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Research Article

Confirmed Record of the Two-Faced Toadfish, Bifax Lacinia Greenfield, Mee & Randall, 1994 (Fam. Batrachoididae) From the Southern Oman Coast of the Arabian Sea

Abstract

The presence of two-faced toadfish Bifax lacinia was confirmed based on a single specimen, 244 mm standard length (SL), caught in the waters of Salalah port, Oman, the Arabian Sea in February 2016. Descriptions, illustrations, meristic and morphometric data are presented. The species is considered as an endemic of the southern Oman waters. Currently, the habitat of B. lacinia in Salalah port is under threat of the destruction due to the planned extension of the port.

Introduction

Toadfishes, called frogfishes in Australia, are mainly marine and brackish water fish of the family Batrachoididae, occurring worldwide between about 51°N and 45°S along a coast down to a depth of at least 366 m, often burying in the sand or under rocks or coral heads where they feed on crabs, shrimps, mollusks, sea urchins, and fishes [1]. Toadfishes can be easily recognized by their toad-like shape and also well known for their ability to produce sound with their swim bladders [2]. These small to medium-sized fish (to 57 cm) [1] are not commercially exploited, but they occur incidentally in artisanal catches and very rarely are used by local fishermen as a food fish. Overall, 23 genera and 84 species of toadfishes recorded in the world [3] including two species from the waters of Oman: flat toadfish Colletteichthys dussumieri and two-faced toadfish Bifax lacinia [4]. Al-Jufaili et al. [5], also listed grunting toadfish Allenbatrachus grunniens in Oman fish biodiversity, however, they did not state, where the species was obtained in Oman, so these data are not confirmed.

Two-faced toadfish, B. lacinia is known only from the south coast of Oman [6]. During the field work in 1989, J.K.L. Mee observed three specimens in horizontal crevices at the base of very large limestone boulders in a small bay near Raysut (Salalah port) but attempts to collect the fish were unsuccessful. In 1990, J.K.L. Mee and J.E. Randall revisits the southern Oman, took underwater pictures and collected one specimen from a crevice in the rocky wall at a depth of 8 m in Sadah bay in April 1990. In October 1993, four specimens, including holotype, were taken by J.L Earle from the reef in the Mahallah bay (near Sadah) at a depth of 6 m and another two specimens were collected by J.P. Hoover, S.A. Shaw and D.R. Deeks at the same place from 8 m depth in November 1993. These specialists determined that this species with its unique jaw flaps does not belong to any recognized genus. In 1994, D.W. Greenfield with J.K.L. Mee and J.E. Randall described the fish as a new genus and new species Bifax lacinia Greenfield, Mee & Randall, 1994 [6]. So far, only these seven specimens were studied and deposited in museum collections.

During the last 23 years, this species has not been seen by specialists in the Omani waters and elsewhere. Therefore, we believe that finding this rare and endemic fish is interesting and worthy of special attention for the study and conservation and preservation of its habitat.

Materials and Methods

A single specimen of Bifax lacinia was collected using a fish trap at underwater rocks in a depth of about 5 m inside Salalah port (16°57'24 N, 54°00'42) located at the south coast of Oman on 19 February 2016 (Figure 1). Meristic counts generally followed Greenfield et al. [6], except for number of vertebrae and extra counts of caudal fin rays and Gill rakers. Morphometric characters were taken following [6] with some...
additions. Measurements were made using electronic calipers to the nearest 0.1 mm and expressed in millimeters and as percentages of standard length (SL). Counts and measurements are given in (Tables 1,2). The specimen was fixed in 10% formalin and later preserved in 70% ethanol for deposit in the fish collection of the Marine Science and Fisheries Centre, Ministry of Agriculture and Fisheries Wealth, Muscat, Sultanate of Oman.

Results and Description

Body flattened dorsoventrally, body depth 6.4 times in SL. Skin smooth, naked without scales. Head broad and greatly depressed, 3.1 times in SL. A striking feature is a large fleshy flap with an eye spot extending laterally on each side of the mouth under the eyes (Figure 1A). Two fleshy whitish barbels present on the tip of snout and two on the chin. Snout short and round; mouth large, terminal; lower jaw with 3 rows of pointed teeth anteriorly, narrowing to a single row posteriorly; upper jaw with 3 rows of pointed teeth in anterior portion and a single row on sides, a single row of teeth on palatines. Maxilla reaches posteriorly to vertical beyond the middle of the eye. Eyes are round and relatively small. Gill cover armed with one large and 4 smaller spines, usually hidden under the skin. Gill membranes with 6 branchiostegal rays. Gill rakers on the first arch: upper limb 1, lower limb 9 (Total 10). Two lateral lines along the side of the body represented by a series of small pores, the upper with 46 pores, and the lower with 38 pores. Two dorsal fins, the first small with 3 spines hidden inside the skin, located just behind the head; second fin long-based with 23 soft rays. Anal fin long with 17 soft rays. Pectoral fin rounded with 20 rays, located in front of the first dorsal fin. The specimen was fixed in 10% formalin and later preserved in 70% ethanol for deposit in the fish collection of the Marine Science and Fisheries Centre, Ministry of Agriculture and Fisheries Wealth, Muscat, Sultanate of Oman.

Table 1: Meristic characters of Bifax lacinia.

| Meristic characteristics | Our specimen | [6] n=7 |
|--------------------------|--------------|--------|
| Dorsal fins               | 2            | 2      |
| spines                   | 3            | 3      |
| soft rays                | 23           | 23-24  |
| Finlets                  | absent       | absent |
| Adipose fin              | absent       | absent |
| Anal fin                 | 0            | 0      |
| spines                   | 17           | 15-18  |
| soft rays                |              |        |
| Pectoral fin             | 0            | 0      |
| spines                   | 0            | 20     |
| soft-rays                |              |        |
| Pelvic fin               | 1            | -*     |
| spines                   | 14           | -      |
| Caudal fin rays          |              |        |
| Lateral lines            | 2            | 2      |
| upper pores              | 46           | 47-56  |
| lower pores              | 38           | 38-48  |
| Gill rakers              | 1            | -      |
| on upper limb            | 9            | -      |
| on lower limb            | 10           | -      |
| total                    | -            | 30     |
| Vertebrae                |              |        |
| * Dash is no data        |              |        |

Table 2: Comparisons of morphometric data for Bifax lacinia.

| Morphometric characters | Our specimen | [6] (n=7) |
|-------------------------|--------------|----------|
| mm | % in SL | mm | % in SL |
| Standard length | 244 | 100.0 | 94.1-280 mm |
| Total length | 281 | 115.2 | - |
| Head length | 78 | 32.0 | 29.73-36.4 |
| Head depth | 38 | 15.6 | 12.0-15.79 |
| Head width | 68 | 27.9 | 28.8-32.3 |
| Preorbital (snout) length | 15 | 6.6 | 4.0-7.14 |
| Eye diameter | 7.5 | 3.1 | 3.7-5.84 |
| Postorbital length | 56 | 23.0 | - |
| Length of upper jaw | 39 | 16.0 | 14.7-16.6 |
| Length of lower jaw | 50 | 20.5 | - |
| Width of maxilla | 5 | 2.0 | - |
| Interorbital width | 34 | 13.9 | 8.3-13.9 |
| Length of mouth flap | 20 | 8.2 | 7.5-8.93 |
| Predorsal fin length 1st | 80 | 32.8 | 32.5-35.7 |
| Predorsal fin length 2nd | 110 | 45.1 | 41.6-47.86 |
| Length of first dorsal fin base | 22 | 9.0 | 4.25-6.3 |
| Length of second dorsal fin base | 126 | 51.6 | 49.3-54.4 |
| Length of caudal peduncle dorsal ventral | 5 | 2.0 | - |
| Prectoral fin length | 92 | 37.7 | - |
| Prectoral fin length | 69 | 28.3 | - |
| Prectoral fin length | 147 | 60.2 | - |
| Prectoral fin length | 161 | 66.0 | 62.59-67.23 |
| Anal fin base | 75 | 30.7 | 26.86-32.09 |
| Maximum body depth | 41 | 16.8 | 13.18-16.1 |
| Body width | 78 | 32.0 | - |
| Caudal peduncle depth | 13.5 | 5.5 | 5.7-6.4 |
| Pectoral fin length | 35 | 14.3 | 16.75-18.7 |
| Pectoral fin length | 32 | 13.1 | 11.9-20.83 |
| Distance between pelvic-fin bases | 34 | 13.9 | 10.3-14.9 |
fins are fleshy with 1 spine and invisible and impalpable soft rays, located under the throat. Caudal fin rounded with 14 rays.

**Coloration**

Body dorsally grey-brown, shading to white ventrally; front of head and upper lip bright yellow; first and second dorsal, pectoral, anal and caudal fins grey-brown at the base matching color of the body, grading into yellow on the tips, pelvic fins whitish; the outer part of cephalic flaps yellow; fleshy flaps with a black eye spot on the lower part of anterior side and dark rim behind; dark rim on the fleshy base of these pelvic fins.

**Remarks**

The meristic and morphometric characters of the specimen agree well with the data given by Greenfield et al. [6], Additionally, we counted the number of rays in the caudal fin and gill rakers, and measured following lengths: total, postorbital, lower jaw, caudal peduncle, prepectoral fin, prepelvic fin and preanus as well as the greatest body width and the width of maxilla, which is new data for this species. Some differences with previous data [6] were found only in number of pores in upper lateral line (46 vs. 47-56), orbit diameter, length of first dorsal-fin base, the greatest body depth and pectoral fin length.

Toadfishes have demersal eggs that are laid in a nest that is guarded by the male [7]. After hatching, unlike most other demersal spawners, the larvae do not move up into the water column to disperse, but rather stay attached to the substratum until most of the yolk sac has been absorbed, at a size of about 12 to 16 mm total length [7]. So toadfishes have limited dispersal ability, because they have demersal eggs and lack pelagic larvae [1].

The species Bifax lacinia has a very limited geographic distribution, because it was found only in the Raysut bay of Salalah port in 1989 and at the same site in our study in 2016, and approximately 120 kilometers toward the northeast near Sadah in 1990 and 1993. Thus, B. lacinia can be considered as an endemic and endangered species of Oman.

It must be stressed here that the Ministry of Transport and Communications of Oman has started implementing the plan of expansion of Salalah port and the project will include the construction of new berths in the place where we collected our specimen. So, it may result in permanent destruction of the habitat of B. lacinia in the Salalah port. It is desirable to conduct a special survey and to estimate abundance and distribution of B. lacinia as well as other endemic species along the coast of Oman.

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