

## A REVIEW OF THE DAMSELFISH GENUS *STEGASTES* FROM THE EASTERN PACIFIC WITH THE DESCRIPTION OF A NEW SPECIES

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### ABSTRACT

The pomacentrid genus *Stegastes* is represented by seven species in the tropical eastern Pacific: *flavilatus*, *leucorus*, *acapulcoensis*, *rectifraenum*, *arcifrons*, *redemptus*, and a new species *baldwini*. *Stegastes flavilatus* and *S. acapulcoensis* are relatively widespread along the coast of Central America and northern South America; *S. rectifraenum* is confined almost exclusively to the Gulf of California, but it has also been collected as far north as Magdalena Bay on the west coast of Baja California. The remaining species appear to be mainly inhabitants of islands situated well offshore, although *S. leucorus* and *S. redemptus* have been reported near the mainland. *Stegastes arcifrons* is a common inhabitant of the Galapagos Archipelago and also occurs on neighbouring islands such as Malpelo and Coco. *Stegastes leucorus* is divisible into two subspecies. The nominal form, *S. leucorus leucorus*, is confined primarily to the Revillagigedo Islands with additional records from Mexico; *S. leucorus beebei* is known from the Galapagos, Malpelo, and a single record from the Perlas Islands, Gulf of Panama. *Stegastes redemptus* occurs at the Revillagigedo Islands, Guadalupe Island, and Cape San Lucas, Baja California. *Stegastes baldwini* sp. nov. is known only from Clipperton Island, where numerous examples were collected in 1956. It is closely allied to *S. leucorus*, differing chiefly in colour pattern and numbers of soft dorsal rays and gill rakers.

### INTRODUCTION

The family Pomacentridae is composed of approximately 300 species which are primarily inhabitants of tropical and subtropical reefs. Until recently most species have been assigned to relatively few genera of which *Abudefduf* Forsskal, *Chromis* Cuvier, and *Pomacentrus* Lacépède are by far the largest. However, a recent study by the senior author (Allen, 1975) stressed the critical need for revision at the generic level. Previous authors have vacillated

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between the use of *Eupomacentrus* Bleeker and *Pomacentrus* for certain species which possess serrae on the margin of the suborbital and preopercle. A revision of these fishes by Dr A.R. Emery and the senior author (1980) substantiates the validity of both genera. However, we have found that *Stegastes* Jenyns (1842) holds priority over *Eupomacentrus* Bleeker (1977), and therefore the former is used here. Emery and Allen (1980) provide details of this nomenclatural change. *Stegastes* contains approximately 30 species which are distributed in all tropical seas; *Pomacentrus* includes about twice as many species, but is confined to the Indo-Pacific. The salient features of *Stegastes* include distinct serrae on the preopercle and suborbital, uniserial teeth on the jaws which are relatively elongated with flattened tips, a relatively broad preorbital which is largely devoid of scales, a scaly suborbital, the snout scaled to about the level of the nostrils, and the greatest body depth of adults usually between 1.9 and 2.1 in the standard length.

The last comprehensive review of the eastern Pacific members of the genus was that of Jordan and Evermann (1898). They recognised only three species: *leucurus*, *rectifraenum*, and *flavilatus*. The present study reveals there are seven species inhabiting this region, including *Stegastes baldwini* which is described herein. Not surprisingly, the eastern Pacific species appear to be most closely allied with regard to overall morphology to those from the tropical western Atlantic. However, only one, *S. flavilatus*, exhibits a close affinity to a Caribbean species (*S. variabilis*).

The distribution of eastern Pacific *Stegastes* is shown in Figs 1 and 2. These fishes generally inhabit shallow rocky areas, usually at depths less than 10 m. The diet consists primarily of algae.

We have collected specimens in the field at the Galapagos Archipelago, Perlas Archipelago, and the near shore islands in the Gulf of Panama. In addition we have examined all the eastern Pacific pomacentrid holdings at the following institutions (abbreviations indicated are used in the subsequent text): Academy of Natural Sciences, Philadelphia (ANSP); American Museum of Natural History, New York (AMNH); British Museum (Natural History), London (BMNH); California Academy of Sciences, San Francisco (CAS); Field Museum of Natural History, Chicago (FMNH); Natur-Museum Senckenberg, Frankfurt (SMF); Stanford University (SU, specimens presently deposited at CAS); National Museum of Natural History, Washington, D.C. (USNM); and the Western Australian Museum, Perth (WAM). In addition, selected specimens were examined from the University of California at Los Angeles (UCLA) and Scripps Institute of Oceanography, California (SIO).

All lengths given in the subsequent text refer to the standard length which is measured from the snout tip to the base of the middle caudal rays. Caudal preduncle length is the horizontal distance between the bases of the last

dorsal ray and middle caudal rays. Preorbital width is the greatest width measured from just above the rear corner of the mouth to the lower edge of the orbit. A summary of counts for the dorsal, anal, and pectoral fin rays, tubed lateral-linescales, and gill rakers on the first arch is presented in Table 1.

Table 1: Fin ray, lateral-line scale, and gill raker counts for species of *Stegastes* from the eastern Pacific.

Species	soft dorsal rays			soft anal rays			pectoral rays					LL scales with tubes				lower limb gill rakers								
	14	15	16	12	13	14	19	20	21	22	23	24	19	20	21	22	10	11	12	13	14	15		
<i>flavilatus</i>	15	1		16				5	10	1			16				8	2						
<i>leucorus leucorus</i>	1	4	16	1	18	2		3	17	1			2	17	2	1						15		
<i>leucorus beebei</i>	5	21	1		26	1		14	44				2	24			5	15	2					
<i>baldwini</i>	10	1			11				9	2			10	1							6	5		
<i>acapulcoensis</i>	10	1			11			1	16	64	5		11				2	3	5					
<i>rectifraenum</i>	12	4		1	14	2		12	55	2			2	16			2	12						
<i>arcifrons</i>	9	2		1	10			1	12				1	12							7	5	1	
<i>redemptus</i>	1	18			19			1	17	1			1	17	1						1	7	10	1

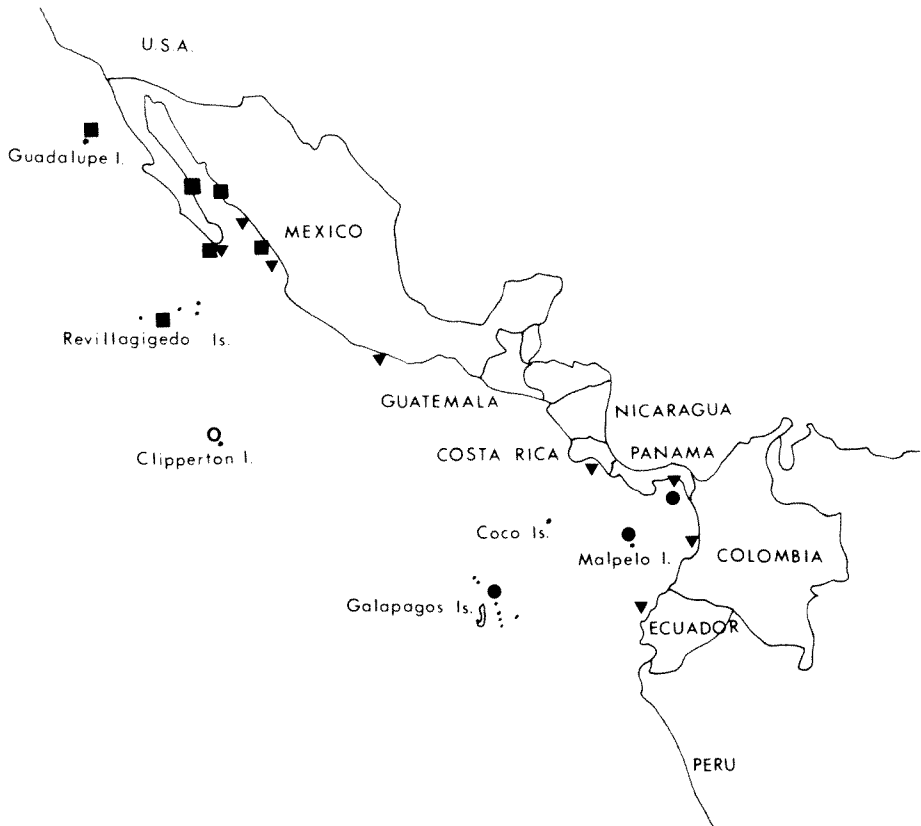


Fig. 1: Distribution of certain species of eastern Pacific *Stegastes*: *S. leucorus leucorus* (squares); *S. leucorus beebei* (solid circles); *S. baldwini* (hollow circles); *S. flavilatus* (triangles).

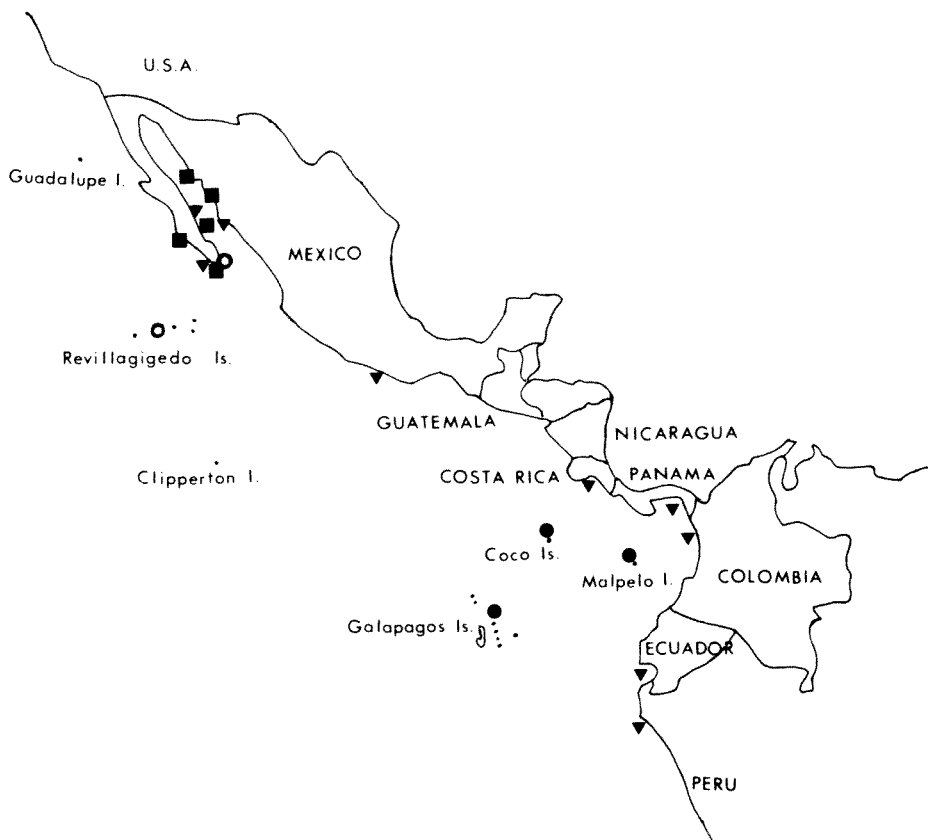


Fig. 2: Distribution of certain species of eastern Pacific *Stegastes*: *S. rectifraenum* (squares); *S. arcifrons* (solid circles); *S. redemptus* (hollow circles); *S. acapulcoensis* (triangles).

### KEY TO *STEGASTES* OF THE EASTERN PACIFIC

- 1a Soft dorsal rays usually 14; soft anal rays usually 12; supplementary scale usually present on opercle (Figs 4a, b) (Cape San Lucas to Bahía de Santa Elena, Ecuador) ..... *flavilatus* (Gill)
- 1b Soft dorsal rays usually 15 or 16; soft anal rays usually 13; supplementary scale on opercle absent (Fig. 4c) ..... 2
- 2a Pectoral fins dark with well contrasted pale (yellow or white) margin (Fig. 8) or if pale margin not apparent prominent pale band present across caudal peduncle; caudal fin dark;

- opercular margin black on upper portion,  
strongly contrasted with surrounding area . . . . . 3
- 2b Pectoral fins without pale margin; prominent  
pale band across caudal peduncle absent  
(peduncle sometimes pale, but not in form of  
contrasted band); caudal fin dark or pale;  
opercular membrane not strongly contrasted  
with surrounding area . . . . . 5
- 3a Soft dorsal rays usually 16; gill rakers on lower  
limb of first arch usually 12 (Guadalupe I.,  
Revillagigedo Is, Gulf of California to  
Mazatlan) . . . . . *leucorus leucorus* (Gilbert)
- 3b Soft dorsal rays usually 15; gill rakers on lower  
limb of first arch usually 10 to 12 . . . . . 4
- 4a Gill rakers on lower limb of first arch usually  
10 or 11; lips dusky, not strongly contrasted  
with surrounding area; prominent pale band  
across caudal peduncle usually not apparent or  
if present poorly defined (Galapagos Is, Malpelo  
I., Perlas Is) . . . . . *leucorus beebei* Nichols
- 4b Gill rakers on lower limb of first arch usually  
12; lips pale (pinkish) strongly contrasted with  
surrounding area; prominent pale band across  
caudal peduncle (Clipperton I.) . . . . . *baldwini* n. sp.
- 5a Pectoral rays 21 to 23 (usually 22) (Gulf of  
California to northern Peru) . . . . . *acapulcoensis* (Fowler)
- 5b Pectoral rays usually 19 or 20 . . . . . 6
- 6a Caudal peduncle about same shade as rest of  
body; caudal fin dusky in specimens over 50  
mm, 11 scales between 13th lateral-line scale  
and anal opening (Gulf of California and Baja  
California) . . . . . *rectifraenum* (Gill)
- 6b Caudal peduncle lighter than rest of body;  
caudal fin pale to dusky; 10 scales between 13th  
lateral-line scale and anal opening . . . . . 7
- 7a Upper profile of head very steep, not symmetri-  
cal with ventral profile (Fig. 11); lips pale, much  
lighter than surrounding area; gill rakers on  
lower limb of first arch usually 12 or 13  
Galapagos Is, Coco Is, Mapelo I.) . . . . *arcifrons* (Heller and Snodgrass)

- 7b Upper profile of head less steep, approximately symmetrical with ventral profile (Fig. 12), lips more or less dusky (at least upper), not strongly contrasted with surrounding area; gill rakers on lower limb of first arch usually 13 or 14 (Revillagigedo Is, Baja California . . . *redemptus* (Heller and Snodgrass)

## SYSTEMATICS

### *Stegastes flavilatus* (Fig. 3)

*Pomacentrus flavilatus* Gill, 1863. *Proc. Acad. Nat. Sci. Philad.*, 1862: 148  
(type locality: Cape San Lucas, Lower California).

*Pomacentrus gilli* Gilbert and Starks, 1904. *Mem. Calif. Acad. Sci.* 4: 141,  
Pl. 22, Fig. 44 (type locality: Panama).

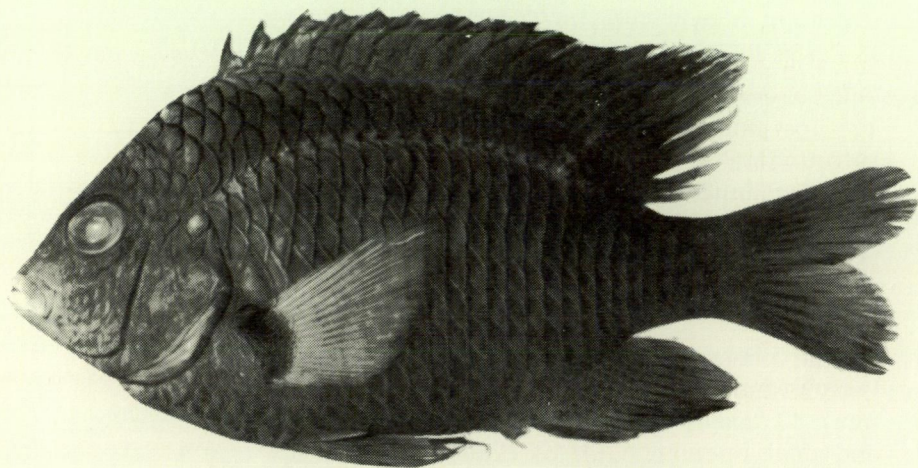


Fig. 3: *Stegastes flavilatus*, 95 mm, Perlas Archipelago (WAM P25511-004).

#### *Diagnosis*

(Proportions based on 15 specimens, 75-104 mm) Dorsal rays XII,14 (rarely 15); anal rays II,12; pectoral rays 22 or 23 (rarely 24); scales in lateral line bearing tubes 20; vertical scale rows from upper edge of gill opening to base of caudal fin 27 (rarely 26), between lateral line and origin of dorsal fin  $3\frac{1}{2}$ ; between 13th lateral-line scale and anal opening 10; gill rakers on lower limb of first branchial arch 11 (rarely 12).

Depth of body 1.8 to 2.0, head length 2.7 to 3.0, both in standard length; snout length 2.7 to 3.1, eye diameter 3.3 to 3.6, interorbital width 3.7 to 4.0, preorbital width 5.6 to 6.2, depth of caudal peduncle 2.3 to 2.5, length of caudal peduncle 2.8 to 3.2, of pectoral fin 1.1 to 1.2, of pelvic fin 1.1 to 1.2, of caudal fin 1.0 to 1.1, all in head length.

Colour in alcohol: (juvenile specimens up to approximately 55 mm) top of head and body blue to dark brown; sides abruptly yellow or light tan; lower lip and lateral portion of upper lip and jaw, preorbital, suborbital, cheeks, and opercles pale or yellow with blue or brown spots, largest and most conspicuous on opercles; a large ocellated dark spot present at base of anterior soft dorsal rays, about one-third on rays and two-thirds on body; an ocellated spot, smaller than pupil, dorsally on caudal peduncle; spinous dorsal and anterior soft rays dark, remainder of fin pale or slightly dusky; caudal yellowish or faintly dusky, outer edges with distinct narrow dark line; small blue spots on basal one-third of middle caudal rays; most of anal fin yellow with fine dark line on outer edge and sometimes a blue spot at base of last two or three rays; pelvic fins with dark spine and outer ray, inner rays yellow or light tan; pectoral fins pale, a small black spot on dorsal edge of base of upper ray only, inner face of pectoral pale. The largest juveniles have dark edges on the scales along the middle of the sides, which is a characteristic adult feature. Some specimens up to 75 mm still retain the juvenile colouration. In the southern portion of its range at Costa Rica and Panama, the transition from pale juvenile to dark adult appears to take place at a much smaller size; the dorsal spot is sometimes lost under 40 mm and the caudal spot disappears before a standard length of 45 mm is attained. One specimen, 45 mm, had lost both spots and many specimens between 40-45 mm were relatively dark on the lower sides showing no trace of the bicoloured juvenile pattern described above. Adults (specimens larger than about 70 mm): head and body dark brown; scales of suborbital and cheek with pale centres; lower lip pale, upper lip dusky; opercular membrane dark or dark edged; scales of lower sides and caudal peduncle with short lengthwise light streaks; body scales dark edged with lighter reddish-brown centres giving appearance of alternating narrow light and dark vertical bands on sides; breast light tan; dorsal fin mostly dark, black along outer margin; posterior soft dorsal rays pale on distal half; caudal fin dusky, darker basally, sometimes pale yellowish or tan distally; anal fin dark except tips of posterior rays pale or slightly dusky; pelvic spine and outer ray entirely dark, inner rays dusky on basal portion, pale distally with pale membranes between rays; pectoral fin pale, a large dark blotch covering fin base, more intense dorsally; outer face of pectoral axil very dark on upper two-thirds, pale ventrally.

Colour in life (from 35 mm transparencies taken at the Perlas Archipelago in 2-4 m depth): juveniles — top of head, spinous dorsal fin and upper back bright blue, remainder of sides abruptly yellow; most of body scales with

dusky margin; prominent light blue edged black ocellus at base of first few soft dorsal rays and smaller ocellated spot on top of caudal peduncle; light blue spot at base of posterior anal rays and similar, but smaller spots on side of head, middle of anal fin and at base of caudal fin; iris golden except light blue stripe across dorsal portion; caudal, anal, and pelvic fins yellow; pectoral fin transparent, but slightly yellowish. Subadults mostly blue except breast, abdomen, and lower half of head tan; body scales with prominent dark margins; dorsal ocellus absent or represented by a diffuse black spot; peduncular spot present or absent; most of soft dorsal, caudal, and anal fins dusky yellow; pelvic fins brighter yellow. Adults — most of head and body golden brown, lighter on breast, abdomen, and lower half of head; body scales with prominent dark margin; most of dorsal and anal fin dusky brown except outer portion of posterior rays yellowish; caudal fin dusky brown basally, yellowish on outer portion; pelvic fins yellow, but with some duski-ness; pectoral fins transparent and slightly yellowish with dark brown blotch at base.

### Range

Widespread on the Pacific coast of Central America from Cape San Lucas and the lower Gulf of California (Isla Venados) to Bahia de Santa Elena, Ecuador.

### Remarks

This species is apparently derived from the same ancestral stock as *S. variabilis* (Castelnau) of the tropical western Atlantic. The two species have nearly identical juvenile colour patterns and possess a supplementary scale on the operculum (Fig. 4). The latter feature is unique among Atlantic and eastern Pacific members of *Stegastes*.

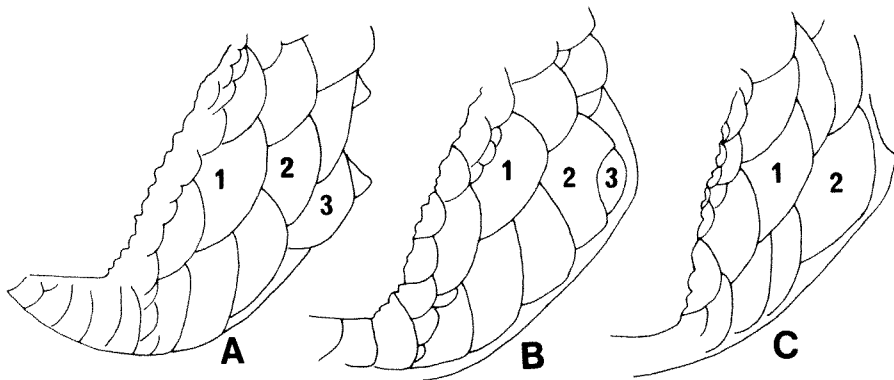


Fig. 4: Diagrammatic representation of opercular scalation in A and B) *S. flavilatus*-*S. variabilis*, C) other species of eastern Pacific and western Atlantic *Stegastes* (adapted from Emery and Burgess, 1974).



*Material examined*

Holotype of *Pomacentrus gilli*, SU 6803, 105 mm, Panama; paratype of *P. gilli*, 101 mm, Panama. In addition, 150 specimens, 18-93 mm, from Isla Venados (Gulf of California), Mazatlán, Acapulco, Costa Rica (Gulf of Nicoya), Panama, Colombia (Gorgona Island), and Ecuador (Bahia de Santa Elena) studied at CAS, FMNH, USNM and WAM.

*Stegastes leucorus leucorus*

(Fig. 5)

*Pomacentrus leucorus* Gilbert, 1891. *Proc. U.S. natn. Mus.*, 14: 554 (type locality: Socorro Island, Revillagigedo Islands).

*Pomacentrus elaimelas* Fowler, 1944. *Monogr. Acad. nat. Sci. Philad.* no. 6: 381, Figs 225-227 (type locality: Mazatlán, Mexico).

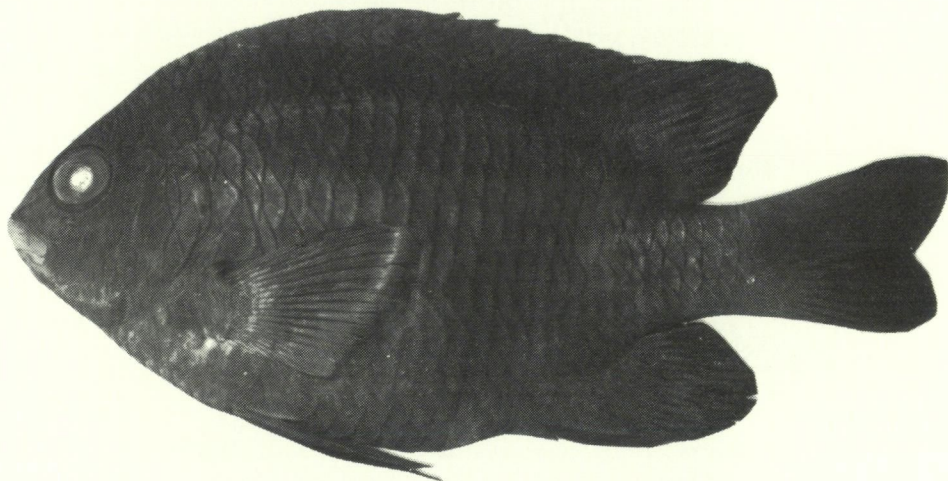


Fig. 5: *Stegastes leucorus leucorus*, 91 mm, Revillagigedo Islands (FMNH 61887).

*Diagnosis*

(Proportions based on 14 specimens, 67-111 mm) Dorsal fin rays XII,16 (occasionally 14 or 15); anal rays II,13 (rarely 12 or 14); pectoral rays 21 (rarely 20 or 22); scales in lateral line bearing tubes 20 (rarely 19, 21 or 22); vertical scale rows from upper edge of gill opening to base of caudal fin 26-27, between lateral line and origin of dorsal fin  $3\frac{1}{2}$ , between 13th lateral-line scale and anal opening 10; gill rakers on lower limb of first branchial arch 12.

Depth of body 1.8 to 2.0, head length 3.0 to 3.3, both in standard length; snout length 2.9 to 3.6, eye diameter 3.0 to 3.6, interorbital width 3.0 to 4.0, preorbital width 6.0 to 7.2, depth of caudal peduncle 1.9 to 2.3, length of caudal peduncle 2.5 to 3.0, of pectoral fin 1.1 to 1.2, of pelvic fin 0.9 to 1.2, of caudal fin 0.9 to 1.2, all in head length.

Colour in alcohol: juveniles — similar to young *S. leucorus beebei*. Adults — head and body dark brown; scales of body with narrow dark margins; hind margin of upper part of operculum jet black; fins dark brown to blackish; spinous dorsal with narrow black distal margin; pectoral fins with highly contrasted white band on posterior margin (see Fig. 8).

Colour in life: juvenile (41 mm, from 35 mm transparency taken by Mr Alex Kerstitch at Isla San Jose, Baja California) — overall dark purplish-brown grading to yellow-brown on forehead, anterior part of back, and spinous dorsal fin; a black spot, about eye size at base of anterior soft dorsal rays; a much smaller black spot on dorsal edge of caudal peduncle; margins of body scales dark brown or blackish; caudal peduncle white, at least posteriorly; soft dorsal fin purple-brown basally, translucent distally, caudal fin translucent; anal and pelvic fins dark purple-brown; pectoral fins translucent.

#### *Range*

Known in the literature primarily from the Revillagigedo Islands, but single specimens are also reported from Guadalupe Islands and Mazatlán, Mexico. Mr Alex Kerstitch reports (personal communication) that it is relatively common at certain localities in the vicinity of Cabo San Lucas, Baja California extending northward in the Gulf of California to Isla Carmen (approximately 26°N), Baja California and Isla San Ignacio Farallon off Topolobampo, Sinaloa (mainland Mexico).

#### *Remarks*

The two subspecies of *S. leucorus* are separable on the basis of colour pattern (Table 2) and slight modal differences in soft dorsal ray and gill raker counts (Table 1). Adult males of *S. leucorus leucorus* and *S. leucorus beebei* have a dense covering of tiny papillae on the outer half of the pectoral fin. The smallest specimens we have examined which exhibit this feature are 86 mm and 89 mm respectively for the two subspecies. The papillae are lacking on our numerous examples of the closely related *S. baldwini*, the largest specimen of which is 90 mm.

#### *Material examined*

Syntypes, USNM 48248-49, three specimens, 79-106 mm, Socorro Island, Revillagigedo Islands; syntypes, SU 329, three specimens, 98-100 mm, Socorro Island; syntypes, BMNH 1901.6.28.202-211, 13 specimens, 65-111

mm, Socorro Island; type of *Pomacentrus elaimelas*, ANSP 70261, 112 mm, Mazatlán, Mexico. In addition, 29 specimens, 45-99 mm, from the Revillagigedo Islands, and a single specimen from Guadalupe Island, 135 mm, studied at CAS, FMNH, SIO, UCLA, and USNM.

Table 2: Comparison of colour patterns of species in the '*leucorus*' complex.

	<i>baldwini</i>	<i>leucorus leucorus</i>	<i>leucorus beebei</i>
General ground colour	yellowish brown, darker in small, lighter in large specimens.	dark brown, some lighter specimens tan or pale greyish brown, not yellowish or reddish.	tan to reddish brown, small specimens (under 50 mm) with back light orange to carmine.
Lips	pale or yellow	dusky	dusky
Pectorals	black with tips of lower rays only hyaline.	black with broad yellow or white bar across distal edge, upper rays included.	black with broad white bar across distal edge, upper rays included.
Spiny dorsal	narrow black margin; yellow or pale submarginal band.	broad black margin, no submarginal pale areas or very narrow pale areas but, these not forming band.	broad black margin, submarginal area lighter but dusky, only indistinct band evident.
Soft dorsal	tip of posterior rays pale; no black spot at any size.	all rays black to tips; small specimens (under 50 mm) with large black spot on base of anterior dorsal rays.	all rays completely black; young with large black spot on base of anterior rays.
Caudal fin	black from base of rays to tip; upper rays pale or yellow in small specimens.	dusky, small specimens dusky on median portion, basal and distal portions pale.	dusky, pale basally in large and small specimens.
Caudal peduncle	prominent white band encircling entire caudal peduncle.	posterior half to one-third pale in small specimens, dark as adjacent body in large.	posterior half to one-third pale in young, usually one-third pale in large, but poorly contrasted in preserved specimens.

*Stegastes leucurus beebei*  
(Fig. 6)

*Eupomacentrus beebei* Nichols, 1924, *Zoologica*, 5: 64 (type locality: Galapagos Is).

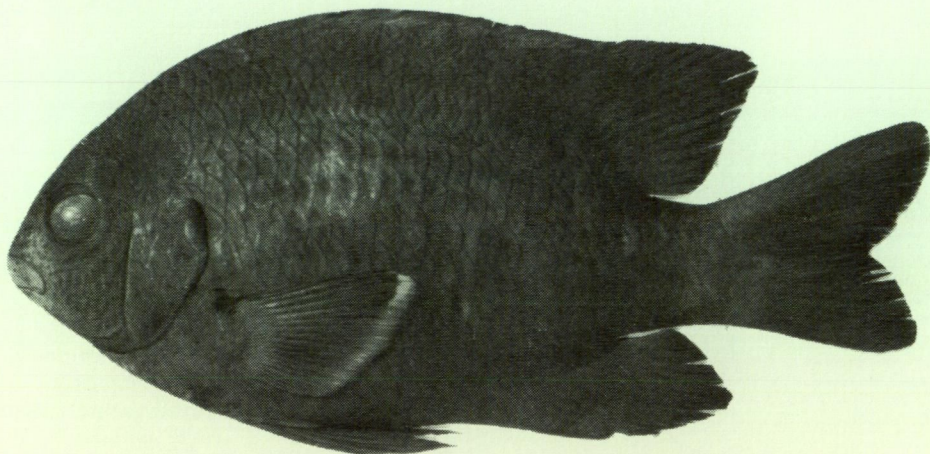


Fig. 6: *Stegastes leucurus beebei*, 94 mm, Galapagos Archipelago (WAM P25574-001).

*Diagnosis*

(Proportions based on 14 specimens, 74-108 mm) Dorsal fin rays XII,15 (occasionally 14, rarely 16); anal rays II,13 (rarely 14); pectoral rays 20 or 21; scales in lateral line bearing tubes 20 (rarely 19); vertical scale rows from upper edge of gill opening to base of caudal fin 26-27, between lateral line and origin of dorsal fin  $3\frac{1}{2}$ , between 13th lateral-line scale and anal opening 10; gill rakers on lower limb of first branchial arch 10-11 (rarely 12).

Depth of body 1.9 to 2.0, head length 3.0 to 3.3, both in standard length; snout length 3.0 to 3.4, eye diameter 3.3 to 3.7, interorbital width 3.1 to 4.0, preorbital width 6.3 to 8.0, depth of caudal peduncle 1.9 to 2.2, length of caudal peduncle 2.5 to 3.0, of pectoral fin 1.1 to 1.2, of pelvic fin 0.9 to 1.1, of caudal fin 1.0 to 1.2, all in head length.

Colour in alcohol: juveniles overall reddish-brown with prominent ocellus at base of anterior soft dorsal rays and small dark spot on upper edge of caudal peduncle; upper edge of opercular membrane black; scale margins on body dusky; most of dorsal fin brown except outer portion of soft rays pale; posterior portion of caudal peduncle turning pale, grading into yellowish caudal fin; anal fin mostly dark brown, nearly black, except outer portion of posterior rays pale; pelvic fins dark brown to black; pectoral fins pale but turning dark with increased size; narrow dark brown bar across pectoral base

and axil light brown. Adults — similar to juveniles except darker brown and all fins dark brown to blackish without ocellus; pectoral fins with prominent pale band across posterior margin (see Fig. 8) and small dark spot at base of uppermost rays.

In many specimens, particularly those under approximately 50-60 mm, there is a hint of faint pale band across the caudal peduncle, similar to that found in *S. baldwini*, but not nearly as strongly contrasted.

Colour in life (from Hobson, 1975, Fig. 2): head and body overall reddish-brown, grading to dark brown posteriorly; strong suffusion of red on anterodorsal portion of body and spinous dorsal fin; bright red patch on top of eye; margins of body scales dark brown; broad pale brown band at base of caudal fin; opercular membrane black; fins dark brown to blackish; pectorals with yellowish band across outer margin; blue stripe across superior portion of iris.

#### *Range*

Previously known only from the Galapagos Archipelago, but also recorded from the Perlas Islands, Gulf of Panama on the basis of a single specimen (UCLA W53-208). In addition, McCosker and Rosenblatt (1975) recorded it from Malpelo Island, off Colombia.

#### *Material examined*

Holotype, AMNH 8270, 14 mm, Galapagos Archipelago. In addition, 553 specimens, 12-113 mm, from the Galapagos Archipelago and a single specimen, 102 mm from Panama were studied at FMNH, SMF, UCLA, and USNM.

### *Stegastes baldwini* sp. nov. (Fig. 7)

#### *Holotype*

USNM 114944, 87 mm, Clipperton Island, about 0-1.5 km north of Wreck on east side of island, 23 October 1956, Baldwin, Limbaugh, and Hohnhaus.

#### *Paratypes*

USNM 114945, 38 specimens, 29-88 mm, same data as holotype; FMNH 61882, 54 specimens, 22-82 mm, Clipperton Island, two areas (1) 400 m west of Wreck, (2) 800 m west of Wreck, 20 October 1956, Baldwin, Limbaugh, and Hohnhaus; BMNH 1957.1.21.1-10, 10 specimens, 38-90 mm, Clipperton Island, just north of Wreck on east side of island, 24 October 1956, Baldwin, Limbaugh, and Hohnhaus; ANSP 75182, 181 specimens, 26-88 mm, Clipperton Island, east side, 1.6 km north of Wreck, near single

coconut tree, 25 October 1956, Baldwin, Limbaugh and Hohnhaus; WAM P25547-001, 10 specimens, 48-85 mm formerly part of ANSP 75182; CAS 20715, 137 specimens, 21-80 mm, Clipperton Island, on south shore near large rock, 28 October 1956, Baldwin, Limbaugh and Hohnhaus; SU W56-241 (now deposited at CAS), 93 specimens, 21-73 mm, Clipperton Island, near grove of trees and old barracks on west shore, 29 October 1956, Baldwin, Limbaugh and Hohnhaus.

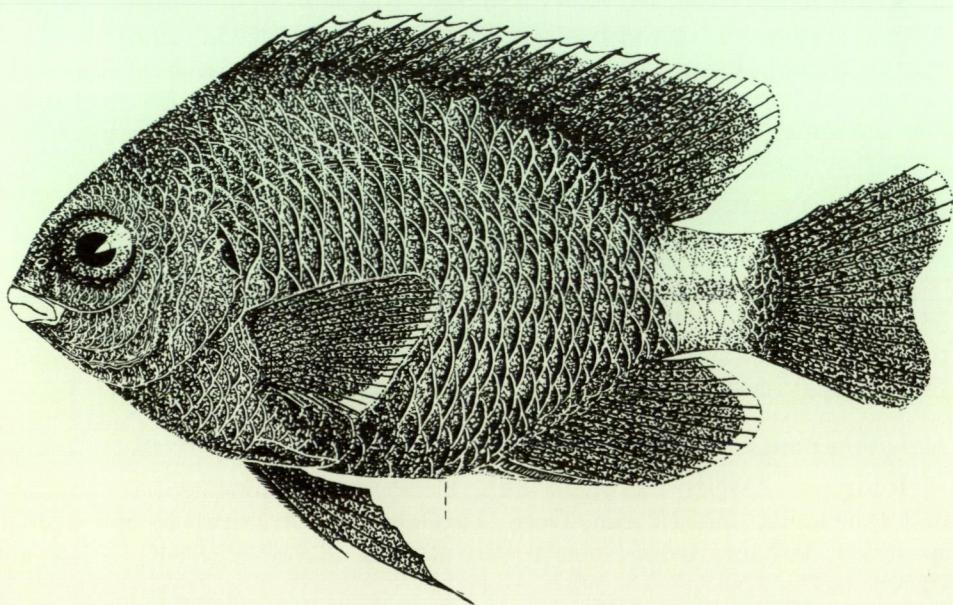


Fig. 7: *Stegastes baldwini*, paratype, 77 mm, Clipperton Island (FMNH 61882).

#### *Description*

(Counts and proportions of type are given first with range for paratypes noted in parentheses. Paratypes measured range in size 69-90 mm, counts based on these plus many additional specimens — see Table 1.)

Dorsal fin rays XII,15 (XII,15, rarely XII,16); anal rays II,13 (II,13); pectoral rays 21 (21, rarely 22); scales in lateral line bearing tubes 20 (20, rarely 21), vertical scale rows from upper edge of gill opening to base of caudal fin 27 (27, rarely 26), between lateral line and origin of dorsal fin  $3\frac{1}{2}$  ( $3\frac{1}{2}$ , rarely 3), between 13th lateral-line scale and anal opening 10 (10); gill rakers on lower limb of first arch 12 (12 or 13).

Depth of body 1.9 (1.8-2.1), head length 3.1 (2.9-3.2), both in standard length; snout length 3.1 (3.1-3.7), eye diameter 3.7 (3.3-3.8), interorbital width 3.3 (3.2-3.8), preorbital width 7.4 (7.1-7.7), depth of caudal peduncle

2.0 (2.0-2.1), length of caudal peduncle 2.5 (2.5-3.0), of pectoral fin 1.2 (1.1-1.3), of pelvic fin 1.0 (0.9-1.0), of caudal fin 1.1 (1.0-1.1), all in head length.

Body deep, strongly compressed, dorsal profile rising steeply to origin of dorsal fin; dorsal profile smoothly convex from interorbital to origin of dorsal, slightly concave snout (straight in small specimens under 45 mm), snout angular, neither exceptionally broad nor pointed; mouth horizontal, posterior tip of upper jaw reaching to vertical with anterior margin of pupil, lips thick, smooth; fleshy flange on maxillary very thick and well developed distally.

Teeth in both jaws uniserial, narrow, close-set to form cutting edge, tips compressed, rounded, truncate or slightly emarginate. Lower pharyngeal bone with tooth patch broadly triangular, teeth arranged in five rows, at apex only one enlarged tooth, behind this the second row contains only two teeth, the third row continuous along sides to wings, fourth row incomplete with only 10 teeth, median ones conical and obtuse, posterior row with teeth slender and elongate except five median teeth have enlarged bases.

Head scaled except for snout anterior to nostrils, preorbital and tip of lower jaw; suborbital scaled to below middle of pupils in small specimens (up to 45 mm), to corner of mouth in larger (50-65 mm) and to anterior margin of pupil in largest specimens (75-90 mm); suborbital scales in a single row in small specimens, a double row in large with scales near rim of orbit much smaller; margin of suborbital entire in young becoming progressively finely serrate anteriorly with increased size, largest specimens serrate to corner of mouth; scales in three regular rows across widest part of cheek, smaller scales surrounding these not reaching to margin of preopercle so preopercle has broad naked margin on horizontal limb but very narrow naked margin on vertical limb; vertical limb margin of preopercle usually straight, angle not produced, serrae very fine.

Gill rakers short, slender, the anterior ones broad and fleshy; longest rakers near angle, their length less than half the diameter of pupil; two rows of very short fleshy papillae on inner face of gill rakers.

Dorsal fin originates above third lateral-line scale; dorsal spines gradually increasing in length posteriorly, length of last spine a little more than half the length of head. Membranes between spines longer than anterior spine forming a short tab at least on first few membranes; margin of soft dorsal fin broadly angular, its base equal in length to both spiny and soft portions of anal fin.

Anal fin originates on vertical below insertion of 11th dorsal spine; anal fin margin broadly rounded; first anal spine more than one-third length of second, second anal spine longer and stronger than any dorsal spines, about 1.6 in head.

Upper caudal lobe slightly angular, lower lobe rounded, caudal fin with broad shallow notch, the middle caudal rays about two-thirds length of longest rays of upper lobe.

Pelvic fins inserted vertically below insertion of third dorsal spine, outer pelvic rays filamentous but not greatly produced; pelvic spine more slender but only a little shorter than second anal spine.

Pectoral fin angular, its posterior margin convex; simple rays on lower margin of fin free about one-third to half their length except inner one (third from bottom) free only at tip; scale just above pectoral axil enlarged, the vertical width of its exposed portion not quite as long as the width of pectoral base.

Colour in alcohol: juveniles (20-25 mm) — uniformly dark bodied with only the posterior half of the caudal peduncle pale; caudal and pectoral fins pale, pectoral with a large dark blotch covering its entire base; distal half to two-thirds of soft dorsal pale; gill membrane between opercular spines and margin of spiny dorsal membranes dark; submarginal band on dorsal fin very faint; lips and chin dusky, but paler than rest of head. One specimen, 22 mm, had short blue lines from the snout to the interorbital; another 20.8 mm possessed a broad, pale lengthwise band (probably yellow in life) running from just above pectoral to base of caudal fin and lacked the black blotch on the pectoral base. Juveniles (30-40 mm) — very dark bodied though some show a trace of yellow on the scales; caudal fin dark on basal portion and lower lobe, but superior portion of upper lobe pale; pectoral fin with basal two-thirds to three-quarters dark, margin hyaline; lips pale, but smallest specimens in this size group have lips dusky laterally; pale submarginal band on dorsal distinct; caudal peduncle with only posterior half pale in specimens to 35 mm, but as 40 mm is approached a larger area is pale; chalky appearance of caudal peduncle not evident on most specimens in this size group. Adults and subadults — body colour generally brown, smaller specimens darker; largest specimens with more yellow on snout, sides and breast; top of head darker brown than rest of body; lips yellow or pale; sometimes slightly dusky near corners of mouth and with preorbital area yellow; chin pale, cheeks brown, posterior row of opercular scales yellow; branchiostegal membranes yellow, opercular membrane intense black in notch between opercular spines; body scales below lateral-line with narrow dark brown margin, the base of each scale yellow so body appears to have a series of diagonal transverse dark lines alternating with yellow; caudal peduncle chalky white, this colour ending abruptly at base of caudal rays; some specimens with middle row of scales on caudal peduncle yellow, forming yellow streak running forward and gradually fading into dark part of body (this band often continues to opercle in very small specimens [20 mm]); a faint dark spot on body just below base of last dorsal rays; dorsal fin dark on base, a pale or yellow submarginal band and narrow black marginal line



on both spiny and anterior soft rays; posterior dorsal rays pale distally; caudal fin usually entirely black but some large specimens with upper rays pale or yellowish; anal fin black; pelvic fins black; pectoral fins black with narrow pale bar across tips of all rays in young, but in individuals larger than 55 mm, upper rays black tipped (with further increase in size pectorals become entirely black); small faint black spot on base of upper pectoral rays; axil of pectoral yellow.

### *Range*

This species is known only from Clipperton Island. It is abundant in shallow (approximately one metre or less) water over the bottom of coral, limestone rocks and sand.

### *Remarks*

*Stegastes baldwini* is obviously a close relative of *S. leucorus*. The two species are separable primarily on the basis of colour pattern differences. This evaluation may appear to be inconsistent with our division of *S. leucorus* into two subspecies on the basis of similar differences. However, it is our opinion that the pattern differences (Table 2 and Fig. 8) are of sufficient magnitude to justify full species recognition for *S. baldwini*. In addition, males of *S. baldwini* lack papillae on the outer pectoral fin, a feature found in both subspecies of *S. leucorus* (see remarks section for *S. leucorus leucorus*).

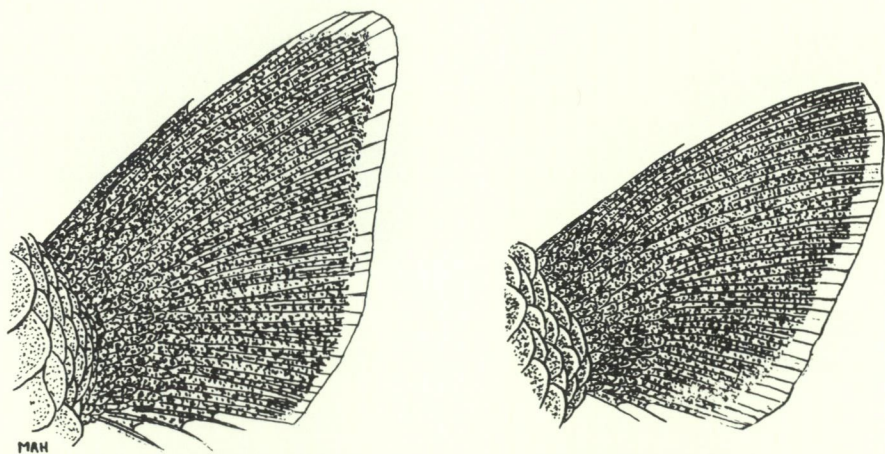


Fig. 8: Comparison of pectoral fin colouration in A) *S. leucorus beebei* and *S. leucorus leucorus*, B) *S. baldwini* (subadults).

The holotype is a male. Among the many specimens examined, only two females (67 and 87 mm) were found with eggs which were very small and certainly not ripe. No difference in colour pattern or shape was noticed between males and females. *Stegastes baldwini* also differs from *S. leucorus beebei* in number of gill rakers on the first arch (usually 12 on the lower limb for *baldwini* vs. 10-11 for *beebei*), and from the Revillagigedo population of *leucorus leucorus*, in number of soft dorsal rays (usually 15 for *baldwini* vs. 16 for *leucorus leucorus*).

Named for Mr Wayne Baldwin, one of the collectors of the excellent series of specimens which formed the basis of the above description.

*Stegastes acapulcoensis*  
(Fig. 9)

*Pomacentrus (Omopomacentrus) acapulcoensis* Fowler, 1944. *Monogr. Acad. nat. Sci. Philad.*, no. 6: 363, Figs 222, 223 (type locality: Acapulco, Mexico).

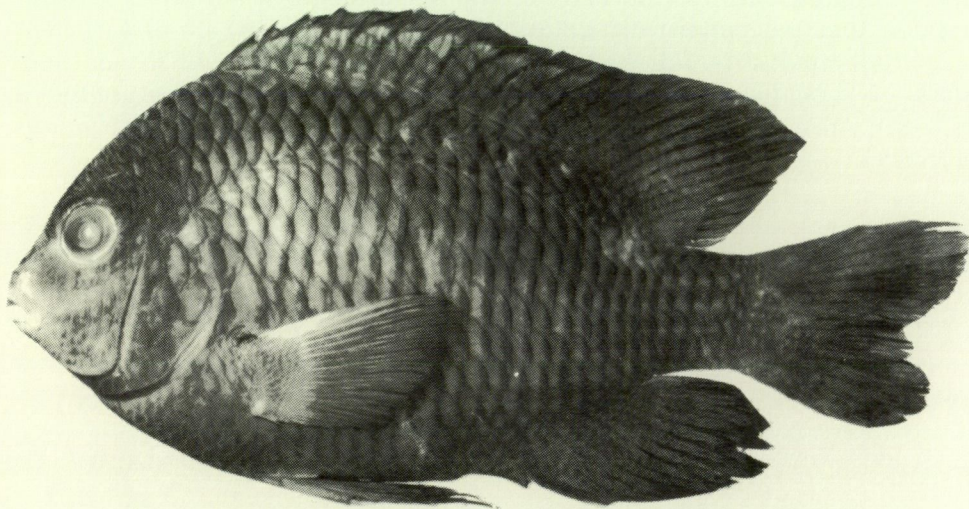


Fig. 9: *Stegastes acapulcoensis*, 102 mm, Perlas Archipelago (WAM P25511-005).

*Diagnosis*

(Proportions based on 20 specimens, 71-140 mm) Dorsal fin rays XII,15 (rarely 16); anal rays II,13; pectoral rays usually 21 or 22 (rarely 20; Panama, Ecuador, and Peru occasionally 23, see Table 3); scales in lateral line bearing tubes 20; vertical scale rows from upper edge of gill opening to base of

caudal fin 26-27; between lateral line and origin of dorsal fin 3-3½; between 13th lateral-line scale and anal opening 10; gill rakers on lower limb of first branchial arch 11 to 13.

Depth of body 1.8 to 2.0, head length 2.9 to 3.2, snout length 2.5 to 3.0, eye diameter 3.4 to 4.0, interorbital width 2.9 to 3.7, preorbital width 3.8 to 5.7, depth of caudal peduncle 2.0 to 2.1, length of caudal peduncle 2.4 to 3.2, of pectoral fin 1.0 to 1.2, of pelvic fin 1.0 to 1.1, of caudal fin 1.0 to 1.2, all in head length.

Colour in alcohol: juveniles (under 60 mm) — general body colour reddish-brown, each scale of head, back, and sides, including scaly sheaths of dorsal and anal fins with a light or blue spot; a pair of blue lines from tip of snout, over eye to sides of spiny dorsal; a short blue bar on preorbital; large black spot on last spine and first three dorsal rays outlined by scales with blue centres, two-thirds of spot on base of rays and one-third of spot on body; a small ocellated spot on upper edge of caudal peduncle; dorsal spot present on specimens under 50 mm, fades and disappears between 50 and 60 mm; trace of caudal peduncle spot persists in specimens even as large as 75 mm. Adults and subadults (in excess of 60 mm) — light greyish to dark reddish-brown; scales with dark brown margin, scale centres paler, these forming light and dark oblique lines across body; light and dark area about equal in smaller specimens (up to 75 mm), lighter lines broader in largest (over 100 mm), head darker than body; lips usually dusky but lower lip pale on large specimens from Panama and Ecuador; vertical fins dark, exposed portion of dorsal membrane dark with small white fleshy tab just behind tip of each spine; caudal, anal, and pelvic fins dark; pectorals pale in specimens up to 75 mm, dusky distally in specimens 90-100 mm, dark distally and pale basally in largest specimens; distinct dark spot on base of upper pectoral ray, inner face of pectoral not darker than adjacent body colour.

Colour in life (from 35 mm transparencies taken by the senior author at the Perlas Archipelago in 2-4 metres depth): juveniles — generally bright blue with prominent ocellus at base of soft dorsal fin and ocellated black spot on dorsal edge of caudal peduncle; scale margins blackish; head dark grey or blackish with pair of bright blue lines from tip of snout, over eye to sides of spinous dorsal fin; blue spot on preorbital and others scattered on cheek and opercles; pectoral fins transparent; remainder of fins grey or dusky with sheath scales mostly blue; spinous dorsal and anterior edge of anal and pelvic fins with narrow margin of light blue. Adults — mostly brown, lighter on head and anterior portion of body; most of scales with blackish margins; fins dark brown to smoky grey; small black spot on upper pectoral base and uppermost two-thirds pectoral rays white on basal half; outer face of pectoral axil with prominent white band across base of rays.

### *Range*

Widespread along the Pacific coast of Central and South America from Mexico (Baja California and Sinaloa Province) to Lobos de Afuera, Peru. Mr Alex Kerstitch reports (personal communication) that it is also locally common at Cabo San Lucas, Baja California and occurs in the Gulf of California at Isla Carmen off the Baja side (approximately 26°N) and at Isla San Ignacio Farallon off Topolobampo, Sinaloa (mainland Mexico). Over a large part of the range this species is sympatric with *S. flavilatus*.

### *Remarks*

Fowler (1944) placed *S. acapulcoensis* in a new subgenus, *Omopama-centrus*, on the basis of an enlarged scale over the pectoral base, numerous small axillary scales on the occiput, interorbital, post ocular, and anterior opercular regions, and the dark colouration of the body and vertical fins. We have examined Fowler's type specimens and find all these characters within the range exhibited by other eastern Pacific *Stegastes*. The enlarged pectoral scale tends to be of greater size and hence most conspicuous in very large adults. It has been exaggerated in Fowler's drawing (Fig. 222).

### *Material examined*

Holotype and paratype, ANSP 70281-70282, 158 and 137 mm, Acapulco, Mexico. In addition, 301 specimens, 12-117 mm, from Mexico (Acapulco), Costa Rica (Gulf of Nicoya), Panama (Gulf of Panama), Colombia (Bahia Utria), Ecuador (Gulf of Guayaquil), and Peru (Lobos de Afuera) studied at AMNH, FMNH, USNM, and WAM.

### *Stegastes rectifraenum* (Fig. 10)

*Pomacentrus rectifraenum* Gill, 1862. *Proc. Acad. nat. Sci. Philad.* 1862. 148 (type locality: Cape San Lucas, Baja California).

*Pomacentrus analigutta* Günther, 1862. *Cat. Fishes Brit. Mus.* 4: 27 (type locality: Cape San Lucas).

### *Diagnosis*

(Proportions based on 13 specimens, 78-88 mm) Dorsal fin rays XII,15 (rarely 16); anal rays II,13 (rarely 12 or 14); pectoral rays usually 20 (occasionally 19 or 21); scales in lateral line bearing tubes 20 (rarely 19); vertical scale rows from upper edge of gill opening to caudal fin base 26-27, between lateral line and origin of dorsal fin 3½, between 13th lateral-line scale and anal opening 11 (rarely 10½); gill rakers on lower limb of first branchial arch 12 (rarely 11).

Depth of body 1.9 to 2.1, head length 2.9 to 3.2, both in standard length; snout length 2.7 to 3.0, eye diameter 3.4 to 3.6, interorbital width 3.5 to 3.9, preorbital width 5.4 to 6.5, depth of caudal peduncle 2.0 to 2.2, length of caudal peduncle 2.7 to 3.2, of pectoral fin 1.1 to 1.2, of pelvic fin 1.0 to 1.1, of caudal fin 1.0 to 1.2, all in head length.

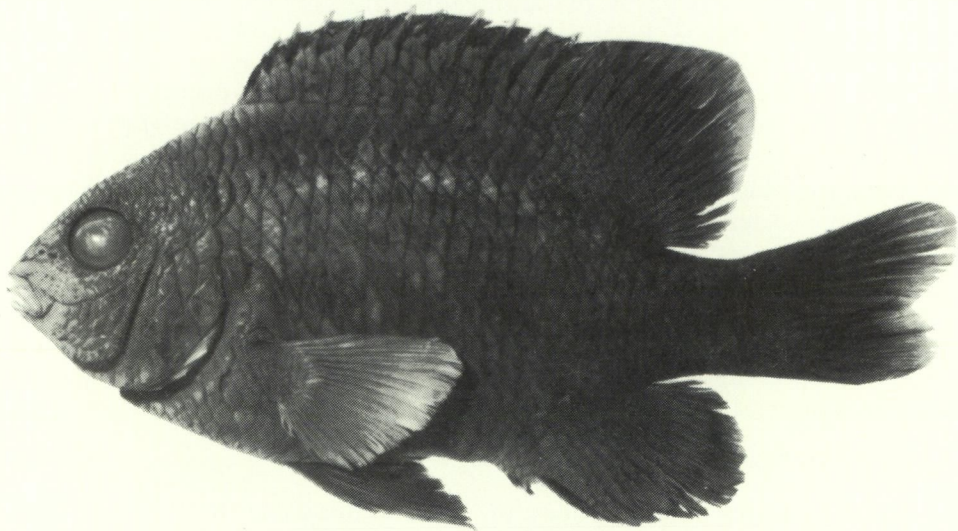


Fig. 10: *Stegastes rectifraenum*, 86 mm, Gulf of California (WAM P25544-001).

Colour in alcohol: juveniles (under 60 mm) — many specimens overall dark, but others showing markings as follows: scales of head and body with basal portion blue, most distinct on back and base of anal fin; distinct blue lines from snout to origin of dorsal fin and from eye along base of dorsal fin; a large dark ocellus on base of last dorsal spines and first soft rays; a small saddle-shaped ocellus on caudal peduncle just behind last dorsal ray, becoming very faint and disappearing in specimens between 40-50 mm, occasionally persisting as a faint remnant to 60 mm; spot on base of upper pectoral rays very distinct, often with narrow extension ventrally across base of most rays. Adults and subadults — overall dark reddish-brown to dark greyish-brown; scales with narrow dark margin or slightly lighter basal portion forming faint transverse lines on sides (sometimes absent); lips dusky, except pale on middle portion of lower lip; some specimens with narrow blue lines on head or each scale of head with faint blue or white marking; opercular membrane dark at notch, pale below; vertical fins dark except tips of dorsal and caudal rays; membrane of spiny dorsal with broad dark band on distal portion, a paler area below this, along edge of scales covering dorsal; pelvic fins dark, the membranes darker than the rays;

pectoral fin pale, a diffuse dark spot on base of uppermost one or two rays; inner face of pectoral not darker than body colour, but basal spot usually distinct on upper rays; largest specimen with median pectoral rays dusky.

Colour in life (based on 35 mm transparencies taken in the Gulf of California by Mr Dave Powell): juveniles — scales of head, body, and base of fins with blue centres and black margins giving overall bright blue appearance; black spot (remnant of ocellus) about size of eye at base of anterior soft dorsal rays; small blue-rimmed black ocellus on dorsal edge of caudal peduncle; a pair of bright blue lines from snout to origin of dorsal fin; similar lines on preorbital, suborbital, and cheek; small blue spot at base of posterior-most anal rays; pectoral fins yellowish; rest of fins smoky grey; margin of spinous dorsal and anterior edge of anal and pelvic fins with narrow margin of light blue. Adults — head, anterior portion of body, and most of spinous dorsal fins pale reddish-brown; blue stripes on snout and forehead, and bright blue scale centres sometimes persisting in adults; posterior portion of body and all fins except pectorals dark charcoal-grey to blackish; scales of body with dark margins giving overall appearance of alternating light and dark lines, particularly evident on lighter anterior portion of body; pectoral fins yellowish.

#### *Range*

Magdalena Bay on the west coast of Baja California and the entire coast of the Gulf of California, including islands; not known south of the state of Sonora on the Mexican mainland. The many literature and museum records of this species from locations south of the Gulf of California are mostly attributable to *S. acapulcoensis*.

#### *Remarks*

The description of *Pomacentrus analigutta* was apparently never published although the authorship is credited to Günther on the basis of its inclusion in a key which appears in his Catalog of Fishes in the British Museum (1862). It is likely that Gill intended to describe the species as Günther stated that the key was communicated to him by Gill. There are 13 specimens, 13-36 mm, at the USNM (register no. 3674) which are labelled as the types of *analigutta*. These are synonymous with *S. rectifraenum*.

The number of pectoral rays is a reliable character for separating *rectifraenum* from *acapulcoensis*, species which are often confused. The pectoral counts are compared in Table 3.

#### *Material examined*

Syntypes, USNM 3670, 4 specimens, 41-64 mm, Cape San Lucas. In addition, 225 specimens, 13-87 mm from the Gulf of California and Magdalena Bay were studied at AMNH, CAS, FMNH, USNM, and WAM.

Table 3: Comparison of number of pectoral rays in *Stegastes rectifraenum* and *S. acapulcoensis* by region.

		No. spec.	Pectoral rays				
			19	20	21	22	23
<i>S. rectifraenum</i>	Baja Calif.-W. Coast and Cape San Lucas	18	3	14	1		
	Baja Calif.-E. Coast and Gulf Islands	26	5	21			
	Mainland Sonora Mexico	24	4	20	1		
<i>S. acapulcoensis</i>	Mazatlán and Tres Marias Islands	22		1	5	16	
	Acapulco	27			7	20	
	Costa Rica	2				2	
	Panama	17			1	14	2
	Ecuador	13			3	9	1
	Peru	3				1	2
	Galapagos	2				2	

*Stegastes arcifrons*  
(Fig. 11)

*Pomacentrus arcifrons* Heller and Snodgrass, 1903. *Proc. Wash. Acad. Sci.* 5: 202, Pl. 7 (type locality: Barrington Island, Galapagos Archipelago).

*Diagnosis*

(Proportions based on 20 specimens, 89-119 mm) Dorsal fin rays XII,15 (rarely 16); anal rays II,13 (rarely 12); pectoral rays 20 (rarely 19); scales in lateral line bearing tubes 20 (rarely 19); vertical scale rows from upper edge of gill opening to caudal fin base 26-27, between lateral line and origin of dorsal fin 3-3½, between 13th lateral-line scale and anal opening 10; gill rakers on lower limb of first branchial arch 12 or 13 (rarely 14).

Depth of body 1.8 to 2.1, head length 2.9 to 3.4, both in standard length; snout length 2.7 to 3.0, eye diameter 3.4 to 3.9, interorbital width 3.1 to 3.8, preorbital width 4.4 to 5.8, depth of caudal peduncle 2.0 to 2.1, length of caudal peduncle 2.4 to 2.9, of pectoral fin 1.1 to 1.3, of pelvic fin 0.9 to 1.2, of caudal fin 0.9 to 1.2, all in head length.

Colour in alcohol: juveniles (under 60 mm) — primarily reddish-brown with the caudal peduncle and adjacent body region more or less abruptly light yellow. The fins are similar to the body in colour except the pectorals, soft dorsal, caudal, and posterior anal rays are pale. There is a pale rimmed black ocellus at the base of the soft dorsal junction. Adults and subadults — head and back dark reddish-brown, sides with oblique streaks following edges of scale rows antero-ventrally, scale bases yellowish; caudal peduncle and caudal fin pale yellow in small specimens, dusky to completely dark in large specimens; breast and abdomen tan to reddish-brown; anal opening pale, lips pale; opercular membrane dusky dorsally; anal, pelvics, and dorsal margin of caudal fin dark; membranes between middle caudal rays with dark streaks; pectoral fins pale, a small black spot on base of upper ray only and extending along dorsal margin of ray; inner face of pectoral base dark with very distinct narrow light streak across base of rays, basal portion of rays on inner side dusky, highlighting light streak.



Fig. 11: *Stegastes arcifrons*, 102 mm, Galapagos Archipelago (WAM P25575-001).

#### *Range*

Known only from the Galapagos Archipelago, Malpelo Island (Fowler, 1938; McCosker and Rosenblatt, 1975), and Coco Island.

#### *Remarks*

Slight differences in body depth and head length were noted between specimens from the Galapagos and Coco Island. Individuals from the latter locality generally have a slightly longer head (2.89-3.17 in SL vs. 3.04-3.37) and are slightly deeper bodied (1.80-1.99 in SL vs. 1.82-2.10) than Galapagos



specimens. There do not appear to be any differences in colour or meristic values between the two populations. It is doubtful that even racial differences can be shown between the two populations which are separated by approximately 700 km.

*Material examined*

Holotype, SU 6356, 113 mm, Barrington Island, Galapagos Archipelago; paratypes, SU 6536, 3 specimens, 70-104 mm, Albemarle Island, Galapagos; paratypes, BMNH 1901.6.28.212-21, 17 specimens, 53-122 mm, Duncan Island, Galapagos. In addition, 370 specimens, 27-124 mm, from the Galapagos studied at CAS, FMNH, and USNM. Also six specimens, 66-92 mm, from Coco Island, Costa Rica.

*Stegastes redemptus*

(Fig. 12)

*Pomacentrus redemptus* Heller and Snodgrass, 1903. *Proc. Wash. Acad. Sci.*, 5: 200, Pl. 6 (type locality: Clarion Island, Revillagigedo Islands).

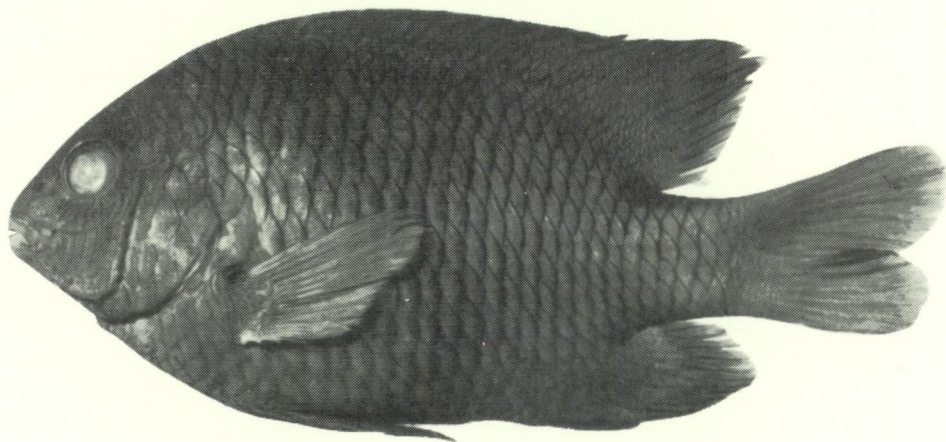


Fig. 12: *Stegastes redemptus*, 103 mm, Revillagigedo Islands (FMNH 61888).

*Diagnosis*

(Proportions based on 18 specimens, 80-107 mm) Dorsal fin rays XII,15 (rarely 14); anal rays II,13; pectoral rays 20 (rarely 19 or 21); scales in lateral line bearing tubes 20 (rarely 19 or 21); vertical scale rows from upper edge of gill opening to caudal fin base 26 (rarely 27), between lateral line and origin of dorsal fin  $3\frac{1}{2}$ , between 13th lateral-line scale and anal opening

10; gill rakers on lower limb of first branchial arch 13-14 (rarely 12 or 15). (rarely 12 or 15).

Depth of body 1.9 to 2.0, head length 3.0 to 3.5, both in standard length; snout length 2.7 to 3.0, eye diameter 3.0 to 3.6, interorbital width 3.1 to 3.8, preorbital width 5.1 to 5.8, depth of caudal peduncle 1.8 to 2.0, length of caudal peduncle 2.4 to 3.1, of pectoral fin 1.0 to 1.2, of pelvic fin 0.8 to 1.1, of caudal fin 0.9 to 1.1, all in head length.

Colour in alcohol: juveniles (under 60 mm) — slightly paler than adults; a black spot, about equal to eye size, at base of anteriormost soft dorsal rays; much smaller black spot on dorsal edge of caudal peduncle. These markings gradually fade with growth and are no longer apparent after a length of approximately 60-65 mm is attained. Adults and subadults — reddish-brown on head, nape and upper sides above lateral line; tip of snout darker than rest of head, lips dusky; sides below lateral line with dark oblique streaks following scale rows formed by dark margins along scales; centres of scales lighter brown, yellowish or even reddish in freshly preserved specimens; spiny dorsal membranes dark along distal edge, tips of soft rays forming dorsal margin dark; posterior half of soft dorsal with membranes dark, rays pale; caudal fin pale, outer edges with a very narrow dark line; membranes of caudal, soft dorsal, and anal fins dusky; anal fin coloured as adjacent body on basal scaly portion, rays pale, membranes dark; pelvic fins dark, membranes darker than rays; pectoral fins pale, a small black spot on base of upper ray extending along outer edge of upper pectoral ray; inner face of pectoral base dark overall with distinct pale streak across basal portion of rays.

Colour in life: juvenile (30 mm collected by Mr Alex Kerstitch at Cabo San Lucas) — overall bright yellow with some duskiness on upper back; a prominent dark spot at base of anterior soft dorsal rays; a smaller dark spot on upper edge of caudal peduncle. Another juvenile, 40 mm, was maintained in captivity for four months by Mr Kerstitch. During this period the fish grew to 60 mm and assumed an overall dusky colour with only a hint of the dorsal spot remaining. Adult (from 35 mm transparency taken by Mr Dave Powell at Socorro Island in six metres depth, total length of fish approximately 130 mm) — head and anterior portion of body light brown, middle portion of body gradually becoming darker brown and posterior one-fourth whitish; most of body scales with prominent blackish margins giving overall reticulated appearance; large diffuse bluish patch on upper back and posterior portion of spiny dorsal fin in transitional region between light and dark parts of body; remainder of spinous dorsal charcoal coloured with narrow black margin; soft dorsal and anal fins mostly whitish with pale yellow on outer portion; caudal fin pale yellow; pelvic fins dark brown; pectoral fins transparent, but slightly yellowish.

### *Range*

Previously known only from Revillagigedo Island, but Mr Alex Kerstitch (personal communication) recently collected two juveniles, 30-40 mm SL, at Bahia Santa Maria, Cabo San Lucas, Baja California.

### *Remarks*

This species appears to be most closely related to *S. arcifrons*, but differs significantly with regard to head shape and modal number of gill rakers on the lower limb of the first branchial arch (Table 1). The forehead profile of *S. arcifrons* is blunter or steeper than that of *S. redemptus* (compare Figs 11 and 12). In addition, there are consistent colour pattern differences. The lips of *S. redemptus*, particularly the upper, are not significantly paler than the surrounding area as they are in *S. arcifrons*. Also the outer portion of the longest dorsal rays tend to be dusky in *S. redemptus* and noticeably pale in *S. arcifrons*. Finally, there is a significant difference in the colouration of juveniles: those of *S. arcifrons* lack the small dark spot on the dorsal surface of the caudal peduncle which is characteristic for *S. redemptus*.

### *Material examined*

Holotype, SU 6358, 108 mm, Clarion Island, Revillagigedo Islands, Mexico. Numerous additional specimens at CAS, FMNH, UCLA, and USNM, all from the Revillagigedo Islands, 38-112 mm.

## ACKNOWLEDGEMENTS

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