

Abstract.—The only cosmopolitan sciaenid genus, *Umbrina*, is represented in the eastern Pacific Ocean by eight species: *U. analis*, *U. bus-singi*, *U. dorsalis*, *U. galapagorum*, *U. reedi*, *U. roncador*, *U. wintersteeni* n. sp., and *U. xanti*. *Umbrina analis* is removed from the synonymy of *U. xanti*. Lectotypes are designated for *U. dorsalis*, *U. galapagorum* and *U. xanti*. *Umbrina wintersteeni*, which usually occurs in shallow, protected waters of the southern Gulf of California and the west coast of southern Baja California Sur, apparently is morphologically intermediate between two major groups of eastern Pacific species. Distinguishing characters of *U. wintersteeni* include peritoneum and inside gill cover with little or no pigment; barbel relatively short and stout; anal fin with six soft rays; anal fin darkly pigmented to dusky; pelvic fins usually dusky; second anal spine of moderate length.

Eastern Pacific species of the genus *Umbrina* (Pisces: Sciaenidae) with a description of a new species

H.J. Walker Jr.

Scripps Institution of Oceanography
University of California at San Diego, La Jolla, California 92093-0208

Kelth W. Radford

Department of Biology, Mesa College
7250 Mesa College Drive, San Diego, California 92111

Of the more than 70 genera in the percoid family Sciaenidae, only *Umbrina* has a worldwide distribution (Chao 1986a). The approximately 15 species that constitute *Umbrina* occur in tropical to temperate waters over the continental shelf to the upper slope. In the New World, *Umbrina* comprises four species in the Atlantic (Gilbert 1966, Miller 1971) and eight in the Pacific (this study). Most eastern Pacific species are collected with beach seines over sand or sand-mud bottoms, along open coasts or in bays, and probably support artisanal or sportfisheries wherever they are found. In southern California the yellowfin croaker *U. roncador* and spotfin croaker *Roncador stearnsii* together make up about 10 percent of the surf fisherman's catch (Frey 1971).

No review of the eastern Pacific species of *Umbrina* has been published, although McPhail (1958) wrote extensive keys to all known eastern Pacific sciaenids, and Lopez S. (1980) described a new species of *Umbrina* from this area. The purposes of this paper are to review the eastern Pacific species of *Umbrina*, provide a key and characters useful in their identification, and describe a new species.

Materials and methods

Counts and measurements generally follow those of Hubbs and Lagler (1958). Gill raker counts include rudiments. Unless otherwise stated, standard length (SL) is used throughout. Vertebral and procurrent caudal ray counts were made from radiographs. A short, stout barbel is defined as one whose length roughly equals its width at midlength (seen in side view); an elongate barbel is at least twice as long as wide. Mean percentages of certain morphometrics used in species diagnoses were calculated usually from 30 specimens, occasionally ~20 (when available), selected from the entire size range of the species. Standard errors associated with these means were calculated strictly to show relative variation for a particular proportion and were always 0.6% (once) or less. All pigmentation notes were made from alcohol-preserved specimens. Institutional abbreviations follow Leviton et al. (1985). There have been many instances where eastern Pacific species have been ascribed to *Umbrina* (e.g., *U. panamensis* = *Menticirrhus panamensis*; *U. imberbis* = *Sciaena*, probably *callaensis*), and these are beyond the scope of this paper. Type material

of all synonyms listed in the species accounts was examined by the authors and/or C.L. Hubbs (deceased).

Systematics

Genus *Umbrina* Cuvier

Synonymy

Umbrina Cuvier 1816:297 (type species *Sciaena cirrosa* Linnaeus, by monotypy, see Opinion 988, Bull. Zool. Nom. (1972):123).

Attilus Gistel 1848:109 (type species *Sciaena cirrosa* Linnaeus, by monotypy).

Asperina Ostroumoff 1896:30 (type species *A. improviso* (= *U. cirrosa*) Ostroumoff, by monotypy).

Diagnosis Deep-bodied to moderately elongate, compressed sciaenid fishes with a single mental barbel, usually with an apical pore; swim bladder single-chambered, usually carrot-shaped, with no diverticula, located entirely abdominally; preopercular margin with bony serrations; two anal spines, the second long and thick.

Description As in Gilbert (1966), Trewavas (1977), and Chao (1978, 1986a, b), with some additions: back slightly arched; ventral profile nearly straight; head oblong; snout thick and protuberant with 5–7 rostral and 5 marginal pores; chin with two pairs of lateral pores surrounding the short barbel; mouth small, inferior, horizontal or nearly so; teeth small, villiform, set in bands in both jaws, outer row of teeth in upper jaw may be slightly enlarged; sagitta (largest otolith) thick, oval, with smooth inner surface and crested or nodular outer surface; cauda of sulcus bent sharply and not reaching ventral edge of sagitta, ostium reaching anterior edge; gill rakers short; caudal fin truncate to slightly emarginate or pointed; scales ctenoid; vertebrae 10–11 + 14–16 = 25–26; dorsal fin rays IX–X + I, 21–33; anal rays II, 5–10; pectoral rays 14–20; overall background coloration white to silver or yellow to brown; usually with dark-brown stripes: oblique dorsolaterally, more longitudinal midlaterally and on peduncle area, becoming faint or absent ventrally, usually faint or absent on head.

Relationships The genera *Sciaena* and *Umbrina* are the only representatives of the tribe Sciaenini (Chao 1986a). Characters of the swim bladder are the most important factors in assessing the phylogenetic relationships among suprageneric groups of sciaenids and the single-chambered swim bladder, lacking appendages, characteristic of the sciaenines, is the most primitive (plesiomorphic) form (Chao 1986a). The genus *Sciaena* (species have no barbels) is a polyphyletic

assemblage containing numerous species and is in need of revision (Chao and Miller 1975, Chao 1986a). Although apparently monophyletic, we presently can only define *Umbrina* with synplesiomorphies or homoplastic apomorphies (e.g., pored mental barbel) (L.N. Chao, Bio-Amazonica Conserv. Int., Brazil, pers. commun., Sept. 1991).

Key to the eastern Pacific species of *Umbrina*

- 1A Inside gill cover dark to black, particularly in area of pseudobranch 2
- 1B Inside gill cover pale or lightly punctate 4
- 2A Dorsal fin with 21–23 soft rays; no stripes on body *U. bussingi*
- 2B Dorsal fin usually with 26–30 soft rays; dark to dusky horizontal or oblique stripes on body 3
- 3A Anal fin normally with 7 soft rays; peritoneum dark *U. roncadore*
- 3B Anal fin normally with 6 soft rays; peritoneum light ventrally (may be dark dorsally) *U. xanti*
- 4A Anal fin with 9(8) soft rays; dorsal fin with IX+I spines *U. reedi*
- 4B Anal fin with 6–7(8) soft rays; dorsal fin with X+I spines 5
- 5A Dorsal fin usually with 30–33 soft rays; snout length less than eye diameter *U. dorsalis*
- 5B Dorsal fin usually with 24–29 soft rays; snout length greater than eye diameter (adults) 6
- 6A Body stripes distinct; pectoral fin rays 17 or fewer; dorsal fin soft rays 27 or fewer 7
- 6B Body stripes indistinct or lacking; pectoral fin rays usually 18 or more; dorsal fin rays 27 or more *U. galapagorum*
- 7A Second anal spine ~1.5 in head; pelvic fins with little or no pigment *U. analis*
- 7B Second anal spine ~2.0 in head; pelvic fins usually dusky to dark *U. wintersteeni*

Umbrina bussingi Lopez S.

Figure 1

Synonymy

Umbrina bussingi Lopez S. 1980:203–208 (original description: holotype LACM 38715-1; Costa Rica).

Diagnosis A small species of *Umbrina* (max. length 252 mm) characterized by the following combination of characters: inside gill cover dark to black; no dark-brown stripes; caudal fin pointed; barbel compressed,

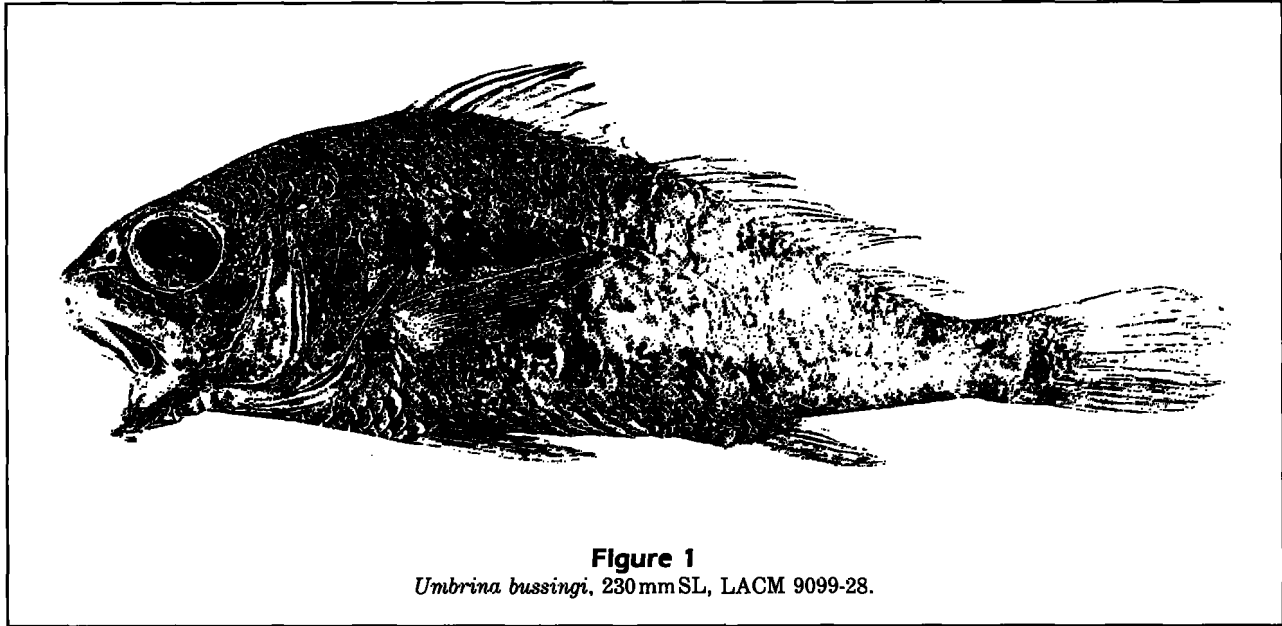


Figure 1

Umbrina bussingi, 230 mm SL, LACM 9099-28.

with anterior, slit-like (vertical) pore (large adults); peritoneum dark to dusky ventrally and laterally, lighter dorsally; soft dorsal fin rays 21–23; soft anal rays 7; pectoral rays usually 18–19; procurrent caudal rays 7–8 + 7–8(9); dorsal spines X + I; gill rakers usually 19–20; vertebrae 10 + 15; length of second anal spine, \bar{x} 17% SL; body depth, \bar{x} 32% SL; eye length, \bar{x} 9% SL; upper-jaw length, \bar{x} 13% SL; pectoral fin length, \bar{x} 26% SL.

Description Counts and measurements are given in Tables 1–6. Soft dorsal and anal fin rays as in Diagnosis. Pectoral rays 17–19; gill rakers 17–22; barbel not fully developed (usually bulbous) on specimens ≥ 154 mm; pigment inside operculum appears externally as large, dark spot; no dark-brown stripes at any size; background color uniformly light- (in young, to ~ 155 mm) to medium-brown; second anal spine relatively long and thick; body fairly deep; eye large, relatively smaller in larger specimens, but length always greater than snout length; head and upper jaw relatively long; pectoral fins extremely long, proportionately shorter at larger sizes; lateral line scales 47–49, \bar{x} 47.95, SE 0.18; spinous dorsal fin dark to dusky, lighter in smaller specimens; soft dorsal, pelvic, and caudal fins light to dusky, becoming darker with increasing size, most pigment on pelvic and caudal fins appearing on distal two-thirds; pectoral fins essentially unpigmented; anterior, proximal portion of anal fin darkly pigmented at most sizes, dark pigment on most of fin at larger sizes.

Distribution Southern Gulf of California, south of Los Frailes to Golfo de Chiriqui, Panama (Fig. 2). A

relatively deep-living species, taken in depths of 32 m to >183 m (Lopez S. 1980).

***Umbrina roncadador* Jordan and Gilbert**

Figure 3

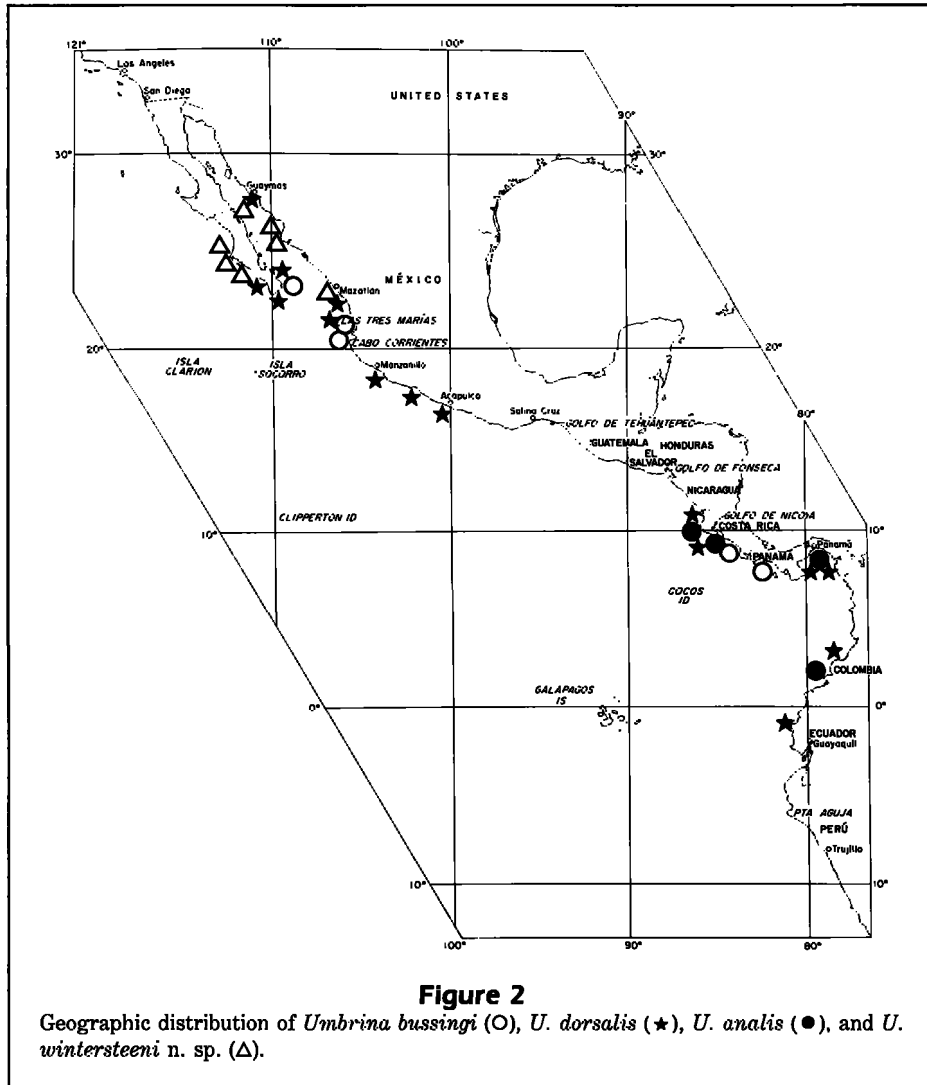
Synonymy

Umbrina roncadador Jordan and Gilbert 1882:277–278 (original description: holotype USNM 29371, Bahia Pequeña, Baja California Sur).

Sciaena thompsoni Hubbs 1921:1–3 + pl. (original description: holotype UMMZ 55053, Santa Catalina I., CA).

Diagnosis An intermediate-sized species of *Umbrina* (reported to ~ 381 mm) characterized by the following: inside gill cover dark to black, particularly in area of pseudobranch; peritoneum usually dark; soft dorsal fin rays usually 26–29; soft anal rays usually 7; pectoral rays usually 17–18; procurrent caudal rays usually 9–10 + 8–9; dorsal spines X + I; gill rakers usually 18–20; vertebrae 10 + 15; barbel relatively elongate, slender, more robust at sizes greater than ~ 200 mm; length of second anal spine, \bar{x} 12% SL; body depth, \bar{x} 29%; eye length, \bar{x} 6%; upper jaw length, \bar{x} 11%; pectoral fin length, \bar{x} 17%.

Description Counts and measurements are given in Tables 1–6. Soft rays of second dorsal fin 24–31; soft anal rays 6–7; pectoral rays 15–20; gill rakers 15–22; snout length greater than eye diameter (adults); pigment inside operculum usually appears externally as large, dark spot, dark pigment around pseudobranch

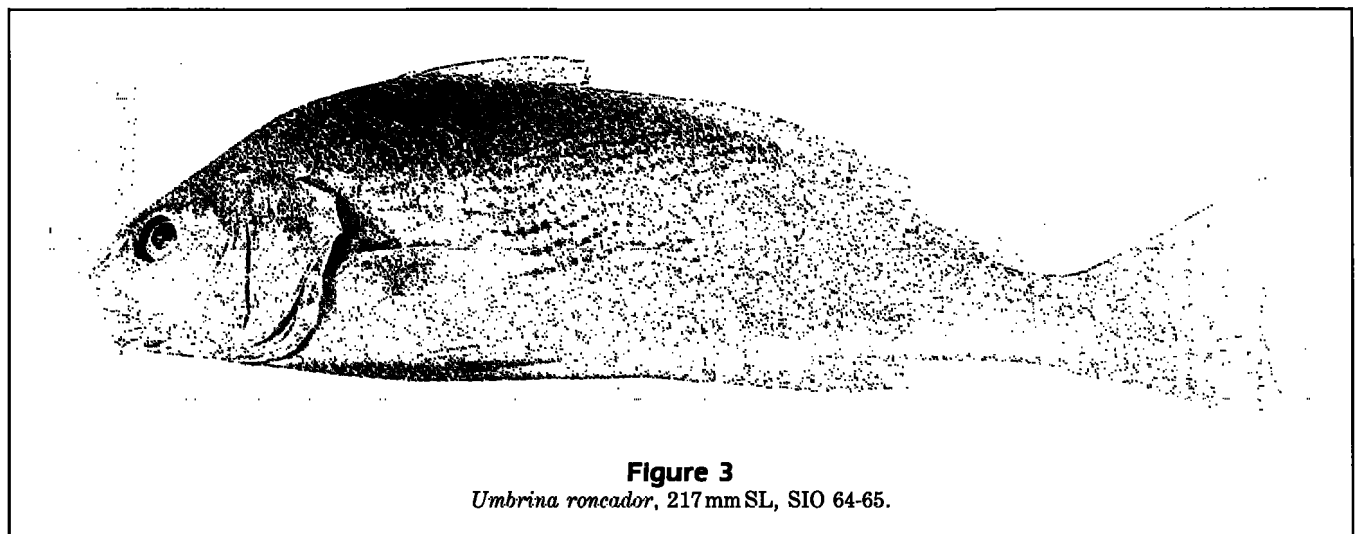


usually present by 50–65 mm; barbel fully developed by ~70 mm, indistinguishable or flat at sizes <30 mm, bulbous between ~30 and 70 mm; lateral line scales 49–54, \bar{x} 50.85, SE 0.04; virtually all brown stripes present by 70 mm; 5–8 dark, vertical bars occasionally on specimens 25–180 mm, usually faint when >80 mm; dorsal fin dusky at most sizes; pectoral, pelvic, anal, and caudal fins usually with little or no pigment, caudal occasionally dusky.

Distribution Point Conception to Bahia Magdalena and disjunctly in the northern Gulf of California, north of 27°N (Fig. 4). Taken in bays and the surf zone to ~45 m (Miller and Lea 1972).

***Umbrina xanti* Gill**
Figure 5

Synonymy
Umbrina xanti Gill 1862:257–258 (original description: syntypes USNM 7156, USNM 2996, USNM 3693, USNM 3694, Cabo San Lucas, Baja California Sur; lectotype USNM 7156 (79



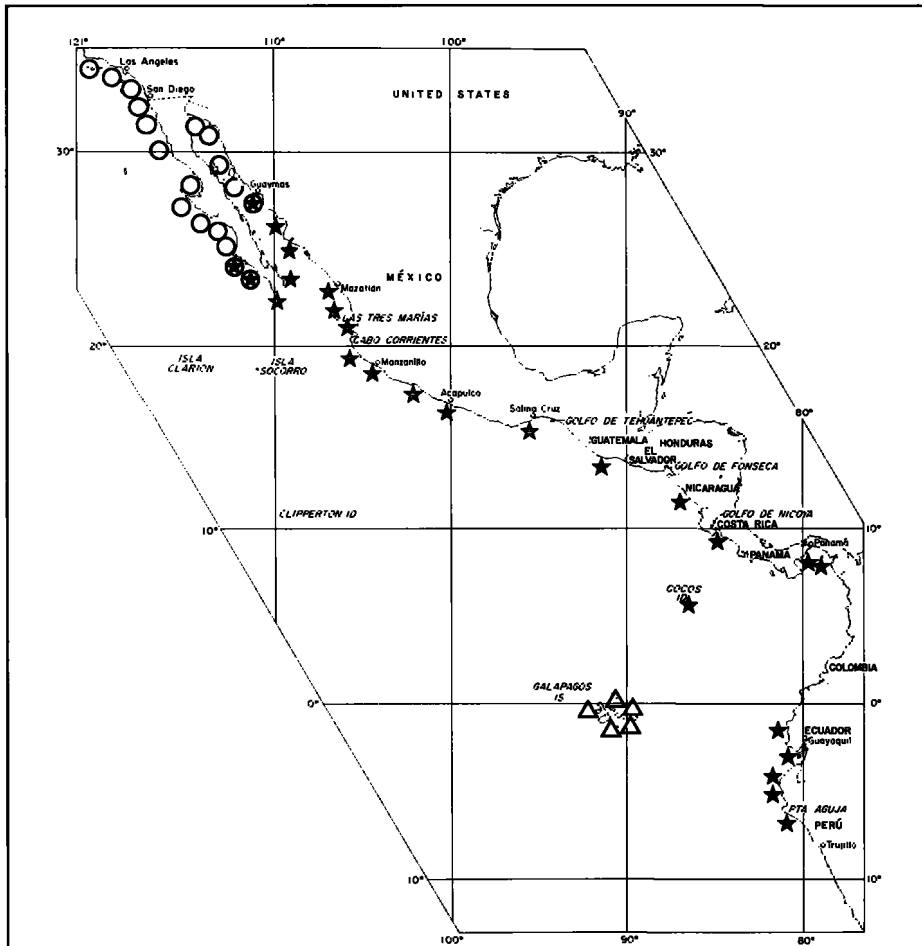


Figure 4
 Geographic distribution of *Umbrina roncadore* (O), *U. xanti* (★) plus one specimen from Chile at 19°36'S, 70°13'W), and *U. galapagorum* (Δ).

mm), herein designated; paralectotypes USNM 316653, [removed from USNM 7156] USNM 2996, USNM 3693, USNM 3694, MCZ 35976 [removed from USNM 3693]).

Umbrina sinaloae Scofield 1896:220-221 (original description: syntypes CAS-SU 1632, Mazatlan, Sinaloa, Mexico).

Diagnosis A small species of *Umbrina* (max. length 295 mm) characterized by the following: gill cover dark to black, particularly in area of pseudobranch; peritoneum usually light ventrally, punctate or occasionally dark dorsally; soft dorsal fin rays usually 27-29; soft anal rays usually 6; pectoral rays usually 17-18; procurrent caudal rays usually 8-9 + 8-9; dorsal spines X + I; gill rakers usually 17-19; vertebrae 10 + 15; barbel relatively elongate, slender; length of second anal spine, \bar{x} 12% SL; body depth \bar{x} 29%; eye length, \bar{x} 7%; upper jaw length, \bar{x} 10%; pectoral fin length, \bar{x} 16%.

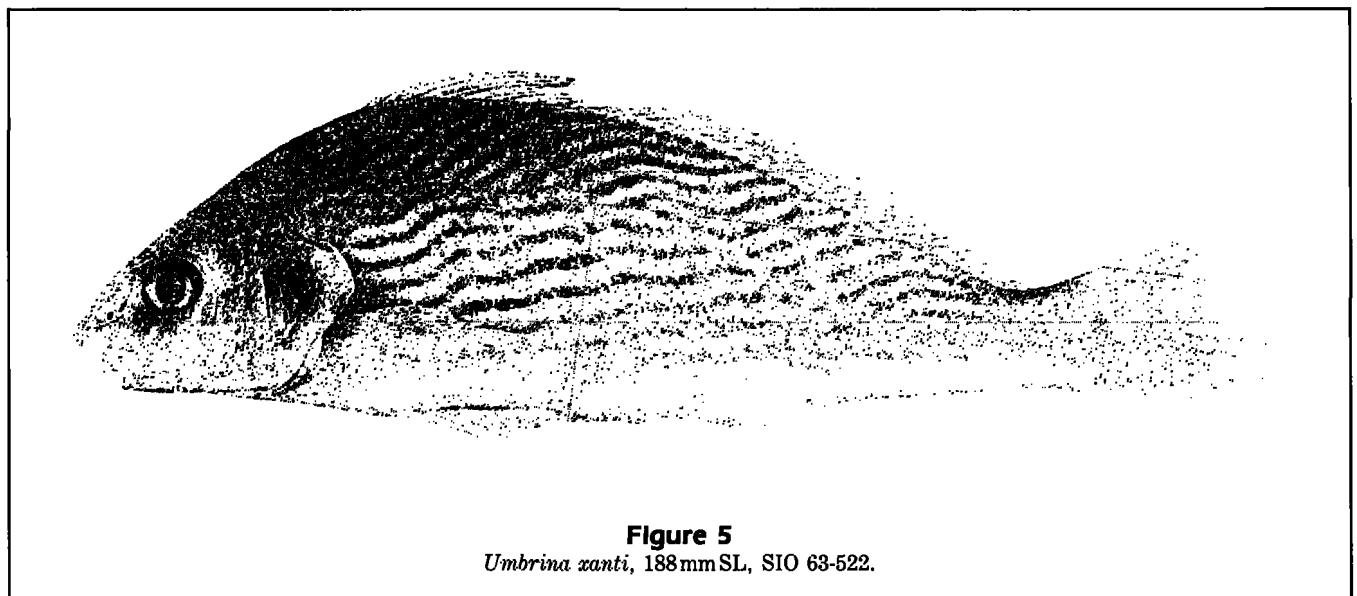


Figure 5
Umbrina xanti, 188mm SL, SIO 63-522.

Description Counts and measurements are given in Tables 1–6. Soft rays of second dorsal fin 26–30; soft anal rays 6–7; pectoral rays 14–19; gill rakers 16–21; snout length greater than eye diameter (adults); pigment inside operculum generally appears externally as large, dark spot; dark pigment around pseudobranch evident by 35–40 mm; barbel fully developed by 45 mm, usually knobby between 30 and 45 mm; lateral line scales 48–52, \bar{x} 50.02, SE 0.05; nearly all brown stripes present by 75–80 mm; dark, vertical bars 6–9, occasionally and only on specimens <100 mm; dorsal fin dusky; pectoral, pelvic, anal and caudal fins usually with little or no pigment, caudal occasionally dusky.

Distribution Bahia Magdalena and the southern Gulf of California (south of 27°N) to northern Peru (incl. Isla del Coco, Fig. 4), one specimen from Pisagua, Chile, 19°36'S, 70°13'W. Found in tide pools (juveniles) and along beaches, to 36 m.

***Umbrina reedi* Günther**

Figure 6

Synonymy

Umbrina reedi Günther 1880:25 (original description: holotype BMNH 1919.5.14.283; I. Juan Fernandez, Chile).

Diagnosis A large species of *Umbrina* (max. length

650 mm) characterized by the following: inside gill cover pale to lightly punctate; peritoneum dark ventrally and laterally, lighter dorsally; large, dark spot in axil of pectoral fin; soft dorsal fin rays usually 24–25; soft anal rays usually 9; pectoral rays usually 18; procurrent caudal rays usually 9–10 + 8–9; dorsal spines IX + I; gill rakers usually 19–20; vertebrae 10 + 15; barbel relatively short, stout; length of second anal spine, \bar{x} 14% SL; body depth, \bar{x} 35%; eye length, \bar{x} 7%; upper jaw length, \bar{x} 13%; pectoral fin length, \bar{x} 23%.

Description Counts and measurements are given in Tables 1–6. Soft rays of second dorsal fin 21–26; soft anal rays 8–10; pectoral rays 17–19; gill rakers 18–22; body and caudal peduncle deep; snout length greater than eye diameter at sizes greater than ~150 mm; pectoral fins relatively long; upper jaw long; barbel bulbous at 28 mm, not fully developed until ~120 mm; lateral line scales 49–52, \bar{x} 49.90, SE 0.17; caudal peduncle and midlateral brown stripes evident by 120 mm; dorso-lateral stripes undifferentiated on most specimens, appearing as irregular dashes of pigment; dorsal and caudal fins dusky; pectoral, pelvic and anal fins dark (pectorals frequently dusky), lighter on specimens less than ~130 mm.

Distribution Islands off Chile: Islas Juan Fernandez (~33°40'S, 78°55'W) and San Felix (~26°17'S, 80°06'W). From the surf zone to 30 m.

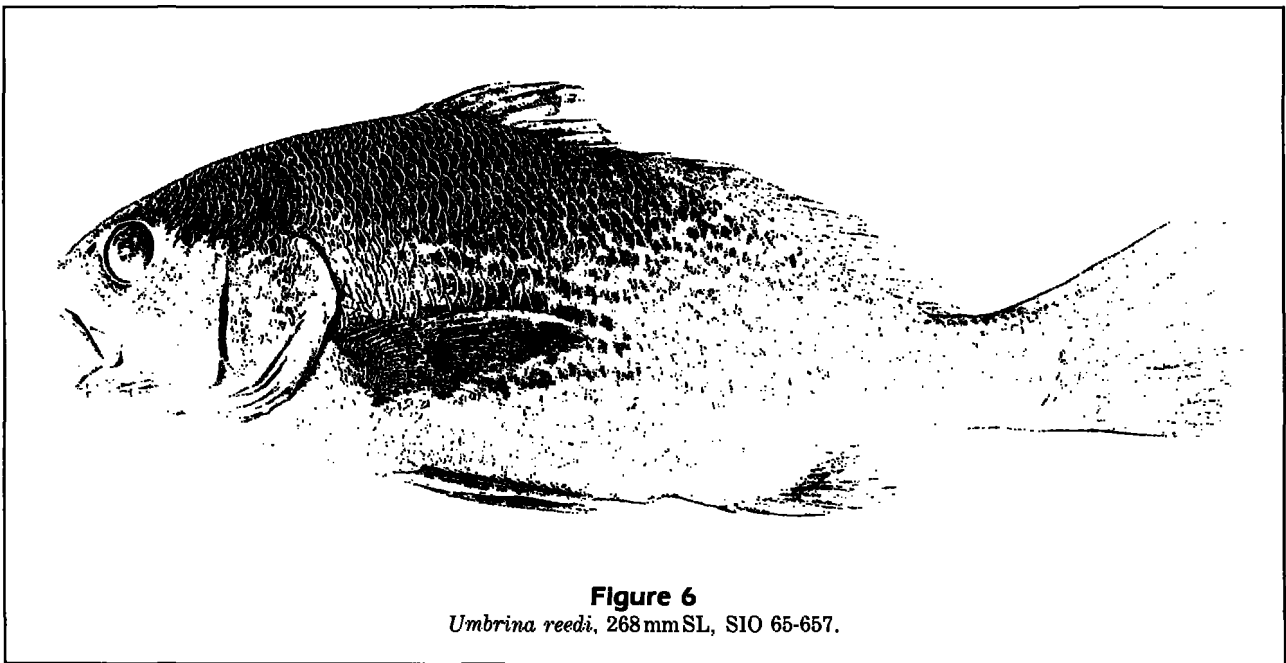
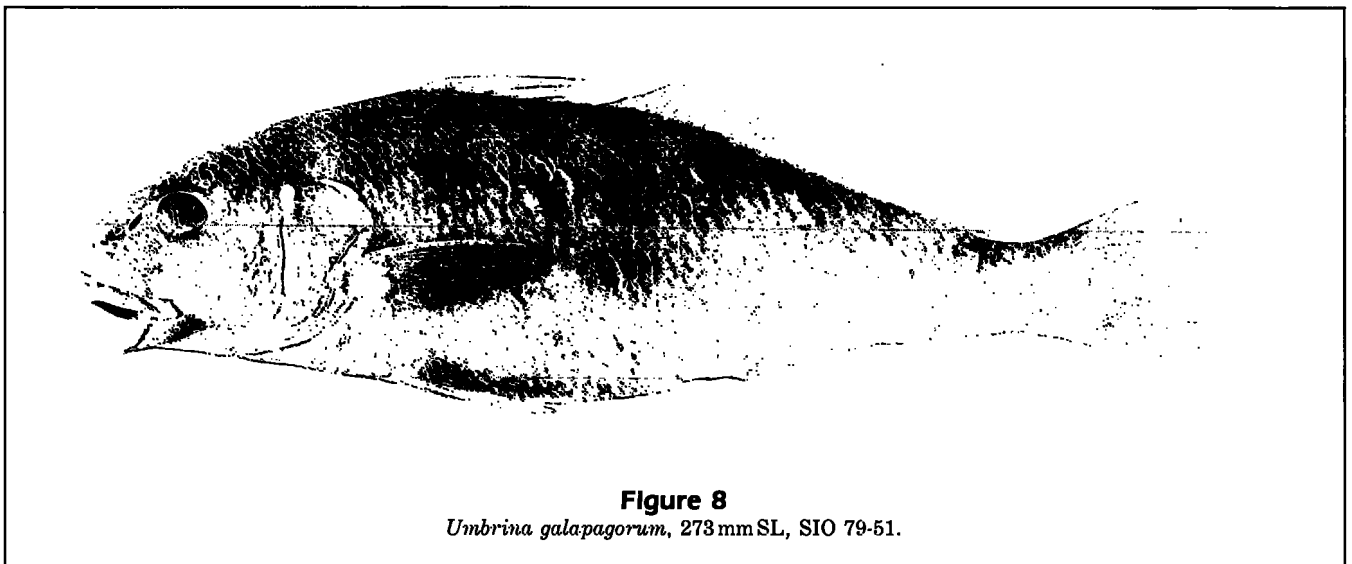
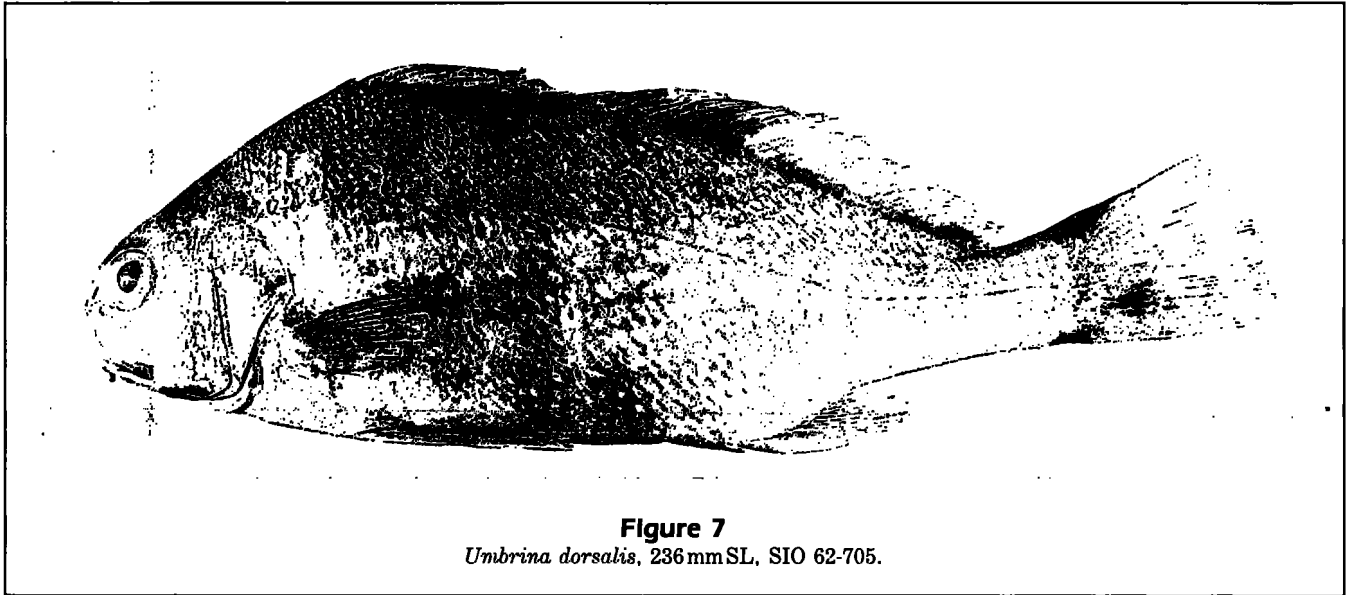


Figure 6
Umbrina reedi, 268 mm SL, SIO 65-657.



***Umbrina dorsalis* Gill**
Figure 7

Synonymy

Umbrina dorsalis Gill 1862:257 (original description: syntypes USNM 3696, Cabo San Lucas, Baja California Sur; lectotype USNM 3696 (77 mm), herein designated; paralectotypes USNM 316654 [removed from USNM 3696]).

Diagnosis An intermediate-sized species of *Umbrina* (max. length 332 mm) characterized by the following: inside gill cover and peritoneum pale to lightly punctate; soft dorsal fin rays usually 30–32; soft anal rays usually 7; pectoral rays usually 16–17; procurent

caudal rays usually 7–8 + 6–7; dorsal spines X + I; gill rakers usually 19–21; vertebrae 10 + 16; barbel relatively long and thick; length of second anal spine, \bar{x} 15% SL; body depth, \bar{x} 38%; eye length, \bar{x} 8%; upper jaw length, \bar{x} 13%; pectoral fin length, \bar{x} 21%.

Description Counts and measurements are given in Tables 1–6. Soft rays of second dorsal fin 28–33; soft anal rays 7–8; pectoral rays 15–17; gill rakers 18–25; eye relatively large, proportionately smaller in larger specimens, generally greater than snout length; upper jaw long; body and caudal peduncle deep; barbel fully developed by 75 mm, bulbous between 30 and 65 mm; lateral line scales 49–54, \bar{x} 51.73, SE 0.15; virtually all brown stripes present by 75 mm, no stripes on speci-

mens <65 mm; 5–8 wide, dark bars (saddles) on specimens 30–65 mm; dorsal and pelvic (posterior) fins dusky to dark; pectoral and caudal fins light to dusky (posterior pectoral fin dark on specimens <45 mm); anal fin dark to dusky.

Distribution South of Bahia Magdalena and in the southern Gulf of California to Ecuador (Fig. 2). Found in tidepools (juveniles) to ~5 m.

Umbrina galapagorum Steindachner

Figure 8

Synonymy

Umbrina galapagorum Steindachner 1878:20–21 (original description: syntypes MCZ 8601, USNM 120437, James I., Galapagos Is.; lectotype MCZ 8601 (94 mm), herein designated; paralectotype USNM 120437).

Diagnosis An intermediate-sized species of *Umbrina* (max. length 413 mm) characterized by the following: inside gill cover lightly punctate or dusky, usually little or no pigment in area of pseudobranch; brown stripes indistinct or absent; peritoneum pale or lightly punctate; soft dorsal fin rays usually 27–29; soft anal rays usually 6–7; pectoral rays usually 17–19; procurrent caudal rays usually 9–10 + 8–9; dorsal spines X + I; gill rakers usually 18–19; vertebrae 10 + 15; barbel relatively elongate, thin; length of second anal spine, \bar{x} 12% SL; body depth, \bar{x} 29%; eye length, \bar{x} 6%; upper jaw length, \bar{x} 10%; pectoral fin length, \bar{x} 18%.

Description Counts and measurements are given in

Tables 1–6. Soft rays of second dorsal fin 26–30; soft anal rays 5–7; pectoral rays 16–20; gill rakers 16–21; snout length greater than eye length; pigment inside operculum occasionally appearing as muted, dark spot; barbel fully developed by 60 mm, bulbous between 30 and ~50 mm; lateral line scales 47–52, \bar{x} 49.73, SE 0.08; faint brown stripes visible at 40–50 mm, occasionally evident to ~100 mm; ~9–10 dark, vertical bars frequently on specimens between ~30 and 95 mm; dorsal and caudal fins usually dusky, caudal occasionally lighter; pectoral, pelvic and anal fins unpigmented to lightly punctate.

Distribution Endemic to the Galapagos Is. (Fig. 4), found near beaches to 18 m.

Umbrina analis Günther

Figure 9

Synonymy

Umbrina analis Günther 1869(1866):426–427 (original description: holotype BMNH 1867.9.23.18, Panama). *Umbrina tumacoensis* Wilson 1916:67 (original description: holotype, presumed lost (pers. commun.: M.E. Anderson, CAS, 2 March 1988; B. Chernoff, FMNH, 22 March 1988), paratypes CAS 62852, FMNH 56840).

Diagnosis A small species of *Umbrina* (max. length 231 mm) characterized by the following (based on nine specimens): peritoneum and inside gill cover pale to lightly punctate; soft dorsal fin rays 24–26; soft anal rays 6; pectoral rays usually 17; procurrent caudal rays 8–9 + 7–8; dorsal spines X + I; gill rakers usually 17–18;

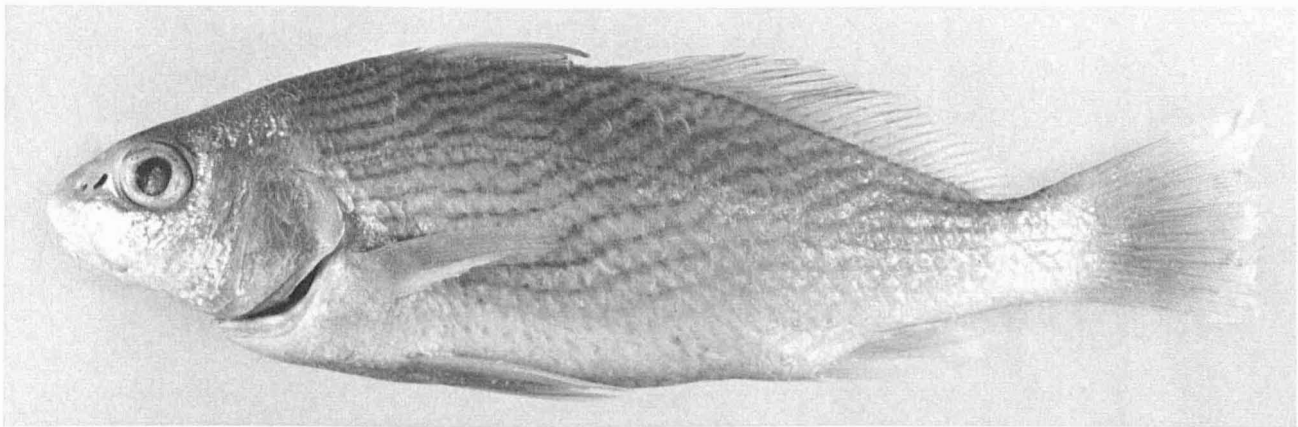


Figure 9

Umbrina analis, 229 mm SL, LACM 33822-32.

vertebrae 10 + 15; barbel relatively short, stout; length of second anal spine, \bar{x} 19% SL; body depth, \bar{x} 32%; eye length, \bar{x} 8%; upper jaw length, \bar{x} 11%; pectoral fin length, \bar{x} 20%.

Description Counts and measurements are given in Tables 1–6. Soft dorsal and anal fin rays as in Diagnosis. Pectoral rays 16–18; gill rakers 16–21; barbel bulbous at 51 mm, more or less fully developed at 82 mm; no brown stripes on a 51 mm specimen, all stripes evident by 82 mm; second anal spine extremely long and thick; caudal peduncle deep; pectoral fins fairly long; lateral line scales 46–50, \bar{x} 47.88, SE 0.44; dorsal and anal fins dusky or dark; caudal fin usually dusky; pectoral and pelvic fins with little or no pigment.

Distribution Known from five collections (one was split), ranging from Costa Rica to Colombia (Fig. 2). No depths recorded.

***Umbrina wintersteeni* n. sp.**

Figure 10

Holotype SIO 60-366, 193 mm; Bahia Almejas, Baja California Sur, F.H. Berry and party, 25 August 1960.

Paratypes 146 specimens (49–298 mm) from 21 collections, all from Mexico: Baja California-west coast: SIO 60-366 (29); SIO 62-126 (10); SIO 64-84 (49); CAS 35536 (4); USNM 316655 (5); AMNH 5514a (1). Gulf of California: UCLA W50-27 (2); UCLA W52-48 (5); UCLA W52-49 (2); UCLA W52-50 (1); UCLA W53-84 (6); UCLA W53-95 (8); UCLA W57-34 (1); UCLA

W57-36 (4); UCLA W57-42 (4); SIO 65-281 (3); SIO 76-275 (2); LACM 38104-26 (4); CAS-SU 375 (1); CAS-SU 2855 (3); CAS-SU 47933 (1); AMNH 5498 (1).

Diagnosis A relatively small species of *Umbrina* (max. size 298 mm) characterized by the following: inside gill cover pale to lightly punctate, little or no pigment in area of pseudobranch; peritoneum pale or lightly punctate; soft dorsal fin rays usually 25–27; soft anal rays usually 6; pectoral rays usually 16–18; procurrent caudal rays usually 7–8 + 6–7; dorsal spines X + I; gill rakers usually 17–20; vertebrae 10 + 15; barbel relatively short, stout; length of second anal spine, \bar{x} 14% SL; body depth, \bar{x} 29%; eye length, \bar{x} 7%; upper jaw length, \bar{x} 10%; pectoral fin length, \bar{x} 17%.

Description Counts and measurements are given in Tables 1–6. Soft rays of second dorsal fin 23–28; soft anal rays 5–6; pectoral rays 15–18; gill rakers 14–23; snout length greater than eye length (adults); barbel bulbous at 49 mm, fully developed by ~100 mm; lateral line scales 48–51, \bar{x} 49.14, SE 0.06; faint, brown stripes at 49 mm, nearly all present by 80–90 mm; ~8–11 dark, vertical bars on many juveniles, never on specimens >100 mm; dorsal, pelvic, and anal fins usually dusky to dark (Gulf of California specimens occasionally with light-to-dusky pelvic and anal fins); caudal fin dusky; pectoral fins lightly pigmented; background coloration tan to gold dorsally, grading to white or silver ventrally; dark-brown stripes: 15–20 oblique dorsolaterally, 8–10 more or less horizontal laterally in abdominal area, 4–5 horizontal on lateral caudal peduncle.

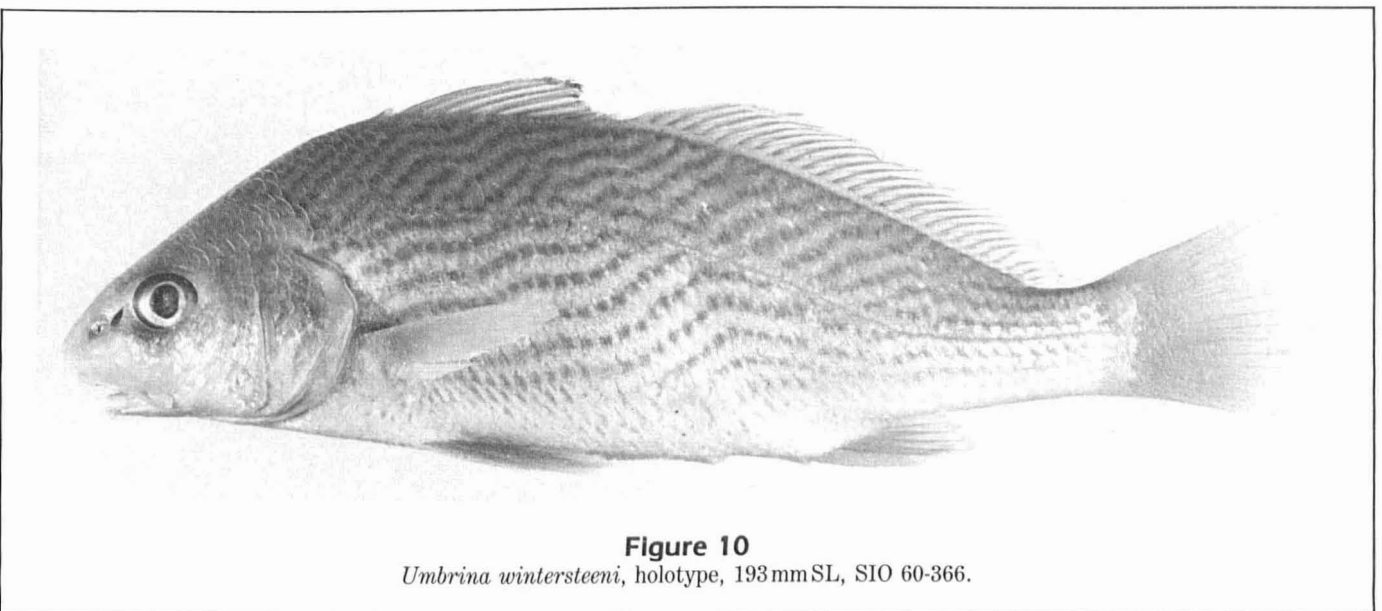


Figure 10

Umbrina wintersteeni, holotype, 193 mm SL, SIO 60-366.

Etymology Named for the late John Wintersteen, longtime researcher in the taxonomy of eastern Pacific sciaenids.

Distribution Just north of Bahia Magdalena (25°23' N, 112°06' W), and the southern Gulf of California from ~27°N to Mazatlan (Fig. 1). Usually collected in bays; thus far, only recorded in depths to ~2m.

Relationships of New World *Umbrina* species

We did not attempt a phylogenetic analysis because we have not seen all *Umbrina* species. In addition, the status and limits of the only recognized sister genus, *Sciaena*, are uncertain. However, morphological similarity allows certain groups of the New World species to be distinguished. *Umbrina bussingi* and *U. milliae* (Atlantic) share several characters: compressed barbel, with anterior, slit-like opening; extremely long pectoral fins; very large eyes; caudal rays longest in middle of fin. They also lack stripes and differ slightly in relative body depth and length of second anal spine; we hypothesize that these are geminate species.

Umbrina analis, *U. broussonnetii* (Atlantic), *U. canosai* (Atlantic), *U. coroides* (Atlantic), *U. dorsalis*, and *U. reedi* share the following characters: relatively deep body; relatively long pectoral fins; dusky to dark anal fin. *Umbrina analis*, *U. canosai*, and *U. reedi* have fairly short, stout barbels and 6, 8, and 9 anal rays, respectively. *Umbrina analis* also has an extremely long, second anal spine. The other three species in this group have relatively slender, elongate barbels and 6 or 7 (*U. dorsalis*) anal rays. *Umbrina dorsalis* also has a relatively large eye and high number of dorsal rays; *U. broussonnetii* and *U. coroides* have low gill raker counts and differ slightly in certain scale and fin counts and pigmentation.

Umbrina galapagorum, *U. roncadorensis*, *U. wintersteeni*, and *U. xanti* share the following characters: relatively elongate body; relatively short pectoral fins; little or no pigment on anal fin (exception: *U. wintersteeni*). Except for *U. wintersteeni*, these species have a somewhat elongate, slender barbel. The inside gill cover of *U. roncadorensis* and *U. xanti* is dark to black and the anal ray counts are 7 and 6, respectively. *Umbrina galapagorum*, which usually lacks stripes (can be faint), and *U. wintersteeni*, which has a short, stout barbel, have 6 anal rays. Although we have no information for some species, juvenile characters (e.g., extreme differences in body depth, pectoral fin pigmentation, dorsolateral pigmentation; Fig. 11) corroborate the latter two major groups (six and four species), with *U. wintersteeni* possibly an intermediate form.

Distribution

As with the species of *Porichthys*, which also are associated with soft bottom (Walker and Rosenblatt 1988), the distributional limits of eastern Pacific species of *Umbrina* generally coincide with zoogeographic boundaries established for rocky shore fishes and other fauna (Springer 1958, Rosenblatt 1967, Briggs 1974, and others). In our area of concern, these boundaries are Point Conception, Bahia Magdalena area, La Paz for the western Gulf of California, and between Guaymas and Mazatlan for the eastern Gulf, Golfo de Tehuantepec area, and northern Peru. *Umbrina roncadorensis* occurs in the northern Gulf of California (north of 27°N) and from Point Conception to the Bahia Magdalena area, which is also the northernmost Baja California (west coast) limit for *U. xanti*, *U. wintersteeni*, and *U. dorsalis*. Both *U. xanti* and *U. dorsalis* are wide-ranging, also occurring from the southern Gulf of California to northern Peru and Ecuador, respectively. *Umbrina wintersteeni* also is found in the southern Gulf as far south as Mazatlan. *Umbrina bussingi* and *U. analis* are each known from five collections. *Umbrina bussingi* occurs nearly throughout the eastern tropical Pacific (southern Gulf of California to Panama), while *U. analis* apparently is confined to the south (Costa Rica to southern Colombia).

Additional materials examined

Umbrina bussingi 140 specimens (56–257 mm) from 4 collections. **Mexico:** SIO 62-51 (130); SIO 70-160 (1); CAS 36615 (4). **Panama:** LACM 9099-28 (5).

Umbrina roncadorensis 367 specimens (23–338 mm) from 88 collections. **California:** SIO H45-130 (17); SIO H45-162 (3); SIO H46-94 (6); SIO H47-160 (2); SIO H48-101 (1); SIO H51-235 (3); SIO H49-90 (5); SIO 86-63 (2); SIO 88-91 (17); CAS 18797 (8); CAS-SU 12666 (1); CAS-SU 19311 (2); CAS-SU 9913 (4); CAS 19515 (1); CAS 19672 (1); CAS 18532 (1); CAS 18527 (1); CAS 18347 (2); CAS 12934 (2); CAS 18272 (2); UCLA W57-208 (8); UMMZ 162170 (1); UMMZ 177364-5 (1); UMMZ 177457 (1); LACM W58-77 (2); LACM W50-126 (2); USNM 132385 (5); USNM 31316 (1); USNM 31317 (1); USNM 31270 (1); USNM 26872 (4); USNM 26758 (4); USNM 5299 (1); USNM 52978 (1); USNM 59496 (3); USNM 54332 (1); USNM 34781 (1); USNM 132394 (1); USNM 124991 (15); USNM 26849 (1). **Mexico, Baja-west coast:** SIO H46-215A (7); SIO H48-56 (1); SIO H48-55 (1); SIO H52-160 (8); SIO 62-729 (2); SIO H48-48 (12); SIO 62-113 (1); SIO H48-88 (1); SIO H52-137 (8); SIO H52-149 (8); SIO H52-135 (9); SIO 60-364 (5); SIO 60-364 (5); SIO 60-367 (1); SIO H48-91 (1); SIO 62-217 (3); UCLA W61-107 (2); UCLA W52-93 (3); UCLA W51-221 (1); UCLA W52-236 (3); LACM W52-248 (7); LACM W52-270 (3); LACM W51-234 (1); CAS-SU 58622 (8); CAS-SU 47932 (4); CAS W52-245 (8); CAS 11713 (2); CAS W52-183 (1); CAS W52-85 (2); CAS W52-93 (2); CAS W52-101 (2); USNM 54514 (1); USNM 132406 (1); USNM 46730 (2). **Mexico, Gulf of California:** UAZ 57 (1); UAZ 156 (71);

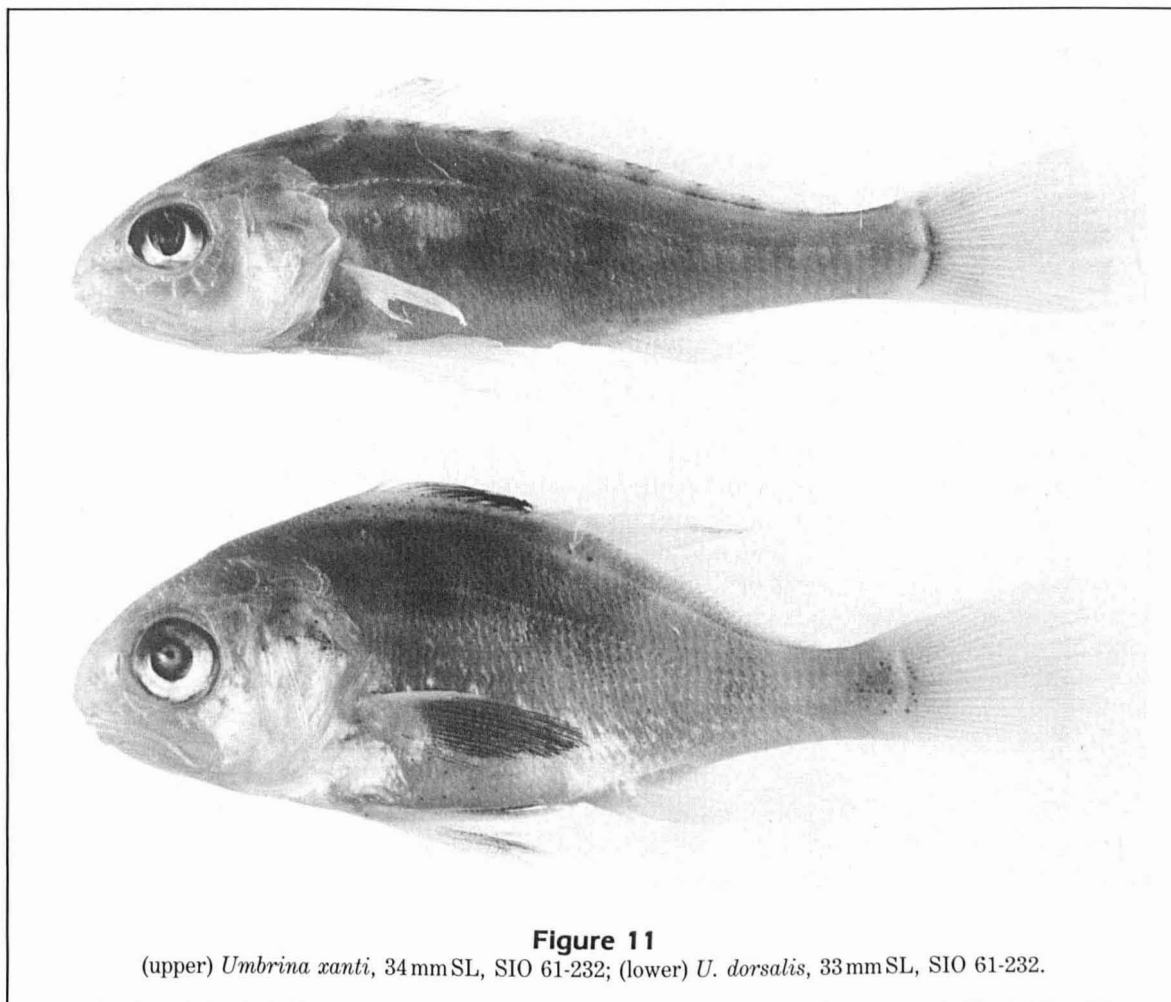


Figure 11

(upper) *Umbrina xanti*, 34 mm SL, SIO 61-232; (lower) *U. dorsalis*, 33 mm SL, SIO 61-232.

SIO 62-217 (3); SIO 63-532 (4); SIO 70-70 (1); CAS-SU 16585 (3); CAS-SU 6327 (1); CAS-SU 187 (1); UCLA W56-76 (3).

Umbrina xanti 397 specimens (20–296 mm) from 63 collections. **Mexico, Baja-west coast:** SIO 62-705 (10); SIO 62-706 (136); SIO 62-707 (2); SIO 62-708 (1). **Mexico, Gulf of California:** UCLA W51-22 (21); UCLA W51-24 (7); UCLA W51-56 (4); UCLA W51-57 (17); UCLA W56-118 (2); UCLA W59-248 (3); LACM W51-41 (1); LACM W51-49 (1); LACM W52-50; LACM W58-46 (1); CAS 2570 (1); CAS 2571 (1); CAS 4489 (1); CAS W51-53 (7); UBC BC 59-216 (1); UBC BC 59-236 (1); USNM 2996 (2); USNM 47443 (4); USNM 47463 (3); USNM 122659 (1); SIO 61-232 (4); SIO 65-349 (1). **Mexico, southern:** MCZ 485 (1); SIO 62-23 (31); SIO 62-28 (2); SIO 62-47 (1); LACM W58-12 (1); UBC BC 57-78 (2); UBC BC 57-85 (1); UBC BC 57-94 (1); UBC BC 57-98 (1); UBC BC 57-108 (1); UBC BC 57-129 (1); UBC BC 60-12 (1); UBC BC 60-13 (1). **Guatemala:** UCR 355-6 (2). **Nicaragua:** UCR 379-13 (1). **Costa Rica, incl. I. Cocos:** UCR 218-39 (1); UCR 259-3 (1); UCR 137-6 (3); LACM 35473-1 (40); SIO 77-89 (38). **Panama:** UCLA W53-283 (3); UCLA W53-285 (3); USNM 82233 (1). **Ecuador:** USNM 88744 (2). **Peru:** CAS-SU 29850 (2); CAS-SU 37491 (3); UCLA W60-34 (1); UBC BC 56-145 (1); UBC BC 56-149 (1); UBC BC 56-159 (1);

UBC BC 56-162 (1); UBC BC 56-165 (1); UBC BC 56-234 (1); USNM 107150 (1); USNM 128009 (8); USNM 128010 (1). **Chile:** Univ. Antofagasta. uncat. (1).

Umbrina reedi 86 specimens (9–650 mm) from 9 collections. SIO 65-623 (1); SIO 65-625 (1); SIO 65-626 (2); SIO 65-655 (2); SIO 65-657 (34); UCLA W66-50 (2); UCLA W66-56 (29); USNM 176411 (7); USNM 88745 (8).

Umbrina dorsalis 93 specimens (28–327 mm) from 25 collections. **Mexico:** SIO 61-232 (12); SIO 61-236 (1); SIO 61-251 (7); SIO 62-23 (3); SIO 62-705 (1); UBC BC 57-100 (1); LACM W55-120 (1); LACM 9044-28 (34); LACM 9045-23 (2); LACM 9051-23 (2); UCLA W51-57 (1); UCLA W53-185 (1); UCLA W59-248 (1). **Costa Rica:** USNM 94000 (1); UCLA W54-168 (2); UCLA W54-172 (1). **Panama:** SIO 90-30 (1); UCLA W53-283 (1); UCLA W53-285 (1); UBC BC 60-117 (1); USNM 144680 (1); USNM 81213 (1); CAS-SU 8113 (2). **Colombia:** UMML Argosy 28, uncat. (1). **Ecuador:** UMML Argosy 44, uncat. (13).

Umbrina galapagorum 253 specimens (29–395 mm) from 27 collections. MCZ 8597, 8602 (38); MCZ 40448 (1); USNM 153626 (1); CAS 2311 (1); CAS 2313-2318 (6); CAS 2373 (1); CAS 2374-2379 (6); CAS 2384 (1); CAS 2385 (1); CAS 4486 (1); CAS 4657 (1); CAS 4952 (1); CAS 6326 (1); CAS 62979

(2); CAS-SU 24402 (2); CAS-SU 24413 (3); LACM W53-21 (5); LACM W53-28 (9); SIO 62-641 (151); SIO 79-51 (3); UBC BC 56-429 (2); UBC BC 56-437 (1); UCLA W50-219 (2); UCLA W53-144 (1); UCLA W55-314 (1); UCLA W56-325 (1).

Umbrina analis 8 specimens (51–229 mm) from 6 collections. **Colombia:** CAS 62852 (2); CAS 62853 (1); FMNH 56840 (2). **Panama:** USNM 81212 (1). **Costa Rica:** LACM 33822-32 (1); USNM 94612 (1).

Umbrina wintersteeni 9 specimens (56–276 mm) from 7 collections. **Mexico:** SIO 60-365 (3); UCLA W51-18 (1); CAS-SU 4827 (1); CAS W53-94 (1); USNM 29430 (1); USNM 46956 (1); USNM 47463 (1).

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Table 1Number of soft dorsal fin rays in eastern Pacific species of *Umbrina*. (Asterisks indicate count of primary type.)

	21	22	23	24	25	26	27	28	29	30	31	32	33	\bar{x}	SE
<i>U. analis</i>				6	1	2*								24.56	0.29
<i>U. bussingi</i>	5	19*	4											21.96	0.11
<i>U. dorsalis</i>								1	3	15	21	8	2*	30.76	0.14
<i>U. galapagorum</i>						9	59*	89	58	24				28.12	0.07
<i>U. reedi</i>	1	1	4	22*	21	1								24.28	0.12
<i>U. roncador</i>				4	11	72	110	105*	46	6	1			27.32	0.06
<i>U. wintersteeni</i>			1	3	25	37*	23	3						25.95	0.10
<i>U. xanti</i>						13	77	168*	114	30	4	1		28.03	0.04

Table 2Number of soft anal fin rays in eastern Pacific species of *Umbrina*. (Asterisks indicate count of primary type.)

	5	6	7	8	9	10	\bar{x}	SE
<i>U. analis</i>		9*					6.00	—
<i>U. bussingi</i>			30*				7.00	—
<i>U. dorsalis</i>			45*	5			7.10	0.04
<i>U. galapagorum</i>	1	164*	73				6.30	0.03
<i>U. reedi</i>				2	46*	2	9.00	0.04
<i>U. roncador</i>		17	339*				6.95	0.01
<i>U. wintersteeni</i>	2	89*					5.98	0.02
<i>U. xanti</i>		402*	6				6.01	0.01

Table 3Number of pectoral fin rays in eastern Pacific species of *Umbrina*. (Asterisks indicate count of primary type.)

	14	15	16	17	18	19	20	\bar{x}	SE
<i>U. analis</i>			2	14*	2			17.00	0.11
<i>U. bussingi</i>				3	30*	19		18.31	0.08
<i>U. dorsalis</i>			1	65*	33			16.32	0.05
<i>U. galapagorum</i>			1	57	323*	78*	4	18.06	0.03
<i>U. reedi</i>				12	69	19*		18.07	0.06
<i>U. roncador</i>	1	11	175*	422	48	1		17.77	0.02
<i>U. wintersteeni</i>	2	16	147*	17				16.98	0.04
<i>U. xanti</i>	1	1	20	532	192*	8		17.24	0.03

Table 4Number of total gill rakers in eastern Pacific species of *Umbrina*.

	14	15	16	17	18	19	20	21	22	23	24	25	\bar{x}	SE
<i>U. analis</i>			1	5	3			1					17.60	0.43
<i>U. bussingi</i>				1	4	6	11	3	2				19.63	0.23
<i>U. dorsalis</i>					8	35	25	17	7	4	1	1	20.01	0.14
<i>U. galapagorum</i>			1	38	248	126	48	4					18.42	0.04
<i>U. reedi</i>					1	14	11	3	1				19.63	0.16
<i>U. roncador</i>		12	26	48	121	160	120	23	1				18.66	0.06
<i>U. wintersteeni</i>	2	5	12	21	46	43	17	5	4	2			18.32	0.13
<i>U. xanti</i>			10	91	475	90	21	1					18.03	0.03

Table 5

Selected morphometrics of eastern Pacific species of *Umbrina*. HL = head length; SN = snout length; INT = interorbital width; SUB = suborbital width; UJ = upper jaw length; PED = caudal peduncle depth; PEL = caudal peduncle length; PA = preanal length; PF = pectoral fin length; PRD = predorsal fin length; DEP = greatest depth; ASP = second anal spine length.

SL (mm)	Range (10^{-3} SL)													
	HL	EYE	SN	INT	SUB	UJ	PED	PEL	PA	PF	PRD	DEP	ASP	
<i>U. analis</i>	52-231	292-332	67-96	76-103	61-87	50-63	91-120	100-117	220-263	670-721	183-204	362-386	302-342	170-214
<i>U. bussingi</i>	59-229	338-401	87-108	62-92	70-94	41-57	111-135	76-99	233-265	663-742	239-287	332-417	298-344	154-186
<i>U. dorsalis</i>	49-327	282-364	57-116	81-103	80-125	37-59	115-173	92-117	235-278	607-652	185-265	344-369	315-378	117-181
<i>U. galapagorum</i>	30-394	269-354	43-90	86-110	69-96	44-68	87-132	83-103	240-292	610-676	168-190	341-376	249-322	92-172
<i>U. reedi</i>	85-650	310-360	40-88	83-113	74-101	41-62	110-147	98-122	209-263	634-685	216-247	378-409	306-396	82-159
<i>U. roncadore</i>	22-339	267-342	38-88	71-99	68-102	31-49	93-152	77-116	219-282	641-685	155-195	333-361	247-329	91-146
<i>U. wintersteeni</i>	30-271	279-344	57-97	83-105	66-100	51-60	92-134	88-112	218-255	648-686	161-199	334-365	261-315	112-168
<i>U. xanti</i>	20-287	267-316	49-105	69-107	66-99	31-36	85-152	80-113	239-316	605-642	150-172	328-358	235-330	97-157

Table 6

Number of procurrent caudal fin rays in eastern Pacific species of *Umbrina*.

	Dorsal							Ventral						
	6	7	8	9	10	\bar{x}	SE	6	7	8	9	10	\bar{x}	SE
<i>U. analis</i>			4	2		8.33	0.21		2	4			7.66	0.21
<i>U. bussingi</i>		6	12			7.67	0.11		12	5	1		7.39	0.14
<i>U. dorsalis</i>	1	17	16	4		7.61	0.12	10	22	1			6.73	0.09
<i>U. galapagorum</i>			2	40	12	9.19	0.03		4	33	13		8.18	0.08
<i>U. reedi</i>			1	19	9	9.28	0.05			15	10	2	8.52	0.12
<i>U. roncadore</i>			5	29	15	9.20	0.05		1	27	13		8.29	0.08
<i>U. wintersteeni</i>		12	30	2		7.77	0.08	7	27	4			6.92	0.05
<i>U. xanti</i>			16	33	5	8.79	0.08		8	30	12		8.08	0.08