PROC. BIOL. SOC. WASH.
103(4), 1990, pp. 931–954

THREE NEW SPECIES OF SYMPHURINE TONGUEFISHES FROM TROPICAL AND WARM TEMPERATE WATERS OF THE EASTERN PACIFIC (*SYMPHURUS*: CYNOGLOSSIDAE: PLEURONECTIFORMES)

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Abstract.—Three new species of *Symphurus* are described based on specimens collected from the Gulf of California southward along Central America and northern South America to northern Peru. *Symphurus oligomerus,* n. sp., occurs from the southern Gulf of California to northern Peru and is a relatively deep-water (84–481 m) species characterized by: a 1-3-2 pattern of interdigitation of dorsal pterygiophores and neural spines (ID pattern), 85–97 dorsal-fin rays, 71–83 anal-fin rays, 12 caudal-fin rays, 48–52 total vertebrae, 5 hypurals, black peritoneum, an alternating series of dark rectilinear pigment blotches and unpigmented areas on the posterior portion of the dorsal fin and throughout the anal fin, a dark pigment blotch on the proximal portion of the caudal fin, with distal portions distinctly unpigmented, and the absence of a pupillary operculum. *Symphurus chabanaudi,* n. sp., occurs from the northern Gulf of California to northern Peru and is among the largest species in the genus, reaching lengths of at least 233 mm SL. This shallow-water species (2–59 m) is characterized by: a 1-5-3 ID pattern, 12 caudal-fin rays, 4 hypurals, small scales on blind-side dorsal- and anal-fin rays, a prominent black spot on the ocular-side opercle, and absence of a pupillary operculum. *Symphurus diabolicus,* n. sp., known only from a single specimen collected at 501 m off Chatham Island in the Galapagos Archipelago, is readily distinguished by the combination of: a 1-3-2 ID pattern, 12 caudal-fin rays, 5 hypurals, 109 dorsal-fin rays, 94 anal-fin rays, 58 total vertebrae, small scales (ca. 135 in longitudinal series), spotted peritoneum, and large eyes (18.6% of head length).

Symphurus is the only genus of tonguefishes (Cynoglossidae) occurring in the New World, with over 40 nominal species recorded from marine waters on both sides of the Americas (Ginsburg 1951, Mahadeva 1956, Menezes & Benvegnú 1976, Munroe 1987). In the eastern Pacific, at least 14 species inhabit coastal and deep-waters (Jordan & Evermann 1898, Mahadeva 1956, Munroe & Mahadeva 1989, Munroe & Nizinski 1990) from southern Oregon (Eschmeyer et al. 1983) to northern Peru (Hildebrand 1946, Mahadeva 1956, Chirichigno 1974). The majority of species occur in tropical waters.

Recent collecting in inshore and deeper areas off the coasts of Mexico, Central, and South America have resulted in the capture of many tonguefishes, including specimens of the new species described herein. This paper provides formal descriptions of three of these new species.

Methods.—Specimens examined are listed by collection acronym following Leviton et al. (1985). Counts and measurements follow Mahadeva (1956), Munroe & Mahadeva (1989), and Munroe (1990a). Standard length (SL) is used throughout. Where possible, measurements to 150 mm were taken to the nearest 0.1 mm with dial calipers or ocular micrometer; measurements larger

than 150 mm were made to the nearest mm with a steel ruler. Measurements are expressed either as thousandths of standard length or thousandths of head length. Abbreviations in text and tables are: head length (HL), head width (HW), eye diameter (ED), snout length (SNL). Unless stated otherwise, observations and descriptions of pigment patterns are based on fishes preserved in formalin and stored in ethyl or isopropyl alcohol.

Interdigitation pattern (ID pattern).—Patterns of interdigitation of proximal dorsal pterygiophores and neural spines were counted and recorded for the first three, or in unusual cases, the first four interneural spaces. The number of dorsal pterygiophores inserted into interneural spaces 1–3 was found to be diagnostic for species or groups of species of *Symphurus* (Munroe 1987). ID patterns are indicated by a pterygiophore formula such as 1-3-2. The 1-3-2 ID pattern indicates one pterygiophore inserts in interneural space one, three in interneural space two, and two in interneural space three. The first neural spine abuts directly against the cranium so there is no obvious space between it and the cranium. Therefore, the first interneural space reflected in the formula is that between the first and second neural spines.

Variation in dorsal- and anal-fin rays and total vertebrae were examined using SYSTAT programs (Wilkinson 1988) for one-way *ANOVA* and Tukey HSD multiple comparison test on log-transformed variables of specimens divided into groups based on capture location.

Symphurus oligomerus, new species
Figs. 1a, b, 2, Tables 1–3

Symphurus atramentatus (not of Jordan & Bollman).—Garman 1899:229 (counts; measurements; color description; Panama and Colombia).

Symphurus sp.—Lavenberg & Fitch 1966: 108 (Gulf of California; photograph).

Holotype.—SIO 84-70, (female, 85.8 mm), Mexico, Gulf of California, Bahia La Paz, 24°26.7′–24°24.8′N, 110°36.0′–110°37.5′W (Toadhop I, Station 4), 240 m, collected with 25′ otter trawl by R. Rosenblatt and party aboard RV *E. B. Scripps,* 14 Jul 1984.

Paratypes.—(171 specimens, 38.0–145 mm SL):

Gulf of California: SIO 68-94, (15 of 40, 38–121), 29°19.9′–29°20.4′N, 113°10.4′–113°12.0′W, 273 m, 20 Jan 1968. LACM 21719, (1, 64.2), ca. 23°N, 109°W, 6.5 mi from Punta Gorda, outer Gorda Bank, ca. 130 m, 12 Mar 1949. LACM 20407, (19, 49–76), outer Gorda Bank, 12 Mar 1949. UCLA W56-79, (10, 54–71), outer Gorda Bank, 12 Mar 1949. LACM 20261, (3, 44–55.5), 29°33′45″N, 113°30′35″W, Puerto Refugio, Isla Angel de la Guarda, 94 m, 29 Jan 1940.

Nicaragua: SIO 73-280, (25 of 174, 66.7–119.4), 11°07.4–07.8′N, 86°35.0–35.5′W, 159 m, 18 Apr 1973.

Costa Rica: UF 33932, (3, 97.4–109.6), Gulf of Nicoya. LACM 33827-10, (6, 87.4–120.6), Gulf of Nicoya, central Puntarenas Province, 29 Jun 1973. SIO 73-281, (24, 86.2–110), 10°50.2–53.2′N, 86°20–24.3′W, 196 m, 18 Apr 1973. UCR 425-18, (1, 113.9), Puntarenas Province, between Cabo Blanco and Punta Herradura, 310 m. UCR 494-6, (1, 91.6), Puntarenas Province, off Parrita, 259 m.

Panama: MCZ 28540, (14, 74.2–105.1), 7°40.0′N, 79°17.9′W, 235 m, 8 Mar 1891. USNM 57882, (2, 110.5–113.8), 7°33′40″N, 79°43′20″W, 283 m, 9 Mar 1891. UMML 26051, (12, 91.7–113.1), Bay of Panama, 7°30.5′–7°31.0′N, 79°41.5′–79°43.3′W, 210 m, 4 May 1967. MCZ 28537, (1, 145), 7°12.3′N, 80°55′W, 337 m, 23 Feb 1891. UMML 31935, (20, 80.1–111.5), 6°31.2–32.1′N, 77°32.2–34.4′W, 205 m, 16 Jan 1972. UMML 31947, (7, 70.7–116.2), 6°28.8–29.3′N, 77°29.2–30′W, 216 m, 16 Jan 1972.

Ecuador: CAS 57858, (1, 126.3), 2°14′S, 81°11′30″W, 481 m, 31 Aug 1968.

Peru: CAS 24201, (6, 93.1–111.9), 5°02'S, 81°24'W, 254 m, 3 Jun 1966.

Diagnosis.—A *Symphurus* with a 1-3-2 ID pattern; 12 caudal-fin rays; a black peritoneum usually showing through abdominal wall on both sides of body; 8–13 black, irregularly rectilinear, blotches alternating with unpigmented areas on posterior two-thirds of dorsal fin and entire length of anal fin; similar black blotch across base of caudal fin with distal three-fourths of caudal fin distinctly unpigmented; 85–97 dorsal-fin rays; 71–83 anal-fin rays; 48–52 (usually 49–51) total vertebrae; 5 hypurals; 86–96 scales in a longitudinal series; 39–46 scales in transverse row; no pupillary operculum; relatively large eyes (ED/SNL 1.3 to 1.5); upper jaw not extending beyond vertical line through posterior margin of pupil of lower eye; well-developed dentition on ocular-side jaws; dorsal-fin origin at vertical line through middle of pupil of upper eye; and body color yellowish tan to dark brown with 3–7, mostly incomplete, crossbands.

Description.—Frequency distributions of meristic data are provided in Table 1. ID pattern typically 1-3-2 (182/205), infrequently 1-3-3 (8/205), 1-2-3 (5/205), or 1-4-2 (4/205), rarely otherwise. Caudal-fin rays 12 (215 of 228 specimens), less frequently 11 (9 individuals) or 13 (two specimens), rarely 10 or 14 (one each). Dorsal-fin rays 85–97, usually 88–94, $\bar{X}$ = 91.3. Anal-fin rays 71–83, usually 74–80, $\bar{X}$ = 77.2. Pelvic-fin rays 4. Total vertebrae 48–52, usually 49–51, rarely 48 or 52, $\bar{X}$ = 50.3; abdominal vertebrae 9 (3+6). Hypurals 5 (180/202), less frequently 4 (22/202). Longitudinal scale rows 86–96, $\bar{X}$ = 90.5. Scale rows on head posterior to lower orbit 20–23. Transverse scales 39–46, $\bar{X}$ = 43.3.

Proportional measurements are provided in Table 2. Medium-sized *Symphurus* with relatively deep body, 259–307 SL, $\bar{X}$ = 281; greatest depth in anterior third of body; gradual posterior taper to body beginning approximately at anterior third of standard length. Trunk length 709–750 SL, $\bar{X}$ = 729. Head relatively long (250–291 SL, $\bar{X}$ = 271), usually slightly shorter than body depth. Snout length 40–69 SL, $\bar{X}$ = 58; covered with small ctenoid scales. Dermal papillae well developed on blind-side snout. Mouth moderately sized, upper jaw length 58–94 SL, $\bar{X}$ = 78. Posterior margin of jaws reaching verticals between mid-eye and posterior margin of pupil of lower eye. Lower eye moderately sized, 32–38 SL, $\bar{X}$ = 34; eyes usually slightly subequal in position with upper in advance of lower eye. Anterior and medial surfaces of eyes with 2 or 3 rows of 3 or 4 scales lying posterior to posterior nostril, and in narrow interorbital region; no scales posteriorly between eyes or on posterior surface of eyes. Pupillary operculum absent. Dorsal-fin origin at vertical line through mid-point of upper eye; predorsal length 61–115 SL, $\bar{X}$ = 100. Longest dorsalfin ray 85–115 SL ($\bar{X}$ = 100). Dorsal- and anal-fin rays without scales on blind side. Pelvic fin relatively long, 64–99 SL, $\bar{X}$ = 86. Anal-fin origin at vertical line approximately through bases of dorsal-fin rays 12–13. Caudal fin with three or four rows of scales on base; scales diminishing in size posteriorly.

Teeth well developed on blind- and ocular-side jaws. Blind-side dentary with 3–4 rows of teeth in middle of crescentic tooth band. Crescent tapers smoothly laterally with number of tooth rows decreasing distally, ending in single tooth. Tooth band on blind-side premaxilla with 3–4 rows of teeth posteriorly, tapering anteriorly to single tooth. Ocular-side premaxilla with one irregular row of prominent conical teeth extending from anterior tip to below anterior margin of lower eye; one irregular row of prominent conical teeth on lower jaw extending to vertical through anterior margin of pupil of lower eye.

Pigmentation.—Ground color tan to dark brown, with variable number (usually 3–7) of darker brown, mostly incomplete crossbands (6–9 scales wide) extending from behind nape to base of caudal fin; 8–11 well-defined, rectilinear, black blotches alternating with unpigmented areas on median fins.

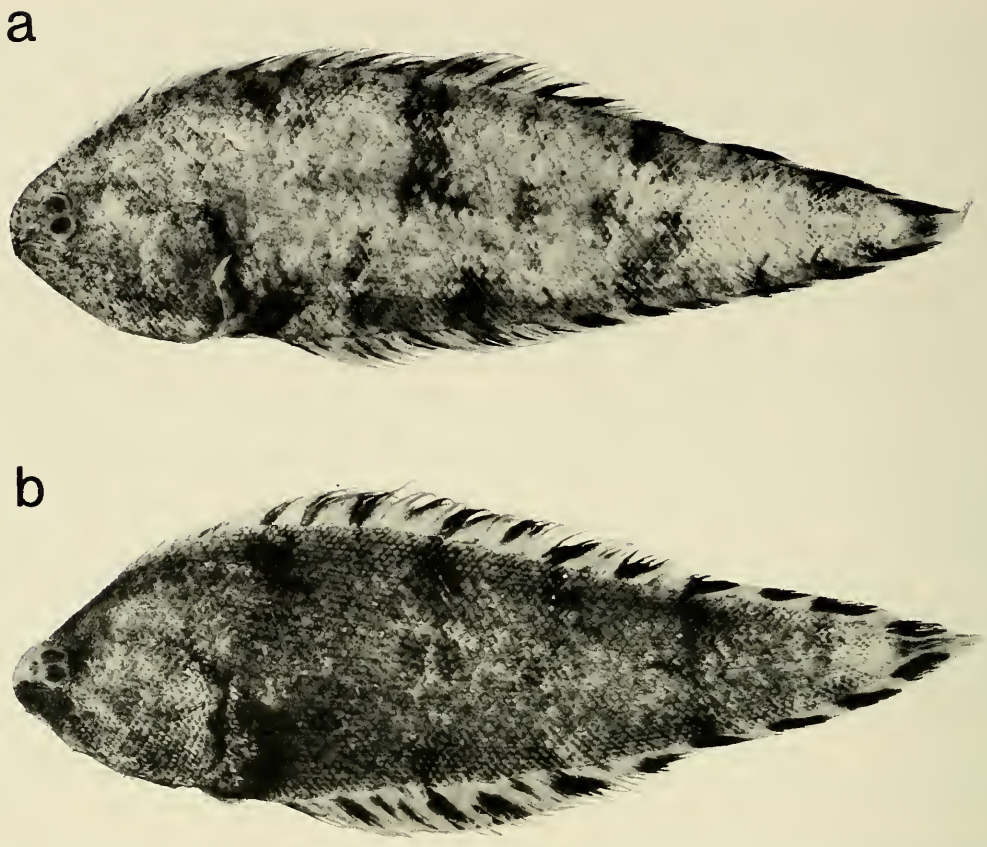

Fig. 1. *Symphurus oligomerus*. a. SIO 84-70, holotype; female, 85.8 mm SL; Gulf of California, Bahia La Paz, 24°25.45′N, 110°36.75′W. b. SIO 73-280, paratype; male, 87.2 mm SL; Nicaragua, 11°07.4–07.8′N, 86°35.0–35.5′W.

Specimens from southern Mexico, Costa Rica, Nicaragua, and Panama generally darker than those from other locations. Blind side usually unpigmented, suggesting creamy whiteness in life. Some specimens with longitudinal series of small melanophores along body midline on blind side. Peritoneum black, showing through abdominal wall on both sides of body.

Head usually uniformly pigmented; occasionally with diffuse, faint crossband, 4–5 scales wide, extending from dorsal margin to ventral border at posterior margin of operculum. Ocular-side outer opercle occasionally with diffuse, irregularly-shaped spot on ventralmost surface. Inner linings of both ocular- and blind-side opercles speckled with melanophores. Isthmus unpigmented on both sides of body. Ocular-side lips with dark band of pigment.

Posterior two-thirds of dorsal fin and entire anal fin with clearly defined, rectilinear blotches, not extending to tips of fin rays. Blotches (8–13 in dorsal fin and 8–12 in anal fin) covering proximal three-fourths of fin rays, often continuous at fin-ray bases with body crossbands. Dark blotches on dorsal fin increase in intensity and size posteriorly; blotches to about middle of body lighter and smaller (covering only 2–4 rays) compared with those on posterior half of fin (black and better defined, covering 5–10 rays). Blotches in anal fin roughly parallel those in dorsal fin in position and intensity of pigmenta-

Table 1.—Frequency distributions of meristic features for *Symphurus oligomerus*. (Asterisks indicate counts for holotype.)

	Dorsal-fin rays													
	85	86	87	88*	89	90	91	92	93	94	95	96	97	$\bar{X}$
Frequency	1	1	1	13	28	37	41	50	44	21	2	1	1	91.3
	Anal-fin rays													
	71	72	73	74*	75	76	77	78	79	80	81	82	83	$\bar{X}$
Frequency	1	2	4	13	22	39	38	59	39	17	2	1	1	77.2
	Caudal-fin rays													
	10	11	12*	13	14									
Frequency	1	9	215	2	1									
	Hypurals													
	4	5*												
Frequency	22	180												
	Total vertebrae													
	48	49*	50	51	52	$\bar{X}$								
Frequency	3	35	75	84	5	50.3								
	Longitudinal scale rows													
	86	87	88	89	90	91	92*	93	94	95	96	$\bar{X}$		
Frequency	2	—	7	1	19	2	11	—	1	1	2	90.5		
	Transverse scale count													
	39	40	41	42	43	44	45	46*	$\bar{X}$					
Frequency	2	2	2	7	4	23	2	4	43.3					

	Pattern	Frequency	%
Interdigitation Pattern	1-3-2-2*	182	88.8
	1-3-3-2	8	3.9
	1-2-3-2	5	2.4
	1-4-2-2	4	2.0
	1-2-2-2	3	1.5
	1-3-3-1	2	1.0
	2-3-2-2	1	0.5

tion. Posteriormost blotch in dorsal and anal fins often coalescing with blotch at base of caudal-fin rays.

Distal three-fourths of caudal-fin rays hyaline, contrasting sharply with strongly pigmented posterior dorsal and anal fins, and base of caudal fin. Specimens occasionally with heavy pigmentation on proximal fourth of caudal fin on blind side of body.

Etymology.—"Oligomerus" from the Greek "oligos" meaning few and "meros" meaning part of segment, in reference to the relatively low number of vertebrae and dorsal- and anal-fin rays of this species compared with most other eastern Pacific *Symphurus*.

Distribution.—Offshore habitats on the continental shelf (Fig. 2) from the Gulf of California at Puerto Refugio, off Isla Angel de la Guarda (29°33'45"N, 113°30'35"W), including Gorda Banks at the entrance to the Gulf, and continuing southwards to the

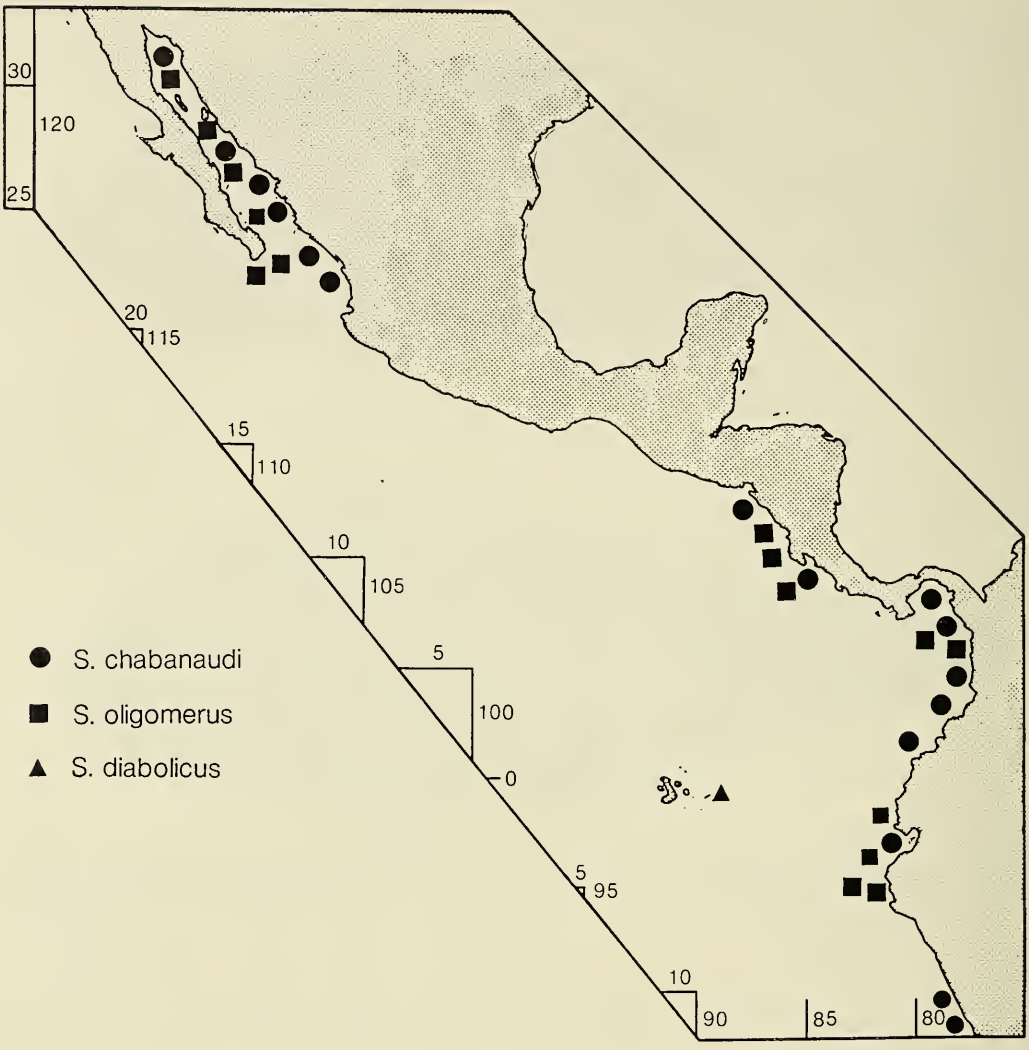

Fig. 2. Geographical distribution of *Symphurus oligomerus, S. chabanaudi,* and *S. diabolicus.* Symbols may represent more than one locality and/or more than a single lot from each locality.

continental shelf off Peru (6°21′S, 80°59′W). There were no specimens collected between ca. 20°N and 10°N available for our study. At this time, the occurrence or abundance of this species between these latitudes is unknown, however, there is no a priori reason to assume that *S. oligomerus* does not occur in this region. The disjunct distribution indicated in Fig. 2 is presumed to be an artifact of collecting intensity.

Symphurus oligomerus has been collected at depths ranging from approximately 80 to 481 m. Ninety-three percent of 356 specimens for which reliable depth information is available were collected between 111 and 300 m. Only five specimens have been collected shallower (one each at 80 and 84 m; three at 94 m) while approximately 6% were taken deeper than 300 m (17 specimens between 301–350 m, 3 specimens at 389 m, and one specimen at 481 m).

Available information for ca. 10% of the

Table 2.—Summary of morphometrics for the holotype (SIO 84-70) and 33 paratypes of *Symphurus oligomerus*. Proportional measurements, except standard length in mm, in thousandths of standard length.

	Holotype	Paratypes	
		Range	Mean
Standard length	85.8	44.4–76.2	—
Body depth	295	259–307	281
Predorsal length	61	85–115	100
Pelvic-fin length	64	75–99	86
Head length	256	250–291	271
Snout length	40	49–69	58
Upper jaw length	68	58–94	78
Eye diameter	35	32–38	34

specimens indicates this species is frequently collected on substrates containing a large sand component, including muddy sand (1 collection, 7 specimens), sand (4 collections, 5 specimens), sand and gravel (1 collection, 3 individuals), rock (1 collection, 1 specimen), and a sand, shell, and rock mixture (1 collection, 30 individuals).

Geographical variation.—Comparisons of selected meristics (Table 3) revealed that specimens collected from the Gulf of California and Mexico had significantly fewer dorsal- ($f = 43.84$; $P < 0.001$) and anal-fin rays ($f = 36.60$; $P < 0.001$), and total vertebrae ($f = 66.78$; $P < 0.001$) than those fishes collected from Central America (El Salvador, Costa Rica, and Panama) and northern South America (Colombia to northern Peru). Fin-ray and vertebral counts of *S. oligomerus* taken between El Salvador and Panama, although slightly greater, were not significantly different from those of specimens collected off northern South America.

Comparisons.—*Symphurus oligomerus* is the third species described (of four known species) from eastern Pacific waters characterized by a 1-3-2 ID pattern, 12 caudal-fin rays, and black peritoneum. Other eastern Pacific species with these characteristics are *S. microlepis* Garman, *S. gorgonae* Chabanaud and *S. diabolicus* (described below).

Table 3.—One-way *ANOVA* for selected meristic features of *Symphurus oligomerus* collected from different portions of the species range. (Asterisk indicates difference at $P < 0.001$.)

	n	Range	Mean	*SD*
Dorsal-fin rays ($f = 43.84$; $P < 0.001$)				
*Gulf of California	46	85–93	90.1	1.35
Central America	146	89–97	92.3	1.37
South America	11	90–94	91.8	1.47
Anal-fin rays ($f = 36.60$; $P < 0.001$)				
*Gulf of California	46	71–79	76.1	1.42
Central America	146	74–83	78.1	1.39
South America	11	76–80	77.8	1.47
Total vertebrae ($f = 66.78$; $P < 0.001$)				
*Gulf of California	46	48–50	49.3	0.59
Central America	145	49–52	50.6	0.67
South America	11	50–51	50.4	0.50

These other species are quite different from *S. oligomerus* and easily distinguished either by their lack of alternating rectilinear pigmented blotches and unpigmented areas on the dorsal and anal fins characteristic of *S. oligomerus* (fin pigmentation uniformly pigmented in *S. diabolicus* and *S. gorgonae*) or by differences in meristic values. *Symphurus oligomerus* has lower vertebral and fin-ray counts than *S. microlepis* and *S. diabolicus* (total vertebrae 48–52 versus 57 in *S. microlepis* and 58 in *S. diabolicus*; dorsal-fin rays 85–97 versus 106 in *S. microlepis* and 109 in *S. diabolicus*; anal-fin rays 71–83 versus 94 in *S. microlepis* and 92 in *S. diabolicus*). Furthermore, the body of *S. oligomerus* is deepest in the anterior third of the standard length with a relatively rapid posterior taper compared with that of *S. diabolicus* in which the body is relatively elongate with almost uniform depth occurring throughout much of the mid-body region and with only a gradual posterior taper. *Symphurus oligomerus* is readily distinguished from *S. gorgonae* in that the blind side is uniformly creamy-white compared with that of *S. gorgonae* in which the blind side has a pepper-dot pattern of melanophores, especially well developed along the

basal pterygiophore regions of the dorsal and anal fins. These two species differ further in that there is little overlap for several meristic features (total vertebrae 48–52 in *S. oligomerus* versus 46–49 in *S. gorgonae*; dorsal-fin rays 85–97 versus 80–89; anal-fin rays 71–83 versus 63–74; hypural numbers 5 versus 4).

Other eastern Pacific *Symphurus* possessing pigmented spots or blotches on the dorsal and anal fins that may be confused with *S. oligomerus* are *S. callopterus* Munroe & Mahadeva (sometimes collected with *S. oligomerus*) and *S. atramentatus* Jordan & Bollman. However, both *S. callopterus* and *S. atramentatus* have an unpigmented peritoneum (versus black in *S. oligomerus*) and a well-developed pupillary operculum (absent in *S. oligomerus*). Additionally, *S. oligomerus* has 5 hypurals (4 in *S. callopterus* and *S. atramentatus*) and a 1-3-2 ID pattern (usually 1-3-4 in *S. callopterus*; 1-3-3 in *S. atramentatus*). *Symphurus atramentatus* also has well-defined oval black spots on the fins (versus rectilinear black blotches in *S. oligomerus*). *Symphurus oligomerus* differs further from *S. callopterus* in several counts (total vertebrae 48–52 versus 57–61 in *S. callopterus*; dorsal-fin rays 85–97 versus 105–114; anal-fin rays 71–83 versus 91–98; longitudinal scale rows 86–96 versus 97–114), and the distal half of the caudal fin is unpigmented in *S. oligomerus,* whereas in *S. callopterus,* the distal half of the caudal fin either has an ill-defined blotch or the entire fin is uniformly darkly pigmented.

Some meristic features of seven other eastern Pacific species, *S. varius* Garman, *S. williamsi* Jordan & Culver, *S. fasciolaris* Gilbert, *S. leei* Jordan & Bollman, *S. atricaudus* (Jordan & Gilbert), *S. melanurus* Clark, and *Symphurus* sp. (the species described by Munroe & Nizinski (1990) with the lower meristic values; hereafter referred to as *Symphurus* sp.) overlap those of *S. oligomerus. Symphurus oligomerus,* however, differs from all of these species in having alternating blotches in the dorsal and anal fins (versus uniformly pigmented fins without alternating blotches, or dorsal and anal fins with posterior intensification of pigment, or with dorsal and anal fins speckled). *Symphurus oligomerus* also differs from these species in ID pattern (1-3-2 versus 1-3-3 in *S. varius*; 1-4-3 in *S. fasciolaris* and *S. leei*; 1-5-3 in *S. atricaudus, S. melanurus,* and *Symphurus* sp.; and 1-5-3 or 1-4-3 in *S. williamsi*) and in the number of hypurals (5 in *S. oligomerus* versus 4 in all others, except *S. varius*). *Symphurus oligomerus* has larger scales (86–96 in a longitudinal series) than does *S. varius* (120–124). Certain meristic values of *S. oligomerus* completely overlap those of *S. williamsi,* but the two species are easily distinguished. *Symphurus oligomerus* has a black peritoneum (unpigmented in *S. williamsi*), lacks a pupillary operculum (present in *S. williamsi*), and lacks scales on the blind side dorsal- and anal-fin rays (present in *S. williamsi*). *Symphurus fasciolaris* and *Symphurus* sp. differ further from *S. oligomerus* in caudal-fin ray counts (12 in *S. oligomerus* versus 10 in *S. fasciolaris* and 11 in *Symphurus* sp.).

Among *Symphurus* species occurring outside the eastern Pacific region, some counts for *S. oligomerus* overlap those of *S. piger* (Goode & Bean), *S. pusillus* (Goode & Bean), *S. plagiusa* (Linnaeus), *S. plagusia* (Schneider, in Bloch & Schneider), *S. diomedeanus* (Goode & Bean), and *S. civitatium* Ginsburg from the western Atlantic, and *S. trifasciatus* (Alcock) from the Indian Ocean. All of these species, except *S. diomedeanus,* lack the highly pigmented fins found in *S. oligomerus.* Although *S. diomedeanus* has counts and pigmented dorsal and anal fins reminiscent of those of *S. oligomerus,* these two species are distinct in caudal-fin ray counts (12 versus 10 in *S. diomedeanus*), hypural numbers (5 versus 4), and ID patterns (1-3-2 versus 1-4-3). *Symphurus diomedeanus* also has a pupillary operculum (absent in *S. oligomerus).*

Additional Material Examined

Counts were taken from the following 150 non-type specimens (28.5–117.5 mm):

Gulf of California: LACM 8818-10, (15, 67–109), 28°55′N, 112°50.5′W, midway between southern tip of Isla Tiburon and Isla Angel de la Guarda. SIO 60-97, (7, 54.1–81.1), 28°13.8–15.0′N, 111°46.7–48.0′W, off Estero de Tastiuta, Costa de Hermosillo, Sonora. SIO 60-110, (1, 82.2), 28°12.9′N, 112°3.2′W, off Costa de Hermosillo, Sonora. SIO 60-98, (25, 79.4–110.1), 28°02′–28°06′N, 111°47.2′–111°53.2′W, 162 m, 21 Mar 1960. LACM 20259, (2, 42.0–52.5), 27°58′40″N, 111°24′10″W, Isla San Pedro Nolasco, 111 m, 12 Mar 1936. LACM 20262, (1, 86.5), 27°58′35″N, 110°22′40″W, Isla San Pedro Nolasco, 6 Feb 1940. LACM 8842-5, (1, 65.5), 26°57′N, 111°49.8′W, 3–5 mi north of Punta Concepcion. SIO 65-293, (7, 28.5–58.9), 25°40.6–44.3′N, 111°05.3–5.6′W, northwest of Isla Monserrate, Baja California Sur. SIO 84-70, (1, 86.5), Bahia La Paz, 24°25.45′N, 110°36.75′W, 240 m, 14 Jul 1984. SIO 84-80, (3, 91.6–100.7), Baja California Sur, 23°31.5–32.5′N, 110°28–30′W, 143 m, 17 Jul 1984. SIO 84-81, (7, 76.1–117.0), northwest of Lobos Point, 23°29.95′N, 110°27.1′W, 17 Jul 1984. LACM 20260, (1, 54.9), 23°02′N, 109°0′15″W, Inner Gorda Bank, Baja California Sur, 20 Jan 1940.

Costa Rica: CAS 43872, (1, 97.9), Cabo Blanco, 268 m, 9 Mar 1974. CAS 44104, (1, 100.4), Cabo Blanco, 268 m, 9 Mar 1974.

Panama: UMML 27031, (73 of 101, 54.1–137.7), Bay of Panama, 7°39.5′–7°40.9′N, 79°40.7′–79°42.7′W, 117 m, 4 May 1967. USNM 57883, (1, 99.7), 7°16′45″N, 79°56′30″W, 389 m, 9 Mar 1891.

Peru: CAS 24200, (1, 118.5), 4°53′S, 81°20–23′W, 84 m, 2 Jun 1966. IMARPE 4, (1, 94.0), 5°0.5′S, 83°24.5′W. CAS 24979, (1, 100.1), 6°21′S, 80°59′W, 142 m, 4 Jun 1966.

Additional material examined but not counted or measured (277 specimens):

Gulf of California: SIO 68-94, (25 of 40, 38–121), 29°19.9′–29°20.4′N, 113°10.4′–113°12.0′W, 273 m, 20 Jan 1968. SIO 60-98, (37, 79.4–110.1), 28°2–6′N, 111°47.2–53.2′W, off San Juan Bautista Flats, Sonora, 162 m, 21 Mar 1960. SIO 68-103, (15, 73.2–101.3), 28°19.3′–28°20.1′N, 112°8.0′–112°10.5′W, 303 m, 21 Jan 1968.

Nicaragua: SIO 73-280, (149, 64–120), 11°07.4–07.8′N, 86°35.0–35.5′W, 159 m, 18 Apr 1973.

Costa Rica: SIO 73-281, (12 of 24, 86.2–110), 10°50.2–53.2′N, 86°20–24.3′W, 196 m, 18 Apr 1973. LACM 33827-56, (1, 106.9), Gulf of Nicoya, central Puntarenas Province, 29 Jun 1973. UCR 682-6, (1, 79.7), Puntarenas Province, Isla del Cano, 80 m. UCR 2190-1, (2, 70.8–81.9), off Cabo Matapalo, tip of Osa Peninsula, 23 Jun 1973.

Panama: UMML 27031, (28 of 101, 54.1–137.7), Bay of Panama, 7°39.5′–7°40.9′N, 79°40.7′–79°42.7′W, 117 m, 4 May 1967. MCZ 28539, (5, 107.0–121.2), 7°33.7′N, 79°43.3′W, 283 m, 9 Mar 1891. MCZ 70978, (2, 89.4–100.8), 7°16.8′N, 79°56.5′W, 389 m, 9 Mar 1891.

Symphurus chabanaudi, new species
Figs. 2, 3a, b, Tables 4–7

Aphoristia elongata (not of Günther).—Jordan & Gilbert, 1883:24 (in part) (listed, Panama).

Symphurus elongatus (not of Günther).—Jordan & Goss, 1889:323 (in part) (after Jordan & Gilbert; Panama).—Jordan & Evermann, 1898:2707 (in part) (after Jordan & Gilbert; Panama).—Gilbert & Starks, 1904:203 (in part) (fish market, Panama City).—Meek and Hildebrand, 1928:1006 (counts; measurements; color description; in key; Panama).—Breder, 1936:5 (in part) (Gulf of California).—Seale, 1940:14 (listed, Tenacatita Bay, Mexico and Colombia).—?Fowler, 1944: 495 (listed, Panama).—Phillips, 1981:54 (in part) (Jiquilisco Bay, El Salvador).

Symphurus atricaudus (not of Jordan & Gilbert).—Breder, 1936:6 (in part) (Gulf of California).—Phillips, 1981:54 (in part) (Jiquilisco Bay, El Salvador).

Symphurus sechurae Hildebrand, 1946:476 (in part) (Gulf of California).

Holotype.—USNM 305717, (male, 130.8 mm), El Salvador, El Potrero, Jiquilisco Bay, Station Number 6, 13°16′N, 88°38′W, on mud bottom canal in mangroves, 5 m trynet, collected 14 Jul 1976, P. Phillips and party.

Paratypes.—(115 specimens, 47.5–233 mm):

Gulf of California: Near San Felipe, 31°18–22′N, 114°47–50′W, ca. 5 m, 6–9 Apr 1947, 50 specimens distributed to the following collections: USNM 164493, (1, 139), USNM 164494, (10, 47.5–152), BMNH 1956.3.1:6–14, (9, 90.5–159), CAS 20696, (10, 59.5–156), UCLA W53-196, (19, 93–153), SIO 47-53, (1, 109). YPM 630, (10, 124–157), north of San Felipe, 26 m, 20 May 1926. UCLA W52-46, (4, 72–127), 10 mi off Santa Clara, Sonora. USNM 119742, (1, 184), south of Guaymas, 1940.

El Salvador: USNM 236606, (2, 185–188), Saite, 26 m, 28 Oct 1975. USNM 291339, (1, 188), La Libertad, 26 m, 29 Oct 1975. USNM 220701, (5, 110.1–131.0), El Potrero, Jiquilisco Bay, 14 Jul 1976.

Costa Rica: LACM 30716-11, (4, 182–211), Puntarenas Province, Gulf of Nicoya, Isla Negritos, 13 Feb 1968. LACM 30714-15, (3, 178–185), Puntarenas Province, Isla Chira, 1968. UCR 1122-3, (2, 147.8–149.5), Puntarenas and Guanacaste Provinces, Golfo de Nicoya and Playa Hermosa, 18–28 m.

Panama: UCLA W53-275, (11, 137–217), Panama Bay. SIO 80-23, (5, 128–184), Panama Bay, Isla Verde, 4 m, 9 Apr 1980.

Colombia: USNM 305718, (5, 138–200), 4°20–18′N, 77°28–29′W, off Río Togorama. USNM 305719, (7, 164–178), 2°57′N, 77°48′W, Punta Coco, south of Buenaventura.

Ecuador: CAS 24199, (5, 161–233), Gulf of Guayaquil, 3°16′S, 80°25′W.

Diagnosis.—A *Symphurus* with 1-5-3 ID pattern; 12 caudal-fin rays; 98–109 dorsal-fin rays; 82–92 anal-fin rays; 52–57 total vertebrae; 91–104 scales in longitudinal series; 32–42 transverse scales; no pupillary operculum; relatively small eye (ED/SNL 2.4 to 2.7); 2–5 small, ctenoid scales on blind-side dorsal- and anal-fin rays; distinct, large black blotch on ocular-side outer opercle (not to be confused with black branchial cavity lining showing through operculum in many species of *Symphurus*); upper jaw usually reaching to or just posterior to vertical line through middle of pupil of lower eye (rarely extending posteriorly to vertical through rear margin of lower eye); dorsal-fin origin usually equal with or just posterior to vertical line through middle of pupil of upper eye (rarely originating at vertical line through anterior margin of upper eye); posterior dorsal and anal fins and caudal fin dusky to dark black; body tan to dark brown usually with 6–8, sharply contrasting crossbands 6–10 scales wide; and unpigmented peritoneum.

Description.—Frequency distributions of meristic data are provided in Table 4. ID pattern usually 1-5-3 (47 of 95 individuals), less frequently 1-4-3 (28/95) or 1-4-4 (13/95), rarely 1-4-3-3, 1-5-2, or 1-5-3-3. Caudal-fin rays 12 (103/108), rarely 11 (5/108). Dorsal-fin rays 98–109, usually 100–107, $\bar{X}$ = 103.4. Anal-fin rays 82–92, usually 84–89, $\bar{X}$ = 86.6. Pelvic-fin rays 4. Total vertebrae 52–57, usually 53–56, rarely 57 (1 of 125), $\bar{X}$ = 54.1; abdominal vertebrae 9 (3 + 6). Hypurals 4 (90/90). Longitudinal scale rows 91–104, $\bar{X}$ = 97.9. Scale rows on head posterior to lower orbit 21–23. Transverse scales 32–42, $\bar{X}$ = 39.0.

Proportional measurements appear in Table 5. Large-sized (to at least 233 mm SL) species with relatively deep body (239–293 SL, $\bar{X}$ = 265); greatest depth in anterior third of body with gradual posterior taper starting near middle of body. Trunk length

Table 4.—Frequency distribution of meristic features for *Symphurus chabanaudi*. (Asterisks indicate counts for holotype.)

	Dorsal-fin rays												
	98	99	100	101	102	103	104	105*	106	107	108	109	$\bar{X}$
Frequency	1	1	10	14	14	20	6	17	14	8	—	2	103.4

	Anal-fin rays											
	82	83	84	85	86*	87	88	89	90	91	92	$\bar{X}$
Frequency	1	3	10	20	23	17	15	13	3	2	1	86.6

	Caudal-fin rays	
	11	12*
Frequency	5	103

	Hypurals
	4*
Frequency	90

	Total vertebrae						
	52	53	54	55	56*	57	$\bar{X}$
Frequency	8	22	27	22	12	1	54.1

	Longitudinal scale rows														
	91	92	93*	94	95	96	97	98	99	100	101	102	103	104	$\bar{X}$
Frequency	1	2	1	4	3	10	5	16	9	5	1	4	4	1	97.9

	Transverse scale count											
	32	33	34	35	36	37	38	39*	40	41	42	$\bar{X}$
Frequency	2	1	—	2	3	3	10	14	17	8	6	39.0

	Pattern	Frequency	%
Interdigitation Pattern	1-5-3-2*	47	49.5
	1-4-3-2	28	29.5
	1-4-4-2	13	13.7
	1-5-3-3	1	1.0
	1-5-2-2	2	2.1
	1-4-3-3	2	2.1
	1-5-4-2	1	1.0
	1-4-2-2	1	1.0

770–816 SL, $\bar{X}$ = 799. Head relatively short, 185–213 SL, $\bar{X}$ = 201; somewhat shorter than body depth. Snout length 42–57 SL, $\bar{X}$ = 47; covered with small ctenoid scales. Dermal papillae well developed on blindside snout, chin, and head region just ventral to anterior portion of dorsal fin. Mouth moderately sized, upper jaw length 49–69 SL, $\bar{X}$ = 64; usually reaching to or just posterior to vertical line through middle of pupil of lower eye (rarely extending posteriorly to vertical through rear margin of lower eye). Lower eye relatively small, 15–21 SL, $\bar{X}$ = 19; eyes usually slightly subequal in position with upper in advance of lower eye. Surface of head from region posterior to posterior nostril and including narrow interorbital region to posterior margin of eyes with 13–14 rows of scales, each row with 6–8 scales (difficult to discern in juveniles). Pupillary operculum absent. Dorsal-fin origin at or just posterior to a vertical line through mid-

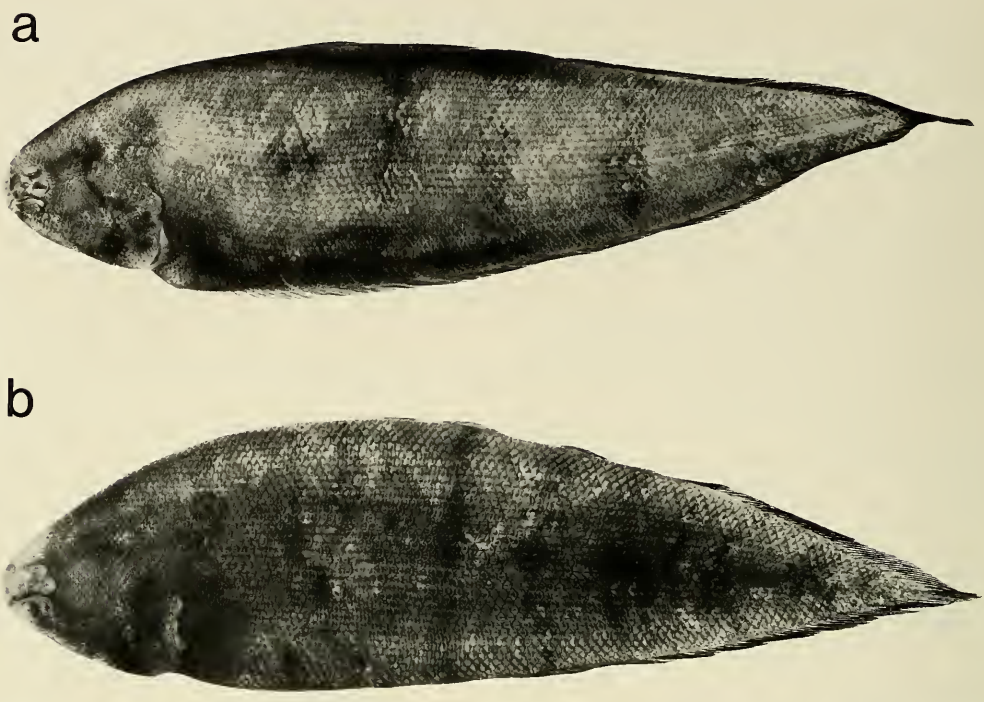

Fig. 3. *Symphurus chabanaudi.* a. USNM 305717, holotype; male, 130.8 mm SL; El Salvador, Jiquilisco Bay, El Potrero. b. USNM 291339, paratype; male, 188 mm SL; El Salvador, La Libertad.

dle of upper eye, occasionally at a vertical line through anterior margin of upper eye; predorsal length, 50–88 SL ($\bar{X} = 80$); longest dorsal-fin ray, 62–86 SL ($\bar{X} = 71$). Blind sides of dorsal- and anal-fin rays with 3–5 very thin, ctenoid scales (difficult to discern in juveniles). Anal-fin origin approximately at vertical line through base of dorsal-fin rays 14–16. Pelvic fin relatively long, 60–83 ($\bar{X} = 73$); reaches first or occasionally second anal-fin ray when depressed posteriorly. Caudal fin with approximately 9–10 relatively large scales on basal half of fin; distal half of caudal fin with numerous minute scales diminishing in size distally.

Teeth well developed on blind-side jaws. Lower jaw on blind side with crescentic tooth band about 5–8 rows wide. Arms of crescent tapering smoothly to a single tooth at extremities. Upper jaw on blind side with 5–8 rows of teeth posteriorly; band tapering to single tooth anteriorly. Juveniles with only 4–5 visible rows of teeth in bands on blind-side jaws. Teeth on ocular-side jaws in irregular rows. Ocular-side premaxilla with one irregular row of feeble teeth extending from anterior tip to point equal with vertical line through anterior base of anterior nostril; ocular-side dentary with irregular row of very feeble teeth extending posteriorly to vertical line through anterior base of anterior nostril.

Pigmentation. —Ground color of live specimens tannish brown with pinkish hue. Median fins pale lavender. Blind side pinkish to creamy white.

Ground color in preserved specimens tannish to dark brown, usually with variable number (6–10) of sharply contrasting blackish-brown crossbands 6–10 scale rows wide extending from behind nape to base of caudal fin. Color of specimens from the Gulf

of California typically lighter than those collected on muddy bottoms along coastal El Salvador, Costa Rica, and Panama. Blind side uniformly creamy white. Occasionally, individuals of both sexes have dark pigment patches on caudal region and scattered along bases of dorsal and anal fins on blind side. Crossbands on body varying in intensity, usually somewhat darker than ground color. Peritoneum unpigmented.

Head with one, or occasionally two, faint crossbands. Anterior band diffuse, about 3–4 scales wide, located immediately posterior to eyes and barely reaching ventral margin of head. Posterior band crossing opercular region and extending ventrally slightly onto blind side of head; often incomplete in dorsal area of head, usually fading, disappearing completely, or occasionally forming faintly pigmented crossband, about 6 scales wide, at dorsal margin of operculum; ventralmost portion of band always expanded into distinct black blotch about 6–10 scale rows wide composed of large epidermal melanophores; clearly visible even in very young specimens; covering more than half the outer surface of ocular-side operculum. Inner linings of opercles on both sides of body heavily pigmented; inner lining on ocular-side opercle more heavily pigmented than that on blind side, often visible externally on outer opercular surface as poorly-defined, dusky blotch. Isthmus heavily spotted on both sides of body.

Basal portions of dorsal and anal fins to about a fifth or sixth the height of fin paler than remainder of fin. Dorsal fin anterior to a vertical line through anal-fin origin usually unpigmented; remainder of dorsal fin and entire anal fin light to dark brown or black without discrete spots or blotches; progressively darker posteriorly, with the posteriormost fourth or fifth of fins almost black in mature fish (fins usually darker in mature males). Posterior portions of dorsal, anal, and caudal fins on blind side often with small patches of melanophores. Caudal fin dark, similar to posterior portions of dorsal and anal fins. Median fins of juveniles usually only lightly pigmented or appearing almost unpigmented to naked eye, but with melanophores discernible under magnification.

Table 5.—Summary of morphometrics for holotype (USNM 305717) and 35 paratypes of *Symphurus chabanaudi*. Measurements, except standard length in mm, in thousandths of standard length.

	Holotype	Paratypes	
		Range	Mean
Standard length	130.8	70.8–226	—
Body depth	263	239–293	265
Predorsal length	50	70–88	80
Pelvic-fin length	60	63–83	73
Head length	193	185–213	201
Snout length	42	43–57	47
Upper jaw length	49	58–69	64
Eye diameter	17	15–21	19

Etymology.—Named in honor of Paul Chabanaud who contributed greatly to our knowledge of flatfishes, especially of the genus *Symphurus*.

Distribution.—A widespread and commonly collected species (Fig. 2) in shallow warmer waters ranging throughout the Gulf of California and extending coastally southward to approximately Callao, Peru (12°06'S, 76°55'W). There were no specimens collected between ca. 20°N and 10°N available for our study. At this time, the occurrence or abundance of this species between these latitudes is unknown, however, there is no a priori reason to believe that *S. chabanaudi* does not occur in this region. The disjunct distribution indicated in Fig. 2 is presumed to be an artifact of collecting intensity.

Symphurus chabanaudi has been collected at depths ranging from approximately 2 to 59 m; however, the majority of specimens (97%) were taken at depths shallower than 28 m. The deepest captures of 277 specimens for which depth information is available are for seven fish taken between

Table 6.—One-way *ANOVA* for selected meristic features of *Symphurus chabanaudi* collected from different portions of the species range. (Asterisk indicates difference at $P < 0.001$.)

	n	Range	Mean	*SD*
Dorsal-fin rays ($f = 30.68$; $P < 0.001$)				
*Gulf of California	33	99–103	101.2	1.14
*Central America	46	98–109	103.8	2.00
*South America	5	103–109	105.7	1.49
Anal-fin rays ($f = 39.77$; $P < 0.001$)				
*Gulf of California	33	82–87	84.8	1.18
*Central America	51	84–91	86.8	1.56
*South America	5	86–92	88.4	1.50
Total vertebrae ($f = 50.44$; $P < 0.001$)				
*Gulf of California	33	52–54	53.0	0.71
*Central America	53	53–57	54.6	0.92
*South America	5	55–56	55.8	0.45

30 and 37 m and for solitary specimens taken at 39 m and 59 m.

Symphurus chabanaudi has most often been collected on muddy or sand-mud substrates. Available substrate data list mud for 13 collections (123 specimens), mud and sand (11 collections, 76 specimens), mud and shell (2 collections, 9 specimens), mud and rocks (1 collection, 2 specimens), sand (5 collections, 13 specimens), clay and bits of shell (1 collection, 50 specimens), and rock (1 collection, 1 specimen).

Geographical variation.—Numbers of dorsal- ($f = 30.68$; $P < 0.001$) and anal-fin rays ($f = 39.77$; $P < 0.001$), and total vertebrae ($f = 50.44$; $P < 0.001$) differed significantly (Table 6) in specimens collected in each of three different portions (Mexico, Central America, and northern South America) of the species range. Specimens collected in the Gulf of California and coastal waters off northern Mexico had the lowest numbers of meristic elements, whereas specimens taken off Colombia and Peru had the highest numbers of finrays and vertebrae for any group examined.

Remarks.—Earlier investigators frequently misidentified *Symphurus chabanaudi* as *S. elongatus,* undoubtedly due to similarities in meristic features of these species. *Symphurus elongatus* occurs sympatrically with *S. chabanaudi,* especially in southern Central America and in coastal waters of northern South America, and the two species are collected syntopically. However, these species are quite distinct (see comparisons below).

Jordan & Gilbert (1883) and later, Jordan & Goss (1889) and Jordan & Evermann (1898) included specimens of *S. chabanaudi* in their accounts of *S. elongatus.* These accounts were based on three specimens of *S. chabanaudi* (CAS-SU 6900), misidentified as *S. elongatus* by Jordan and co-workers, collected from *Albatross* station 2804 off Colombia, together with numerous specimens of *S. leei* and 10 specimens of *S. elongatus.*

At least one specimen (USNM 50333) identified as *S. elongatus* by Gilbert & Starks (1904) is *S. chabanaudi,* but their account probably included other specimens. Morphometric proportions reported (table on p. 204) more closely match those of *S. chabanaudi* than *S. elongatus,* especially body depth measurements. These authors reported body depths equalling 24.5–28.0% SL, which are larger values than those (20.4–25.5% SL) noted for specimens of *S. elongatus* examined by Mahadeva (1956). Also, the large sizes (up to 255 mm) reported for specimens referred to as *S. elongatus* by Gilbert & Starks more nearly reflect sizes attained by *S. chabanaudi*; *S. elongatus* is a much smaller species usually not exceeding 150 mm SL.

It is apparent that Meek & Hildebrand (1928) included specimens of *S. chabanaudi* in their account of *S. elongatus* from Panama, given the pigment characters listed in their key, especially references to dark crossbars, a dark blotch on the opercle, and posterior darkening of dorsal and anal fins (pigment characters not found in *S. elongatus*). Two lots (USNM 81032 and 81674) examined in the present study, cited as *S.*

elongatus by Meek & Hildebrand, are *S. chabanaudi*. It is possible that Meek & Hildebrand did not examine any *S. elongatus* in their study, as they noted that the maxilla in their specimens reached a point only equal with the middle of the lower eye, whereas, in *S. elongatus*, the maxilla usually extends to a point well beyond the vertical line through the posterior margin of the lower eye.

Specimens (YPM 630–633a) collected in the Gulf of California and reported as *S. elongatus* and *S. atricaudus* by Breder (1936) are *S. chabanaudi*. Hildebrand (1946) tentatively identified specimens of *S. chabanaudi* (USNM 126741 and USNM 50333) collected in the Gulf of California and Panama Bay as *S. sechurae*, a nominal species now placed in the synonymy of *S. melanurus* Clark (Munroe 1990b). Hildebrand (1946) also incorrectly identified as *S. elongatus* several lots (USNM 144788–144791) collected in the Miraflores Locks, Panama Canal, in which were actually represented four different species, including juvenile *S. chabanaudi, S. elongatus, S. melanurus* and *S. williamsi*.

Comparisons.—Eastern Pacific *Symphurus* with counts comparable to those of *S. chabanaudi* include *S. elongatus* (Günther), *S. atricaudus, S. fasciolaris, S. leei, S. melanurus, S. diabolicus*, and *S. microlepis*. The pigmentation of *S. chabanaudi* (well-defined crossbands and a black blotch on the ocular-side opercle) differs from that of *S. elongatus, S. melanurus, S. microlepis*, and *S. diabolicus*, which usually lack crossbands and an opercular spot. *Symphurus leei* and *S. atricaudus* both have crossbands in a pattern different from *S. chabanaudi*. *Symphurus leei* has four or fewer wide bands (when bands are present) and lacks an opercular spot. The crossbands of *S. atricaudus*, in turn, are disrupted and incomplete. *Symphurus leei* and *S. atricaudus* also lack an opercular spot. In *S. fasciolaris*, the ocular-side of the body often has a number of spherical spots accompanying crossbands (when present), an ocellated spot in the caudal fin (absent in *S. chabanaudi*), and this species lacks the opercular spot characteristic of *S. chabanaudi*. *Symphurus chabanaudi* and *S. fasciolaris* also differ in caudal-fin ray counts (12 versus 10 in *S. fasciolaris*).

Symphurus chabanaudi and *S. elongatus* are further distinguished in the length of the upper jaw, which in *S. chabanaudi* does not extend beyond a vertical line through the posterior margin of the pupil of the lower eye, whereas in *S. elongatus* it extends to a vertical line through or beyond the posterior margin of the lower eye. *Symphurus chabanaudi* also has small ctenoid scales on the blind-side dorsal- and anal-fin rays (absent in *S. elongatus*) and the posterior taper of the body starts anterior to the body midpoint rather than near the middle of the standard length as in *S. elongatus*. Additionally, *S. chabanaudi* has a much larger eye ranging from 1.5–2.1% ($\bar{X}$ = 1.9) SL versus only 0.9–1.5% ($\bar{X}$ = 1.2) SL in *S. elongatus*.

Symphurus chabanaudi can be further distinguished from *S. atricaudus* in lacking both a pupillary operculum and small ctenoid scales on the ocular-side dorsal- and anal-fin rays that are present in *S. atricaudus*.

Symphurus chabanaudi differs most notably from *S. leei* in having the head length (185–213 SL, $\bar{X}$ = 201) considerably less than the body depth (239–293 SL, $\bar{X}$ = 265), in contrast to *S. leei*, in which the head length (235–256 SL, $\bar{X}$ = 245) nearly equals body depth (237–269 SL, $\bar{X}$ = 253).

Symphurus chabanaudi is easily distinguished from *S. melanurus* in the possession of small ctenoid scales extending onto distal portions of the blind-side dorsal- and anal-fin rays and in lacking a pronounced fleshy ridge on the posterior extent of the ocular-side lower jaw. In contrast, in *S. melanurus*, scales are either absent or there are 1–2 scales limited to the bases of the fin rays and the posterior extent of the ocular-side lower jaw has a distinct fleshy ridge. The dorsal-fin

origin is always posterior to a vertical line through the anterior margin of the upper eye in *S. chabanaudi,* whereas in *S. melanurus,* the dorsal-fin originates more anteriorly with the first dorsal-fin ray located anterior to a vertical line through the anterior margin of the upper eye. In *S. chabanaudi,* the posterior margin of the jaw does not extend posterior to a vertical line through the posterior margin of the lower eye, whereas in *S. melanurus,* the jaw always reaches a vertical line through, or posterior to, the posterior margin of the lower eye.

Symphurus chabanaudi is readily distinguished from *S. microlepis* and *S. diabolicus* in: having an unpigmented peritoneum (versus black in *S. microlepis* and spotted in *S. diabolicus*); in ID pattern (1-5-3 or 1-4-3 versus 1-3-2); hypural number (4 versus 5); and by the number of scales in a longitudinal series (91–104 versus 126 and 135, respectively, in *S. microlepis* and *S. diabolicus*).

Species of *Symphurus* possessing 1-5-3 or 1-4-3 ID patterns (patterns occurring in *S. chabanaudi*) are found only in the New World (Munroe 1987). Western Atlantic *Symphurus* with similar ID patterns, fin-ray counts, or pigment patterns to those observed in *S. chabanaudi* include *S. tessellatus* (Quoy & Gaimard), an undescribed species (species D of Munroe 1987), and *S. plagusia* (Schneider, in Bloch & Schneider). *Symphurus chabanaudi* is easily distinguished from *S. plagusia* by the large black opercular spot and scales on blind-side dorsal- and anal-fin rays (both absent in *S. plagusia*); the absence of a fleshy ridge on the ocular-side lower jaw (present in *S. plagusia*); the dorsal-fin origin placed at a vertical line through the middle or anterior margin of the upper eye (versus dorsal-fin origin at a vertical line anterior to anterior margin of upper eye); and meristic values (dorsal-fin rays 98–109 versus 89–98 in *S. plagusia*; anal-fin rays 82–92 versus 73–81; total vertebrae 52–57 versus 47–51; and scales in a longitudinal series 91–104 versus 79–89).

Of all species in the genus, *S. chabanaudi* is most similar in form, size, and pigmentation pattern to *S. tessellatus. Symphurus chabanaudi,* however, differs from *S. tessellatus* in its modally higher counts of dorsal- and anal-fin rays and total vertebrae (Table 7). The most useful character to distinguish *S. chabanaudi* from *S. tessellatus* is the number of dorsal-fin rays, which range from 98–109 in *S. chabanaudi* compared with only 91–102 in *S. tessellatus.* Comparison of frequency distributions for dorsal-fin ray counts in these species (Table 7) reveals that about 12% of the specimens overlap with respect to dorsal-fin ray number. However, *S. chabanaudi* usually has 101 or more dorsal-fin rays (95 of 107 specimens) while *S. tessellatus* usually has 100 or fewer dorsal-fin rays (224 of 233 with 100 or fewer dorsal-fin rays). Corresponding modal differences, although not as great as those noted for dorsal-fin rays, also occur in number of anal-fin rays (82–92 versus 74–86 in *S. tessellatus*) and total vertebrae (52–57, usually 53–56 in *S. chabanaudi* versus 48–54, but usually 50–53 in *S. tessellatus*). There are also differences in the relative frequencies of occurrence of particular ID patterns in the two species. In *S. chabanaudi,* 50% (47/95) of the individuals had a 1-5-3 ID pattern and only 30% (28 specimens) featured a 1-4-3 pattern. In contrast, 173 of 233 (74%) *S. tessellatus* possessed a 1-4-3 ID pattern, while only 6% (13 specimens) had a 1-5-3 pattern.

Many meristic features of *S. chabanaudi* completely overlap those of undescribed species D from the Caribbean Sea. *Symphurus chabanaudi* differs from undescribed species D, however, in having 4–8 small, but well-developed scales on the blind-side dorsal- and anal-fin rays (especially prominent in specimens larger than 60 mm); a somewhat larger eye (1.5–2.1, $\bar{X}$ = 1.9 SL versus 1.2–1.9, $\bar{X}$ = 1.5 SL); and *S. chabanaudi* lacks a fleshy ridge on the ocular-side lower jaw (usually present and well developed in undescribed species D). The

Table 7.—Comparison of selected meristic features for the eastern Pacific *Symphurus chabanaudi* and the western Atlantic *S. tessellatus*.

	Dorsal-fin rays																		
	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109
S. chabanaudi								1	1	10	14	14	20	6	17	14	8	—	2
S. tessellatus	2	1	5	16	37	30	51	35	28	19	8	1							
	Anal-fin rays																		
	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
S. chabanaudi									1	3	10	20	23	17	15	13	3	2	1
S. tessellatus	1	—	—	5	21	33	43	45	37	26	18	3	1						
	Total vertebrae																		
	48	49	50	51	52	53	54	55	56	57									
S. chabanaudi					8	22	27	22	12	1									
S. tessellatus	1	2	45	81	71	32	2												

posterior extension of the jaws is slightly more anterior in *S. chabanaudi,* reaching only to a vertical line through the rear margin of the pupil or rear margin of the lower eye. In undescribed species D, the jaws extend further backwards reaching a vertical line through the posterior margin of the eye and in many specimens, the jaws actually extend slightly beyond the eyes. *Symphurus chabanaudi* also differs from undescribed species D in the relative frequencies of specimens possessing 1-5-3 and 1-4-3 ID patterns. *Symphurus chabanaudi* has a much higher frequency of occurrence of the 1-5-3 ID pattern (50% of individuals examined) compared with only 30% with a 1-4-3 pattern. In contrast, 40 of 45 (89%) of the undescribed species D examined had a 1-4-3 pattern and only one specimen possessed a 1-5-3 pattern.

Symphurus chabanaudi also differs from undescribed species D in subtle features of its pigmentation. *Symphurus chabanaudi* generally has about nine wide, dark-brown crossbands; undescribed species D has 10–14 (usually 10–12) narrower bands. Additionally, the posterior third of the dorsal and anal fins, and the caudal fin in *S. chabanaudi* are usually uniformly dark brown or black without alternating blotches and unpigmented areas. In undescribed species D, the posterior two-thirds of the dorsal and anal fins usually have an alternating series of blotches and unpigmented areas.

Additional material examined.—The following non-type specimens were also examined (393 specimens, 19–226 mm):

Gulf of California western shore: UCLA W54-367, (52, 106–145), about 5 mi north of San Felipe. CAS 24062, (5, 120–133), between Punta Majoro and Punta Ensenada Blanca, about 3 mi north of San Felipe. UCLA W49-427, (2, 152–161), off Ensenada Blanca, 31°03′30″N, 114°50–51′W. CAS-SU 47384, (1, 101). UCLA W55-26, (1, 160). CAS 24060, (1, 162) and CAS 24071, (11, 119–164), near San Felipe. UCLA W55-2, (13, 99–168), about 9 mi east of San Felipe. YPM 632 (1, 111), San Felipe Bay, 6 m, 19 May 1926. YPM 631 and 633a, (2, 75–122), San Felipe Bay, 6 m, 14 May 1926. CAS 24065, (2, 138–149), 2–3 mi north of Punta Estrella (Diggs), about 7 mi south of San Felipe. CAS 24066, (2, 144–161), about 9 mi south of San Felipe. CAS 24064, (1, 138), about 10 mi south of San Felipe. UCLA W62-61, (22, 66–154), off Punta Estrella (Diggs). UCLA W52-45, (6, 90–182), about 2–3 mi off Punta San Fermin. CAS 24063, (3, 100–150), about 15 mi south of San Fe-

lipe. UCLA W59-17, (1, 191), off Punta Willard, Bahia San Luis Gonzaga. USNM 126741, (2, 122–132) and CAS-SU 5571, (2, 126–128), 30°50′45″N, 114°29′45″W, off Isla San Luis.

Gulf of California eastern shore: UCLA W49-55, (20, 114–178), 20 mi southwest of El Golfo, Sonora. UCLA W56-28, (10, 156–166), north of Punta Lobos, Sonora. UCLA W58-233, (1, 149), north of Punta Lobos, Sonora. UCLA W50-27, (1, 166), near mouth of Río Muerto, in tidal waters west of Mapoli, Sonora. CAS 24059, (2, 70–101), Bahia Guaymas, Sonora. CAS 24061, (2, 96–97), just south of channel and east of Punta Baja, Guaymas Harbor, Sonora. UCLA W52-40, (7, 71–105), Guaymas Harbor, Sonora. UCLA W50-42, (10, 111–180), south of Boca del Río Mayo, Sonora. CAS 24068, (1, 122) and UCLA W50-43, (2, 19–22) (larvae with eyes recently migrated), 26°40′N, 109°47′W, in vicinity of Boca del Río Mayo, Sonora. UCLA W56-113, (2, 150–168), south of mouth of Bahia Topolobampo, Sinaloa. SIO 60-95, (1, 218), 24°32.6–33.4′N, 108°03–04.5′W, off Altata, Sinaloa. UCLA W51-36, (2, 98–103), near Astillero at Mazatlan, Sinaloa.

Pacific coast of southern Mexico: CAS 4670, (1, 168), near Isla Isabela. SIO 60-87, (2, 173–200), 21°46.4–50.5′N, 105°25.2–44.9′W, near mouth of Río San Pedro, Nayarit. UCLA W58-18, (12, 43–97), Boca del Asodero, Nayarit. UCLA W58-3, (3, 161–197), 1–3 mi north of Ensenada Chacala, Nayarit.

El Salvador: CAS-SU 46259, (2, 144–159), 13°20′03″N, 87°48′57″W, off La Union, Gulf of Fonseca. USNM 220804, (7, 122.0–133.7, five specimens cleared and stained), Río Chaguantique, Jiquilisco Bay, 14 Sep 1976. USNM 291340, (19, 66.7–123.3), Jiquilisco Bay, Sept 1975–Mar 1976.

Nicaragua: CAS-SU 46258, (1, 160), 13°02′30″N, 87°29′30″W, off Punta Monypenny, Gulf of Fonseca.

Costa Rica: SIO 64-465, (1, 179), vicinity of Cabo Blanco. LACM 9754-1, (1, 198), between Isla San Lucas and Isla Negritas, Gulf of Nicoya. UCLA W54-35, (4, 67–101), Erdman Cove, Isla Caballo, Gulf of Nicoya. CAS 24067, (2, 64–106), off Isla Chira, Gulf of Nicoya. UCR 297-16 and 297-17, (7, 150–193), Puntarenas Province, Gulf of Nicoya. UCLA W54-434, (23, 116–165), exact locality unknown. UMMZ 194670, (2, 199–206), Gulf of Nicoya, off Puntarenas, Puntarenas Province, 1 Jul 1973.

Panama: YPM 4369, (8, 149–201), Canal Zone. ANSP 123572, (2, 174–181), Canal Zone, Oct 1953. CAS 24965, (3, 123–136), 8°58′15″N, 79°25′15″W. CAS 24962, (7, 146–191), 8°43′15″N, 79°41′W. CAS 24967, (8, 174–204), 8°43′10″N, 79°15′W. SIO 52-193, (1, 126), 8°40′N, 79°45′W, off Punta Chame. CAS 24963, (14, 152–214), 8°38′N, 78°40′W. CAS 24961, (1, 116), 8°27′15″N, 78°49′50″W, Isla del Ray. UMML 34330, (2, 167–186), 8°19′N, 78°36′W, 29 m, 7 May 1967. CAS 24964, (1, 162), 8°15′N, 78°26′W. CAS 24968, (2, 156–183), 8°08′15″N, 80°20′W. CAS 24966, (4, 133–176), San Miguel, Bay of Garachine. UCLA W54-325, (1, 136). UCLA W54-345, (1, 107.5). UCLA W58-278, (1, 208). UCLA W58-304, (20, 82.5–158). UCLA W58-305, (17, 84–170). CAS 24070, (1, 202). LACM 6509-26, (2, 189–193), Bahia de Panama. CAS-SU 6900, (3, 172–226), 8°16′30″N, 79°37′45″W. USNM 50333, (1, 220). USNM 81674, (1, 43.5) and USNM 81032, (1, 189), from Panama City Market. CAS 24069, (2, 208–212), off Chiman, Gulf of Panama. ANSP 123579, (1, 194), off Chiman Province, Gulf of Panama, 9 m, 10 Sep 1953. USNM 291357, (1, 161), Canal dredge effluent, Fort Amador, 16 Mar 1967.

Colombia: USNM 305725, (3, 160–180), 3°37–39′N, 77°20.5–21′W, Tortugas grounds south of Buenaventura, 18 m, 22 Oct 1970. USNM 305722, (1, 172), 3°39′N, 77°18′W, Tortugas grounds south of Buenaventura, 9 m, 19 Sep 1969. USNM 305724, (1, 178), 3°31–33′N, 77°22–22.5′W, Tortugas grounds south of Buenaventura, 9 m, 22 Oct 1970. USNM 305720, (1, 202),

3°18–16′N, 77°33.5–34′W, 9 m, 23 Oct 1970. USNM 305723, (1, 197), 2°43′N, 77°51′W, Timbiqui, 7 m, 25 Jan 1969. USNM 305721, (1, 205), 1°42′N, 79°00′W, Punta Manglares, 11 m, 28 Jan 1969.

Peru: IMARPE 2, (1, 204), 5°11′S, 81°12′W, Paita. IMARPE 13, (1, 142), 12°06′S, 76°55′W, Lima.

Symphurus diabolicus, new species
Figs. 2, 4a, Table 8

Holotype.—USNM 135653 (male, 112.6 mm), collected by the U. S. Fish Commission Steamer *Albatross,* Sta. 2817, 15 Apr 1888, west of Isla San Cristobal (Chatham Island), Galapagos Islands (0°46′S, 89°42′W), Ecuador, 501 m.

Diagnosis.—A *Symphurus* with a 1-3-2 ID pattern, 109 dorsal-fin rays; 94 anal-fin rays; 12 caudal-fin rays; 58 total vertebrae; 5 hypurals; extremely small scales, 135 in longitudinal series and 58 in transverse row; no pupillary operculum; large, prominent eyes (ED/SNL 0.96), with narrow interorbital space; upper jaw reaching vertical line just posterior to anterior margin of lower eye; well-developed dentition on ocular-side jaws; origin of dorsal fin at vertical between anterior margin and mid-point of pupil of upper eye; head length slightly larger (1.04 times) than body depth, spotted peritoneum (possibly black in life); and uniform body color without crossbands.

Description.—ID pattern 1-3-2. Caudal-fin rays 12 (caudal fin broken and nearly completely severed from body). Dorsal-fin rays 109. Anal-fin rays 94. Pelvic-fin rays 4. Total vertebrae 58; abdominal vertebrae 9 (3 + 6). Hypurals 5. Longitudinal scale rows approximately 135. Scales on head posterior to lower orbit missing. Transverse scales approximately 58.

Body medium-sized, relatively elongate, depth at anus 203 SL; greatest body depth 212 SL, beginning about at base of anal-fin ray 5 and continuing almost uniformly over large area in middle of body (to approximately anal-fin rays 60–70); body taper anterior and posterior of that region smooth and gradual. Anterior curvature of body not pronounced. Preanal length 248 SL; somewhat longer than body depth. Head relatively long, 220 SL, greater than body depth. Head length greater than head width (194 SL). Postorbital length 131 SL. Lower head lobe (97 SL) slightly smaller than upper head lobe (103 SL). Snout length 194 HL, with small number of small ctenoid scales. Dermal papillae scarcely evident on blind-side snout. Anterior nostril relatively long, but not reaching lower eye when depressed pos-

Table 8.—Comparison of meristic and morphometric features for holotypes and only known specimens of *Symphurus diabolicus* (USNM 135653, male, 112.6 mm) and *S. microlepis* (MCZ 28535, male, 99.5 mm).

	S. diabolicus	*S. microlepis*
ID pattern	1-3-2	1-3-2
Caudal-fin rays	12	12
Dorsal-fin rays	109	106
Anal-fin rays	94	92
Total vertebrae	58	57
Hypurals	5	5
Longitudinal scales	135	126
Postorbital scale rows	—	30
Transverse scale count	ca. 58	55
Morphometrics (thousandths of SL)		
Body depth at anus	203	279
Greatest body depth	212	279
Preanal length	248	271
Dorsal-fin base	938	967
Anal-fin base	756	746
Head length	220	248
Head width	194	275
Postorbital length	131	176
Upper head lobe	103	110
Lower head lobe	97	170
Predorsal length	62	33
Morphometrics (thousandths of HL, except HW/HL)		
HW/HL	0.88	1.11
Postorbital length	597	708
Snout length	194	154
Upper jaw length	230	231
Eye diameter	186	130
Chin depth	157	109

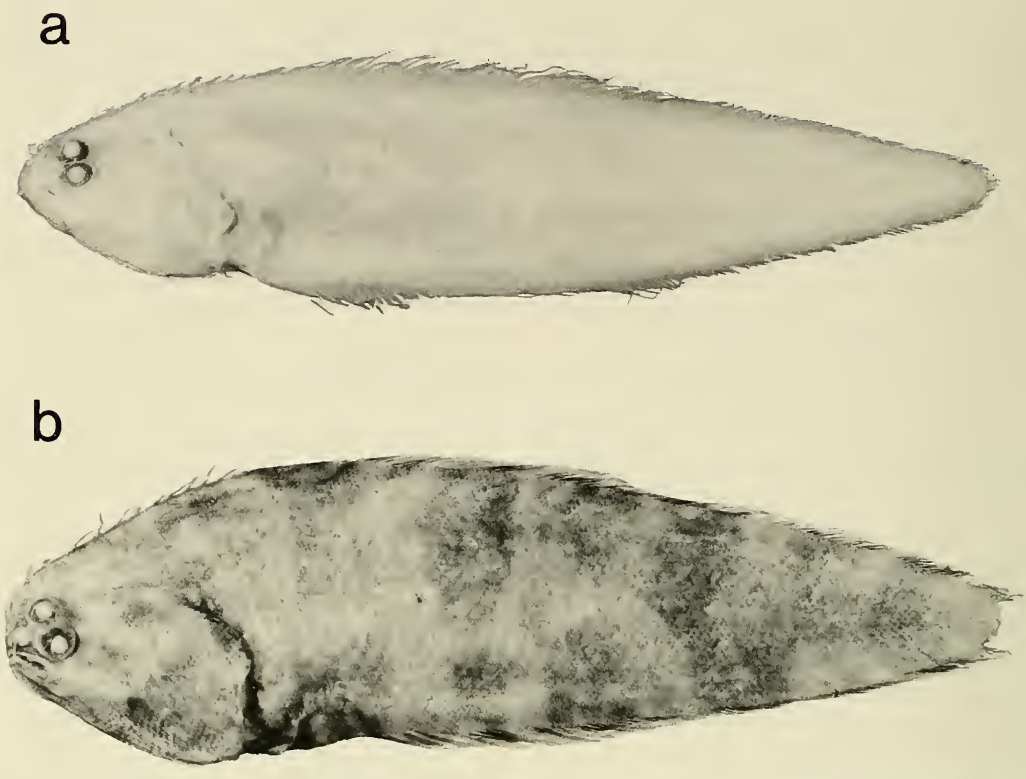

Fig. 4. a. *Symphurus diabolicus,* USNM 135653, holotype; male, 112.6 mm SL; Ecuador, Galapagos Islands (00°46′S, 89°42′W). b. *Symphurus microlepis,* MCZ 28535, holotype; male, 99.5 mm SL; off Panama (7°32.6′N, 79°16′W).

teriorly. Evidently 6–8 rows of 2–4 tiny and flimsy scales behind posterior nostril and in narrow interorbital region to posterior margin of eyes (most scales lost; counts made from scale pockets). Mouth relatively large, upper jaw 230 HL, reaching to a vertical line through anterior margin of lower eye. Chin depth 157 HL, shorter than snout length. Lower eye large, 186 HL; eyes slightly subequal with upper in advance of lower; eyeballs almost touching. Pupillary operculum absent. Length of dorsal-fin base 938 SL. Dorsal-fin origin reaching vertical line through point between anterior margin and mid-point of pupil of upper eye; predorsal length relatively long, 62 SL. Length of anal-fin base 756 SL; blind sides of dorsal and anal fins apparently without scales. Anal-fin origin approximately at vertical line between bases of fourteenth and fifteenth dorsal-fin rays. Pelvic fin with 4 rays; distal half of fin rays broken. Caudal fin damaged posteriorly; with four or five rows of tiny scales to point where rays broken.

Teeth well developed on both jaws. Blind-side dentary with 5–6 rows of strong teeth across middle of crescentic tooth band. Arms of crescent tapering to fewer rows, ending in single tooth. Premaxilla on blind side with tooth band as broad posteriorly as middle of lower jaw crescent, but narrowing anteriorly to fewer rows, terminating in single tooth. Ocular-side premaxilla with single row of prominent teeth extending from tip to about mid-point of bone (at point equal with vertical midway between anterior margin of lower eye and posterior margin of anterior nostril). Ocular-side dentary with

row of teeth extending to point below anterior margin of lower eye.

Scales small (smallest among eastern Pacific tonguefishes), numerous, ctenoid on both sides of body. Scales on blind side with fewer cteni than those on ocular side (a feature not observed in other eastern Pacific *Symphurus*).

Pigmentation.—Specimen uniformly yellowish throughout without visible signs of any other form of pigmentation. Whether yellowish color is natural pigmentation of the species or results from bleaching of natural pigment during fixation and long-term storage is unknown.

Etymology.—From the Latin "diabolus" meaning devil, in reference to the large, grotesque eyes; an apparent adaptation to the deep-water habitat occupied by this species.

Distribution.—Known only from the holotype collected at 501 m on white sand substrate west of Isla San Cristobal (Chatham Island) in the Galapagos Islands (Fig. 2).

Comparisons.—*Symphurus diabolicus* is only the fourth known eastern Pacific *Symphurus* with the following combination of characters: a 1-3-2 ID pattern, 12 caudal-fin rays, and a black peritoneum (although the peritoneum in the holotype is spotted and not now solid black, it is thought to have had a black peritoneum and that most natural pigment has been bleached from this specimen during fixation and storage. Fourteen nominal species in addition to *S. diabolicus* are characterized by a 1-3-2 ID pattern and 12 caudal-fin rays (Munroe 1987). Of these, ten species, all occurring in deep water (>50 m), have a black peritoneum. Only four species inhabiting relatively shallow-waters (<45m) have an unpigmented peritoneum.) Other eastern Pacific species characterized by this combination of characters include *S. microlepis, S. gorgonae,* and *S. oligomerus. Symphurus diabolicus* differs strikingly from these other *Symphurus* with the exception of *S. microlepis* (see below). *Symphurus diabolicus* differs from *S. gorgonae* and *S. oligomerus* in vertebral counts (total vertebrae 58 versus 46–49 in *S. gorgonae* and 48–52 in *S. oligomerus*); numbers of dorsal-fin rays (109 versus 80–89 in *S. gorgonae* and 85–97 in *S. oligomerus*); numbers of anal-fin rays (94 versus 63-74 in *S. gorgonae* and 71–83 in *S. oligomerus*); and body shape (relatively elongate with gradual posterior taper in *S. diabolicus* versus much deeper body with greatest body depth in anterior third of body and rapid posterior taper in *S. gorgonae* and *S. oligomerus*). *Symphurus diabolicus* differs further from *S. gorgonae* in having 5 hypurals (versus 4) and in its much larger size (112.6 mm versus adults smaller than 70 mm).

Among all other congeners, *S. diabolicus* is most similar in morphology and meristic features to *S. microlepis,* a second eastern Pacific species known only from the holotype collected in deep-water off the coast of Panama. Although only the types are available for comparison, the differences between these specimens are, nevertheless, substantial and beyond the range of intraspecific variation normally encountered in other species of *Symphurus.* These differences are particularly noteworthy in light of the fact that both specimens are males and of nearly the same size (112.6 versus 99.5 mm SL), which reduces or eliminates confounding factors attributable to size or sexually related variations in morphology. The two species have similar meristic features, especially ID pattern (1-3-2), total vertebrae (58 versus 57 in *S. microlepis*), numerous small scales in a longitudinal series (ca. 135 and 126), and caudal-fin rays (12); however, they are easily distinguished by a number of characters (compare Figs. 4a and 4b and see Table 8 for detailed comparison of morphological characteristics of both species). Notable differences between these species are body shape and relative size and shape of the head. *Symphurus diabolicus* has a more elongate body featuring a smooth, gradual taper with the greatest depth (21.2%

SL) occurring slightly posterior to the anus and diminishing posteriorly only slightly throughout the middle of the body. In contrast, *S. microlepis* has a much deeper body (27.9% SL) with the greatest depth occurring at the anus and the body tapers posteriorly much more rapidly. In *S. diabolicus,* the head is shorter (HL = 22.0% SL versus 24.8% SL in *S. microlepis*) and longer than wide (HW/HL = 0.88 versus 1.11) compared with that of *S. microlepis.* Differences in head shape between these species are particularly evident in the relative size of the lower head lobe, which is only 0.94 the width of upper head lobe in *S. diabolicus,* in contrast to being 1.6 times larger in *S. microlepis.* Although both species have relatively large eyes, that of *S. diabolicus* is larger, more elliptically-shaped, and equal in length to about one-fifth of the head length while that of *S. microlepis* is only about one-eighth of head length and almost spherical.

None of the Atlantic *Symphurus* possessing 1-3-2 ID pattern, 12 caudal-fin rays, and black peritoneum have vertebrae or fin-ray counts approaching those of *S. diabolicus.*

Other species in the genus with meristic features similar to *S. diabolicus* include two rarely collected, Indian Ocean, deep-water species, *S. macrophthalmus* Norman and *S. fuscus* Brauer. *Symphurus macrophthalmus* is a large-eyed, deep-water species known only from the holotype and a single paratype collected in the Gulf of Oman near the Persian Gulf (Norman 1939). Large eye size, black peritoneum, and generally slender body are the only similarities this otherwise distinctive species shares with *S. diabolicus. Symphurus diabolicus* has a different ID pattern than that observed in *S. macrophthalmus* (1-3-2-2-2 versus 1-2-2-1-2); fewer caudal-fin rays (12 versus 14); and some higher counts (total vertebrae 58 versus 48; 109 versus 87 dorsal-fin rays and 94 versus 75 anal-fin rays).

Certain similarities exist in meristic features of *S. diabolicus* and those observed for *S. fuscus* known only from the holotype collected off the east coast of equatorial Africa (Brauer 1906). Both species have 58 total vertebrae and similar numbers of dorsal- (109 in *S. diabolicus* versus 105 in *S. fuscus*) and anal-fin rays (94 versus 93). However, *S. diabolicus* differs from *S. fuscus* primarily in ID pattern (1-3-2-2-2 versus 1-2-2-1-2) and caudal-fin ray counts (12 versus 14).

Discussion

Interestingly, southward increases in several meristic features occurred in *S. oligomerus* and *S. chabanaudi* (Tables 3, 6). Similar increases in meristic features occur in other eastern Pacific tonguefishes that range from the Gulf of California to northern Peru, including *S. atramentatus, S. fasciolaris, S. leei, S. melanurus,* and *S. gorgonae* (Mahadeva 1956). Increased meristic elements in tonguefishes occurring in the southernmost extent of the species range in the Northern Hemisphere contradicts the well-known Jordan Rule (Jordan 1891), in which specimens of Northern Hemisphere species inhabiting the northernmost portions of the species range usually have the highest number of meristic elements. Hubbs (1924, 1926, 1934), in reviewing probable causes of latitudinal variation in meristic elements, noted strong correlations between the number of elements formed during development and ambient water temperatures, but he recognized that other factors such as salinity could also influence the complement of meristic elements formed during ontogeny. One or more of those factors may account for the cline we find in these *Symphurus* species; however, because virtually nothing is known concerning the seasonality and location of spawning and rates of larval development of these tonguefishes, it is premature to speculate which factors contribute to this trend in these species.

Acknowledgments

The following curators and support staff generously provided space and arranged for

loan of specimens: W. Smith-Vaniz and W. Saul (ANSP); A. Wheeler, M. Halloway, and J. Chambers BM(NH); W. Eschmeyer, M. E. Anderson, W. Follett, L. Dempster, and D. Catania (CAS); N. Chirichigno (IMARPE); R. Lavenberg, J. Seigel, and R. Feeney (LACM); K. Hartel (MCZ); C. Hubbs, R. Rosenblatt, D. Gibbons, and H. J. Walker (SIO); L. Knapp (SOSC); B. Walker and D. Buth (UCLA); W. Bussing (UCR); C. R. Robins (UMML); R. R. Miller, D. W. Nelson, and A. S. Creighton (UMMZ); V. G. Springer, R. P. Vari, and S. L. Jewett (USNM); L. P. Schultz (formerly USNM); and K. Thompson (YPM). We thank R. Gibbons and R. Wisner for assistance with photography and radiography. M. Nizinski provided assistance reading radiographs and prepared Fig. 2. The manuscript was improved through critical reviews by B. Collette, R. Vari, and R. Lavenberg. Portions of this study comprised a partial requirement for the Ph.D. degree from UCLA to the first author. Portions of this study were independently initiated while the second author was a postdoctoral fellow in the Division of Fishes, USNM. Travel funds enabling Munroe to work at UMML in 1982 were provided by the Department of Fisheries, VIMS.

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