



A new species of the perciform fish genus *Symphysanodon* (Symphysanodontidae) from the Arabian Sea off the southwestern coast of India

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Abstract

Symphysanodon xanthopterygion, new species, reported herein from 15 specimens collected near Quilon, India, off the Kerala Coast in the southeastern Arabian Sea, becomes the twelfth described species in the genus. The following characters in combination distinguish *S. xanthopterygion* from its congeners: parapophyses present on first caudal vertebra, total number of gillrakers on first arch 38 to 42, tubed lateral-line scales 54 to 59, sum of lateral-line scales plus total number of gillrakers in individual specimens 94 to 101, head length 33 to 37% SL, head depth 18 to 21% SL, snout length 5 to 6% SL, body depth 24 to 27% SL, lower caudal-fin lobe bright yellow.

Key words: *Symphysanodon xanthopterygion*, Arabian Sea, India, Kerala Coast, Quilon

Introduction

The marine fish family Symphysanodontidae contains a single genus, *Symphysanodon*, and 11 previously described species (Anderson and Springer, 2005; Khalaf and Krupp, 2008; Quéro *et al.*, 2009). In addition, McCosker (1979) and Anderson and 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.

Symphysanodon (with adults reaching less than 175 mm SL) occurs in depths of about 80 to 700 m in the Atlantic, Pacific, and Indian oceans. Four species of *Symphysanodon* have been described from the Indian Ocean (*sensu lato*)—*S. andersoni* Kotthaus, 1974 (southwest of Socotra Island, near the entrance to the Gulf of Aden; also reported from the Gulf of Kutch, an inlet in the northeastern quadrant of the Arabian Sea on the west coast of India by Manilo and Bogorodsky, 2003); *S. rhax* Anderson and Springer, 2005 (off the Maldivé Islands); *S. disii* Khalaf and Krupp, 2008 (Gulf of Aqaba); and *S. pitondelafournaisei* Quéro *et al.*, 2009 (off Reunion Island). Herein we describe *S. xanthopterygion* based on 15 specimens collected in the Arabian Sea off Quilon, India.

Methods and abbreviations

Methods used are those of Anderson (1970) and Anderson and Springer (2005), counting lateral-line scales on left side where possible. Institutional abbreviations are: CAS—California Academy of Sciences, San Francisco; CMFRI—Central Marine Fisheries Research Institute, Cochin, Kerala, India; DNR—Designated National Repository, CMFRI, Cochin, Kerala, India; GMBL—Grice Marine Biological Laboratory, College of Charleston, Charleston, South Carolina; UF—Florida Museum of Natural History, University of Florida, Gainesville;

USNM—National Museum of Natural History, Smithsonian Institution, Washington, DC.; ZMH—Zoologisches Museum der Universität Hamburg, Hamburg, Bundesrepublik Deutschland. SL denotes standard length; TL, total length.

***Symphysanodon xanthopterygion*, new species**

Indian Bunquelovely, Indian Slopefish

(Figures 1, 2; Tables 1–3)

Material examined. COLLECTION I—5 specimens, 127–145 mm SL; off Quilon, India, Kerala Coast, southeastern Arabian Sea; 09°05' N, 75°52' E; 240 meters; collected by K.K. Bineesh and K.V. Akhilesh, 08 September 2010. COLLECTION II—10 specimens, 119–146 mm SL; off Quilon, India, Kerala Coast, southeastern Arabian Sea, 09°20' N, 75°51' E; 150–220 meters; collected by K.K. Bineesh and K.V. Akhilesh, 17 September 2010.

Holotype. From COLLECTION II: USNM 400886, 141 mm SL.

Paratypes. From COLLECTION I: DNR GB. 31.146.1.2, DNR GB. 31.146.1.2.1, DNR GB. 31.146.1.2.2—3 specimens, 127–131 mm SL; GMBL 10-016, one specimen, 136 mm SL; USNM 400887, one specimen, 145 mm SL. From COLLECTION II: CMFRI/PFD/SYM/8.1-8.8, 8 specimens, 119–146 mm SL; UF 180312, one specimen, 137 mm SL.

Diagnosis. A species of *Symphysanodon* distinguishable from the other species of the genus by the following combination of characters. First caudal vertebra with parapophyses. Total gillrakers on first arch 38 to 42. Lateral-line scales 54 to 59. Sum of lateral-line scales plus total number of gillrakers on individual specimens 94 to 101. Head length 33 to 37% SL. Head depth 18 to 21% SL. Snout length 5 to 6 % SL. Body depth 24 to 27 % SL. Lower caudal-fin lobe bright yellow; bright yellow spot usually present on posterior part of opercle.



FIGURE 1. Holotype of *Symphysanodon xanthopterygion*, USNM 400886, 141 mm SL; southeastern Arabian Sea, Kerala Coast, off Quilon, India. Photographed by Sean Money, Charleston Museum.

Description. Morphometric data appear in Table 1. Data for countable characters follow (some of which also appear in Table 2); values for the holotype are indicated by asterisks for characters having variable counts (data for some osteological characters not available for holotype). Branchiostegals 7. Dorsal-fin rays IX, 10. Anal-fin rays III, 7. Pectoral-fin rays 16* to 18 (17*). Pelvic-fin rays I, 5. Caudal-fin rays: principal 17 (9 + 8); branched 15 (8 + 7); procurrent 12 or 13 dorsally, 11 to 13 ventrally. Gillrakers on first arch 11 to 13 (12*) + 27 to 30*—total 38 to 42*. Tubed lateral-line scales 54 to 59* (58*). Sum of total number of gillrakers plus lateral-line scales, in individual specimens, 94 to 101* (100*). No spur on posteriormost ventral procurrent caudal-fin ray, but penultimate ventral procurrent 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.* (1976:297). First caudal vertebra with parapophyses. Neural spine of second preural centrum short. Autogenous haemal spine associated with second preural centrum. Parhypural autog-

enous, bearing a hypurapophysis. Hypurals 1 and 2 fused, hypurals 3 and 4 fused. Hypural 5 autogenous. Epurals 3. Epineurals associated with first 9 or 10 vertebrae. Pleural ribs on vertebrae 3 through 10. Trisegmental pterygiophores: 3 associated with dorsal fin, 2 or 3 with anal fin.

TABLE 1. Morphometric data on *Symphysanodon xanthopterygion*. Standard lengths in mm, other measurements in percentages of standard length; > = slightly damaged.

Measurement	n	Range	Holotype	Measurement	n	Range	Holotype
Standard length	15	119–146	141	Caudal peduncle, length	15	24.0–26.6	24.3
Head, length	15	33.2–36.5	35.0	Anal fin, length of base	15	13.2–16.0	14.9
Head, depth	15	18.4–20.5	19.8	Depressed anal fin, length	15	24.0–27.8	25.2
Snout, length	15	5.1–6.2	6.0	Pectoral fin, length	15	23.5–29.4	29.4
Fleshy orbit, diameter	15	8.1–9.6	9.6	Pelvic fin, length	15	20.5–24.3	23.2
Postorbital length of head	15	17.6–21.3	17.8	Upper caudal–fin lobe, length	13	>29.1–47.3	ca. 39.3
Suborbital width	15	0.24–0.87	0.57	Lower caudal–fin lobe, length	13	>28.4–40.4	ca.36.4
Cheek, height	15	5.7–7.0	6.7	First dorsal spine, length	15	4.3–6.3	6.0
Maxilla width	15	4.0–5.6	4.2	Second dorsal spine, length	13	7.8–9.4	9.1
Upper jaw, length	15	13.6–15.0	14.4	Third dorsal spine, length	15	9.8–11.6	10.7
Lower jaw, length	15	14.0–15.2	14.8	Fourth dorsal spine, length	14	10.8–13.1	12.5
Bony interorbital, width	15	6.1–7.9	7.1	Last dorsal spine, length	15	11.1–13.0	11.7
Internarial distance	15	0.60–0.93	0.71	Longest dorsal spine, length	15	11.4–13.5	12.7 (5th)
Predorsal–fin length	15	33.9–35.6	35.5	First anal spine, length	15	3.8–5.9	4.2
Body, depth	15	23.8–27.4	27.0	Second anal spine, length	15	8.1–9.4	9.2
Caudal peduncle, depth	15	8.8–10.5	9.8	Third anal spine, length	15	>9.8–11.6	11.5



FIGURE 2. Freshly caught *Symphysanodon xanthopterygion*, southeastern Arabian Sea, Kerala Coast, off Quilon, India. Photographed by K. K. Bineesh.

Snout blunt. Anterior ends of premaxillae incised, forming a notch that receives anterior ends of dentaries. Dorsalmost margin of maxilla covered by very narrow suborbital with mouth closed. Mouth terminal, oblique; premaxillae protrusile; jaws about equal. Maxilla reaching posteriorly to vertical beyond middle of eye. Anterior and posterior nares fairly closely set on each side of snout. Pseudobranchiae present. Interorbital region flattened to very slightly convex. Opercle with two flattened spines. Both limbs of preopercle rarely serrate, margins usually smooth, occasionally slightly roughened; angle of preopercle with short spine, spine-like process, a few serrae, or occasionally smooth. 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, dorsal and lateral aspects of snout, and interorbital region scaly. Branchiostegals and branchiostegal membranes naked; most of gular region naked, but with some scales anteriorly. Dorsal and anal fins naked (except some scales present proximally on posteriormost soft rays), but with low 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 well forked.

Premaxilla with outer series of small conical teeth and inner band of extremely small teeth; anteriorly teeth in outer series considerably enlarged; premaxillary notch toothless. Dentary with series of small conical teeth extending from elevated posterodorsal surface of bone almost to symphysis; numerous teeth adjacent to symphysis and on elevated posterodorsal surface of jaw conspicuously enlarged; some enlarged teeth at anterior end of dentary exerted, extending anterior to premaxillary notch when mouth closed; symphysis toothless. Vomer and palatines with extremely small teeth; vomerine tooth patch chevron shaped, without posterior prolongation; palatine teeth in narrow band. Endopterygoids without teeth. No evidence of teeth on tongue, but tongue with numerous papillae.

Coloration. Head mostly red orange, usually with bright yellow patch on posterior part of opercle; body red orange dorsally, pallid ventrally; iris of eye mainly yellow; dorsal fin yellow to orange; pectoral fin rosy; pelvic and anal fins pallid; upper lobe of caudal fin orange to red, lower lobe bright yellow.

Comparisons. *Symphysanodon xanthopterygion* can be distinguished from all other described species of *Symphysanodon* except *S. typus* by number of tubed scales in the lateral line—54 to 59 in *S. xanthopterygion* vs. 42 to 52 (60 or 61 in *S. andersoni*); the range of counts of lateral-line scales in *S. typus* (49 to 55) overlaps slightly the range for *S. xanthopterygion* (Table 2). The range of sums of total numbers of first-arch gillrakers plus numbers of tubed lateral-line scales in individual specimens is 94 to 101 in *S. xanthopterygion*, distinguishing it from all other species except *S. typus*, which has a slightly overlapping range of 86 to 94 (Table 2). The ranges for a number of morphometric characters (in percentages of standard length) in *S. xanthopterygion* differ (or overlap only slightly) with those of *S. andersoni* and *S. typus* (Table 3).

The photograph included with the account of *S. typus* in Kimura *et al.* (2003:46) shows a fish with a yellow patch on the posterior part of the opercle, yellow lower caudal-fin lobe, and overall light rosy coloration. The coloration of *S. xanthopterygion* is similar, but the yellow on the lower caudal-fin lobe is brighter and the general body coloration is redder.

Heemstra *et al.* (2006) reported and illustrated (p. 454, figure 7G) a species of *Symphysanodon*, observed and photographed from a submersible off Ngazidja (Grand Comoro) Island, writing (p. 453): “Our photograph and video tapes show a pinkish purple fish, with a bright yellow spot on the opercle; the lower caudal fin lobe is yellow and the upper lobe is pink with a white tip; the dorsal fin is hyaline yellow.” The yellow on opercle and lower caudal-fin lobe is reminiscent of *S. xanthopterygion*, but the overall body coloration is not.

Distribution. This species is known from the southeastern Arabian Sea off the Kerala Coast of southern India. The specimens reported herein were collected off Quilon in 150 to 240 meters of water.

Remarks. As can be seen in Figure 2, *S. xanthopterygion* is numerous in collections made off Quilon and is common (along with *Nemipterus*) in the local fishery, being sold in the domestic market.

Symphysanodon xanthopterygion and *S. typus* are quite similar in morphology and coloration (see **Comparisons** above and Tables 2 & 3) and have nonoverlapping geographic ranges (*S. typus* being widely distributed in the Pacific from Hawaii to the Philippines and Indonesia), suggesting that the two species constitute a sister group and that the range of a more continuously distributed ancestor may have been split by a barrier formed in the Indo-Malaysian Region.

Etymology. The name *xanthopterygion* is from the Greek—xanthos (yellow), pterygion (fin)—referring to the yellow coloration of the lower caudal-fin lobe. The specific name of the new species is a noun in apposition to the generic name *Symphysanodon*.

TABLE 2. Frequency distributions in three species of *Symphysanodon* for total numbers of gillrakers on first gill arch, numbers of tubed lateral-line scales, and sums of total gillrakers plus lateral-line scales in individual specimens. Counts of gillrakers and lateral-line scales are presented for both sides of the holotype of *S. andersoni*, the only specimen of that species examined.

Total numbers of gillrakers on first gill arch													
	<u>36</u>	<u>37</u>	<u>38</u>	<u>39</u>	<u>40</u>	<u>41</u>	<u>42</u>	<u>Mean</u>					
<i>andersoni</i>						1	1						
<i>typus</i>	6	6	7	1	2			37.41					
<i>xanthopterygion</i>			1	3	7	2	2	40.07					

Numbers of tubed lateral-line scales														
	<u>49</u>	<u>50</u>	<u>51</u>	<u>52</u>	<u>53</u>	<u>54</u>	<u>55</u>	<u>56</u>	<u>57</u>	<u>58</u>	<u>59</u>	<u>60</u>	<u>61</u>	<u>Mean</u>
<i>andersoni</i>												1	1	
<i>typus</i>	2	1	4	4	5	2	1							52.00
<i>xanthopterygion</i>						1	2	3	—	4	3			57.00

Sums of total numbers of first-arch gillrakers plus numbers of tubed lateral-line scales in individual specimens																		
	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>91</u>	<u>92</u>	<u>93</u>	<u>94</u>	<u>95</u>	<u>96</u>	<u>97</u>	<u>98</u>	<u>99</u>	<u>100</u>	<u>101</u>	<u>102</u>	<u>Mean</u>
<i>andersoni</i>																	2	
<i>typus</i>	2	3	—	3	2	3	2	—	2									89.71
<i>xanthopterygion</i>									3	1	1	2	3	1	1	1		97.00

TABLE 3. Comparisons of morphometric data for three species of *Symphysanodon*. Standard lengths in mm, other measurements in percentages of SL. > = slightly damaged.

Measurement	<i>S. xanthopterygion</i>			<i>S. typus</i>		<i>S. andersoni</i>
	n	Range	n	Range	Holotype ZMH 5170	
Standard length	15	119–146	24	44–165	157	
Head, length	15	33.2–36.5	12	27.7–33.5	33.4	
Head, depth	15	18.4–20.5	12	19.1–24.2	26.5	
Snout, length	15	5.1–6.2	12	6.1–8.2	6.3	
Fleshy orbit, diameter	15	8.1–9.6	12	8.1–12.0	10.1	
Upper jaw, length	15	13.6–15.0	12	12.4–15.0	12.6	
Lower jaw, length	15	14.0–15.2	12	12.5–14.6	13.8	
Bony interorbital, width	15	6.1–7.9	12	6.6–8.7	8.9	
Body, depth	15	23.8–27.4	24	22.0–29.0	31.2	
Caudal peduncle, depth	15	8.8–10.5	12	9.9–12.1	11.1	
Anal fin, length of base	15	13.2–16.0	23	14.7–20.8	16.2	
Depressed anal fin, length	15	24.0–27.8	16	26.6–>34.2	27.1	
First anal spine, length	15	3.8–5.9	21	4.8–7.2	6.2	
Second anal spine, length	15	8.1–9.4	20	8.7–10.9	ca. 9.7	
Third anal spine, length	15	>9.8–11.6	19	10.8–13.1	12.1	

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References

- Ahlstrom, E.H., Butler, J.L. & Sumida, B.Y. (1976) Pelagic stromateoid fishes (Pisces, Perciformes) of the eastern Pacific: Kinds, distributions, and early life histories and observations on five of these from the northwest Atlantic. *Bulletin of Marine Science*, 26 (3), 285–402.
- Anderson, W.D., Jr. (1970) Revision of the genus *Symphysanodon* (Pisces: Lutjanidae) with descriptions of four new species. *Fishery Bulletin*, 68(2), 325–346.
- Anderson, W.D., Jr. & Springer, V.G. (2005) Review of the perciform fish genus *Symphysanodon* Bleeker (Symphysanodontidae), with descriptions of three new species, *S. mona*, *S. parini*, and *S. rhax*. *Zootaxa*, 996, 1–44.
- Campos, P.N., Bonecker, A.C.T., de Castro, M.S. & Anderson, W.D., Jr. (2009) First record of the fish genus *Symphysanodon* (Teleostei: Perciformes: Symphysanodontidae) from the western South Atlantic Ocean. *Zootaxa*, 2270, 63–68.
- Heemstra, P.C., Hissmann, K., Fricke, H., Smale, M.J. & Schauer, J. (2006) Fishes of the deep demersal habitat at Ngazidja (Grand Comoro) Island, Western Indian Ocean. *South African Journal of Science*, 102, 444–460.
- Hughes, D.R. (1981) Development and organization of the posterior field of ctenoid scales in the Platycephalidae. *Copeia*, 1981(3), 596–606.
- Johnson, G.D. (1975) The procurrent spur: An undescribed perciform caudal character and its phylogenetic implications. *Occasional Papers of the California Academy of Sciences*, No. 121, 1–23.
- Khalaf, M.A. & Krupp, F. (2008) A new species of the genus *Symphysanodon* (Perciformes: Symphysanodontidae) from the Gulf of Aqaba, Red Sea. *aqua, International Journal of Ichthyology*, 14(2), 85–88.
- Kimura, S., Peristiwady, T. & Suharti, S.R. (2003) Symphysanodontidae. In: Kimura, S. & Matsuura, K. (Eds) *Fishes of Bitung, Northern Tip of Sulawesi, Indonesia*. Oceanic Research Institute, The University of Tokyo, Tokyo, 45–46.
- Kotthaus, A. (1974) Fische des Indischen Ozeans. Ergebnisse der ichthyologischen Untersuchungen während der Expedition des Forschungsschiffes "Meteor" in den Indischen Ozean, Oktober 1964 bis Mai 1965. A. Systematischer Teil, XI. Percormorphi (4). "Meteor" *Forschungsergebnisse*, Reihe D, No. 17, 33–54.
- Manilo, L.G. & Bogorodsky, S.V. (2003) Taxonomic composition, diversity and distribution of coastal fishes of the Arabian Sea. *Journal of Ichthyology*, 43, Supplement 1, S75–S149.
- McCosker, J.E. (1979) Inferred natural history of the living coelacanth. In: McCosker, J.E. & Lagios, M.D. (Eds) *The biology and physiology of the living coelacanth. Occasional Papers of the California Academy of Sciences*, No. 134, 17–24.
- Quéro, J.-C., Spitz, J. & Vayne, J.-J. (2009) *Symphysanodon pitondelafournaisei*: Une nouvelle espèce de Symphysanodontidae (Perciformes) de l'île de La Réunion (France, océan Indien). *Cybium*, 33(1), 73–77.
- Roberts, C.D. (1993) Comparative morphology of spined scales and their phylogenetic significance in the Teleostei. *Bulletin of Marine Science*, 52(1), 60–113.