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Redescription of the percoid fish *Symphysanodon andersoni* Kotthaus (Symphysanodontidae) from the northwestern Indian Ocean, based on the holotype and the second known specimen

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Abstract

Symphysanodon andersoni was described in 1974 from a single specimen collected southwest of Socotra Island, near the entrance to the Gulf of Aden. A more recent report (2003) of its capture in the Gulf of Kutch, Arabian Sea, was based on a misidentification. The second known specimen of the Bucktoothed Slopefish, *S. andersoni*, (at 204 mm SL the largest known specimen of the genus *Symphysanodon*) was collected off the south coast of Oman, Arabian Sea, in April 2014. *Symphysanodon andersoni* is distinguishable from its congeners by number of tubed scales in the lateral line, 60 to 65 versus 42 to 59 in the other species of the genus. In view of the fact that *S. andersoni* is poorly known, we redescribe it based on the holotype and the new specimen collected off Oman and provide the first color photograph of the species.

Key words: *Symphysanodon andersoni*, Indian Ocean, Arabian Sea, Socotra Island, Oman

Introduction

The marine fish family Symphysanodontidae contains a single genus, *Symphysanodon* Bleeker 1878, and 12 described species (Anderson & Bineesh 2011, Anderson & Springer 2005, Khalaf & Krupp 2008, Quéro *et al.* 2009). In addition, McCosker (1979) and Anderson & Springer (2005) reported a species of *Symphysanodon*, as yet undescribed, that was obtained from the stomach of a coelacanth (*Latimeria chalumnae*) caught in the Comoros in the southwestern Indian Ocean. Later Heemstra *et al.* (2006) mentioned an undescribed species of *Symphysanodon* from the Comoros that may be conspecific with the species reported from the coelacanth stomach. Also, Campos *et al.* (2009) reported two larval *Symphysanodon*, collected off southern Brazil, that may represent another undescribed species. In view of the fact that the genus *Symphysanodon* is not well known, with most species poorly represented in museum collections, it seems likely that other species await discovery.

Symphysanodon (largest known specimen 204 mm SL) occurs in depths of about 80 to 700 m in the Atlantic, Pacific, and Indian oceans. Five species of *Symphysanodon* have been described from the Indian Ocean (*sensu lato*), viz., *S. andersoni* Kotthaus 1974 (southwest of Socotra Island, near the entrance to the Gulf of Aden), *S. rhax* Anderson & Springer 2005 (off the Maldivé Islands), *S. disii* Khalaf & Krupp 2008 (Gulf of Aqaba), *S. pitondelafournaisei* Quéro *et al.* 2009 (off Reunion Island), and *S. xanthopterygion* Anderson & Bineesh 2011 (Arabian Sea off southern India). Manilo & Bogorodsky (2003) reported *Symphysanodon andersoni* from the Gulf of Kutch, an inlet in the northeastern quadrant of the Arabian Sea on the west coast of India. The second author (MVC) asked L. G. Manilo, at the National Museum of Natural History in Kiev (Ukraine), to check that record. Manilo found three specimens of *Symphysanodon*, identified as *S. andersoni*, in the Kiev collection, and sent MVC data on two of them (the third is in poor condition). Based on the number of lateral-line scales (54, 55) and total number of gillrakers on the first arch (39, 40), those two specimens appear to be identifiable as *S. xanthopterygion*.

Herein we redescribe *S. andersoni* based on the holotype and an additional specimen caught in the Arabian Sea off the south coast of Oman and provide the first color photograph of this species.

Methods and abbreviations

Methods used are those of Anderson (1970) and Anderson & Springer (2005). Institutional abbreviations are: MCZ—Museum of Comparative Zoology (Harvard University); USNM—National Museum of Natural History, Smithsonian Institution, Washington, DC; ZMH—Zoologisches Institut und Zoologisches Museum der Humboldt Universität (Hamburg); SL denotes standard length.

Symphysanodon andersoni Kotthaus 1974

Bucktoothed Slopefish

(Figures 1, 2; Tables 1–3)

Symphysanodon andersoni Kotthaus 1974:52, fig. 326 (original description, illustration; holotype. ZMH 5170, 157 mm SL; type locality southwest of Socotra Island, near the entrance to the Gulf of Aden (11°33.9' N, 52°54' E to 11°38' N, 52°52' E), depth 290 to 190 meters).

Diagnosis. A species of *Symphysanodon* distinguishable from all other members of the genus by number of tubed lateral-line scales, 60 to 65 in *S. andersoni*, fewer than 60 in the other species. Also, in combination, the following characters distinguish *S. andersoni* from other *Symphysanodon*: parapophyses present on first caudal vertebra, total number of gillrakers on first arch 41 or 42, sum of total number of gillrakers plus lateral-line scales (in individual specimens) 101 to 106, depth of body at dorsal-fin origin 31.2 to 31.4 % SL.

Description. Morphometric data are in Table 1. Data for most countable characters follow (data for scale counts appear in Table 2); values for the holotype are indicated by asterisks for characters having variable counts. Branchiostegals 7. Dorsal-fin rays IX, 10. Anal-fin rays III, 7. Pectoral-fin rays 16 or 17.* Pelvic-fin rays I, 5. Caudal-fin rays: principal 17 (9 + 8); branched 15 (8 + 7); procurent 13 dorsally, 12 ventrally. Gillrakers on first arch 12 or 13* + 29 (total 41 or 42*). Tubed lateral-line scales 60* to 65. Sum of total number of gillrakers plus lateral-line scales, in individual specimens, 101 to 106. No spur on posteriormost ventral procurent caudal-fin ray, but penultimate ventral procurent caudal-fin ray shortened basally (see Johnson, 1975). Vertebrae 25 (10 precaudal + 15 caudal). Formula for configuration of supraneural bones, anterior neural spines, and anterior dorsal pterygiophores 0/0/0 + 2 + 1/1/1/ (using notation of Ahlstrom *et al.* 1976). First caudal vertebra with parapophyses. Short neural spine on second preural centrum. Autogenous haemal spine associated with second preural centrum. Parhypural autogenous, bearing a hypurapophysis. Hypural 1 + hypural 2 present as a single unit, hypural 3 + hypural 4 present as a single unit. Hypural 5 autogenous. Epurals 3. Uroneurals 2 pairs. Epineurals associated with first 9 vertebrae. Pleural ribs on vertebrae 3 through 10. Trisegmental pterygiophores: 3 or 4 associated with posterior part of dorsal fin, 3 with posterior part of anal fin. Snout relatively blunt. Dorsalmost margin of maxilla covered by very narrow suborbital with mouth closed. Mouth terminal; lower jaw inclined dorsally with mouth closed; jaws about equal. Maxilla reaching posteriorly to vertical beyond middle of eye. Anterior and posterior nares fairly closely set. Pseudobranchiae present. Interorbital region flattened to slightly convex. Opercle with two flattened spines. Margins of both limbs of preopercle almost smooth; angle of preopercle with or without spine-like projection. Dorsal fin continuous and not incised at junction of spines and segmented rays. Scales ctenoid (with ctenial bases in posterior fields proximal to marginal cteni—see Hughes 1981; this is the transforming ctenoid scale of Roberts 1993). Most of head, including maxillae, dentaries, lachrymals, lateral aspects of snout, and interorbital region with scales; dorsum of snout mostly without scales. Branchiostegals and branchiostegal membranes without scales. Dorsal and anal fins without scales (except specimen of 204 mm SL with some scales on most posterior dorsal and anal-fin rays), but with scaly sheaths at their bases; pectoral and pelvic fins scaly basally; both lobes of caudal fin scaly. Large modified scales associated with pelvic fin, just dorsal to pelvic spine (axillary scales) and in ventral midline between the pelvic fins (interpelvic scales). Lateral line gently curved beneath dorsal fin. Caudal fin distinctly forked. Anterior ends of premaxillae incised, forming conspicuous notch that receives anterior ends of dentaries (see Fig. 2), anteriorly each dentary with well-developed patch of mostly

exserted teeth. Premaxilla with outer series of small teeth and inner band of much smaller granular teeth; premaxillary notch toothless, but some of teeth on either side of notch exserted in holotype (well developed patch of exserted teeth on either side of notch in 204-mm-SL specimen, see Fig. 2). Dentary with series of small conical teeth extending from elevated posterodorsal surface of jaw almost to symphysis; numerous teeth at anterior end of jaw adjacent to symphysis and on elevated posterodorsal surface of jaw somewhat enlarged; many enlarged teeth at anterior end of jaw exserted and fitting into premaxillary notch when mouth closed. In 204-mm SL specimen, teeth in exserted patches at anterior ends of upper and lower jaws mostly incisor like to molariform, some of these teeth conical to subconical. Vomer and palatines with teeth; vomerine tooth patch small, semicircular or triangular, without posterior prolongation; palatine teeth in longitudinal band. No teeth seen on tongue or pterygoids.

TABLE 1. Morphometric data for *Symphysanodon andersoni*. Standard, fork, and total lengths in mm; other measurements in % standard length. ZMH 5170 = holotype; USNM 435866 = specimen from south coast of Oman.

Character	ZMH 5170	USNM 435866
Standard length	157	204
Fork length	174	222
Total length	224	283
Length of upper caudal-fin lobe	43.7	~ 36.3
Length of lower caudal-fin lobe	40.0	~ 36.9
Length of mid-caudal fin rays	9.7	10.0
Length of head	33.4	30.2
Length of snout	6.3	6.9
Diameter of fleshy orbit	10.1	7.6
Postorbital length of head	17.4	15.3
Width of bony interorbital	8.9	7.5
Depth of head	26.5	20.9
Width of head	16.4	14.7
Length of upper jaw	12.6	12.2
Length of lower jaw	13.8	14.4
Width of maxilla	4.7	4.6
Suborbital width	0.7	1.0
Depth of body @dorsal-fin origin	31.2	31.4
Greatest width of body	15.8	14.0
Predorsal fin length	34.6	35.2
Prepectoral fin length	33.1	32.8
Prepelvic fin length	38.3	36.1
Preanal fin length	65.7	63.1
Length of caudal peduncle	27.6	25.3
Depth of caudal peduncle	11.1	11.4
Length of pectoral-fin	28.8	28.3
Length of pelvic-fin	22.5	22.9
Length of dorsal-fin base	44.1	44.7
Length of depressed dorsal fin	56.3	56.9
Length of third dorsal spine	11.6	11.3
Length of fourth dorsal spine	12.1	12.4
Length of last dorsal spine	~ 12.6	11.8

.....continued on the next page

TABLE 1. (Continued)

Character	ZMH 5170	USNM 435866
Length of longest dorsal spine	13.0 (7 th)	12.4 (4 th)
Length of first dorsal soft ray	13.3	12.0
Length of last dorsal soft ray	11.6	12.5
Length of longest dorsal soft ray	14.6 (8 th)	14.7 (8 th)
Length of anal-fin base	16.2	17.1
Length of depressed anal fin	27.1	29.7
Length of first anal spine	6.2	5.7
Length of second anal spine	~9.7	9.9
Length of third anal spine	12.1	11.9
Length of first anal soft ray	14.4	13.7
Length of last anal soft ray	11.4	13.3
Length of longest anal soft ray	14.4 (1 st)	14.0 (6 th)

TABLE 2. Data for counts of scales in *Symphysanodon andersoni*. ZMH5170 = holotype; USNM 435866 = specimen from south coast of Oman. For bilateral counts, left side is presented first; LL = lateral line.

Character	ZMH 5170	USNM 435866
Standard length (mm)	157	204
Lateral-line scales	60, 61	65, 60
Cheek-scale rows	18	~16, ~13
Scales: dorsal-fin origin to LL	7	8
Scales: anal-fin origin to LL	18	~18
Scale rows: mid-dorsal fin to LL	~6	~7
Circum-caudal peduncular scales	38	~35

**FIGURE 1.** Freshly collected specimen of *Symphysanodon andersoni* (USNM 435866, 204 mm SL) caught in a fish trap off the south coast of Oman. Photograph by M. V. Chesalin.

Coloration. In specimen caught off Oman (Fig. 1): Head mostly reddish. Dorsum of body yellow, overlain by red orange beneath dorsal fin and on caudal peduncle; body beneath lateral line mainly rosy. Iris of eye red adjacent

to pupil. Spines in dorsal fin yellow, interspinous membranes pale violet; soft dorsal fin mostly yellow, red on distal portions of posterior dorsal soft rays. Pectoral, pelvic, and anal fins mainly pallid, with some rose. Caudal fin mainly yellow, with considerable orange and red orange dorsally and posteriorly.

Comparisons. Number of tubed lateral-line scales distinguishes *S. andersoni* (with 60–65) from all other species of *Symphysanodon* (variously with 42–59). Sum of total number of gillrakers plus number of lateral-line scales (in individual specimens) distinguishes *S. andersoni* (with 101–106) from all other species of *Symphysanodon* except *S. xanthopterygion* (with 94–101). In addition, *S. andersoni* has parapophyses on the first caudal vertebra, whereas the Atlantic species *S. berryi*, *S. mona*, and *S. octoactinus*, the Pacific species *S. maunaloae* and *S. parini*, and the Indian Ocean species *S. rhax* lack those processes. In Table 3, we compare selected characters of Indian-Ocean species of *Symphysanodon*.

TABLE 3. Comparisons of data for selected characters in Indian–Ocean species of *Symphysanodon*. Standard lengths in mm, other measurements in % SL; *piton* = *pitondelafournaisei*, *xantho* = *xanthopterygion*.

Character	<i>andersoni</i> n = 2	<i>disii</i> n = 5	<i>piton</i> n = 2	<i>rhax</i> n = 16	<i>xantho</i> n = 15
Standard length	157 & 204	146–163	90 & 99	54–144	119–146
Parapophyses on first caudal vertebra	yes	yes	yes	no	yes
Pectoral-fin rays	16 or 17	16 or 17	15	16–18	16–18
Lateral-line scales	60–65	~48–50	48–50	47–52	54–59
Total first arch gillrakers	41 or 42	34–37	34–36	34–38	38–42
Sum of lateral-line scales plus total gillrakers	101–106	82–87	84	84–88	94–101
Width of bony interorbital	7.5–8.9	7.7–8.7	8.9–9.1	5.3–7.7	6.1–7.9
Depth of body at origin of dorsal-fin	31.2–31.4	27.8–31.1	26.3–30.0	19.8–24.8	23.8–27.4
Length of pelvic fin	22.5–22.9	23.7–25.1	No data	>19–>67	20.5–24.3
Length of depressed anal fin	27.1–29.7	31.1–34.9	33.3–38.4	21.8–25.8	24.0–27.8
Least depth of caudal peduncle	11.1–11.4	11.1–12.9	11.1–12.1	7.1–10.3	8.8–10.5
Length of base of anal fin	16.2–17.1	16.5–18.0	16.7–18.2	10.8–14.8	13.2–16.0
Length of first anal spine	5.7–6.2	4.8–5.7	4.4–5.0	2.1–4.8	3.8–5.9
Length of second anal spine	~9.7–9.9	8.3–9.7	9.1–10.0	7.5–10.5	8.1–9.4
Length of third anal spine	11.9–12.1	10.8–11.9	11.1–12.2	9.3–12.5	>9.8–11.6

Distribution. Known from southwest of Socotra Island, near the entrance to the Gulf of Aden, and from the Arabian Sea off the south coast of Oman.

Holotype: ZMH 5170, 157 mm SL; near mouth of Gulf of Aden, about 60 nautical miles off Socotra, northwestern Indian Ocean; 11°33.9' N, 52°54' E to 11°38' N, 52°52' E; METEOR station 102; depth 290 to 190 meters; 20 December 1964.

Other material: USNM 435866, 204 mm SL; off Raysut Port, Salalah, Dhofar, Sultanate of Oman, Arabian Sea, northwestern Indian Ocean; 16°55'39" N, 54°01'18" E; depth ca. 80 meters; collected by S. R. Al Shajibi, 16 April 2014.

Symphysanodon sp.

Three small specimens (USNM 326398, 40–47 mm SL) of *Symphysanodon*, collected by prawn trawl in 78 meters off Somalia in the Gulf of Aden, may be representatives of *S. andersoni*. Unfortunately, they are not in good enough condition to be identified to species (Anderson & Springer 2005). Also, there are 13 small specimens of *Symphysanodon* (MCZ 156850–156857, 8–20 mm in length) in the Museum of Comparative Zoology (Harvard University) collected off Somalia and Oman in 1995 that are identifiable only to genus. They, too, may be *S. andersoni*.



FIGURE 2. Anterior view of dentition in specimen of *Symphysanodon andersoni* (USNM 435866, 204 mm SL) collected off the south coast of Oman. Photograph by Sandra J. Reardon.

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