

Two new species of *Stellifer* from inshore waters of the eastern Pacific, with a redescription of *S. ephelis* (Perciformes: Sciaenidae)

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Abstract: Two new species of *Stellifer* from the eastern Pacific coast are described. *Stellifer walkeri* n. sp. and *S. wintersteenorum* n. sp. are both found in coastal waters off southern Mexico. They are distinguished from other species of *Stellifer* by having two sharp spines at the lower margin of the preopercle and four sensory pores at the tip of the lower jaw. *Stellifer wintersteenorum* can be distinguished from *S. walkeri* by having jet black pigment on the roof of the mouth and pharyngeal cavity. *Stellifer wintersteenorum* can be further distinguished from *S. furthii* (Steindachner), which also has a black mouth lining, by having a pair of short diverticula on the anterior chamber of the gas bladder compared with those of *S. furthii*, which are extended posteriorly as long, narrow tubes. *Stellifer walkeri* is further distinguished from *S. pizarroensis* Hildebrand by having fewer gill rakers (36-38 vs. 51-55) and soft anal-fin rays (9 vs. 10-11), and from *S. zestocarus* Gilbert by having two, instead of one preopercular spines, more gill rakers (36-38 vs. 29-32) and a smaller eye (4.5-4.8 vs. 3.6-4.2 in head length). *Stellifer ephelis* Chirichigno, which was incompletely described when named, is redescribed based on materials from throughout the species' range. A key to the eastern Pacific species of *Stellifer* is also included.

Key words: New species, description, taxonomy, *Stellifer*

The Sciaenidae, a monophyletic family with cosmopolitan distribution throughout the continental shelf waters of tropical to warm temperate regions (Chao 1978, 1986, Sasaki 1989), can be distinguished from all other Perciformes by a long dorsal fin with a deep notch dividing a short spinous portion anteriorly from an elongate soft portion, and by one or two spines in the anal fin (usually three or more in other Percoidei). Sciaenids are also characterized by a well-developed acoustico-lateralis system; a series of enlarged, pored lateral-line scales extending to the caudal fin tip; a well-developed gas

bladder often with elaborated appendages (main gas chamber anchored to the ventral side of a few anterior vertebrae, which are often modified with expanded lateral processes); and one or two pairs of enlarged otoliths. The sagitta of sciaenids typically has a "tadpole-shaped" sulcus on its inner surface, the anterior head portion (ostium) is a shallow oval impression and the tail portion (cauda) is often J-shaped and deeply grooved (Chao 1978, 1995). Detailed diagnosis of synapomorphies and a phylogeny of Sciaenidae is given by Sasaki (1989).

The subfamily Stelliferinae (Sasaki, 1989), or the *Stellifer*-group (Chao, 1978), is endemic to the New World, and includes species of *Bairdiella*, *Corvula*, *Elattarchus*, *Odontoscion*, *Ophioscion* and *Stellifer*. These species are unique in having a two chambered gas-bladder, the anterior one yoke-shaped and the posterior main chamber carrot-shaped, and two large pairs of otoliths (sagitta and lapillus). Sasaki (1989) listed nine synapomorphies for the subfamily. *Stellifer* can be distinguished from other Stelliferinae by the presence of a pair of variably developed diverticula on the posterior margin of the anterior gas chamber (Chao, 1978) and by a medially concave ventral margin of the palatine (Sasaki, 1989).

This paper includes descriptions of two new species of *Stellifer* from inshore waters of the eastern Pacific and a redescription of *S. ephelis* Chirichigno 1974. A field identification key to the species of eastern Pacific *Stellifer*, modified from Chao (1995), is included to facilitate identification of these species, which share rather similar morphology and are very common in the by-catches of coastal bottom trawl fisheries.

MATERIALS AND METHODS

Specimens were deposited and examined from a number of collections during the course of this study. Museum collection acronyms follow Leviton *et al.* (1985). Methods of counting and measuring follow Hubbs and Lagler (1964), terms of morphological structure and descriptions are the same ones used by Chao (1978, 1995). Gill raker counts are the total number on the first gill arch and include rudimentary rakers. Lateral line scale count is the number of scales perforated by lateral line pores exclusive of those distal to the structural base of the caudal fin (hypural plates).

To examine the often-small appendages on the anterior chamber of the gas bladder, an extensive incision is cut through the isthmus of the cleithrum. Gas bladders are illustrated

with the position of the vent and anal fin origin indicated. Drumming muscles, when present in the females, are also illustrated.

Stellifer walkeri new species

Figure 1

Stellifer sp. 3. Chao 1995:1442 (in species key).

Holotype: USNM 208556, female, 127 mm SL, Bahía Matenchén in vicinity of San Blas, Nayarit, Mexico. Collected by B.W. Walker and W.J. Baldwin, 3 February 1958. Type series was taken in a 16 ft shrimp trawl net in murky water over a mud and sand bottom at depths from 2.7 to 13.5 m between 0.2 and 2.4 km off a sandy beach, ca. 21°30'N, 105°30'W.

Paratypes: CAS 16051, 3(93-102). SIO 23-52, 2(95-101). LACM 58-40, 7(93-102). UCLA 58-38, 2(102-117). USNM 208557, 7(95-104). Collected 3-6 February 1958 on same locality as holotype. SIO 62-37, 1(136), ca. 20°42'N, 105°19.5'W, Bahía de Banderas in vicinity of San Blas, Nayarit, Mexico. MCZ 156816, 1(107), 16°22'30"N, 98°39'30"W. Pacific southern Mexico, bottom trawl, 13 m depth, April 15, 1952. NMC 68-1380, 1(148), Acapulco, Mexico. UNAM 8900, 2(75-110), coast of Mazatlan, Mexico, collected by A. Yáñez-Arancibia, Dec. 8, 1975.

Diagnosis: A deep-bodied species of *Stellifer*, distinguished from its congeners by having two preopercular spines, four pores on underside of lower jaw, 36-38 total gill rakers, a pale mouth lining, and pelvic fins without filamentous elongation. *Stellifer walkeri* resembles *S. pizarroensis* Hildebrand 1946 and *S. zestocarus* Gilbert 1898. It differs from *S. pizarroensis* in having one less anal-fin ray and fewer gill rakers, and from *S. zestocarus* in having two instead of one preopercular spine, more gill rakers and a smaller eye. Diagnostic characters of these three species are presented in Table 1.

Etymology: Named in honor of Dr. Boyd W. Walker (formerly at UCLA) for his contribution to our knowledge on the ichthyology of eastern Pacific shorefishes.

Description: Dorsal-fin rays X + II or III, 21-24; anal-fin rays II, 9; pectoral-fin rays 17-20; gill rakers 14-15 + 22-23 = 36-38; preopercle with two strong spines at angle; lateral-line pored scales 48-50.

Head deep, almost equilaterally triangular with a broad, arched interorbital region.

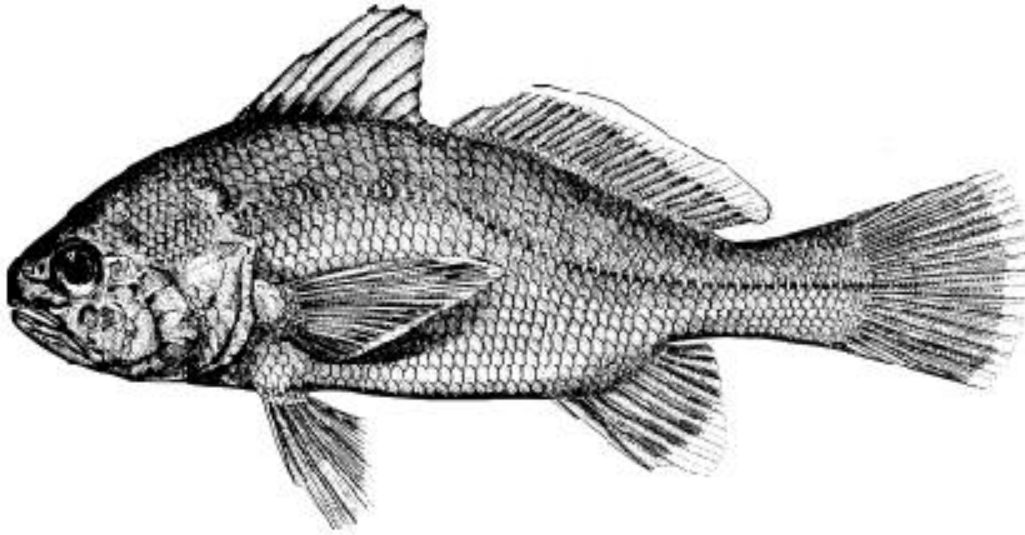


Fig. 1 *Stellifer walkeri* new species (paratype: USNM 208557, 104mm SL)

Top of cranium cavernous with strongly developed frontal arches and ridges, not spongy to touch. Snout short, 4.1-4.5 in head length, and even with or barely projecting beyond upper lip; snout tip with three upper and five marginal pores, rostral fold smooth. Eye moderate, diameter 4.5-4.8 in head length, orbit somewhat ovoid.

Mouth large, subterminal, upper jaw 2.1-2.3 in head length, lower jaw included; gape forms angle of about 45°. Tip of upper lip on a horizontal line passing between ventral margins of pupil and orbit. Posterior margin of maxilla extending to or slightly in advance of vertical line through posterior margin of orbit, more anterior in specimens less than 127 mm SL. Underside of lower jaw with four pores and weakly developed symphyseal knob at tip.

Upper jaw with outer row of closely set, distinctly enlarged, conical teeth, largest not longer than one-fifth pupil diameter; outer row bordered medially by very narrow band of small, conical teeth. Lower jaw with outer

row of very small, villiform teeth and inner row of widely spaced, enlarged conical teeth similar in size to those in upper jaw.

Preopercular margin finely spinous, two distinctly longer and stronger spines at angle, lower one longer and stronger, projecting beyond preopercular membrane and directed backward at a 45° angle. Upper spine barely extending beyond preopercular border, directed posteriorly and slightly above horizontal.

Gill rakers long and slender; longest much longer than gill filament at angle of first gill arc, its length about 1.0-1.2 in eye diameter.

Dorsal fin long with short spinous portion anteriorly separated from a long soft-rayed portion by a deep notch. Anal fin truncate, second spine rather long and strong, 1.6-2.0 in head length. Caudal fin rhomboidal to slightly rounded, length slightly more than three quarters of head length. Pectoral fin tip vertically extending to or slightly posterior to vertical through vent. Tip of pelvic fin with-

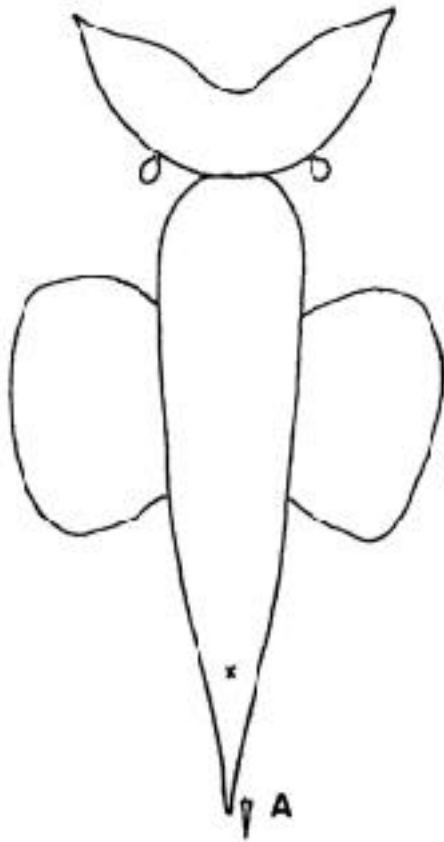


Fig. 2. Gas bladder of *Stellifer walkeri* (paratype: USNM 208557, 104mm SL, female) with two chambers, anterior one with pair of knob-like diverticula and posterior chamber with pair of laterally attached drumming muscle patches. A. Anal-fin origin. x. position of vent.

out filamentous elongation, reaching to anus or to point within one-half eye diameter of anus.

Trunk scales large, thin, and strongly ctenoid, except for one or two irregular rows of cycloid scales beneath opercular flap. Head scales cycloid, scales on snout embedded and reduced in size. Median fins with one to two rows of reduced cycloid scales forming basal sheaths. All fins heavily and uniformly invested with small, elongate, cycloid scales. Pored lateral-line scales ctenoid, with an aborescent canal and smaller intercalated ctenoid scales. Scales in adjacent rows about same size as lateral-line scales.

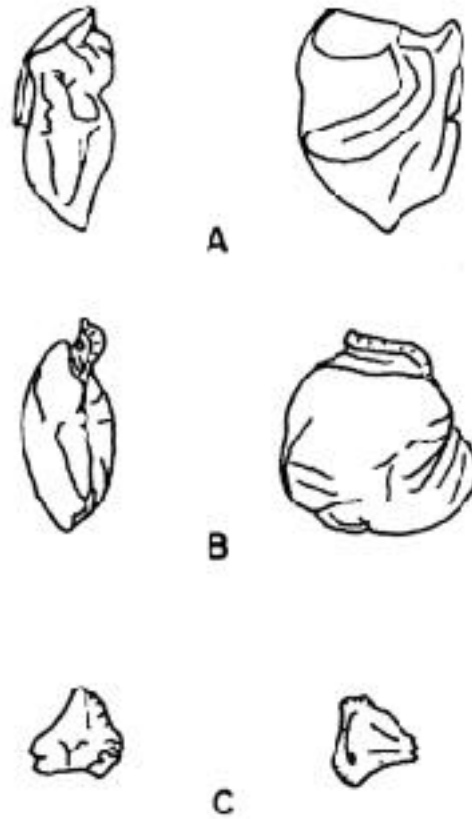


Fig. 3. Otoliths of *Stellifer walkeri* (paratype: USNM 208557, 104mm SL, female) inner surfaces on right, lateral view on left for Sagitta (A.) and Lapillus (B.), and outer surface for Asteriscus (C.)

Gas bladder with two chambers; anterior chamber with pair of short, pear-shaped diverticula on posterior margin (Fig. 2). Posterior gas chamber simple, carrot-shaped, its tip terminating just anterior to anal-fin insertion. A pair of patch-like drumming muscles present on dorsal and lateral coelomic walls in both sexes.

Sagitta (Fig. 3A) rather broad with anterior-dorsal notch; sulcus with oval-shaped ostium, J-shaped, deeply grooved cauda and distinct marginal groove; outer surface with irregular crest-like elevations. Lapillus (Fig. 3B) slightly smaller than sagitta, ovoid, its anterior margin with thin flange; inner surface smoothly elevated, outer surface slightly

TABLE 1.

Comparative characters of Stellifer walkeri with similar species

| Character | <i>S. walkeri</i> | <i>S. pizarroensis</i> | <i>S. zestocarus</i> |
|----------------------|-------------------|------------------------|----------------------|
| Anal-fin rays | 9 | 10 (9 rare) | 10-11(9 rare) |
| Gill rakers | 36-38 | 51-55 | 29-32 |
| Preopercular spines | 2 | 2 | 1 |
| Eye diameter in head | 4.5-4.8 | 4.3-4.9 | 3.6-4.2 |

concave and irregularly grooved. Asteriscus (Fig. 3C) triangular with lancelet groove near ventral margin of inner surface.

Color in Alcohol: Body nearly uniform yellowish-silver. Nape and dorsum finely stippled with small chromatophores producing a brownish tinge. Sides peppered with larger chromatophores to about level of lower part of pectoral-fin base. Top of head and snout dusted with small, dark chromatophores, a few scattered ventrally and in suborbital region. Dark streak or blotch at opercular hinge. Ventral half of orbit with dark rim. Dorsal aspect of anterior third of upper lip with dark band, a few chromatophores scattered posteriorly. Tip of lower lip and underside of chin with a sprinkling of chromatophores. Tongue and inside of mouth pale except for dark band on lower jaw just behind tooth rows and an occasional sprinkling of chromatophores on vomer. Inside of opercula lightly dusted with tiny chromatophores anterior to pseudobranchiae, larger chromatophore scattered on inner surface of opercula and also on outer surface of cleithrum. Spinous dorsal fin heavily dusted with small chromatophores, more concentrated distally, apex of fin dark. Soft dorsal fin similarly pigmented but less densely patterned than spinous portion. Anal fin pale and more evenly speckled antero-basally. Caudal fin evenly stippled, appearing dusky. Upper half of axial and inner surface of pectoral fins heavily speckled with large, dark chromatophores from base to tip except for lowermost rays. Pelvic fins variably dusted at tips and along leading half of fin. Peritoneum silvery.

Distribution: Known from the vicinity of San Blas, Nayarit to Acapulco, Guerrero, Mexico.

***Stellifer wintersteenorum* new species**
Figure 4

Stellifer sp.1. Chao, 1995:1442 (in key).

Holotype: USNM 208559, male, 127.3 mm, Bahia Matenchen in vicinity of San Blas, Nayarit, Mexico. 16-foot balloon trawl. Bottom depth to 13.7 m. Collected by B. W. Walker and W. J. Baldwin, 3 February 1958.

Paratypes: ANSP 122063, 40(68-122); BMNH 1973. 6.1.20, 20(71-127); CAS 16052, 80(40-153); FMNH 71706, 40(63-145); LACM 58-31, 87(61-162); LACM 58-33, 27(44-156); UCLA 58-34, 35(78-144); LACM 58-39, 43(121-150); LACM 58-40, 8(96-137); SIO 73-51, 40(65-135); UCLA 58-31, 22(65-157); UCLA 58-35, 11(58-104); UNAM 8901, 10 (86-122); USNM 208560, 60(74-146); same locality as holotype, collected during the period 3-6 February 1958. LACM 50-43, 1(109), mouth of the Rio Mayo, 80 miles south of Guaymas, Sonora. LACM 6545-1, 1(106), Bajos la Tonina, Sonora. LACM 56-123, 2(67), vicinity of Isla Altamura, Sinaloa. LACM 56-148, 1(90), vicinity of Isla Macapule, Sinaloa. SIO 64-375, 1(126), 23°55'N, 107°03'W, near Mazatlan. SIO 65-104, 1(82), mouth of Bahia Altata, Sinaloa. NMC 68-111, 12(69-151), San Blas, Nayarit. SIO 60-87, 4(104-144), off mouth of the Rio San Pedro. SIO 62-71, 1(166), ca. 22°03' N., 105°42'W. SIO 62-72, 2(115-124), 22°05'N., 105°42.5'W.

Diagnosis: A *Stellifer* with two preopercular spines, black pigment on roof of mouth behind vomer, and a pair of short, pear shaped, diverticula on anterior gas chamber (Fig. 5). This combination of characters differentiates this species from all *Stellifer* except its Panamanian counterpart *S. furthii* (Steindachner 1875), which it closely resembles in general appearance and morphometrics (Table 2). It is distinguished from *S.*

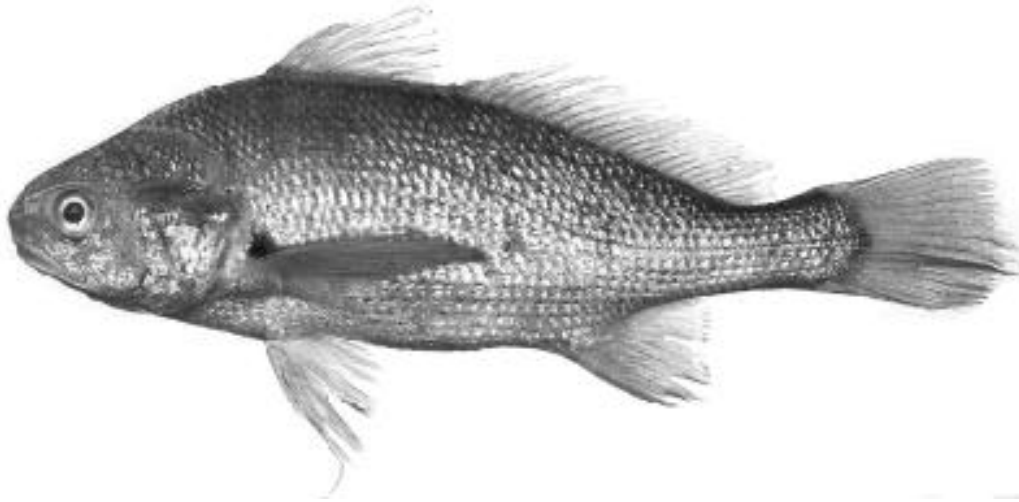


Fig. 4. *Stellifer wintersteenorum* new species (holotype: USNM 208559, 127mm SL).

furthii by its short pear-shaped diverticula on the anterior gas chamber (Fig. 4), which are not extended posteriorly in long, narrow tubes.

Etymology: Named in honor of my late co-worker, John Wintersteen and his mother, Bernice McI. Wintersteen.

Description: Dorsal-fin rays X (rarely IX) + II or III, 21-25; anal-fin rays II, 9 (rarely 8 or 10); pectoral-fin rays 18-19; gill rakers 14-16 + 21-25 = 36-41; preopercular spines 2; lateral-line scales 47-50.

Head low and broad with nearly flat interorbital region, cavernous but rather firm, with strongly developed frontal bone arches and ridges. Snout shorter than eye diameter, barely projecting beyond upper lip, its tip with three upper and five marginal pores. Rostral fold smooth. Eye small, 5.2-6.0 in head length, orbit slightly ovoid.

Mouth moderately small, subterminal, upper jaw 2.7-2.9 in head length, lower jaw included within gape, forming angle of about

20°. Tip of upper lip on horizontal line passing through or slightly below ventral margin of orbit. Posterior margin of maxilla extending slightly short of vertical line through posterior margin of orbit. Underside of lower jaw with four pores, median pair closely set without symphyseal knob.

Upper jaw with outer row of distinctly enlarged, nearly contiguous, conical teeth; enlarged teeth longer than one fourth pupil diameter, bordered medially by band of fine villiform teeth. Lower jaw with broad band of villiform teeth, none noticeably enlarged.

Preopercular margin smooth with two strong spines at angle; lower spine slightly longer and stronger, its shape and direction varying from straight and angled down about 30° to curved and pointing vertically downward. Upper spine straight and directed backward horizontally. Both spines projecting slightly outward and extending beyond membranous preopercular margin.

Gill rakers long and slender; longest

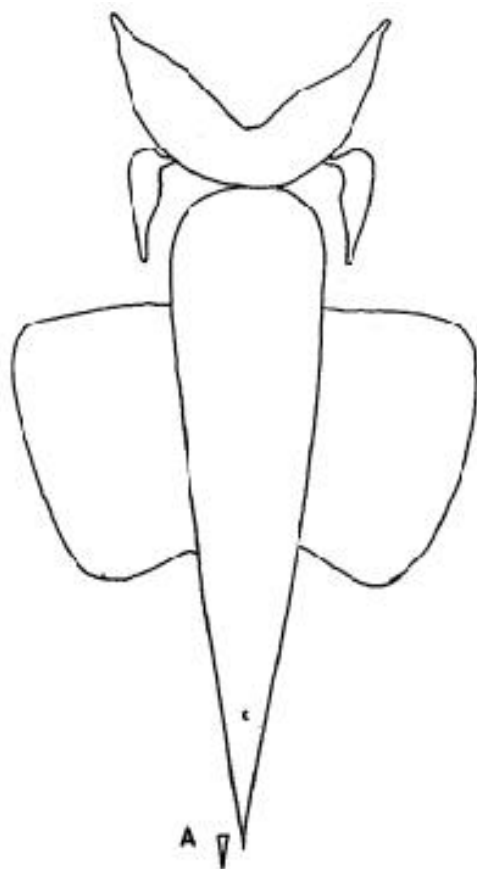


Fig. 5. Gas bladder of *Stellifer wintersteenorum* (NMC68-111, 138 mm SL, female) with two chambers, anterior one with pair of pear-shaped diverticula and posterior chamber with pair of laterally attached drumming muscle patches. A. anal fin origin. x. position of vent.

raker about equal to length of gill filaments at angle of first gill arch and to about three-fourth of eye diameter.

Dorsal fin long with deep notch between short spinous portion and long soft-rayed portion. Anal fin truncate; second spine long and slender, 1.6-2.0 in head length. Caudal fin gently rounded, length about three fourth or more of head length. Vertical from tip of pectoral fin passing midway between vent and anal fin insertion. Tip of pelvic fin,

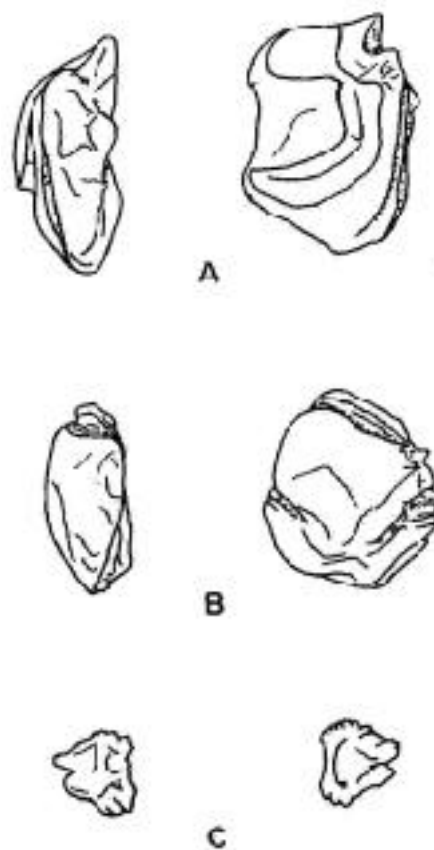


Fig. 6. Otoliths of *Stellifer wintersteenorum* (NMC 68-111, 120 mm SL, female) inner surfaces on right, lateral view on left for Sagitta (A.) and Lapillus (B.), and outer surface for Asteriscus (C.)

exclusive of filamentous elongation, reaching to within an eye diameter of vent.

Scales below lateral line strongly ctenoid except for one or two rows of cycloid scales beneath opercular flap, in region between pectoral- and pelvic-fin bases. Ctenii on scales above lateral line progressively reduced antero-dorsally, disappearing in advance of middle of spinous dorsal base. Nape and head scales cycloid, scales becoming reduced and embedded in snout region.

TABLE 2
Comparative characters between *Stellifer walkeri* and *Stellifer furthii*

| Character | <i>S. wintersteenorum</i> | <i>S. furthii</i> |
|---|---------------------------|-------------------|
| Dorsal spines (mode) | XIII | XII |
| Head length in SL | 3.1-3.3 | 3.3-3.6 |
| Snout in head length | 4.0-4.1 | 3.7-4.0 |
| Eye in head length | 5.7-6.0 | 4.7-5.4 |
| Number of scale rows between lateral line and first dorsal spine | 7 or 8 | 5 or 6 |
| Peritoneal chromatophores | Absent | Present |
| Pectoral axillary blotch | Dark | Faint |
| Drumming muscles | Males & Females | Males only |
| Diverticula on anterior gas chamber | Knob-like | Long-tube |

Underside of lower jaw with a row of large, deeply embedded, cycloid scales along each ramus. Spinous dorsal fin with two rows of reduced cycloid scales at its base, but no distinctive basal sheath. Interspinous membrane mostly naked except for rows of minute, elongated scales along posterior border of each spine and an additional row of somewhat larger scales on interspinous membrane in proximal portion anteriorly. Soft dorsal, anal, caudal, and paired fins uniformly invested with minute cycloid scales. Pored lateral-line scales strongly ctenoid posteriorly, becoming cycloid anteriorly, smaller than scales in adjacent rows and with small intercalated scales. Canal system on lateral-line scales arborescent.

Gas bladder with two chambers; anterior one with pair of elongated pear-shaped diverticula on posterior margin (Fig. 5); posterior main chamber carrot shaped, its tip reaching to base of first proximal pterygophore of first anal-fin spine. Drumming muscles patch-like, present on dorsal and lateral walls of coelomic cavity in both sexes.

Sagitta thick with notch at antero-dorsal corner (Fig. 6A); sulcus with ovoid ostium, a large, deeply grooved, J-shaped cauda, and a distinct groove along dorsal margin; outer surface with crest-like elevations. Lapillus (Fig. 3B) smaller than sagitta, ovoid with thin anterior flange, inner surface smoothly elevated, outer surface slightly convex and irregularly grooved. Asteriscus (Fig. 6C)

thin, triangular, with lanceolate groove near ventral margin of inner surface.

Color in Alcohol: Body brassy silver becoming brownish dorsally due to dense stippling of tiny chromatophores. Operculum above level of angle sprinkled with larger, sometimes stellate chromatophores. Some concentrations of chromatophores on snout and around orbit. Upper lip variably dotted with chromatophores; lower lip pale. Roof of mouth black posterior to vomer; tongue and floor of mouth pale. Inside of opercula black anterior to pseudobranchiae, variably dusky or punctate elsewhere. Dorsal fins lightly to moderately stippled, chromatophores concentrated distally, and fin borders dusky. Caudal fin evenly dusted with small chromatophores. Anal and upper half of pectoral fins sprinkled with chromatophores. Conspicuous dark blotch at dorsal and medial surface of pectoral axial. Pelvic fin variably sprinkled with chromatophores, occasionally concentrated at tips of rays. Peritoneum silvery.

Distribution: Known from eastern shore of the Gulf of California from 120 Km south of Guaymas, Sonora to Bahia Matenchén, in the vicinity of San Blas, Nayarit, Mexico.

Remarks: *Stellifer wintersteenorum* appears to be fairly abundant over mud and sand bottoms at depths between 3 and 20 meters. Some ripe females were caught in

TABLE 3
Allometric growth of *Stellifer wintersteenorum*

| | 45 to 90 mm SL | 120 to 167 mm SL |
|--------------------------------------|-----------------|------------------|
| Eye diameter in head length | 4.1-5.1 | 5.2-6.0 |
| Upper jaw in head length | 2.1-2.6 | 2.7-2.9 |
| Caudal fin length in SL | 2.9-3.6 | 3.9-4.3 |
| Longest gill raker vs. gill filament | Equal to longer | Equal to shorter |

July (NMC 68-111).

Specimens between 45 and 89 mm differ slightly from larger specimens in morphometry and general appearance. However, the two preopercular spines and pear-shaped gas bladder diverticula are apparent even in a 45 mm SL specimen. The chromatophore pattern in juveniles is essentially the same as in adults although the stippling is less dense. The axillary blotch, for example, is represented by a grouping of large chromatophores and is still a conspicuous characteristic.

Growth is allometric and small specimens have proportionally larger eyes and longer upper jaws. The caudal fin, in addition to being proportionally longer, is lanceolate in juveniles and rhomboidal to rounded in adults. By dividing the specimens into size groups, the proportional differences in these features become apparent (Table 3).

Stellifer ephelis Chirichigno 1974

Figure 7

Stellifer ?ephelis Wintersteen? Chirichigno F. 1969:63, *nomen nudum* (name only) common names: mojarilla, roncadador).

Stellifer ephelis W. Chirichigno F., 1974:252, Fig. 470 (listed as "*S. ephelis* W." in key and figure). Bussing & Lopéz 1994:124 (valid name). Eschmeyer 1998:534 (regarded Chirichigno as author)

Stellifer sp. 2. Chao 1995:1443 (included in key)

Remarks: Chirichigno (1969) first use the name "*Stellifer ?ephelis* Wintersteen?" (indicating a manuscript name by John Wintersteen) in a checklist, without providing a description or figure of the fish. In doing so she created a *nomen nudum*. Chirichigno (1974) included "*S. ephelis* W." (again indicating a manuscript name of Wintersteen) in

her key to Peruvian shore fishes with a figure. The characters described in the key and the illustration are considered sufficient to establish the validity of the name (Bussing & Lopéz 1994, and Eschmeyer 1998:534). I agree that Chirichigno (1974) has effectively, although inadvertently, become the author of the species and the holotype is the specimen that the illustration (Fig. 470 by M. Mendez G. of IMARPE) based on.

Diagnosis: A small-eyed *Stellifer*, eye diameter about 6 times in head length (usually less than 6 in others). *S. ephelis* is further distinguished from all congeners but *S. ericymba* (Jordan & Gilbert 1881) by having four to nine preopercular spines and four pores on the underside of the lower jaw. It is differentiated from *S. ericymba* by characters shown in Table 4.

Etymology: From the Greek *ephelis*, freckle, in reference to the chromatophore pattern on the sides of the body.

Description: Dorsal-fin rays X or XI + II or III, 21-25; anal-fin rays II, 8; pectoral-fin rays 17-20; gill rakers 10-13 + 18-21 = 28-34; preopercular spines 4-9; lateral-line scales 41-46.

Head short and deep with a gently arched interorbital region, extremely cavernous and spongy. Snout short, 4.1-4.6 in head, and not projecting beyond upper lip, tip of snout with five marginal pores and three upper pores (pores often inconspicuous). Eye smaller than in most species of *Stellifer*, 5.8-6.1 in head length.

Mouth large, terminal, lower jaw slightly projecting in front of upper with gape forming 45° angle. Tip of upper lip usually on horizontal line passing through or above

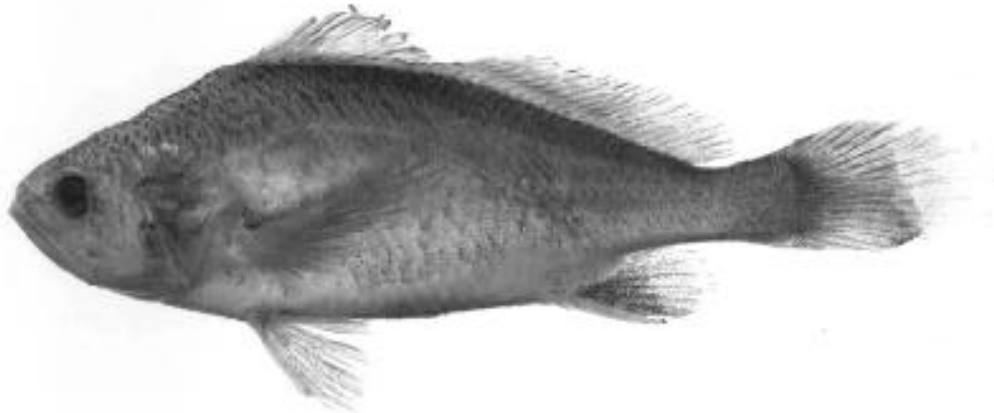


Fig. 7. *Stellifer ephelis* Chirichigno (USNM 208544, 94.5 mm SL)

ventral margin of pupil. Posterior margin of maxilla extending to or just behind vertical through posterior margin of orbit. Underside of lower jaw with four pores and distinct symphyseal knob at tip.

Upper jaw with outer row of slightly enlarged, conical teeth, largest not longer than one-quarter the pupil diameter, and with inner, narrow band of villiform teeth. Lower jaw with narrow, outer band of villiform teeth bordered medially by single row of irregularly spaced, scarcely enlarged, conical teeth.

Preopercular margin with 5-7 distinct spines, lowermost longest and strongest, those above progressively shorter and weaker, with uppermost often reduced to thin, flat, flexible points. Lowermost spine usually pointed downward at angle of 45° , second slightly below horizontal, and third above horizontal.

Gill rakers long and slender; longest raker longer than filaments at angle of first gill arch and greater than eye diameter.

Dorsal fin long, with a deep notch in between spinous and soft portions. Anal fin slightly rounded; second spine strong and very long, 1.3- 1.8 in head. Caudal fin lanceolate, nearly equal to head length. Vertical from tip of pectoral passing midway between vent and anal fin insertion. Pelvics reaching to or beyond vent, and without filamentous elongation.

Scales large, thin, and strongly ctenoid on trunk except for one or two irregular rows of cycloid scales beneath opercular flap. Head squamation ctenoid but cycloid on snout and inter- and sub-orbital regions. Dorsal and anal fins with well developed basal sheath of reduced cycloid scales. All fin membranes covered with small, elongated, cycloid scales. Pored lateral-line scales strongly ctenoid, their margins notably indented in middle of posterior field, smaller than those of adjacent rows and without intercalated scales. Canal system on scales arborescent.

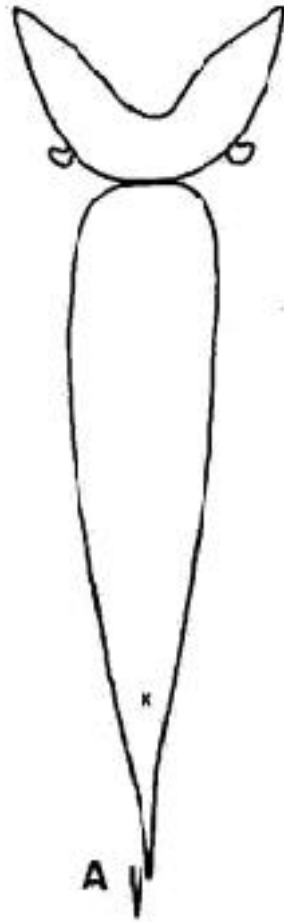


Fig. 8. Gas bladder of *Stellifer ephelis* (uncatalogued, 97 mm SL, female) with two chambers, anterior one with a pair of knob-like diverticula and posterior chamber in simple carrot shape; drumming muscles absent in female. A. anal fin origin. x. position of vent.

Gas bladder with two chambers, anterior one yoke-shaped with pair of short, knob-like diverticula on posterior margin (Fig. 8). Tip of carrot-shaped posterior chamber reaching to base of first proximal pterygophore of anal spines. Drumming muscles present in males only.

Sagitta (Fig. 9A) more or less oval with rather pointed posterior; sulcus with short, broad ostium, a deeply grooved, oblique

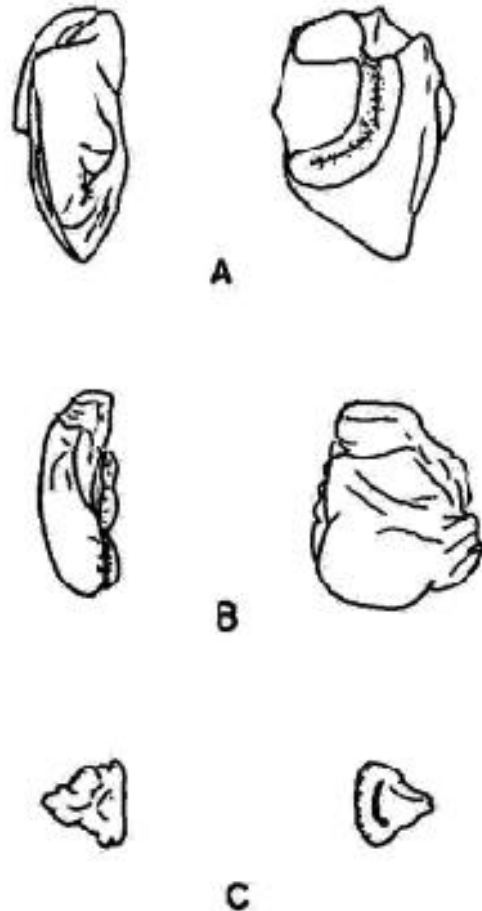


Fig. 9. Otoliths of *Stellifer ephelis* (uncatalogued 97 mm SL) inner surfaces on right, lateral view on left for Sagitta (A.) and Lapillus (B.), and outer surface for Asteriscus (C.)

cauda, and shallow groove along posterior half of dorsal margin; outer surface with an elevated center. Lapillus (Fig. 9B) smaller than sagitta, ovoid, anterior end with short thin flange; inner surface slightly convex, outer surface concave, with irregular granulations and grooves. Asteriscus (Fig. 9C) triangular with an indistinct lanceolate groove near ventral margin of inner surface.

Color in Alcohol: Body nearly uniform beige or tan. Back and sides heavily stippled

TABLE 4.
Character comparison of *S. ephelis* and *S. erycymba*

| Character | <i>S. ephelis</i> | <i>S. erycymba</i> |
|--------------------------------|-------------------|--------------------|
| Anal fin soft rays | 8 | 9 (rarely 8 or 10) |
| Upper jaw in head length | 2.1-2.2 | 2.4-2.7 |
| Eye in upper jaw length | 2.5-3.0 | 1.7-2.2 |
| Pelvic filament | Absent | Present |
| Angle of mouth gape | 45 | 30 |
| Symphyseal knob at tip of chin | Pronounced | Small |

with very small, brown chromatophores becoming progressively larger and more sparsely distributed ventrally, usually disappearing below level of pectoral base. Scattering of large chromatophores in region above anal-fin base in some specimens. Top of head and nape dusky, chromatophores forming dark bands on each scale just proximal to its edge. Snout, suborbital region, and upper portion of cheek and operculum with scattered, large chromatophores. Upper half of anterior third of upper lip with conspicuous dark band, a few chromatophores scattered posteriorly. Tongue and inside of mouth pale except for dark band just interior to lower tooth rows. Dark band also present along lower margin of lower lip. Inside of gill cavity and cleithrum heavily speckled. Spinous dorsal dusted with small chromatophores, concentrated distally, apex of fin dusky. Soft dorsal similarly but less densely patterned than spinous portion. Anal and caudal fins speckled with chromatophores. Axial and inner surface of pectoral fin speckled except for lowermost portion. Pelvic fin heavily speckled except for trailing edge. Peritoneum silvery.

Distribution: Pacific coast of Central

America from the Gulf of Fonseca, Honduras, to northern Peru.

Remarks: *S. ephelis* has been taken in shrimp trawls and bait nets in warm, shallow waters over muddy bottoms at depths not exceeding 27 m. It does not appear to be a very abundant species. Females taken from the Bay of Panama at the end of May were ripe.

Materials Studied: Honduras, Gulf of Fonseca: NMC 77-385, 75(69-96); SIO 51-324, 5(55-93); SIO 64-459, 1(92); SIO 64-467, 1(95); UCLA 51-165, 2(52-73); USNM 208544, 1(94.5); USNM 20855, 10(63-84).

Costa Rica, Gulf of Nicoya: LACM 30710-31, 4(69-96), Bahia del Rio Grande de Tarcoles; SIO 63-476, 3(91-105).

Gulf of Panama: LACM 31310-51, 4(52-99), SIO 69-386, 3(89-93), vicinity of Chiman; UCLA 58-303, 2(68-70), between Punta Chame and Punta Anton; UCLA 58-304, 72(48-85), between Punta Hicacal and Rio Pasiga; UCLA 58-305, 5(46-86), between Rio Chico and Punta de la Plata.

Peru: MCZ 157197, 1 (110), MCZ 157221, 3 (104-122) Calleta Tombes, Peru, Collected by N. Chirichigno, ca. 1966.

ACKNOWLEDGEMENTS

This publication is in memory of John Wintersteen and those he loved. All three species reported in this paper were first recognized by John Wintersteen in the 1960s,

Key to the eastern Pacific species of *Stellifer*

- 1a Preopercular margin weakly serrated without strong spines; dorsal spines XV; anal rays 13 (rarely 12)
..... *S. mancorensis* Chirichigno, 1962
(Costa Rica, Bay of Panama and Northern Peru)
- 1b Preopercular margin with one or more strong spines; dorsal spines XIV or fewer; anal rays 12 or fewer 2
- 2a Preopercular spines 1 or 2 3
- 2b Preopercular spines 4 or more 9

- 3a Preopercular spines 1; gill rakers 32 or fewer; eye 3.6-4.2 in head *S. zestocarus* Gilbert, 1898
(Costa Rica to Gulf of Guayaquil, Ecuador)
- 3b Preopercular spines 2; gill rakers 35 or more; eye 42 or more in head 4
- 4a Underside of lower jaw with 6 pores; upper jaw 21 or less in head; peritoneum black 5
- 4b Underside of lower jaw with 4 pores; upper jaw 21 or more in head; peritoneum pale to silvery, sometimes
punctuated, never black 6
- 5a Roof of mouth pale; gill rakers 41-43; interorbital width 25-28 in head; predorsal scales on nape ctenoid;
drumming muscles in both sexes *S. melanocheir* Eigenmann, 1917
(Buenaventura, Columbia to Gulf of Guayaquil, Ecuador)
- 5b Roof of mouth black; gill rakers 45-52; interorbital width 21-23 in head; predorsal scales on nape cycloid;
drumming muscles only in males *S. ositans* (Jordan & Gilbert, 1882)
(Gulf of Fonseca, El Salvador to Gulf of Guayaquil, Ecuador)
- 6a Roof of mouth black posterior to vomer; chin without symphyseal knob between median pair of mental pores; upper
jaw 25% or more in head length; pelvic fins with filamentous elongation of first ray 7
- 6b Roof of mouth pale; chin with variably developed symphyseal knob between median pair of mental pores;
upper jaw less than 25% in head length; pelvic fins without filamentous elongation of first ray 8
- 7a Upper portion of pectoral axial with conspicuous dark blotch; 7 or 8 longitudinal scale rows between
first dorsal spine and lateral line; peritoneum silvery; gas bladder diverticula short,
pear-shaped *S. wintersteenorum* n sp
(Near Guaymas to Bahia Matenchen, Nayarit, Mexico)
- 7b Upper portion of pectoral axial without dark blotch; 5 or 6 longitudinal scale rows between first dorsal spine
and lateral line; peritoneum punctate; gas bladder diverticula long, tubular *S. furthii* (Steindachner, 1875)
(Gulf of Nicoya, Costa Rica to Gulf of Guayaquil, Ecuador)
- 8a Gill rakers 51-55; anal rays 10-11; scales between base of anterior portion of dorsal fin
and lateral line cycloid *S. pizarroensis* Hildebrand, 1946
(Coast of Peru, from Puerto Pizarro to Ilo)
- 8b Gill rakers 35-37; anal rays 9; scales between base of anterior portion of dorsal fin
and lateral line ctenoid *S. walkeri* n sp
(San Blas to Acapulco and southern Mexico)
- 9a Underside of lower jaw with 4 pores 10
- 9b Underside of lower jaw with 6 pores 11
- 10a Anal-fin rays 9 (rarely 8 or 10); first gill arch with dark ramus; upper jaw 24-27 in head; eye 17-22
in upper jaw; pored scales of lateral line 47-50; pelvic fins with short elongation
of first ray *S. ericymba* (Jordan & Gilbert, 1882)
(Bahia Matenchen, Nayarit, Mexico, to Puerto Pizarro, Peru)
- 10b Anal-fin rays 8 (rarely 7); first gill arch with pale ramus; upper jaw 21-22 in head; eye 25-30 in upper jaw;
pored scales of lateral line 41-46; pelvic fins without elongation of first ray *S. ephelis* Chirichigno, 1974
(Gulf of Fonseca, Honduras to Bay of Panama)
- 11a Gill rakers 18-21; body without prominent, longitudinal, dark stripes; drumming muscles
only in males *S. illecebrosus* (Gilbert, 1895)
(Guaymas, Mexico, to Gatas, Ecuador)
- 11b Gill rakers 21-38 (rarely 20 or 21); body with prominent, longitudinal, dark stripes; drumming muscles
in both sexes 12
- 12a Dorsal spines XIII or XIV; gill rakers 33-38; ana-fin rays 11 (occasionally 10 or 12); upper jaw 23-25 in head;
chin with weak symphyseal knob; peritoneum punctate *S. minor* (Tschudi, 1845)
(Paita, Peru to Valparaiso, Chile)
- 12b Dorsal spines X or XI; gill rakers 21-25; anal-fin rays 8 or 9; upper jaw 26-29 in head; chin without symphyseal
knob; peritoneum silvery *S. chrysoleuca* (Günther, 1867)
(Mazatlan, Mexico, to Callao, Peru)

while he was a graduate student at work on a taxonomic revision of *Stellifer* and related genera under the guidance of Dr. Boyd Walker at UCLA. In 1976, John passed the unfinished study and materials to me and we worked off and on across three countries and two continents, for over a decade. In 1989, when we were ready to submit the manuscript (near 300 ms pages and 100 figures) to LACM, John had a fatal heart attack on his beloved sailboat on the high seas. The manuscript has since aestivated in the Amazon with me for another decade. I thank numerous colleagues, especially managers and curators at major fish collections, who have helped John and me during three decades. Some of them have retired or passed away, I apologize for the long delay. I thank Karel Leim and Bruce B. Collette who sponsored me as a research associate at MCZ and NMNH respectively. I am most grateful to Karsten Hartel, fish collection manager at MCZ, for his support and friendship, and for reviewing this and other papers. To Tome Monroe, National Systematics Laboratory National Marine Fisheries Service, who offered most helpful comments on the nomenclature issues and the final draft.

RESUMEN

Se describe dos nuevas especies de *Stellifer* del Pacífico Oriental. *Stellifer walkeri* n. sp. y *S. wintersteenorum* n. sp. Habitan el sur de México a poca profundidad. Se redescubre *Stellifer ephelis* Chirichigno y se incluye una clave para las especies de *Stellifer* del Pacífico.

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