla sheathed dorsally, preopercle almost reaching posterior

Fig. 1. Bassozetus mozambiquensis, ZMH 26332, female, 478 mm SL.
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margin of opercle, weak opercular spine, single well-developed basibranchial tooth patch, fourth actinost not protruding anteroventrally, and pelvic fin with one ray (Cohen and Nielsen 1978; Nielsen and Merrett 2000; Nielsen and Møller 2008). In addition, the following characters of the present specimen are similar to the diagnostic characters of *B. mozambiquensis* given by Tomiyama et al. (2016): 116 dorsal-fin rays (vs. 117 in the holotype), 14–15 long gill rakers (vs. 14), 31 oblique scale rows (vs. ca. 30), 63 total vertebrae (vs. 65) and short pelvic-fin, 9.0% SL (vs. 9.5%) (Table 1). The differences in other counts and measurements between the present specimen and *B. mozambiquensis* (within three and 2.6 points, respectively) are minor, and regarded here as intraspecific variations due to similar ranges existing in other species of *Bassozetus* (see Nielsen and Merrett 2000; Tomiyama et al. 2015, 2018, 2021). There being no other signifi-

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**Table 1.** Major counts and measurements of *Bassozetus mozambiquensis.*

|                          | ZMH 26332 Present specimen | USNM 206917 Holotype |
|--------------------------|-----------------------------|-----------------------|
| **Standard length (mm; SL)** | 478                         | 431                   |
| **Counts**               |                             |                       |
| Dorsal-fin rays          | 116                         | 117                   |
| Anal-fin rays            | 95                          | 98                    |
| Pectoral-fin rays        | 26/27<sup>b</sup>           | 26                    |
| Caudal-fin rays          | 8                           | 8                     |
| Long gill rakers         | 1+1+13/12=15/14<sup>b</sup> | 1+1+12=14            |
| Short gill rakers        | 4+4=8                       | 4+4/5=8/9<sup>b</sup> |
| Oblique scale rows       | 31                          | ca. 30                |
| Vertebrae                | 13+50=63                    | 13+52=65              |
| **Vertebral ordinal numbers** |                            |                       |
| just below dorsal fin-origin | 4                         | 4                     |
| just above anal fin-origin | 15                        | 16                    |
| **Measurements (% SL)**  |                             |                       |
| Head length              | 19.6                        | 21.5                  |
| Greatest body depth      | 15.4                        | 18.0                  |
| Body depth at anal-fin origin | 12.6                    | 13.5                  |
| Snout length             | 4.5                         | 5.1                   |
| Eye diameter             | 1.4                         | 1.7                   |
| Upper jaw length         | 10.3                        | 11.4                  |
| Postorbital length       | 13.9                        | 15.7                  |
| Preanalis length         | 34.0                        | 34.7                  |
| Predorsal length         | 18.0                        | 19.7                  |
| Preanal length           | 35.4                        | 37.1                  |
| Prepelvic length         | 14.8                        | 15.8                  |
| Distance between pelvic and anal fins | 22.6                  | 22.5                  |
| Tail length              | 66.7                        | 65.2                  |
| Pelvic-fin length        | 9.0                         | 9.5                   |

<sup>a</sup> data from Tomiyama et al. (2016), except for tail length (measured in this study). <sup>b</sup> left side/right side

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**Fig. 2.** Diagrams of vomerine (A) and basibranchial (B) tooth patches of *Bassozetus mozambiquensis.* ZMH 26332, 478 mm SL. Scale bar: 5 mm.

**Fig. 3.** Left second gill arch of *Bassozetus mozambiquensis.* ZMH 26332, 478 mm SL.
cant morphological variations, the present specimen was concluded as being *B. mozambiquensis*.

Following the original description of *B. mozambiquensis*, three further species of Bassozetus (B. nielseni, *B. trichibranchus* and *B. squamosus*) were also described, and *B. robustus* redescribed (Tomiyama et al. 2018, 2021). *Bassozetus mozambiquensis* differs from all of the others in having a shorter pelvic fin, 9.0–9.5% SL (vs. 10.6–18.7% in *B. nielseni*, 18.9–20.6% in *B. squamosus*, 17.5–21.7% in *B. trichibranchus* and 14.3–18.3% in *B. robustus*). Additionally, *B. mozambiquensis* differs from *B. nielseni, B. trichibranchus* and *B. robustus* in having 116 or 117 dorsal-fin rays (vs. 122–129, 119–126 and 119–123, respectively), and from *B. nielseni, B. squamosus* and *B. trichibranchus* in having 30 or 31 oblique scale rows (vs. 20–25, 44–47 and 39–45, respectively). Sagittal morphology can also be used to distinguish *B. mozambiquensis* from the above four species, as follows: dorsal margin smooth (vs. one or two indentations present on margin in *B. squamosus, B. trichibranchus* and specimens of *B. robustus* over 186 mm SL); a small process absent on anterior margin [vs. present (as a wide bulge) in most specimens of *B. nielseni*] (Tomiyama et al. 2016, 2018, 2021).

The present specimen of *B. mozambiquensis*, the second example of the species, extends the distributional range ca. 8300km westward from the type locality (Mozambique Channel, western Indian Ocean), and represents the first Atlantic record. Therefore, seven species of the genus, Bassozetus levistomatus Machida, 1989, *B. nielseni, Bassozetus normalis* Gill, 1883, *Bassozetus oncercephalus* (Vaillant, 1888), *Bassozetus taenia* (Günther, 1887), *B. trichibranchus*, and *B. mozambiquensis*, reported in this study, have been recorded from the Atlantic Ocean (Nielsen and Merrett 2000; Tomiyama et al. 2018, 2021; this study). *Bassozetus mozambiquensis* is also readily separable from *B. normalis, B. oncercephalus* and *B. taenia* in dorsal-fin ray number, the latter having 121–132, 129, and 122–128 fin rays, respectively, as well as in total vertebral number (63–65 vs. 67–71, 70, and 67–73, respectively). In addition, *B. mozambiquensis* has a greater number of oblique scale rows than *B. oncercephalus* (ca. 20–25) and *B. taenia* (ca. 15–22), and shorter pelvic fin than *B. normalis* (14.5–19.0% SL) and *B. taenia* (12.0–18.0%). Almost all counts and measurements of *B. levistomatus* overlap those of *B. mozambiquensis*, but the latter has 14 or 15 long gill rakers (vs. 9–11 in the former) and a single well-developed basibranchial tooth patch (vs. absent) (Nielsen and Merrett, 2000; Tomiyama et al., 2021). Although *B. compressus* and *B. robustus* have been previously recorded from the Atlantic Ocean by several authors (e.g., Nielsen and Merrett, 2000), their authentic distributional range were recently revised, being limited to the western Pacific Ocean (Tomiyama et al. 2015, 2021).

ZMH 26332, the collection lot of the present specimen, originally comprised three specimens, reported as *B. robustus* in Nielsen and Merrett (2000). However, excluding the present specimen, the others were reregistered as ZMH 26333 and designated as paratypes of *B. trichibranchus* (see Tomiyama et al. 2021).

**Comparative material.** Bassozetus mozambiquensis: USNM 206917, holotype, 431 mm SL, female, Mozambique Channel, 21°18′S, 36°18′E, 1510–1600 m depth, 2 October 1964, R/V Anton Bruun, bottom trawl.

**Acknowledgements**

We are most grateful to J. T. Williams and S. J. Raredon (USNM), and R. Thiel and I. Eidus (ZMH) for specimen loans. We also thank G. S. Hardy (Ngunguru, New Zealand) for his critical reading of the manuscript.

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