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A NEW DAMSELFISH, *CHROMIS LUBBOCKI* (TELEOSTEI: POMACENTRIDAE) FROM THE CAPE VERDE ARCHIPELAGO, WITH NOTES ON OTHER EASTERN ATLANTIC POMACENTRIDS

CANCAP Project, Contributions to the Zoology, Botany and Paleontology of the Canarian-Cape Verdean region of the North Atlantic Ocean, no. 61.

by

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Edwards Alasdair: A new damselfish, *Chromis lubbocki* (Teleostei: Pomacentridae) from the Cape Verde Archipelago, with notes on other eastern Atlantic pomacentrids. CANCAP Project, Contributions to the Zoology, Botany and Paleontology of the Canarian-Cape Verdean region of the North Atlantic Ocean, no. 61.

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Key words: Pomacentridae; eastern Atlantic; *Chromis lubbocki* spec. nov.; Cape Verde Archipelago;

A new species of damselfish *Chromis lubbocki* (Teleostei: Pomacentridae) from the Cape Verde Archipelago is described. The following combination of characters separates *C. lubbocki* from other eastern Atlantic *Chromis*: Dorsal fin rays XIV, 12; pectoral fin rays 20 (occasionally 19 or 21); transverse scale rows 27 (rarely 26); scales below lateral-line 9, scales between terminal lateral-line scale and dorsal base $1\frac{1}{2}$; 22-24 gill-rakers on lower limb of first gill-arch; second anal spine longer than longest anal ray; length of second anal spine 18.0-22.2% SL; pelvic fins short, length of longest ray 23.0-29.6% SL; fins yellowish in life.

A key to the five species of *Chromis* now known from the eastern Atlantic is provided and their nomenclature discussed.

Using the pomacentrid collections of the CANCAP project of the Rijksmuseum van Natuurlijke Historie as a basis, the taxonomic status of other eastern Atlantic pomacentrids is reviewed and unresolved taxonomic problems outlined. Finally, a provisional list of pomacentrid species occurring in the eastern Atlantic is given.

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INTRODUCTION

Four species of the genus *Chromis* Cuvier are currently known from the eastern Atlantic and Mediterranean. These are: (1) *Chromis chromis* (Lin-

naeus, 1758) from the Mediterranean Sea, Black Sea and coast of southern Portugal as far as 38.5°N; (2) *C. limbata* (Valenciennes, 1833) from the Azores, Madeira Archipelago, Canary Islands and mainland coast of West Africa from Senegal to the Congo; (3) *C. cadenati* Whitley, 1951 at present known only from the mainland coast of West Africa from Senegal to Ghana; and (4) *C. multilineata* (Guichenot, 1853) recorded from the Cape Verde Archipelago, the island of São Tomé and the mainland coast of West Africa from Ghana to the Congo (Cadenat, 1949a, 1951a; Osorio, 1893; Roux, 1957; Saldanha, 1966; Wood, 1977). The gender of *Chromis* has been discussed by Emery (1975) and I follow him in regarding the genus as feminine.

In the present paper a fifth species of *Chromis*, *C. lubbocki*, which appears to be confined to the Cape Verde Archipelago, is described and a key to the identification of East Atlantic *Chromis* is presented. In addition, the nomenclature of each of the eastern Atlantic species of the genus is discussed briefly.

Other pomacentrids reliably recorded from the Cape Verde Archipelago are the amphi-Atlantic *Abudefduf saxatilis* (Linnaeus, 1758) and *A. taurus* (Müller & Troschel, 1848), and the eastern Atlantic species: *Stegastes imbricatus* Jenyns, 1842; "*A.*" *luridus* (Cuvier, 1830), "*Parma*" *hermani* (Steindachner, 1887) and *A. hoefleri* (Steindachner, 1881). During a visit to the Cape Verde Archipelago in 1979, all these species were encountered except for *A. taurus* which has been reported from there under the synonym *A. analogus* (Gill, 1863) by Cadenat (1951b) and Franca and Vasconcelos (1962), and *A. hoefleri* which has been reported from the Cape Verde Archipelago by Osorio (1909) and, as *Abudefduf* sp., by Franca & Vasconcelos (1962).

Finally, because of the considerable confusion over the status of several of the nominal species of pomacentrid recorded from the eastern Atlantic, their nomenclature is briefly reviewed, the unresolved taxonomic problems outlined and a provisional list of species given. This review is based largely on a collection of about 80 pomacentrid specimens built up during the long-term exploratory collecting programme (CANCAP project) of the Rijksmuseum van Natuurlijke Historie in the subtropical and tropical eastern Atlantic. This project is discussed in more detail by den Hartog (1984).

MATERIALS AND METHODS

In 1979, during stop-overs at the islands of São Vicente and Brava in the Cape Verde Archipelago, the Cambridge Expedition to Saint Paul's Rocks collected five specimens of the new *Chromis* species in shallow water, using

spears. Three further specimens were collected at the islands of Santa Luzia and São Vicente in June 1982 during the CANCAP-VI expedition, and recently I discovered four specimens, originally reported as *C. chromis* (Franca & Vasconcelos, 1962), in collections made by the Navio Oceanográfico "Baldaque da Silva" of the Missão de Biologia Marítima in 1958 and 1959. The additional, hitherto unreported, pomacentrid material was collected primarily by the Dutch oceanographic vessel H.N.I.M.S. "Tydeman" during CANCAP-II in 1977 and CANCAP-IV in 1980 at the Canary Islands, CANCAP-III in 1978 at Ilhéus Selvagens and the Madeira Archipelago, CANCAP-V in 1981 at the Azores and CANCAP-VI in 1982 at the Cape Verde Archipelago and at Cap Vert in Senegal (D = Diving station; K = Coastal Station).

Type specimens have been deposited at the British Museum (Natural History), London (BMNH), at the Rijksmuseum van Natuurlijke Historie, Leiden (RMNH), and at the Instituto Nacional de Investigação das Pescas, Lisbon (INIP). Material from the Muséum National d'Histoire Naturelle, Paris (MNHN), and National Museum of Natural History, Washington D.C. (USNM) has also been examined. The INIP specimens from the Cape Verde Archipelago were originally deposited at the Centro de Biologia Piscatória, Lisbon (Franca & Vasconcelos, 1962).

All measurements are made to the nearest 0.1 mm with dial calipers. Standard length (SL) is measured from the anterior end of the snout in the median line to the base of the caudal fin (posterior end of hypural plate). Head length is measured from the same anterior point to the most posterior edge of the gill cover. Body depth is measured where greatest, allowance being made for obvious malformation from preservation. Body width is measured where greatest. Orbit diameter is the greatest fleshy diameter. Interorbital width is measured with calipers fitting moderately tightly but without distorting interorbital area. Snout length is the horizontal distance from front edge of upper lip to a vertical at anterior edge of orbit, and length of upper jaw is the horizontal distance from front of upper lip to a vertical through posterior edge of maxilla. Measurements of dorsal and anal fin spines and rays are taken from the base of the scaly sheath, where present. Lengths of rays include filamentous extensions. Length of caudal peduncle is measured horizontally between verticals at rear of base of anal fin and base of caudal fin. Caudal length is the horizontal distance between posterior end of hypural plate and end of longest caudal ray; caudal concavity is this distance minus length of shortest caudal ray. Gill-raker counts include all elements. Longitudinal scale rows (exclusive of sheath scales at median fin bases) are counted forwards and upwards from the origin of anal fin to lateral-line and from there to dorsal fin base. Transverse scale rows are counted from the up-

per angle of the gill opening to the posterior of the hypural plate. Vertebral counts and detailed caudal fin ray counts are made from radiographs. Counts of caudal vertebrae do not include terminal half-centrum.

In the description of *Chromis lubbocki*, measurements and counts are those of the holotype (86.4 mm SL), followed in parentheses by those of the paratypes where these differ. More measurement data are presented in table 1 than are summarised in the text. Proportional measurements are expressed as a percentage of SL unless otherwise stated and, in the text, are rounded to the nearest 0.05.

THE NEW SPECIES OF *CHROMIS* FROM THE CAPE VERDE ARCHIPELAGO

***Chromis lubbocki* spec. nov.**

(figs. 1, 2d, tabs. 1-3)

Material. — Holotype: BMNH 1982.4.2:17, 86.4 mm SL, coll. H.R. Lubbock, spear, 5-15 m, over rocks, Porto da Fajã, Brava Is., Cape Verde Archipelago, 4 September 1979.

Paratypes: BMNH 1982.4.2:16, 32.4 mm SL, collected with holotype; BMNH 1982.4.2:19, 51.9 mm SL, coll. H.R. Lubbock, spear, 0-7 m, over rocks off breakwater, Porto Grande, São Vicente Is., Cape Verde Archipelago, 1 September 1979; BMNH 1982.4.2:18, 94.8 mm SL, coll. H.R. Lubbock, spear, end of the breakwater, Porto Grande, São Vicente Is., Cape Verde Archipelago, 30 August 1979; BMNH 1982.4.2:20, 112.8 mm SL, coll. H.R. Lubbock, A.J. Edwards and D. Lindsay, 2-8 m, off rocks at Punta Machado, São Vicente Is., Cape Verde Archipelago, 1 September 1979; RMNH 29211 and 29212, 120.2 and 118.6 mm SL resp., CANCAP-VI Sta. D07, 16°45'N 24°46'W, coll. J. van Egmond and M.J.P. van Oijen, spears, 5-10 m, on rocky slopes of Ilhéu Zinho, off south-west coast of Santa Luzia Is., Cape Verde Archipelago, 16 June 1982; RMNH 29542, 118.7 mm SL, CANCAP-VI Sta. D12, 16°55'N 24°59'W, depth to 15 m, rocky coast, bay west of Mindelo, northern coast of São Vicente Is., Cape Verde Archipelago, 21/22 June 1982; INIP 5053 [MBM-1958-NO-P74], 113.2 mm SL, hand-line, Baía das Gatas, São Vicente Is., Cape Verde Archipelago, 5 August 1958; INIP 5316 [MBM-1959-NO-P16], 57.4 mm SL, recovered from the stomach of an *Epinephelus guaza* caught at 50 m depth on a bottom-line, bank (15°25.3'N 23°25.9'W) between São Tiago Is. and Maio Is., Cape Verde Archipelago, 20 April 1959; INIP [MBM-1958-NO-P35, in part], 55.0 mm SL, trawling net, Tarrafal de Monte Trigo, Santo Antão Is., Cape Verde Archipelago, 30 July 1958.

Additional material (not used in description). — INIP [MBM-1959-NO-P58], 35.2 mm SL, trawling net, Tarrafal de Monte Trigo, Santo Antão Is., Cape Verde Archipelago, 2 July 1959.

Diagnosis. — Dorsal fin rays XIV, 12; anal fin rays II, 11; pectoral rays 19–21 (usually 20); tubular lateral-line scales 18-19 (usually 19); transverse scale rows 27 (rarely 26); gill-rakers 8-9 + 1 + 21-23. Body moderately deep, depth 2.0-2.45 in SL; eye fairly large, orbit diameter 2.3-3.1 in head (becoming relatively smaller with age); caudal peduncle shallow, least depth 1.95-2.45

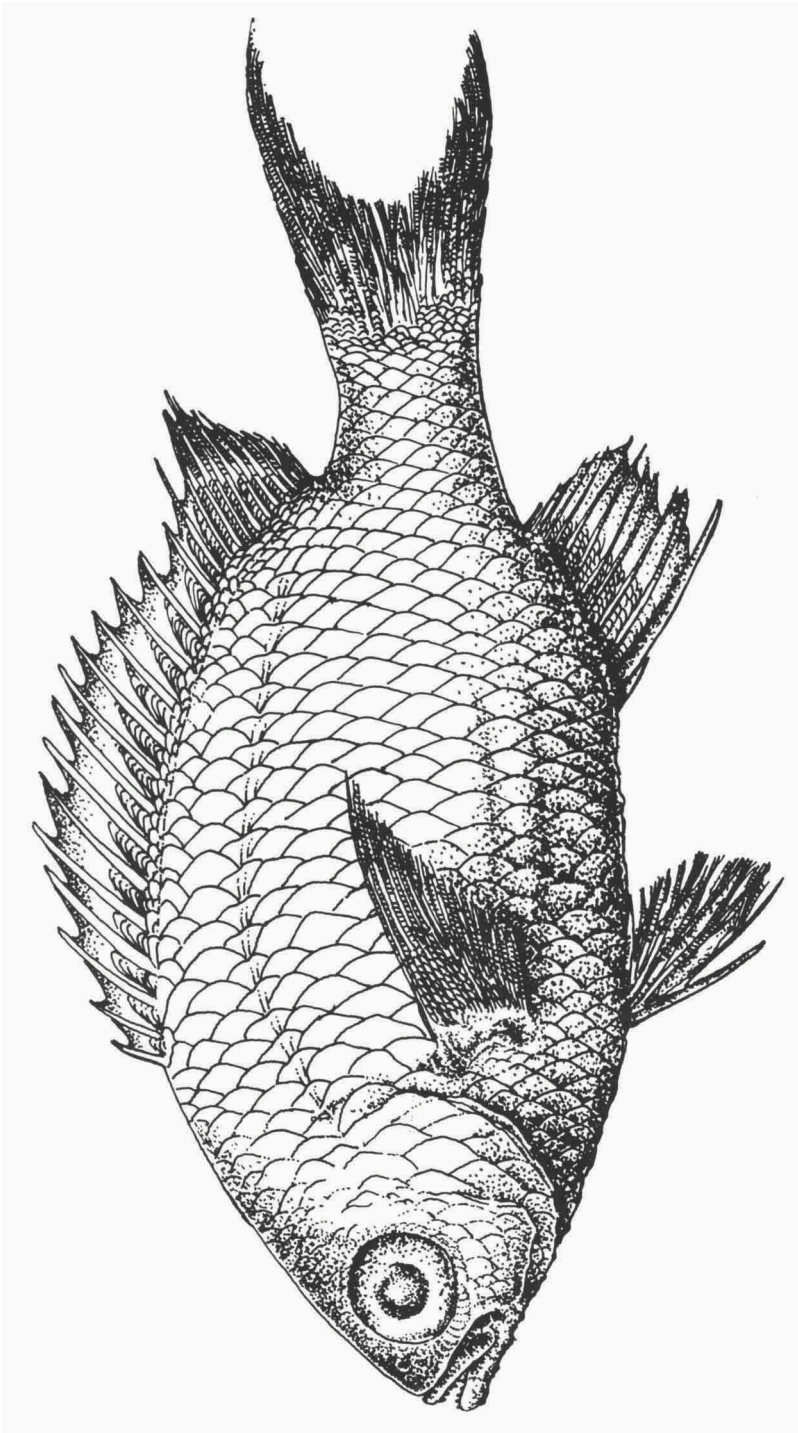


Fig. 1. Holotype of *Chromis tubbocki* spec. nov., 86.4 mm SL.

in head; second anal spine longer than longest anal ray, length of first anal spine in second 2.5-3.2; length of second anal spine 18.0-22.2% SL; pectoral fin relatively short, length 24.2-29.1% SL; pelvic fin rays also relatively short, length of longest ray 23.0-29.6% SL. Head and body greyish brown, arrangement of pigment on the scales giving the appearance of horizontal stripes; fins yellowish in life, black spot on pectoral axil.

Description. — Dorsal fin rays XIV, 12; anal fin rays II, 11; pectoral fin rays 20 (19-21, usually 20), first ray closely applied to second, first two rays and last two rays unbranched; principal caudal rays 15 (middle 13 branched); total upper caudal rays 13, outer 3 procurrent; total lower caudal rays 12, outer 3 procurrent. Tubed lateral-line scales 19 (18-19, usually 19); transverse scale rows 27 (26-27, usually 27); longitudinal scale rows 9 + 1 + 1½; circumpeduncular scales 16. Branchiostegal rays 6; gill-rakers on first arch 8 + 1 + 22 (8-9 + 1 + 21-23 = 30-33, smaller juvenile not included); precaudal vertebrae 11, caudal vertebrae 14.

Body moderately deep, depth 2.2 (2.0-2.45) in SL, and laterally compressed, width 2.5 (2.15-3.0) in depth; head profile approximately conical, head length 3.35 (2.85-3.85) in SL, tending to be relatively shorter with age; snout length 4.85 (4.05-6.3) in head, tending to be relatively shorter in juvenile specimens; eye large, diameter of orbit 2.57 (2.3-3.1) in head; interorbital space broad and flattened medially, its width 3.15 (2.45-3.20) in head; caudal peduncle usually slightly longer than deep, least depth 2.15 (1.95-2.45) in head (for additional measurements see table 1).

Single nasal opening on each side of snout at level of pupil; mouth terminal, oblique and small, maxilla extending posteriorly to just beyond a vertical at the anterior edge of orbit; head relatively sharply pointed, forehead barely convex; slightly concave, pupil-sized area in middle of interorbital space; tip of snout, preorbital region immediately surrounding nostrils, lips and anterior of chin and isthmus naked, remainder of body scaled; scales finely ctenoid; preopercle bearing 4 rows of scales at angle and 3 rows behind orbit at level of pupil, inner row of scales adjacent to orbit small; opercle with 3 major rows of scales at level of pupil, and bearing a single spine on posterior margin just above level of pectoral axil; lateral-line gently arched beneath dorsal fin, sixth tubed scale 2½ scale rows (counted postero-ventrally) below first dorsal spine, last tubed-scale 1½ scale rows below last dorsal spine; bases of pectoral, dorsal and anal fins scaled; bases of both anal and dorsal fins with scaly sheath (beginning at about fourth dorsal spine on dorsal fin), and with single rows of scales lying between spines and rays on up to basal two-thirds of membranous portion of fins; up to basal fifth of pectoral fin covered in small scales; outer rays of caudal fin minutely scaled along almost full length.

Teeth of jaws small, conical and multiserial, with largest teeth in outer row and irregular series of smaller teeth behind; 36-54 teeth in outer row of upper jaw, front four teeth on each side usually larger than others and slightly recurved; 1-2 rows of smaller teeth inside outer row, except towards posterior of upper jaw; 40-58 teeth in outer row of lower jaw; anterior teeth tend to be stubbier, those at back of lower jaw more dagger-like; two irregularly spaced rows of smaller teeth lie behind eight or so anterior teeth on each side, anterior 2-4 teeth on each side of lower jaw larger than those behind.

Spines of dorsal, anal and pelvic fins pungent; pelvic fin connected to belly by membrane, extending posteriorly about three-quarters of length of large pelvic axillary scale; longest interpelvic scale and axillary scales approximately the same length; longest (first) pelvic soft ray extending posteriorly beyond vent, and, in juveniles, reaching second anal spine. Origin of dorsal fin at a vertical through third to fourth tubed lateral-line scales, termination of lateral-line at a vertical through first to second soft dorsal rays; soft portion of dorsal fin sharply angled at fourth to fifth soft rays. Second anal spine 2.45-3.2 times length of first anal spine and marginally longer than longest soft anal ray. Caudal fin moderately deeply forked, upper lobe longer than lower lobe.

Colour in alcohol. — Body pale yellowish-brown, becoming dusker dorsally; indistinct pattern of horizontal greyish stripes following edges of scale rows usually present (obscured where body dusky). Fins, except pectoral, dusky. Black spot at anterior of dusky pectoral base, remainder of pectoral pale; pectoral axil with black mark almost as large as orbit. Juveniles yellow and less dusky than adults.

Colour when newly dead. — Head and body greyish with tinges of yellow, becoming darker dorsally; about eight horizontal, faint light bluish-grey stripes on body following scale rows; iris light to dark grey. Dorsal fin greyish basally, becoming yellowish brown and then brown to dark brown on distal third to a half; basal half of anal fin greyish-yellow, spines and distal half brownish-yellow; upper and lower lobes of caudal fin yellowish on basal quarter, becoming yellowish-brown and then brown posteriorly, central rays yellowish grey-brown; pectoral fins dark yellowish hyaline with tinges of brown, a black spot covering inner, upper three-quarters of axil and upper quarter of pectoral base; basal half of pelvic fins whitish, becoming brown distally.

Juvenile similarly coloured; but caudal lobes and basal half of anal fin deep yellow with tinges of brown; basal half of dorsal fin yellowish-brown; caudal peduncle yellowish; and posterior half of body yellower than adult.

Colour in life (from photographs). — Head and body greyish brown, cen-

	Holotype		Paratypes				
	BM(NH) 1982.4.2:16	RMINH 29211	RMINH 29212	BM(NH) 1982.4.2:20	BM(NH) 1982.4.2:18	BM(NH) 1982.4.2:19	BM(NH) 1982.4.2:17
Standard length (mm)	86.4	120.2	118.6	112.8	94.8	51.9	32.4
Greatest body depth	45.4	42.4	43.0	41.8	48.3	50.1	44.1
Greatest body width	18.2	19.1	20.1	18.5	16.6	18.3	18.5
Head length	29.7	26.0	26.7	27.6	29.6	33.7	34.9
Snout length	6.1	5.4	6.6	5.4	6.5	6.0	5.6
Orbit diameter	11.6	9.6	8.9	9.6	9.7	12.1	15.1
Interorbital width	9.5	9.5	8.9	10.0	9.9	11.6	11.7
Length of upper jaw	8.0	6.2	6.7	6.8	7.3	7.7	8.0
Least depth of caudal peduncle	13.9	13.1	12.0	12.9	14.9	15.0	14.2
Length of caudal peduncle	17.5	17.3	16.7	17.0	14.8	17.3	14.5
Predorsal length	32.6	30.3	32.5	33.2	31.4	32.9	32.1
Preanal length	65.4	66.4	63.7	64.5	66.0	63.8	62.4
Prepelvic length	34.3	38.4	36.1	34.2	36.8	38.0	37.3
Length of 1st dorsal spine	6.5	broken	6.1	6.0	6.3	7.1	6.8
Length of 4th dorsal spine	14.1	14.5	12.1	13.7	13.0	16.4	15.1
Length of last dorsal spine	11.8	11.1	10.8	11.1	11.7	12.5	9.9
Length of longest dorsal ray	18.4	17.5	18.6	17.4	19.1	18.5	18.2
Length of dorsal fin base	56.9	58.5	57.5	54.4	57.1	58.6	57.4
Length of 1st anal spine	7.5	6.8	6.9	6.5	7.1	7.5	6.8
Length of 2nd anal spine	21.1	18.4	18.0	18.2	18.9	21.0	19.8
Length of longest anal ray	19.6	16.1	15.8	17.0	17.7	19.5	18.8
Length of anal fin base	19.9	20.2	21.2	19.9	21.0	21.8	21.3
Length of caudal fin	30.9	30.6	31.9	28.5	30.4	37.2	31.2
Caudal concavity	14.7	14.6	15.9	14.6	13.0	19.1	13.0
Length of pectoral fin	29.1	25.9	25.3	26.2	27.4	29.1	28.7
Length of pelvic spine	16.4	14.6	13.3	14.2	16.7	18.1	16.4
Length of pelvic fin	23.7	24.0	23.9	23.0	26.6	27.4	26.2

Table 1. Proportional measurements of the holotype and selected paratypes of *Chromis lubbocki* (expressed as a percentage of standard length).

tres of scales pale so that each scale clearly delineated by its darker edge; horizontal rows of pale scales with dark edges give striped appearance; dorsal and anal fins yellow; anal spines and tips of dorsal spines light blue, anterior of soft portions of these fins also edged in light blue; outer edges of caudal fin yellow, extreme edges tinged bluish-white; pectoral fins yellowish, their rays dark; black spot at anterior of pectoral base, and large dark spot on inside of pectoral axil clearly visible when pectoral lowered (fig. 2d).

Remarks. — *Chromis lubbocki* is commonly encountered in shallow water (< 10 m depth) in the Cape Verde Archipelago, often in mixed schools with *C. multilineata* (Guichenot). Specimens of *Chromis* from the Cape Verde Archipelago assigned to *C. chromis* (Linnaeus) by Franca & Vasconcelos (1962: 53-54) are this species, as presumably were those of Bowdich (1825) and those assigned to *C. cadenati* Whitley (recorded as *C. lineatus*) by Cadenat (1951b).

Distribution. — *Chromis lubbocki* appears to be confined to the Cape Verde Archipelago (fig. 3c). The only other *Chromis* reliably recorded from these islands is the shallow-bodied *C. multilineata*.

Comparisons. — *Chromis lubbocki* can be readily distinguished from *C. multilineata* by its possession of fourteen dorsal spines (as opposed to twelve in the latter species), its deeper body, yellowish caudal fin lacking conspicuous dark bands on the upper and lower edges, and lack of a white spot below the rear of the soft portion of the dorsal fin.

C. lubbocki closely resembles the three remaining eastern Atlantic *Chromis*, all of which have fourteen spines in the dorsal fin, but seems most similar to *C. cadenati* from the mainland coast of tropical West Africa. For ready comparison, summaries of the meristic and morphometric characteristics of all four species are presented in tables 2 and 3. It differs from *C. chromis*, *C. limbata* and *C. cadenati* in possessing 12 soft dorsal fin rays and a second anal spine which is always longer than the longest anal ray. Note, however, that *C. limbata* which usually has 11 soft dorsal fin rays may occasionally have 12 and that Cadenat (1949a) reported that rarely *C. cadenati* may have 12 dorsal fin rays. Additional characters which separate *C. lubbocki* from *C. limbata* are the yellowish fins, usually greater number of gill-rakers on the lower limb of the first gill-arch, shallower caudal peduncle, shorter last dorsal spine, and proportionately shorter, longest soft dorsal ray, pectoral and pelvic fins (table 2).

C. lubbocki may be distinguished from *C. cadenati* by its proportionately longer second anal spine and, in most cases, by its shorter first dorsal spine and longest soft dorsal ray (tables 3 and 4). It is readily separable from *C. chromis* by its higher dorsal and pectoral fin ray counts (table 2) and proportionately shorter pelvic fins.

	Soft dorsal rays					Soft anal rays				Pectoral rays					
	8	9	10	11	12	9	10	11	12	16	17	18	19	20	21
<i>C. lubbocki</i>					11			11					1	9	1
<i>C. cadenati</i>					13†		1	11	1				1	10	2
<i>C. chromis</i>	2	17	35	6		6	46	8			12	48			
<i>C. limbata</i>				45	9		1	44	9				3	44	7

	Lateral-line scales					Upper			Gill-rakers						
									Lower limb						
	16	17	18	19	20	7	8	9	20	21	22	23	24	25	
<i>C. lubbocki</i>			2	9				5	5			3	6	1	
<i>C. cadenati</i>			1	4	8			1	12				4	5	3
<i>C. chromis</i>	2	13	30	2				6	9		2	3	4	1	
<i>C. limbata</i>			7	37	9	1		10	3		3	6	4		

Table 2. Comparison of meristic characters of eastern Atlantic *Chromis* species with fourteen dorsal spines. For *C. limbata* and *C. chromis* the raw data of Wood (1977) has been included with my own counts. † = Reported as rarely 12 by Cadenat (1949a). Longitudinal scale rows counted forwards and upwards from origin of anal fin to lateral-line, and from terminal lateral-line scale to base of dorsal fin: *C. lubbocki* (9+1+1½); *C. cadenati* (8+1+2½); *C. chromis* (8+1+1½); *C. limbata* (9+1+2½).

Etymology. — The fish is named after the late Hugh Roger Lubbock, leader of the Cambridge Expedition to Saint Paul's Rocks, who first recognized the fish as being a new species.

KEY TO SPECIES OF *CHROMIS* FROM THE EASTERN ATLANTIC AND MEDITERRANEAN

This key is broadly based on that of Wood (1977).

1. Dorsal spines XIV; dorsal rays 9-12 (very rarely 8); anal rays 10-11 (occasionally 9 or 12) 2
 - Dorsal spines XII (rarely XIII); dorsal rays 12 (rarely 11 or 13); anal rays 12 (rarely 11) *C. multilineata*
2. Dorsal rays 12; pectoral rays usually 20 (occasionally 19 or 21); tubed lateral-line scales 18-19 (usually 19); gill-rakers on lower limb of first arch 22-24 (modally 23); second anal spine longer than longest anal ray; length of second anal spine 18.0-22.2% SL; caudal fin lacking dark bands along upper and lower margins *C. lubbocki*

	<i>Chromis lubbocki</i> (11: 32.4-120.2 mm SL)		<i>Chromis cadenati</i> (10: 70.1-140.0 mm SL)		<i>Chromis chromis</i> (10: 74.5-119.1 mm SL)		<i>Chromis limbata</i> (10: 56.9-97.9 mm SL)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Greatest body depth	44.2	(40.6-50.1)	42.6	(40.3-44.7)	47.6	(44.7-51.9)	50.2	(45.8-52.5)
Greatest body width	18.2	(15.6-20.1)	17.4	(16.3-19.0)	20.0	(18.4-22.3)	19.8	(18.6-20.9)
Head length	29.2	(26.0-34.9)	30.1	(28.8-31.1)	29.0	(27.2-30.0)	30.4	(28.5-32.0)
Snout length	5.8	(4.9- 6.6)	6.1	(5.3- 7.0)	5.5	(4.1- 6.5)	5.7	(5.1- 6.2)
Orbit diameter	10.8	(8.9-15.1)	9.5	(8.7-10.7)	9.1	(8.3-10.2)	10.8	(9.6-11.7)
Interorbital width	10.1	(8.9-11.7)	10.0	(9.3-11.0)	10.9	(9.9-11.9)	10.8	(10.2-11.6)
Length of upper jaw	6.8	(5.7- 8.0)	6.6	(5.5- 8.5)	6.7	(5.6- 7.7)	6.3	(5.6- 7.6)
Least depth of caudal peduncle	13.6	(12.0-15.0)	14.0	(13.1-15.1)	15.7	(14.2-16.6)	15.6	(14.9-16.5)
Length of caudal peduncle	16.1	(13.9-17.5)	15.2	(14.4-16.1)	16.5	(15.3-17.5)	14.4	(11.7-15.7)
Predorsal length	31.9	(30.3-34.0)	33.1	(31.6-34.3)	32.8	(30.1-35.9)	33.8	(31.1-36.2)
Preanal length	64.7	(62.4-66.4)	65.7	(63.6-67.8)	65.0	(63.1-67.9)	65.8	(64.3-67.8)
Prepelvic length	36.3	(34.2-38.7)	36.6	(34.2-38.2)	35.7	(34.1-38.7)	34.4	(31.8-38.0)
Length of 1st dorsal spine	6.7	(6.0- 7.7)	8.0	(7.3- 8.9)	6.7	(5.4- 8.1)	6.8	(6.1- 8.9)
Length of 4th dorsal spine	14.7	(12.1-17.5)	15.6	(13.6-17.4)	15.1	(13.4-16.3)	15.7	(14.6-18.1)
Length of last dorsal spine	11.5	(9.9-12.5)	13.7	(11.2-14.7)	11.9	(10.7-13.4)	13.9	(12.7-14.6)
Length of longest dorsal ray	18.7	(17.4-21.3)	21.5	(20.5-22.9)	20.9	(19.7-21.7)	24.6	(22.3-26.5)
Length of dorsal fin base	56.5	(53.6-58.6)	55.7	(54.4-58.1)	56.9	(55.1-59.0)	59.5	(57.0-60.8)
Length of 1st anal spine	7.1	(6.0- 8.2)	6.6	(6.0- 7.4)	7.4	(5.3- 8.7)	7.7	(7.1- 9.0)
Length of 2nd anal spine	19.7	(18.0-22.2)	15.7	(14.3-17.0)	15.9	(14.3-18.3)	18.6	(17.1-20.4)
Length of longest anal ray	18.4	(15.8-21.5)	18.8	(17.9-21.1)	19.5	(17.5-21.4)	21.7	(18.7-24.1)
Length of anal fin base	21.0	(19.9-22.0)	21.4	(19.8-23.1)	21.1	(20.3-22.6)	22.9	(21.2-24.9)
Length of caudal fin	31.0	(27.2-37.2)	33.9	(31.2-39.6)	33.7	(31.4-36.2)	41.2	(32.5-47.7)
Length of pectoral fin	27.0	(24.2-29.1)	28.3	(27.1-30.5)	30.4	(28.0-32.7)	31.5	(29.4-33.2)
Length of pelvic spine	15.8	(13.3-18.1)	15.2	(13.6-16.9)	15.6	(14.7-16.4)	17.0	(15.2-18.6)
Length of pelvic fin	25.6	(23.0-29.6)	27.8	(23.9-30.4)	31.2	(30.0-32.5)	33.2	(28.6-35.7)

Table 3. Comparison of morphometrics of eastern Atlantic *Chromis* species with fourteen dorsal spines. All measurements are expressed as a percentage of standard length.

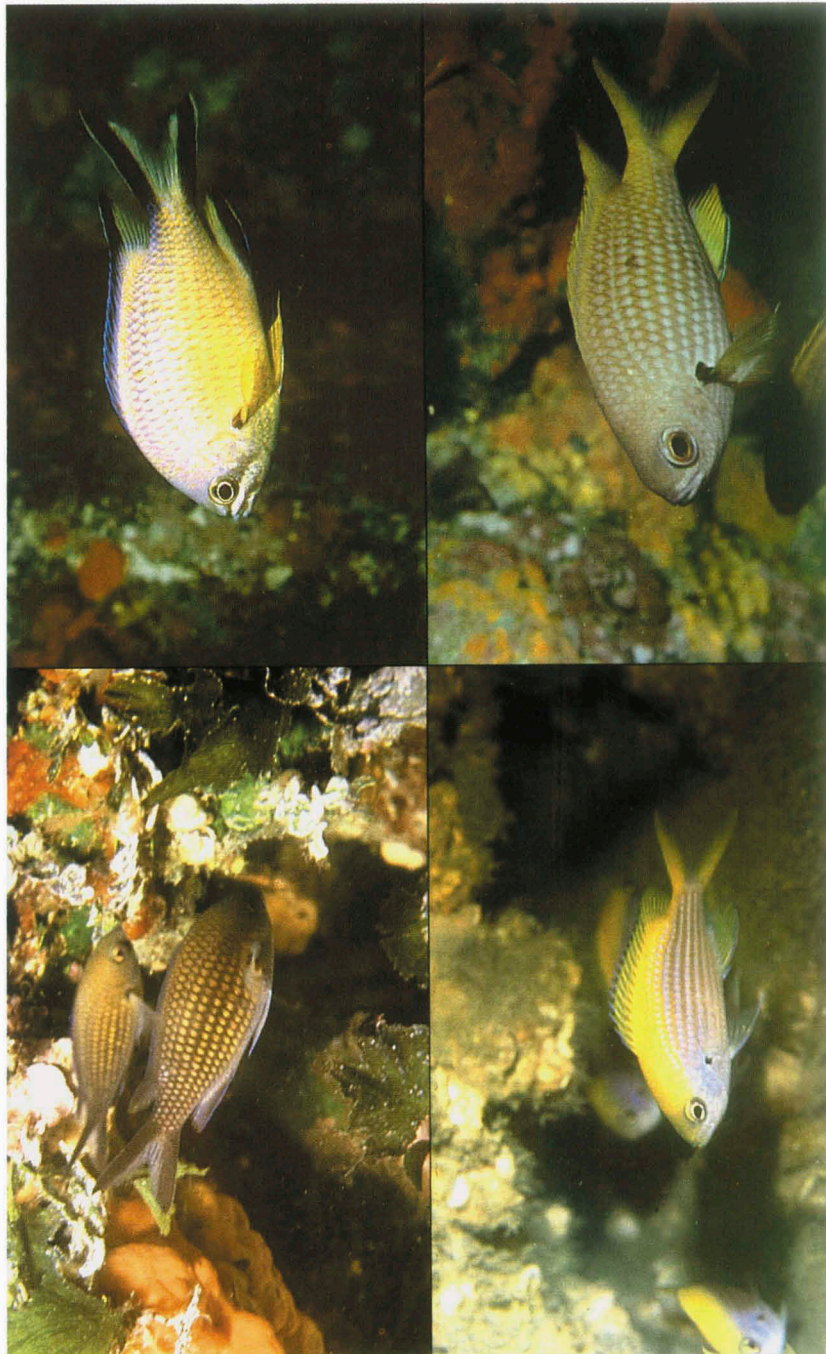


Fig. 2. The eastern Atlantic species of *Chromis* with 14 dorsal spines. 2a (upper left). *C. chromis*, Malta, J. Lythgoe. 2b (upper right). *C. limbata*, Madeira, R. Rozendaal. 2c (lower left). *C. cadenati*, Ghana, H.R. Lubbock. 2d (lower right). *C. lubbocki*, Brava Is., Cape Verde Archipelago, H.R. Lubbock.

- Not as above; dorsal rays usually less than 12; second anal spine shorter than longest anal ray 3
- 3. Greatest body depth usually less than 44.7% SL (40.3-44.7% SL); pectoral rays 20 (occasionally 19 or 21); 23-25 gill-rakers on lower limb of first gill-arch *C. cadenati*
- Greatest body depth usually greater than 44.7% SL (44.7-52.5% SL); pectoral rays 17-19 (rarely 20); 20-22 gill-rakers on lower limb of first gill-arch (rarely 23) 4
- 4. Length of longest dorsal ray less than 22% SL (19.7-21.7% SL); length of caudal peduncle 15.3-17.5% SL; pectoral rays 17-18 (usually 18); number of soft anal or dorsal rays rarely more than 10; black bands not present along margins of median fins; juveniles vivid blue in colour *C. chromis*
- Length of longest dorsal ray greater than 22% SL (22.3-26.5% SL); length of caudal peduncle 11.7-15.7% SL; pectoral rays usually 19-20 (rarely 18); number of soft anal and dorsal rays almost always 11 or 12; adults with blackish bands along distal edges of dorsal and anal fins and upper and lower margins of caudal fin (fig. 2b); juveniles similarly coloured to adult *C. limbata*

NOMENCLATURE AND DISTRIBUTION OF EASTERN ATLANTIC *CHROMIS* SPECIES

Chromis chromis (Linnaeus, 1758) (fig. 2a, tabs. 2, 3)

Sparus chromis Linnaeus, 1758: 280, (type locality: "southern Europe", Mediterranean).

Chromis castanea Cuvier, 1816: 356, (Mediterranean). Substitute name proposed for *S. chromis* Linnaeus. (Sherborn (1914) indicated that p. 341-416 of this volume for 1815 were published in 1816).

Material examined. — BMNH 1975.5.29:30-40 (in part) (5 specimens: 90.6-119.1 mm SL), Gibraltar; BMNH 1978.7.20:166-172 (in part) (5 specimens: 74.5-80.3 mm SL), Puerto Javea, Spain; additional material listed in Wood (1977).

Known from the Mediterranean, Black Sea, Sea of Azov and coast of southern Portugal (Saldanha, 1966; Wood, 1977; Arruda, 1980) (fig. 3a). Detailed comparisons between Mediterranean, and Black Sea and Sea of Azov populations have yet to be carried out. The behaviour and ecology of this species are discussed by Abel (1961) and Wood (1977). Before it became clear

that there are several species of 14 spined *Chromis* in the eastern Atlantic, *C. limbata*, *C. cadenati* and *C. lubbocki* were all reported as this species at one time or another. *C. chromis* is the type-species of *Chromis* Cuvier, first established in Desmarest (1814), and first used in binomial form when Cuvier (1816) published *C. castanea* as his substitute name for *Sparus chromis* Linnaeus (cf. Emery, 1975). Arruda (1980) considers *C. chromis* to be composed of two subspecies: an Atlantic island-West African subspecies (*C. c. limbata*) and a Mediterranean-Portuguese subspecies (*C. c. chromis*). His subspecies are here considered as separate species (see below). Grows to at least 126 mm SL.

***Chromis limbata* (Valenciennes, 1833)**
(fig. 2b, tabs. 2, 3)

Heliases limbatus Valenciennes in Cuvier & Valenciennes, 1833: 511-512, (type locality: Madeira).
Heliases marginatus Valenciennes, 1843: 27 (Canary Islands). Substitute name. In the legend for fig. 1, pl. 7 of the Atlas of Valenciennes' work (published in 1838), the species is referred to as *Heliases limbatus*.

Reported as *Heliastes chromis* and *Chromis chromis* by numerous authors (see Wood, 1977).

Material. — RMNH 29543 (1 specimen: 95.1 mm SL), CANCAP-IV Sta. D01, 28°50'N 13°47'W, west of Punta Papagayo, south coast of Lanzarote Is., Canary Islands, 14/19 May 1980; RMNH 29544 (5 specimens: 76.7-91.4 mm SL), CANCAP-II Sta. D3, 28°12'N 14°1'E, rocky bottom and sand, 5-15 m, south coast of Fuerteventura Is. near Punta de Gran Tarajal, Canary Islands, 26/29 August 1977; RMNH 29545 (1 specimen: 80.4 mm SL), CANCAP-II Sta. D2, 28°4'N 14°30'W, 10-15 m, sandy bottom with seagrass and rocks, Punta Jandia, south-west coast of Fuerteventura Is., Canary Islands, 24 August 1977; RMNH 29546 (2 specimens: 92.3, 94.5 mm SL), CANCAP-II Sta. D5, 28°4'N 14°21'W, 10-15 m, rocky and sandy bottom, near Punta de Morro Jable, south coast of Fuerteventura Is., Canary Islands, 30 August 1977; RMNH 29547 (1 specimen: 80.3 mm SL), CANCAP-II Sta. D6, 28°4'N 14°30'W, 10-15 m, sandy bottom with seagrass and rocks, Punta Jandia, south-west coast of Fuerteventura Is., Canary Islands, 31 August 1977; RMNH 29548 (1 specimen: 74.0 mm SL), CANCAP-II Sta. D9, 27°41'N 18°2'W, 10-15 m, rocky bottom with sand, Tecerone, south coast of Hierro Is., Canary Islands, 9 September 1977; BMNH 1895.5.28:82-83 (2 specimens: 84.1-89.0 mm SL), coll. C. Baring and W.R. Ogilvie-Grant, Madeira; BMNH 1975.5.29:8-21 (in part) (5 specimens: 56.9-97.9 mm SL), coll. E. Wood, 10-12 m depth, São Miguel, Azores; BMNH 1977.3.21:115 (1 specimen: 60.7 mm SL), coll. H.R. Lubbock and D. John, 10-12 m, Prampram, Ghana; BMNH 1981.4.1:7-8 (2 specimens: 88.2-91.5 mm SL), coll. M. Holloway, Arrecife Market, Lanzarote Is., Canary Islands; USNM 270828, Guinean Trawl Survey, 1 specimen, R.V. "La Rafale" Sta. 3 Trans. 7, 9°13'N 14°38'W, 40-45 m, trawl, off Guinée, 26 November 1963; additional material listed in Wood (1977).

Valenciennes's species *Heliases limbatus* was considered a synonym of *Chromis chromis* by most authors until Wood (1977) recognised that it was indeed a valid species which could be separated from *C. chromis* on behavioural, colour and standard meristic and morphometric characters. Dif-

ferences in breeding behaviour are of particular interest. Previously Saldanha (1966) had noted the marked variability between “*Chromis chromis*” (as it was then understood) populations of Mediterranean and eastern Atlantic origin. Arruda (1977, 1980), using a limited number of characters, carried out detailed comparisons between Mediterranean, Madeira, Azores, Canaries and Portuguese populations of *Chromis*. He concluded that the form *limbata* was best considered as a subspecies of *C. chromis* on the basis of the level of differentiation achieved using the characters he chose. However, the adult coloration (fig. 2b), juvenile coloration (Ré & Gomes, 1982) and certain behaviours (Mapstone & Wood, 1975) of *C. limbata* are quite distinct from those of *C. chromis* (fig. 2a; Saldanha, 1966; Abel, 1961; Wood, 1977). These characteristics, several of which are intimately related to the breeding biology of the fishes, cannot be ignored. I thus follow Wood (1977) in considering *C. limbata* as a distinct species. Known from the Azores, Madeira Archipelago, Canary Islands and mainland coast of West Africa from Senegal to at least as far south as Pointe Noire in the Congo (Arruda, 1980; Cadenat, 1951a; Roux, 1957; Wood, 1977) (fig. 3b). Grows to at least 115.5 mm SL (Bauchot, Desoutter & Allen, 1978). The record of *C. chromis* from Moçâmedes, Angola in Penrith (1978) is based on a juvenile specimen of *Stegastes imbricatus*.

***Chromis cadenati* Whitley, 1951**

(fig. 2c, tabs. 2-4)

Chromis chromis, Norman & Irvine (*non* Linnaeus) in Irvine, 1947: 173-174, (Prampram, Ghana).

Chromis lineatus Cadenat, 1949a: 669-671 (figure), (type locality: Senegal). Name preoccupied by *Chromis lineatus* Flower & Bean, 1928: 50-51, pl. 3, (Philippines).

Chromis cadenati Whitley, 1951: 66. Proposed as replacement name for *C. lineatus* Cadenat.

Material. — BMNH 1939.7.12:29-30 (3 specimens: 132.3-163.8 mm SL), coll. Irvine, deep water, Prampram, Ghana; BMNH 1977.33.21:103-104, 105-106 (4 specimens: 70.1-75.3 mm SL), coll. H.R. Lubbock, 25 m, oil rig 5 miles off Tema, Ghana; BMNH 1977.3.21:107 (1 specimen: 140.0 mm SL), coll. H.R. Lubbock, 52 m, trawled on rocky bank 70 miles west of Accra, Ghana; MNHN 1950-73 (3 specimens: 125.1-131.0 mm SL, Syntypes), coll. IFAN (trawler “Gérard-Tréca”), up to 35 m, off Joal, Senegal; MNHN 1957-115 (1 specimen: 110.7 mm SL), coll. Prudhomme, Senegal; MNHN 1971-125 (1 specimen: 112.4 mm SL), coll. Arnoult, coast of Guinea; USNM 270823, Guinean Trawl Survey, 1 specimen, R.V. “La Rafale” Sta. 3 Trans. 29, 4°4' N 1°39' W, 40 m, trawl, off Ghana, 19 September 1963; USNM 270824 (4 specimens: 71.5-90.8 mm SL), Guinean Trawl Survey, R.V. “La Rafale” Sta. 5 Trans. 16, 5°24'30'' N 9°49' W, 70 m, trawl, off Liberia, 3 November 1963; USNM 270825 [lost] (1 specimen: 102.3 mm SL), Guinean Trawl Survey, R.V. “La Rafale” Sta. 4 Trans. 4, 10°23' N 16°25' W, 50 m, trawl, off Guinée, 6 December 1963; USNM 270826 (2 specimens: 72.1, 79.5 mm SL), Guinean Trawl Survey, R.V. “Thierry” Sta. 3a Trans. 30, 4°49' N 0°57' W, 40 m, trawl, off Ghana, 5 September

	BM(NH) ³	SYNTYPES		MNHN 1971-125	MNHN 1957-115	BM(NH) ¹	BM(NH) ²	BM(NH) ¹	BM(NH) ²	BM(NH) ¹	BM(NH) ²
		MNHN 1950-73	MNHN 1950-73								
Standard length	140.0	131.0	127.2	125.1	112.4	110.7	75.3	73.8	70.9	70.1	70.1
Greatest body depth	43.3	42.7	40.3	42.0	41.9	40.8	42.6	44.6	44.7	42.8	42.8
Greatest body width	16.3	17.2	17.5	19.0	17.0	15.4	17.7	17.8	18.5	18.1	18.1
Head length	29.8	30.2	30.3	30.3	29.1	30.8	28.8	30.6	30.0	31.1	31.1
Snout length	6.6	5.8	6.1	5.4	6.0	5.8	5.3	7.0	6.2	6.4	6.4
Orbit diameter	9.1	8.7	9.0	9.3	9.1	9.4	10.1	9.8	10.3	10.7	10.7
Interorbital width	9.9	11.0	9.9	10.6	9.3	9.6	9.4	10.3	10.6	9.4	9.4
Length of upper jaw	7.4	5.8	5.8	6.6	5.5	8.5	7.4	6.8	6.5	5.8	5.8
Least depth of caudal peduncle	14.3	13.1	13.6	13.7	13.3	13.6	14.1	14.9	15.1	14.4	14.4
Length of caudal peduncle	15.4	16.1	15.0	15.3	14.6	15.3	16.1	15.4	14.4	14.7	14.7
Predorsal length	31.9	33.1	34.3	33.4	33.2	31.6	33.2	33.2	33.6	34.0	34.0
Preanal length	66.1	65.8	67.0	66.8	65.2	67.8	63.6	63.8	64.5	66.5	66.5
Prepelvic length	36.6	35.8	38.1	37.4	34.2	37.7	36.8	35.0	36.1	38.2	38.2
Length of 1st dorsal spine	7.4	7.4	8.3	7.8	8.4	8.9	8.4	8.3	7.5	7.3	7.3
Length of 4th dorsal spine	14.9	13.8	15.3	13.6	16.4	16.1	16.2	15.6	16.4	17.4	17.4
Length of last dorsal spine	14.6	12.9	14.4	12.9	14.1	11.2	14.7	13.6	14.4	14.3	14.3
Length of longest dorsal ray	21.1	21.2	22.7	20.5	20.7	21.3	21.2	22.9	22.0	21.0	21.0
Length of dorsal fin base	57.3	55.2	56.2	58.1	54.4	56.1	55.4	54.5	55.7	54.4	54.4
Length of 1st anal spine	6.5	6.6	6.8	6.8	6.1	7.4	6.4	6.5	7.2	6.0	6.0
Length of 2nd anal spine	14.3	15.1	15.4	14.9	17.0	16.0	15.0	16.4	16.6	16.3	16.3
Length of longest anal ray	19.2	17.9	20.0	17.9	18.1	19.4	18.1	21.1	18.2	18.0	18.0
Length of anal fin base	21.2	21.0	19.8	20.1	20.5	21.2	22.2	22.6	23.1	22.7	22.7
Length of caudal fin	32.3	34.5	32.8	39.6	32.0	32.1	35.1	31.2	35.3	34.5	34.5
Length of pectoral fin	29.1	28.8	28.3	28.6	28.6	30.5	27.1	28.0	27.1	27.2	27.2
Length of pelvic spine	14.3	14.4	13.6	14.6	15.2	16.2	15.7	15.4	16.9	16.0	16.0
Length of pelvic fin	23.9	27.2	27.6	27.7	27.4	30.4	27.9	28.9	28.5	28.2	28.2

Table 4. Proportional measurements of ten specimens (including three syntypes) of *Chromis cadenati* (expressed as a percentage of standard length).
¹1977.3.21:105-106, ²1977.3.21:103-104, ³1977.3.21:107.

1963; USNM 270827, Guinean Trawl Survey, 1 specimen, R.V. "Thierry" Sta. 4a Trans. 30, 4°44'N 0°55'W, 50 m, trawl, off Ghana, 5 September 1963.

This colourful species (fig. 2c) was described initially by Cadenat (1949a) from Senegal specimens and is now known also from the mainland coast of West Africa off Guinea, Liberia and Ghana (see Material examined) (fig. 3c). Generally it seems to occur in deeper water (20-70 m depth: Cadenat, 1949a; Guinean Trawl Survey data). *Chromis cadenati* appears to be the largest of the eastern Atlantic species of *Chromis*, reaching at least 165 mm SL. Cadenat's description is rather brief and I have thus included detailed measurements of 10 specimens in table 4.

***Chromis multilineata* (Guichenot, 1853)**

Heliases multilineatus Guichenot, 1853: 76-77, pl. II, fig. 2, (type locality: Cuba).

Heliases marginatus Castelnau (*non* Valenciennes), 1855: 9, pl. 3, fig. 1, (type locality: Bahia, Brazil).

Onychognathus cautus Troschel, 1866: 231-233, pl. V (legend p. 239), figs 12-14, (type locality: Cape Verde Archipelago).

Material. — RMNH 29549 (3 specimens: 87.2-89.1 mm SL), CANCAP-VI Sta. D01, 14°55'N 23°30'W, depth to 15 m, sandy and rocky bottom, sheltered bay south-east of Praia, São Tiago Is., Cape Verde Archipelago, 4/5 June 1982.

The status of the nominal species *Chromis marginata* (Castelnau) and *C. cauta* (Troschel), and the populations of "*C. multilineata*" *sensu lato* at Ascension and St Helena Islands are currently being investigated by the author and Dr A.R. Emery, National Museum of Natural Sciences, Ottawa. At present it is not clear whether the eastern Atlantic form of *C. multilineata s.l.* should be considered as (a) a valid species *C. cauta*, (b) a subspecies *C. multilineata cauta*, or (c) merely one of many geographical variant populations of a pan-Atlantic species *C. multilineata* (fig. 3d). Pending the results of our study I have followed Wood (1977) in considering the eastern Atlantic form as *C. multilineata*.

NOMENCLATURE AND IDENTITIES OF OTHER EASTERN ATLANTIC POMACENTRIDS

In the following section I outline the nomenclatural and taxonomic problems associated with various nominal species of pomacentrid recorded from

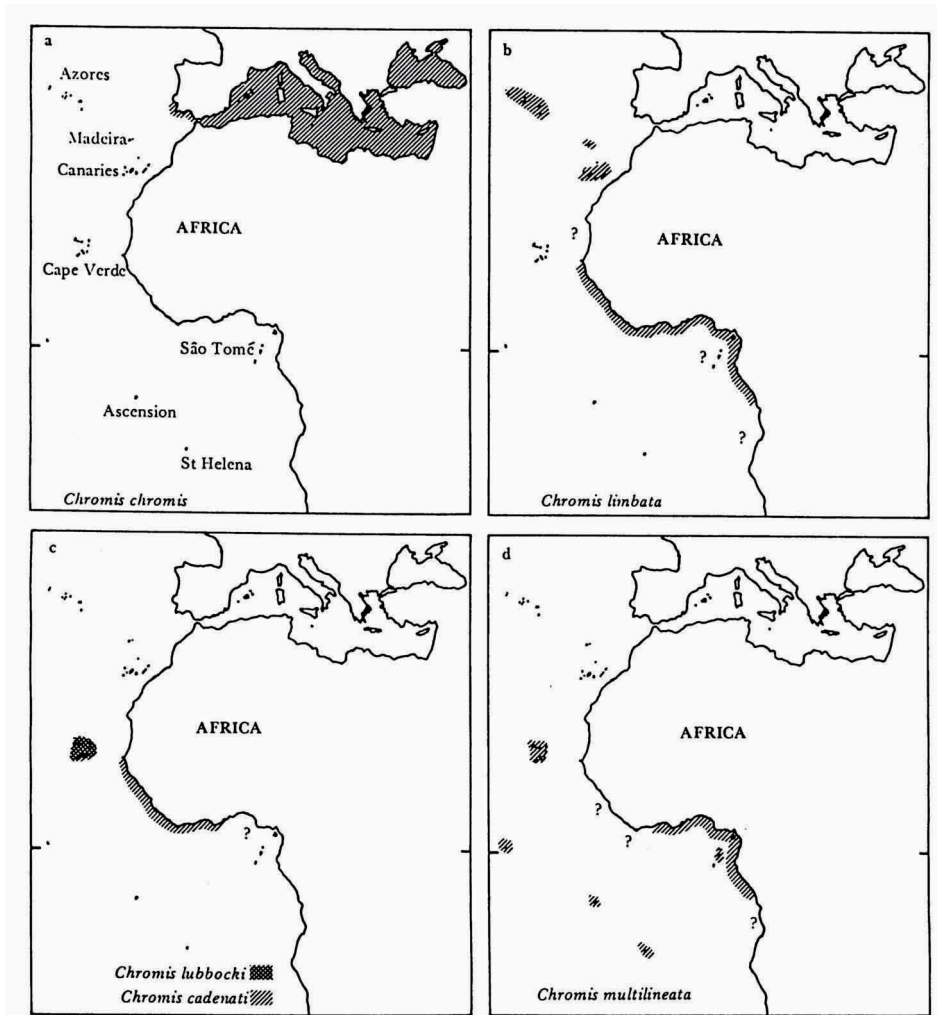


Fig. 3. The ranges of eastern Atlantic *Chromis* species. (b) *C. limbata* might be expected to occur in suitable rocky habitats between Cap Vert and the Canary Islands; also it is unclear whether this species occurs at São Tomé and the other Gulf of Guinea islands or whether it ranges south of Pointe Noire, Congo to Angola. Two other tropical pomacentrids, *Abudefduf taurus* and *Stegastes imbricatus*, are both found as far south as Moçâmedes in Angola. (c) At present it is not known whether *C. cadenati* ranges east of Ghana on the West African coast. (d) *C. multilineata* might be expected to occur at localities between Ghana and the Cape Verde Archipelago and perhaps range south of Pointe Noire to Angola. Areas where distributions are uncertain due to the paucity of records are denoted by "?".

the eastern Atlantic. These species are dealt with under the names by which they are commonly referred to in the eastern Atlantic. The types of several nominal species are unfortunately no longer extant so the status of some of these species may never be satisfactorily resolved. In particular, Rochebrune (1880, 1882) described two pomacentrid species (“*Pomacentrus Hamyi*” and “*Heliastes bicolor*”) from Casamance, Senegal which do not appear to match closely any of the twelve species currently known in the eastern Atlantic. The types of both are lost and I tentatively assign these *nomina dubia* to the taxa to which they appear closest.

***Abudefduf analogus* (Gill, 1863)**

Material. — RMNH 29550 (3 specimens: 41.0-82.3 mm SL), CANCAP-VI Sta. K15, 16°45'N 24°46'W, sandy coast, south-west of Ilha de Santa Luzia, Cape Verde Archipelago, 16 June 1982; RMNH 29551 (18 specimens: 25.2-65.6 mm SL), coll. F.C. Roest, Fann Residence, Cap Vert, Dakar, Senegal, 23 March 1982.

This species was described briefly (as *Euschistodus analogus*) by Gill (1863) on the basis of a specimen from the Caribbean coast of the isthmus of Panama. It is a synonym of *Abudefduf taurus* (Müller & Troschel, 1848). D.A. Hensley tentatively excludes this species from *Abudefduf* on account of its adnate suborbitals and deeply notched teeth and places it in *Nexilarius* Gilbert. Thorough comparisons of eastern Pacific, western Atlantic and eastern Atlantic populations of *Nexilarius*-group species are needed to determine the precise taxonomic status of these forms. Meanwhile, there is clearly no justification for the use of the western Atlantic junior synonym *analogus* (sometimes misspelt *anologus*) for the eastern Atlantic form of *Abudefduf taurus* as has been customary (Blache, Cadenat & Stauch, 1970; Blanc, Cadenat & Stauch, 1968; Cadenat, 1951a, 1951b; Franca & Vasconcelos, 1962; Monod, 1927; Penrith, 1978). *A. taurus* is recorded in the eastern Atlantic from the Cape Verde Archipelago and Cap Vert, Senegal in the north to as far south as Moçâmedes in Angola.

***Abudefduf hoefleri* (Steindachner, 1881)**

Material. — INIP 5006 [MBM-1958-NO-P46] (1 specimen: 167 mm SL), paternoster line, Baía de Monte Trigo, Santo Antão Is., Cape Verde Archipelago, 31 July 1958; INIP 5026 [MBM-1958-NO-P59] (1 specimen: 148.7 mm SL), paternoster line, Baía do Passo do Pau, Santo Antão Is., Cape Verde Archipelago, 1 August 1958.

This species was described and figured by Steindachner (1881, 1882) from a specimen collected at Gorée, Senegal. I have examined two specimens of *Abudefduf* from the Cape Verde Archipelago whose characters differ from those of *A. saxatilis* but agree well with the description and figure of this species. Since *A. hoefleri* is so poorly known (Emery, 1981), I include a brief note of characters which serve to distinguish these specimens from *A. saxatilis*, the eastern Atlantic species to which it appears most similar.

Dorsal fin rays XIII, 14; anal fin rays II, 13; head length 25.0-25.3%, body depth 49.3-50.0%, least depth caudal peduncle 14.7-15.0%, third dorsal spine length 12.9-14.0% and greatest head breadth 21.1-22.0% of standard length. Preserved specimens may be mistaken for *A. saxatilis* but comparisons of proportional measurements of specimens of a similar size from both species indicate that *A. hoefleri* has a shorter head, is less deep bodied, has a shallower caudal peduncle, longer third dorsal spine, and a broader head and body. In addition, *A. saxatilis* tends to have one fewer dorsal and anal soft rays. Steindachner (1882) described the colour of *A. hoefleri* as blue-violet with each scale on the trunk having a more-or-less sharply defined, bright gold-yellow spot.

A. hoefleri has also been reported from Ilhéu das Rôlas, São Tomé (= Ilhéu Gago Coutinho) in the Gulf of Guinea (Osorio, 1891), from Razo Is., Cape Verde Archipelago (Osorio, 1909) and from Dahomey (= Benin) where it was apparently common in lagoons and eaten after being smoked (Pellegrin, 1914). Irvine (1947) recorded it from Ghana but his specimen (BMNH 1939.7.12:28) is *A. taurus*.

“*Abudefduf*” *luridus* (Cuvier, 1830)

Material. — RMNH 29552 (3 specimens: 60.3-105.2 mm SL), CANCEP-IV Sta. D01, 28°50'N 13°47'W, west Punta Papagayo, south coast of Lanzarote Is., Canary Islands, 14/19 May 1980; RMNH 29553 (11 specimens: 49.0-100.2 mm SL), CANCEP-IV Sta. D03, 28°57'N 13°33'W, Recife, south-east coast of Lanzarote Is., Canary Islands, 20/21 May 1980; RMNH 29554 (1 specimen: 89.6 mm SL), CANCEP-III Sta. D4, 32°31'N 16°31'W, depth to 15 m, west coast of Deserta Grande, Ilhéus Selvagens, 18 October 1978; RMNH 29555 (1 specimen: 97.9 mm SL), CANCEP-II Sta. D3, 28°12'N 14°1'E, 5-15 m, rocky bottom and sand, near Punta de Gran Tarajal, south coast of Fuerteventura Is., Canary Islands, 26 August 1977; RMNH 29556 (2 specimens: 102.4-103.9 mm SL), CANCEP-II Sta. D6, 28°4'N 14°30'W, 10-15 m, sandy bottom with seagrass and rocks, Punta Jandia, south-west coast of Fuerteventura Is., Canary Islands, 31 August 1977; RMNH 29557 (4 specimens: 52.4-94.9 mm SL), CANCEP-III Sta. D5, 32°44'N 16°44'W, depth to 20 m, Caniçal, south-east coast of Madeira Is., 19-20 October 1978; RMNH 29558 (1 specimen: 123.2 mm SL), CANCEP-V Sta. D07, 38°31'N 28°37'W, rocky coast south of harbour, Horta, south-east Faial Is., Azores, 1/5 June 1981; RMNH 29559 (2 specimens: 91.7-102.1 mm SL), CANCEP-III Sta. D6, 30°08'N 15°52'W, 5-20 m, Enseada das Cagarras, south-west coast of Selvagem Grande, Ilhéus Selvagens, 21 October 1978; RMNH 29560 (1

specimen: 43.2 mm SL), CANCAP-II Sta. D9, 27°41'N 18°2'W, 10-15 m, rocky bottom with sand, Tecerone, south coast of Hierro Is., Canary Islands, 10 September 1977; RMNH 29561 (6 specimens: 49.4-92.1 mm SL), CANCAP-II Sta. D8, 27°42'N 18°8'W, 5-25 m, rocky bottom with some sand, off Faro de Orchilla, south-west coast of Hierro Is., Canary Islands, 8 September 1977; RMNH 29562 (1 specimen: 61.3 mm SL), CANCAP-IV, south or east coast of Lanzarote Is., Canary Islands, May 1980; RMNH 29563 (2 specimens: 52.9, 80.4 mm SL), CANCAP-III Sta. D05, 32°44'N 16°44'W, rocky littoral with rockpools, 20 m, Caniçal, south-east coast of Madeira Is., 19/20 October 1978; RMNH 29564 (1 specimen: 96.7 mm SL), CANCAP-II Sta. D7, 27°39'N 18°W, 10-15 m, rocky bottom, Puerto Naos, south coast of Hierro Is., Canary Islands, 3 September 1977; RMNH 29565 (2 specimens: 72.4, 97.2 mm SL), CANCAP-II Sta. D9, 27°41'N 18°02'W, 10-15 m, rocky bottom with sand, diving, Tecerone, south coast of Hierro Is., Canary Islands, 9 September 1977; RMNH 29566 (1 specimen: 99.2 mm SL), CANCAP-II Sta. D3, 28°12'N 14°01'W, 5-15 m, rocky bottom with sand, near Punta de Gran Tarajal, south coast of Fuerteventura Is., Canary Islands, 26/29 August 1977; RMNH 29567 (1 specimen: 91.7 mm SL), CANCAP-II Sta. K12, 28°04'N 14°30'W, exposed rocky littoral with large rockpools, Punta Jandia, west coast of Fuerteventura Is., Canary Islands, 24/31 August 1977; RMNH 29568 (1 specimen: 92.6 mm SL), CANCAP-IV Sta. D01, 28°50'N 13°47'W, west Punta Papagayo, south coast of Lanzarote Is., Canary Islands, 14/19 May 1980; RMNH 29569 (2 specimens: 97.4, 101.0 mm SL), CANCAP-III Sta. D01, 33°N 16°23'W, 0-15 m, east of Baixo near Porto Santo, Madeira Archipelago, 15 October 1978; BMNH 1982.4.2:13 (1 specimen: 96.0 mm SL), 2-8 m, rocks, Punta Machado, São Vicente Is., Cape Verde Archipelago, coll. H.R. Lubbock, A. Edwards & D. Lindsay, 1 September 1979; BMNH 1982.4.2:14-15 (2 specimens: 43.3, 84.2 mm SL), 0-7 m, rocks, off breakwater, Porto Grande, São Vicente Is., Cape Verde Archipelago, coll. R. Lubbock, 1 September 1979.

Both the morphology and behaviour of *Abudefduf luridus* from the Cape Verde Archipelago led me to suspect that it might not be an *Abudefduf*. D.A. Hensley (pers. comm.) has confirmed that this is indeed the case. He is describing a new genus for *A. luridus* with J.K. Dooley and J. Van Tassell.

This species, which is particularly well represented in the CANCAP collections, was first described from Madeira and is also reliably recorded from the Azores, Ilhéus Selvagens, Canary Islands and Cape Verde Archipelago (Hilgendorf, 1888; Mapstone & Wood, 1975; Osorio, 1909; CANCAP project material). It has been reported from Senegal by Rochebrune (1882).

***Abudefduf marginatus* (Bloch, 1788)**

The Atlantic form of the Sergeant-Major is generally referred to under the name *Abudefduf saxatilis* but recent unpublished work of D.A. Hensley has indicated that the Linnaean types of *A. saxatilis* are best interpreted as of Indo-West Pacific origin. If the Atlantic form is to be considered as a distinct species (as done by Allen, 1976), or subspecies, the earliest available Atlantic name appears to be *A. marginatus*, the name which has been used customarily for this species by eastern Atlantic workers. Pending publication of Hensley's conclusions, I tentatively retain the name *A. saxatilis*. Known in the eastern Atlantic from the Cape Verde Archipelago south to Angola.

Chromis insolata (Cuvier, 1830)

Wood (1977) includes this species in her review of damselfishes in the eastern Atlantic on the basis of records from Senegal (as *Chromis bicolor* — see below) and St Helena Island. Günther (1868), Bauchot and Blanc (1961) and Wood (1977) record the western Atlantic *C. insolata* (type locality: Martinique) as being present at St Helena in the tropical, central South Atlantic. Recent studies by the author indicate that the deep-bodied St Helena *Chromis* is not this species but a new species which is being described elsewhere.

“Heliastes bicolor” Rochebrune, 1880

The type specimen of this species from Casamance, Senegal appears to be lost (Bauchot, Desoutter & Allen, 1978). Wood (1977) considered that Rochebrune's fish was synonymous with *Chromis insolata* (see above), however, there is no reliable record of this species in the eastern Atlantic. If Rochebrune's fish is indeed a *Chromis*, as Fowler (1936) supposed, his description and figure appear to rule out both *C. limbata* and *C. cadenati*, the only species of *Chromis* known at present from the coast of Senegal. However, in my opinion the figure of Rochebrune (1882: plate III, fig. 3) depicts not a *Chromis*, but an *Abudefduf*-like fish, and his description, particularly of the coloration [brown with a golden spot on the free part of all the scales] (Rochebrune, 1880), in many respects closely matches that of *Abudefduf hoefleri* (Steindachner, 1881, 1882) from Gorée, Senegal. His description does not appear to match any other eastern Atlantic pomacentrid. However, the number of dorsal spines is reported to be twelve in *A. bicolor* as against thirteen in *A. hoefleri*. Despite this I tentatively consider Rochebrune's *Heliastes bicolor* to be a synonym of *A. hoefleri*. However, because of (1) the absence of type specimens, (2) the inadequate description, and (3) the consequent uncertainty as to the identity of *bicolor*, I propose that the later published name *A. hoefleri* be retained for this species.

Microspathodon frontatus Emery, 1970

Records of the western Atlantic species *Microspathodon chrysurus* (Cuvier) in the eastern Atlantic are referable primarily to *M. frontatus* (type locality: Annobon = Pagalu). This species appears to occur from Ghana to at least as far south and east as the island of Pagalu (Cadenat, 1961 — *Mi-*

crospathodon indet., Ghana: Lubbock, pers. comm. — Ghana: Osorio, 1891 — Ilhéu Gago Coutinho, São Tomé, formerly Ilhéu das Rôlas: Osorio, 1895; Blanc, Cadenat & Stauch, 1968; Emery, 1970 — Pagalu: Emery, 1970 — Fernando Po). The record of *Glyphidodon* [= *Microspathodon*] *chrysurus* from the Cape Verde Archipelago reported by Osorio (1909) is referable to “*Parma*” *hermani* (see below).

“Parma” hermani (Steindachner, 1887)

Material examined: BMNH 1982.2.9:13 (1 specimen: 57.4 mm SL), 15 m, rock, Porto da Fajã, Brava Is., Cape Verde Archipelago, coll. A. Edwards, 3 September 1979.

This species appears to be endemic to the Cape Verde Archipelago and is currently being redescribed and placed in a new genus by D.A. Hensley. First described by Steindachner (1887, 1888) this species has been reported by Osorio (1905, 1909) [as *Glyphidodon chrysurus*] and by Cadenat (1949b, 1951b) and Cadenat & Roux (1964). The dorsal and anal fin ray counts given by Osorio (1909) make it clear that he was dealing with this species at the Cape Verde Archipelago and not *Microspathodon frontatus* (see above) which has similar adult coloration.

“Pomacentrus Hamyi” Rochebrune, 1880

The type of this fish from Casamance, Senegal appears to be lost (Bauchot, Desoutter & Allen, 1978). The denticulate preopercular margin and coloration (Rochebrune, 1880, 1882) suggest that Rochebrune’s fish might have been a juvenile *Stegastes imbricatus* but the soft anal ray count (10) appears too low for *S. imbricatus* (anal fin rays II, 13-15). The description does not match any other known eastern Atlantic pomacentrid and I tentatively consider *Pomacentrus hamyi* to be a junior synonym of *S. imbricatus*.

Pomacentrus leucostictus Müller & Troschel, 1848

Material. — RMNH 29570 (3 specimens: 85.0-95.3 mm SL), CANCAP-VI Sta. D01, 14°55'N 23°30'W, depth to 15 m, sandy and rocky bottom, sheltered bay south-east of Praia, São Tiago, Cape Verde Archipelago, 4/5 June 1982; BMNH 1982.4.2:12 (1 specimen: 72.0 mm SL), 0-7 m, rocks, off breakwater, Porto Grande, São Vicente Is., Cape Verde Archipelago, coll. H.R. Lubbock, 1 September 1979.

The western Atlantic name *Pomacentrus leucostictus* (type locality: Barbados) has been applied to eastern Atlantic *Stegastes* specimens by Osorio (1891: São Tomé), Fowler (1936), Cadenat (1951a: Senegal), Cadenat (1951b: Cape Verde Archipelago), Franca & Vasconcelos (1962: Cape Verde Archipelago), Blanc, Cadenat & Stauch (1968: Pagalu, formerly Annobon), Blache, Cadenat & Stauch (1970) and Penrith (1978: Moçâmedes, Angola). All these records appear referable to *Stegastes imbricatus* Jenyns (type locality: Cape Verde Archipelago).

***Pomacentrus Sanctae-Helenae* Sauvage, 1879**

Although I do not consider St Helena as part of the eastern Atlantic zoogeographic region, for conformity with Wood (1977) I include discussion of the pomacentrids of that island. The type specimen of the above species from St Helena Island appears to be lost (Bauchot, Desoutter & Allen, 1978). However, the description of Sauvage (1879) agrees reasonably well with the only *Stegastes* species at St Helena, which although considered as the western Atlantic *Pomacentrus leucostictus* Müller & Troschel [= *Stegastes leucostictus* (Müller & Troschel)], by Günther (1868) and all subsequent authors except Sauvage, is indeed a distinct species endemic to the island. A redescription of *S. sanctaehelenae* (Sauvage) based on new material recently collected by the author is being published elsewhere.

PROVISIONAL LIST OF DAMSELFISHES IN THE EASTERN ATLANTIC (excluding the islands of Ascension and St. Helena)

- Abudefduf hoefleri* (Steindachner, 1881); *A. bicolor* (Rochebrune, 1880) is tentatively considered a synonym.
 “*Abudefduf*” *luridus* (Cuvier, 1830)
Abudefduf saxatilis (Linnaeus, 1758)
Abudefduf taurus (Müller & Troschel, 1848)
Chromis cadenati Whitley, 1951
Chromis chromis (Linnaeus, 1758)
Chromis limbata (Valenciennes, 1833)
Chromis lubbocki new species
Chromis multilineata (Guichenot, 1853); *C. cauta* (Troschel, 1866) is tentatively considered a synonym.
Microspathodon frontatus Emery, 1970

“*Parma*” *hermani* (Steindachner, 1887)
Stegastes imbricatus Jenyns, 1842; *S. hamyi* (Rochebrune, 1880) is tentatively considered a synonym.

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