

A NEW PARROTFISH (SCARIDAE) FROM BRAZIL, AND
REVALIDATION OF *SPARISOMA AMPLUM* (RANZANI, 1842),
SPARISOMA FRONDOSUM (AGASSIZ, 1831), *SPARISOMA AXILLARE*
(STEINDACHNER, 1878) AND *SCARUS TRISPINOSUS*
VALENCIENNES, 1840

Rodrigo Leão de Moura, José Lima de Figueiredo and Ivan Sazima

ABSTRACT

A total of 19 species of parrotfishes (Scaridae) have been recorded from the southwestern Atlantic. Nine of these species records (*Sparisoma aurofrenatum*, *Sparisoma chrysopterum*, *Sparisoma rubripinne*, *Sparisoma viride*, *Scarus coelestinus*, *Scarus coerulesus*, *Scarus iserti*, *Scarus taeniopterus* and *Scarus vetula*) are based on misidentifications, and these species do not occur in the southwestern Atlantic. Of the remaining 10 species, *Scarus zelindae* is described as a new species, and *Sparisoma frondosum* (Agassiz, 1831), *Sparisoma amplum* (Ranzani, 1842), *Sparisoma axillare* (Steindachner, 1878) and *Scarus trispinosus* Valenciennes, 1840 are revalidated as southwestern Atlantic species. *Cryptotomus roseus* Cope, 1871, *Nicholsina usta* (Valenciennes, 1840), *Sparisoma atomarium* (Poey, 1861), *Sparisoma radians* (Valenciennes, 1840) and *Scarus guacamaia* Cuvier, 1829 are confirmed as Brazilian records. This study shows that at least five parrotfishes add to the Brazilian-endemic reef fishes isolated from the Caribbean by the freshwater plume off the Amazon and Orinoco river mouths.

There is considerable homogeneity in the western Atlantic reef fish fauna, although recent evidence indicates that the western South Atlantic harbors a sizeable portion of endemic species (Moura et al., 1999a; Floeter and Gasparini, 2000). Greenfield (1988, 1989), studying complexes of wide-ranging west Atlantic reef fishes, was the first author to remark that the known number of species restricted to the southwestern Atlantic is increasing as various groups of demersal fishes are being investigated. Subsequent work (e.g., Moura, 1995; Rocha and Rosa, 1999) confirmed that trend and also showed that several Caribbean reef fish species recorded for the Brazilian coast were, in fact, undescribed endemic species (e.g., Sazima et al., 1997, 1998). The recorded number of reef fish species endemic to the southwestern Atlantic continues to increase (Moura et al., 1999a), both by description of new species and resurrection of names from synonymies for species described previously.

Parrotfishes (family Scaridae), highly characteristic of coral reef habitats (Choat and Randall, 1986; Bellwood and Choat, 1989), are morphologically conservative (Bellwood, 1994) and coloration is extremely important for species identification (e.g., Bruce and Randall, 1985; Choat and Randall, 1986). The unavoidable reliance on color pattern to identify parrotfishes (Randall and Choat, 1980) led Schultz (1958), who first reviewed the family but examined mostly faded and long-time preserved museum specimens, to consider *Scarus spinidens* Guichenot, 1865, described from Brazil, as a junior synonym of *S. axillare* (Steindachner, 1878). The type locality of *S. axillare* was wrongly stated in the original description as North Australia (Schultz, 1958), but Steindachner's specimen in fact came from Brazil. Also, *Scarus frondosus* Agassiz, 1831 and *Scarus amplus* Ranzani, 1842, both described from Brazil, were considered by Schultz (1958) as junior synonyms

of *Sparisoma abildgaardi* (Bloch, 1791), described from the Caribbean (see Moura and Randall, 1998).

Schultz (1958, 1962) was aware of sexual dimorphism from Brock and Yamaguchi's (1954) and Winn and Bardach's (1957, 1960) papers, but not about its preponderance in family Scaridae, nor was he aware of the protogynous life history of parrotfishes. Randall (1963, 1978) and Randall and Randall (1963), then attentive to sexual dichromatism in labroids, considered *S. axillare* (Steindachner, 1878) as a junior synonym of *S. rubripinne* (Valenciennes, 1839), described from the Caribbean, but otherwise followed Schultz's general taxonomic arrangement. Additionally, of particular interest to the present work, is the fact that Schultz (1958) and Bauchot and Guibé (1960) considered *Scarus trispinosus* Valenciennes, 1840, described from Brazil, as unidentifiable.

In recent years, we have had the opportunity to collect parrotfishes along the Brazilian coast, observing their color patterns and social behavior, as well as examining museum specimens, original descriptions and type material, which led to the taxonomic revision presented herein. In this paper, a species of the genus *Scarus*, similar to *S. iserti* Bloch, 1789 and *S. taeniopterus* Desmarest, 1831, is described as new. *Sparisoma frondosum* (Agassiz, 1831), *Sparisoma amplum* (Ranzani, 1842), *S. axillare* (Steindachner, 1878) and *Scarus trispinosus* Valenciennes, 1840, endemic to Brazil, are revalidated and diagnosed. Five additional species recorded from the southwestern Atlantic are also briefly commented upon.

MATERIAL AND METHODS

Methods of counting, measuring, determining color phases and defining a specimen as juvenile or adult follow Choat and Randall (1986). Type specimens are in the fish collections of MCP, MHNN, MNHN, MZUSP, USNM, and ZUEC (institutional abbreviations follow Leviton et al., 1985). In the description, range of counts and proportional measurements are presented first, followed by values for the holotype in parentheses. Description of *Scarus zelindae* sp. n. is based on the holotype and 10 paratypes, except for vertebral counts and pharyngeal bones description, based on paratype ZUEC 4652. Abbreviations IP and TP refer to initial and terminal color phases (cf Warner and Robertson, 1978), respectively. Diagnoses are based exclusively on material examined. The generic classification used is that proposed by Bellwood (1994).

RESULTS

Scarus zelindae new species

(Fig. 1, Table 1)

Scarus croicensis. Ribeiro, 1915: 496 (listed). Ribeiro, 1918: 142 (listed). Fowler, 1941: 175 (listed). *Scarus taeniopterus*. Menezes and Figueiredo, 1985: 36 (listed). Carvalho-Filho, 1992: 193 (description).

Scarus iserti. Menezes and Figueiredo, 1985: 36 (listed). Carvalho-Filho, 1992: 192 (description, distribution, illustration).

Scarus sp. Ferreira et al., 1995: 225 (listed). Rocha et al., 1998: 563 (listed).

Holotype.—MZUSP 46651 (1-TP, 278 mm SL), Alcatrazes Archipelago (24°06'S, 45°42'W), São Paulo, Brazil, coll. R. L. Moura, 15 Apr. 1994.

Paratypes (11 spec., 152–332 mm SL): MZUSP 53159 (1-TP, 315 mm SL), Manoel Luís Reefs (00°52'S, 44°15'W), Maranhão, Brazil, coll. R. L. Moura, R. B. Francini-



Figure 1. Recently collected specimens of *Scarus zelindae* sp. n., from Alcatrazes Archipelago, southeastern Brazil. Upper fish terminal phase holotype, MZUSP 46651; lower fish initial phase paratype, MZUSP 46652 (photo F. P. Campos).

Filho and M. C. M. Rodrigues, 02 Jul.1998. MZUSP 46658 (1-IP, 263 mm SL), Salvador (14°00'S, 38°30'W), Bahia, Brazil, coll. A. O. Lima, 07 Feb. 1994. ZUEC 4631 (1-TP, 232 mm SL), Abrolhos Archipelago (17°57'S, 38°41'W), Bahia, Brazil, coll. I. Sazima, C. Sazima, J. L. Gasparini and R. L. Moura, 10–15 Jan.1997. MZUSP 47910 (1-IP, 154 mm SL), same locality and collector as MZUSP 47908, 10 Jun. 1993. MZUSP 46650 (1-TP, 332 mm SL), Alcatrazes Archipelago (24°06', 45°42'W), São Paulo, Brazil, coll. R.

Table 1. Standard length and proportional measurements of *Scarus zelindae* sp. n., holotype and 10 paratypes. Standard length is expressed in mm and proportions expressed as percentages of standard length; SD = standard deviation.

	Holotype	Range	Mean	SD
Standard length	278	152.–332		
Body depth	32.7	31.3–37.9	33.9	1.96
Body width	16.9	13.5–19.7	17.4	1.57
Head length	33.3	32.1–36.5	34.2	1.32
Snout length	13.2	11.9–15.6	13.7	1.18
Orbit diameter	4.7	3.5–6.3	5.2	0.84
Interorbital width	12.3	11.6–13.2	12.3	0.54
Caudal peduncle depth	14.7	13.3–16.3	14.9	1.03
Caudal peduncle length	13.5	11.2–17.4	13.7	1.63
Predorsal length	30.9	30.9–37.2	33.3	1.85
Prepelvic length	35.0	33.8–38.7	36.0	1.58
Dorsal fin base	56.7	51.9–59.5	56.5	2.09
Length 1st dorsal spine	8.0	8.0–11.6	9.6	1.00
Length 9 th dorsal spine	8.02	8.0–15.0	11.4	1.69
Length longest dorsal ray	12.2	10.5–15.2	13.1	1.32
Anal fin base	26.8	23.1–28.3	26.2	1.44
Length 3 rd anal spine	7.8	7.6–11.3	8.7	1.07
Length longest anal ray	10.8	10.6–13.8	12.0	1.18

L. Moura, 15 Apr. 1994. MZUSP 46652 (1-IP, 192.4 mm SL), same data as the holotype. MCP '27356' (1-IP, 194 mm SL), same locality and collector as MZUSP 46650, 02 Feb. 1993. MZUSP 46786 (1-IP, 152 mm SL), same locality and collector as MZUSP 46650, 21 Apr. 1993. ZUEC 46410 (1-IP, 157 mm SL), same locality and collector as MZUSP 46650, 25–27 Feb. 1994. USNM 357500 (1-IP, 151 mm SL), Laje de Santos (24°19'S, 46°11'W), São Paulo, Brazil, coll. R. L. Moura, 11 Jun. 1993. USNM 357501 (1-IP, 131 mm SL), same locality and collector as MZUSP 46650, 26 Apr. 1992. ZUEC 4652, dissected specimen, 235 mm SL, same locality as MZUSP 46658, 5 Nov. 1993.

Diagnosis.—Scale counts and color pattern discriminate the new species from all western Atlantic congeners. The presence of seven predorsal scales separates *S. zelindae* sp. n. from *Scarus coeruleus* (Bloch, 1786), *Scarus coelestinus* Valenciennes, 1840, *S. trispinosus* Valenciennes, 1840 and *S. guacamaia* Cuvier, 1829, all with six predorsal scales. The presence of six scales in the uppermost cheek row discriminates the new species from *S. taeniopterus* Desmarest, 1831. The dark white-edged anal fin and four white blotches embedded in the dark lateral band of IP individuals (Fig. 1) discriminates *S. zelindae* from *S. iserti* Bloch, 1789, *S. taeniopterus* Desmarest, 1831 and *S. vetula* Bloch and Schneider, 1801. Terminal phase individuals are also readily separated from the latter three species by the presence of an orange stripe on dorsal and anal fins combined with the absence of a yellow (pale in preserved specimens) area adjacent to the pectoral fin.

Description (based on holotype and 10 paratypes, 4 TP plus 6 IP).—Dorsal rays IX, 10; anal rays III, 9; pectoral rays 14 (uppermost ray rudimentary, second ray unbranched); pelvic rays I, 5; principal caudal rays 13, uppermost and lowermost unbranched; upper procurent caudal rays 5; lower procurent caudal rays 5; lateral line interrupted, dorsoanterior portion with 18–19 (18) tubed scales (tubules branched) and peduncular part with 3–4 pored plus 7–8 tubed scales (4+7); scales above lateral line to origin of dorsal fin 2; scales below lateral line to origin of anal fin 6.5; median predorsal scales 7; scale rows on cheek 3, upper row with 6, middle row with 5–7 (6), lower row with 2; circumpeduncular scales 12; gill rakers 47–52 (47); branchiostegal rays 15; vertebrae 11+14. Morphometric data summarized in Table 1.

Mouth slightly inferior, gape slightly oblique; teeth fully coalesced, forming a beak-like dental plate; median suture in each dental plate; 0–3 (3) canine teeth projecting laterally from the angle of upper dental plate (no canine teeth in IP specimens smaller than 190 mm); upper lip covering 1/2 to whole upper dental plate, and lower lip covering 2/3 to whole lower dental plate.

Upper pharyngeal bones each with row of 11 ridged molariform teeth (cusps of 5 posterior teeth flattened by wear) that interlock medially, and lateral row of small rudimentary molariform teeth which alternate with ridged molars; concave elliptical surface of lower pharyngeal bone with interdigitating molariform teeth in 5 transverse rows of 6–13, first 4 transverse rows distinctly ridged, the rest worn nearly flat.

Nostrils small, in front of upper edge of pupil, second nostril about 1/3 horizontal distance to tip of snout; internarial space 1/2 pupil diameter.

Scales large, cycloid, extending dorsally on head to mid interorbital space; fins naked, except for upper row of scales on body which extends broadly onto base of dorsal-fin (except posteriorly), and 2 vertical rows of scales basally on caudal fin (posteriormost scale pointed); scaly process of 3 scales mid-ventrally at base of pelvic fins; pointed axillary scale at lateral edge of pelvic fin base about 2/3 length of pelvic spine.

Origin of dorsal fin slightly anterior to upper end of gill opening; dorsal fin continuous without notch between spinous and soft portions; dorsal and anal spines slender and flexible, tips curving posteriorly. Caudal fin slightly rounded to slightly emarginate in both IP and TP specimens (Fig. 1), its length 2.1–2.8 (2.7) in head; fourth pectoral ray longest, 1.6–1.8 (1.8) in head; pelvic fins 1.9–2.2 (2.2) in head.

Color Pattern.—Fresh TP specimens (Fig. 1) bluish; body scales bluish green distally, orange basally; lower half of operculum orange; snout and chin orange with bluish green markings; lips edged in bluish green, the band of upper lip extending to lower edge of eye and continuing to end of preoperculum; head above this band darker; irregular bluish green horizontal band crossing upper edge of eye, ending with a distinctive blotch below 4–5th predorsal scale; transverse bluish green band joined at angles to mid-ventral bluish green band flanked by a bluish green band on operculum margin; iris orange, paler outwardly; teeth white; dorsal and anal-fins bluish green with middle orange stripe; caudal-fin with yellowish to orange irregular distal band, margin bluish green; pectoral-fins yellowish with dark margin; pelvic fins orange with bluish green lateral margin. In life, 2–3 pale bars about 2 scales wide below soft dorsal fin, corresponding to last pale spots of IP individuals. In alcohol, bluish green areas turn grayish brown, markings on head still visible; orange areas turn pale; pectoral fins turn pale.

Fresh IP specimens brown, lighter ventrally with orange caste (Fig. 1); 3–4 whitish blotches 1–2 scales wide, embedded on a smudgy dark brown mid-lateral horizontal band extending from eye onto caudal peduncle; unpaired fins uniformly dark brown, anal-fin with distinctive white margin; pelvic-fins pale. In alcohol, lateral blotches remain visible, as well as lighter anal fin margin, even in specimens preserved for up to 10 yrs.

Remarks and Distribution.—*S. zelindae* is similar to the shallow-bodied northwestern Atlantic *S. taeniopterus* and *S. iserti*, with which it has been confused (e.g., Ribeiro, 1915, 1918; Menezes and Figueiredo, 1985; Carvalho-Filho, 1992). These three shallow-bodied species share the presence of seven predorsal scales, three rows of scales on cheek, and some similarities in color pattern of both initial and terminal phases.

S. zelindae is restricted to the southwestern Atlantic, occurring from Manoel Luís Reefs, the closest well developed reefs to the Amazon River mouth (Moura et al., 1999b), south to the State of São Paulo coast, southeastern Brazil (from 0°52'S to about 24°20'S). It is remarkable that the genus *Scarus* does not occur in any southwestern Atlantic oceanic island.

Etymology.—The specific name honors Zelinda Margarida Andrade Nery Leão, a prominent geologist and enthusiastic conservationist of Brazilian reefs. The common name 'Zelinda's parrotfish' is proposed.

Additional Material.—Five non-type specimens (109–253 mm SL): MZUSP 47909 (1-IP, 185 mm SL), Abrolhos Archipelago (17°57'S, 38°41'W), Bahia, Brazil, coll. C. E. L. Ferreira, 10 Jun. 1993. MZUSP 47907 (1-TP, 253 mm SL), same data as MZUSP 47909. MZUSP 46409 (1-IP, 137 mm SL), Alcatrazes Archipelago (24°06', 45°42'W), São Paulo, Brazil, coll. R. L. Moura, Feb. 1994. MZUSP 46781 (1-IP, 131 mm SL), same locality and collector as MZUSP 46409, 24 Nov. 1991. MZUSP 46408 (1-IP, 109 mm SL), same locality and collector as MZUSP 46409, 25–27 Feb. 1994.

Comparative Material.—*S. taeniopterus* (6 spec. 85.5–283 mm SL): UF 16629 (1 of 13, IP, 171 mm SL), Kingston fish market, Jamaica. UF 28747 (1 IP, 125 mm SL), Grand Cayman, Cayman Islands, coll. C. R. Gilbert and J. C. Tyler, 24 Oct. 1964. USNM 10178 (1-TP, 190mm SL), Cuba, coll. F. Poey. USNM 010383 (1-TP, 204 mm SL), same data as

USNM 10178. USNM 175761 (1-TP, 283 mm SL), Bermuda, coll. H. Winn, 02 Jun. 1956. USNM 319139 (1 of 2, IP, 85.5 mm SL), Buccoo Reef, Tobago, coll. J. T. Williams, 11 Sep. 1990.

S. iserti (5 spec. 76.5–195 mm SL): UF 1460 (1-IP, 195 mm SL), Grand Bahama Island, Bahama Islands, coll. E. L. Pierce, 17 Sep. 1951. USNM 319141 (1-TP, 132 mm SL), Buccoo Reef, Tobago, coll. J. T. Williams, 10 Sep. 1990. USNM 319142 (2-TP, 1-IP, 76.5–128.5 mm SL), same data as USNM 319141.

Sparisoma frondosum (Agassiz in Spix and Agassiz, 1831)
(Fig. 2, left)

Scarus frondosus Agassiz in Spix and Agassiz, 1831: 98, pl. 54 (original description, type locality Brazil).

Scarus frondosus Valenciennes in Cuvier and Valenciennes, 1840: 204 (original description, type locality Brazil).

Sparisoma frondosum. Günther, 1862: 210 (listed). Guichenot, 1865: 15 (listed). Jordan, 1887: 673 (description, distribution). Starks, 1913: 61 (listed). Ribeiro, 1915: 500 (description, distribution). Ribeiro, 1918: 142 (listed). Fowler, 1941: 175 (listed).

Sparisoma chrysopterum. Roux, 1973: 151 (description). Koike and Guedes, 1981: 69 (description, distribution). Menezes and Figueiredo, 1985: 38 (description, distribution, illustration). Carvalho-Filho, 1992: 190 (description, distribution, illustration). Begossi and Figueiredo, 1995: 714 (listed). Ferreira et al., 1995: 225 (listed). Rosa and Moura, 1997: 985 (listed). Rocha et al., 1998: 563 (listed).

Lectotype.—MHNN 581 mm SL, 61,7mm BD. Designated herein, the only known extant syntype.

Material Examined.—Eighteen spec. (139–345 mm SL): MZUSP 53168 (1-IP, 158 mm SL), Manoel Luís Reefs (00°52'S, 044°15'W), Maranhão, Brazil, coll. R. L. Moura, R. B. Francini-Filho and M. C. M. Rodrigues, 30 May 1998. USNM 346581 (1-TP, 240 mm SL; 3-IP, 175–200 mm SL), Ceará State (02°28'S, 39°28'W), Brazil, coll. RV OREGON (sta.4254), 13 Mar.1973. USNM 293203 (3-IP, 140–185 mm SL), Ceará State (03°06'S, 38°48'W), Brazil, coll. RV OREGON (sta. 4261), 14 Mar. 1963. MZUSP 49039 (2-TP, 195–202 mm SL; 2-IP, 225–260 mm SL), Rocas Atoll (03°52'S, 33°50'W), Rio Grande do Norte, Brazil, coll. R. S. Rosa and R. L. Moura, Apr.1995. ZUEC 4654 (1-IP, 139 mm SL), same locality as MZUSP 49039, coll. N. A. Menezes, Feb. 1972. MZUSP 47916 (1-IP, 202 mm SL), Abrolhos Archipelago (17°57'S, 38°41'W), Bahia, Brazil, coll. C. E. L. Ferreira, 08 Jun. 1993. MZUSP 52831 (1-IP, 196 mm SL; 1-TP, 153 mm SL), same locality as MZUSP 47916, coll. R. L. Moura, R. B. Francini-Filho, C. Sazima and I. Sazima, 22 Jan. 1998. MZUSP 46398 (1-TP, 345 mm SL), Alcatrazes Archipelago (24°06', 45°42'W), São Paulo, Brazil, coll. R. L. Moura, 25–27 Feb.1994. MZUSP 46395 (1-IP, 257 mm SL), same locality and collector as MZUSP 46398, 02 Feb. 1993. MZUSP 46802 (1 IP, 185 mm SL), Laje de Santos (24°19'S, 46°11'W), São Paulo, Brazil, coll. R. L. Moura, 23 Feb. 1992. MZUSP 46818 (1-TP, 195 mm SL), same locality as MZUSP 46802, coll. A. Carvalho-Filho, Jan. 1976.

Comparative Material.—*Sparisoma chrysopterum* (15 spec. 65.2–323 mm SL): UF 18741 (1-IP, 180 mm SL), San Salvador, Bahama Islands, coll. C. R. Gilbert and B. C. Leavitt, 6 Jan. 1972. USNM 320568 (1-TP, 246 mm SL), Little Tobago Island, Tobago, coll. J. T. Williams. USNM 331965 (1-IP, 170 mm SL), Cayo Frances, Cuba, coll. Cuban/

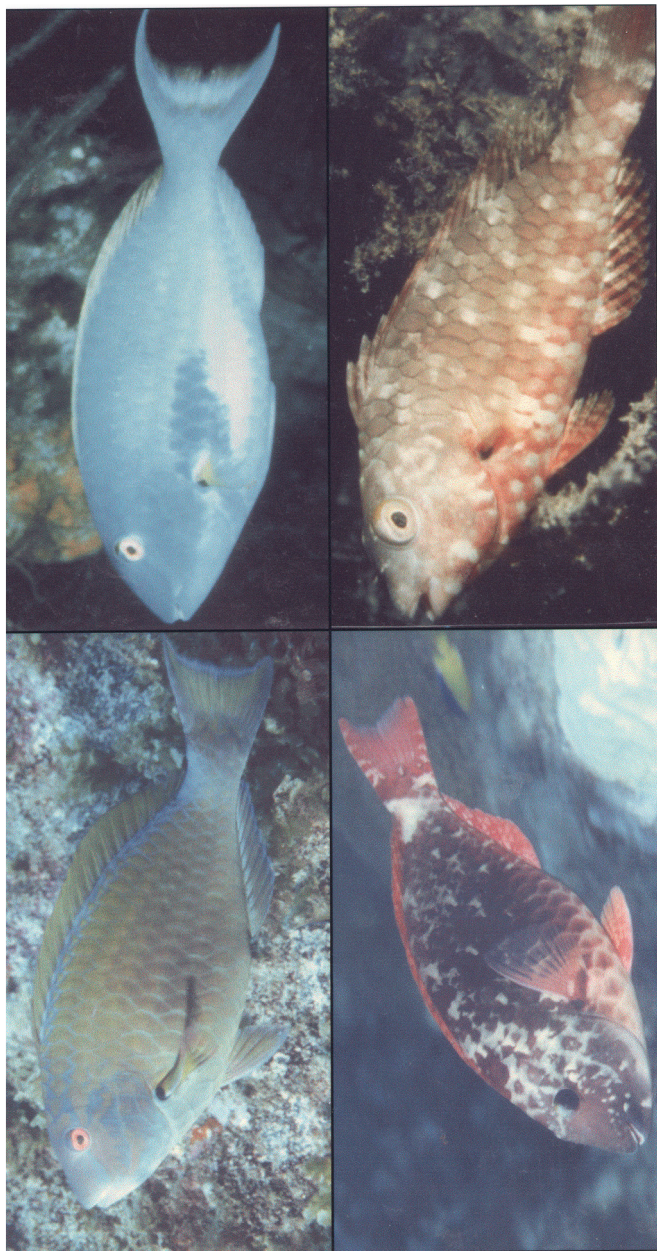


Figure 2. *Sparisoma frondosum*, a species endemic to Brazil, and the similar species *Sparisoma chrysopteron*, endemic to the Caribbean. Terminal phase (upper left) and initial phase (lower left) of *S. frondosum*, Fernando de Noronha Archipelago, northeastern Brazil (photos R. L. Moura); terminal phase (upper right) and initial phase (lower right) of *S. chrysopteron*, Bahamas (photos J. E. Randall).

Smithsonian Ulisses Expedition, 13 Apr. 1994. USNM 343447 (7-IP, 65.2–114.5 mm SL), Cayo Paredon Grande, Cuba, same collectors as USNM 331965, 15 Apr. 1994. USNM 349134 (1-IP, 110 mm SL), Carrie Bow Cay, Belize, coll. E. O. Wiley, 10–23 Jul. 1991. USNM 89667-9 (1-IP, 113 mm; 2-TP 169–182.5 mm SL), Port-au-Prince Bay, Haiti, coll. A. Curtiss, 20 Aug. 1945. USNM 52832 (1-TP, 270 mm SL), Arroyo, Puerto Rico, coll. U.S. Bureau of Fisheries, 1899. USNM 175815 (1-TP, 323.5 mm SL), Bermuda, coll. H. Bardach, 09 Jul. 1956.

Diagnosis, Remarks and Distribution.—This species has been recently identified (e.g., Menezes and Figueiredo, 1985; Carvalho-Filho, 1992; Begossi and Figueiredo, 1995; Ferreira et al., 1995; Rosa and Moura, 1997; Rocha et al., 1998) as the Caribbean species *S. chrysopterus* (Bloch and Schneider, 1801), the redtail parrotfish, due to their similar morphology. However, color pattern readily discriminates the two species (Fig. 2). *S. frondosum* TP individuals lack the dark crescent marking on the caudal fin margin and the turquoise area adjacent to pectoral fin, as well as the pale-yellow area on the pectoral-fin axil, all characteristic of TP *S. chrysopterus*. A pale spot on upper portion of the caudal peduncle in *S. frondosum*, on both IP and TP live individuals, readily discriminates it from all other west Atlantic scarids. Also, dorsal, caudal, anal and pelvic fins are reddish in IP *S. frondosum*, while in *S. chrysopterus* these fins are brownish (Fig. 2).

S. frondosum (Agassiz, 1839) is restricted to the southwestern Atlantic, occurring from Manoel Luís Reefs, northern Brazil, south to the State of Santa Catarina coast, southern Brazil (from 0°52'S to about 27°20'S). It also occurs at Saint Paul's Rocks and at the oceanic islands of Fernando de Noronha, Atol das Rocas and Trindade (Rosa and Moura, 1997; pers. observ.). We recorded *S. frondosum* dwelling on coral reefs, algal reefs, seagrass beds and rocky reefs, at depths ranging from 5 to at least 45 m. Largest IP specimen examined 257 mm SL, smallest TP 153 mm SL. The common name 'Agassiz's parrotfish' is proposed.

Authorship and Date of Publication.—Authorship of species descriptions and dates of publication of Spix and Agassiz's *Selecta genera et species piscium Brasiliensium* is still problematic (e.g., Weitzman, 1996; Géry, 1999), notwithstanding the publications of Whitehead and Myers (1971) and Kottelat (1988).

Spix and Agassiz's *Brazilian Fishes* was published in two fascicles, one in June 1829 and the other in January 1831 (Kottelat, 1988), nearly simultaneous with Cuvier and Valenciennes's *Histoire naturelle des poissons* (see Bailey for dates of publication of the latter). Regardless of the exact date of publication of the second fascicle of *Brazilian Fishes*, in which *S. frondosus* is described, we do know that it was issued well before January 1840 (Kottelat, 1988; Whitehead and Myers, 1971), the date of publication of Cuvier and Valenciennes's volume 14 of *Histoire naturelle...* (Bailey, 1951, 1957).

We examined *S. frondosus* Agassiz, 1831 only extant syntype, MHNN 581 (see Kottelat, 1988 for details on this and other Agassiz's type specimens), here designated as a lectotype, and also the plate 54 in Spix and Agassiz (1831), depicting a moderately elongate blue parrotfish. Both sources leave no doubt about the identity of *S. frondosus* Agassiz, 1831.

The description of *S. frondosus* by Cuvier (1831) clearly refers to Agassiz's (1831) *S. frondosus*, in spite of the lack of any reference to *Brazilian Fishes* within his comments. Specimens studied by Cuvier (latter considered syntypes by Bauchot and Guibé, 1960) were also examined at the MNHN. Specimen MNHN 1764 (108 mm SL, well preserved

in alcohol) is, no doubt, an IP individual of *S. frondosum* (Agassiz, 1831), but we failed to identify syntype MNHN 1765, 196 mm SL, a dry *Sparisoma* individual in very poor condition. Regardless of the identity of specimen MNHN 1765, specimens cited by Bauchot and Guibé (1960) are not the types of *S. frondosum* Agassiz, 1831. Despite recent misidentifications with *S. chrysopteron*, many authors (e.g., Günther, 1862; Guichenot, 1865; Jordan, 1887; Starks, 1913; Ribeiro, 1915, 1918; Fowler, 1941) correctly assigned the presence of *S. frondosum* in Brazil.

Sparisoma amplum (Ranzani, 1842)

(Fig. 3, upper left)

Scarus amplus Ranzani, 1842: 324, pl. 25 (original description, type locality Brazil)

Sparisoma abildgaardi. Cuvier and Valenciennes, 1839: 175 (description, distribution). Guichenot, 1865: 10 (listed). Jordan, 1887: 676 (listed). Ribeiro, 1915: 500 (description, distribution). Ribeiro, 1918: 144 (listed). Fowler, 1941: 174 (listed).

Sparisoma viride. Roux, 1973: 151 (description). Menezes and Figueiredo, 1985: 40 (description, distribution, illustration). Carvalho-Filho, 1992: 190 (description, distribution, illustration). Ferreira et al., 1995: 225 (listed). Rosa and Moura, 1997: 985 (listed). Rocha et al., 1998: 563 (listed).

Material Examined.—Ten spec. (156–390 mm SL): MZUSP 53162 (1-TP, 290 mm SL), Manoel Luís Reefs (00°52'S, 44°15'W), Maranhão, Brazil, coll. R. L. Moura, R. B. Francini-Filho and M. C. M. Rodrigues, 01 May 1998. MZUSP 53163, same locality and collector as MZUSP 53162, 30 Apr. 1998. MZUSP 48261 (4-TP, 340–390 mm SL), Rocas Atoll (03°52'S, 33°50'W), Rio Grande do Norte, Brazil, coll. R. L. Moura and C. L. B. Francini, 16 Dec. 1994–10 Jan. 1995. MZUSP 51567 (1-IP, 164 mm SL), Tamandaré (08°22'S, 35°05'W), Pernambuco, Brazil, coll. R. L. Moura and M. C. M. Rodrigues, Mar. 1997. MZUSP 47911 (1-IP, 165 mm SL), Abrolhos Archipelago (17°57'S, 38°41'W), Bahia, Brazil, coll. C. E. L. Ferreira, 10 Jun. 1993. MZUSP 46803 (1-IP, 205 mm SL), Alcatrazes Archipelago (24°06', 45°42'W), São Paulo, Brazil, coll. R. L. Moura, 02 Feb. 1993. ZUEC 4653 (1-IP, 156 mm SL), same locality and collector as MZUSP 46803, 25 Apr. 1992. MZUSP 46444 (1-IP, 210 mm SL), Laje de Santos (24°19'S, 46°11'W), São Paulo, Brazil, coll. R. L. Moura, 20 Jun. 1993.

Comparative Material.—*Sparisoma viride* (7 spec. 94.5–294 mm SL): USNM 164277 (1-TP, 251 mm SL), Backe Shoal, Florida, United States, coll. J. E. Randall, Mar. 1954. USNM 117112 (1-IP, 197 mm SL), Tortugas, Florida, United States, coll. W. H. Longley. UF 37297 (1-TP of 2, 277 mm SL), Pacific Reef, Dade County, Florida, United States, coll. F. Hedges and J. S. Coles, 24 Feb. 1962. USNM 175810 (1-IP, 294 mm SL), Hamilton Island, Bermuda, coll. H. Winn, 24 Jul. 1956. UF 32349 (1-IP, 172 mm SL), Elbow Cay, Straits of Florida, Bahama Islands, R. V. Miller, 16 Mar. 1967. USNM 133741 (2-TP, 225–237 mm SL), Port-au-Prince Bay, Haiti, coll. A. Curtiss, Jan. 1947. USNM 329839 (1 IP of 2, 94.5 mm SL), Carrie Bow Cay, Belize, coll. E. O. Wiley, 12 Jul. 1991.

Diagnosis, Remarks and Distribution.—This species has been recently identified (e.g., Menezes and Figueiredo, 1985; Carvalho-Filho, 1992; Rosa and Moura, 1997) as the Caribbean species *S. viride* (Bonaterre, 1783), the stoplight parrotfish, due to their similar morphology and similar color pattern of IP specimens. However, *S. amplum* (Ranzani, 1842) is easily distinguished from *S. viride* by the distinctive color pattern of TP specimens (Fig. 3). The lack of a yellow area on caudal peduncle ('stoplight') and the absence

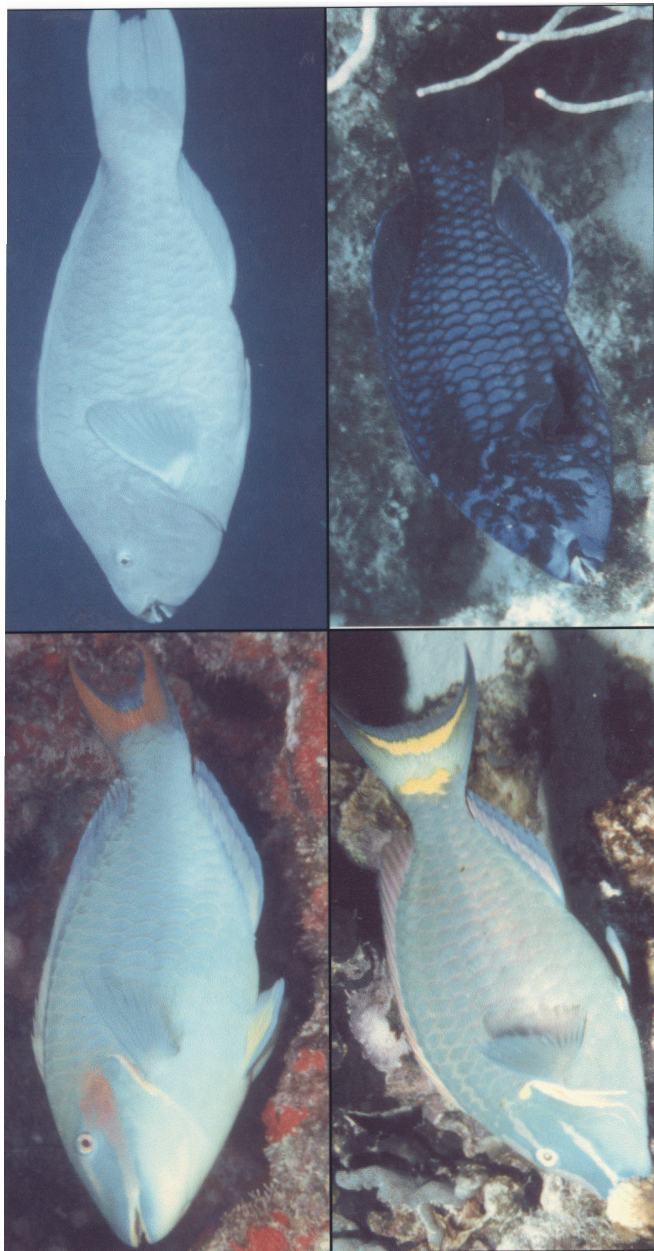


Figure 3. *Sparisoma amplum*, a species endemic to Brazil (upper left, photo A. Amarante), and the similar species *Sparisoma viride* (lower left, photo R. L. Moura), endemic to the Caribbean. *Scarus trispinosus*, a species endemic to Brazil (upper right, photo A. Amarante), and the similar species *Scarus coelestinus*, endemic to the Caribbean (lower right, photo J. E. Randall).

of a yellow spot at the angle of opercle, on TP individuals, readily separates *S. amplum* from *S. viride*, even in long-time preserved museum specimens, that have been in alcohol for at least 70 yrs.

We have not examined the holotype (MZUB 980), an IP individual, but the figure in Ranzani's description, depicting a deep bodied parrotfish with pale ventral surface, leaves no doubt about its identity.

S. amplum (Ranzani, 1842) is restricted to the southwestern Atlantic, occurring from Manoel Luís Reefs, northern Brazil, south to the State of São Paulo coast, southeastern Brazil (from 0°52'S to about 24°20'S). It also occurs at the oceanic islands of Fernando de Noronha, Atol das Rocas and Trindade (Rosa and Moura, 1997; pers. observ.). We recorded *S. amplum* dwelling mainly in shallow and turbulent habitats on coral, algal and rocky reefs. It also occurs, apparently in smaller numbers, in deeper habitats; depth records range from 1 to at least 30 m. Largest IP specimen examined 280 mm SL, smallest TP 290 mm SL. The common name 'reef parrotfish' is proposed.

Sparisoma axillare (Steindachner, 1878)
(Fig. 4, left)

Scarus spinidens (not of Quoy and Gaimard, 1824) Guichenot, 1865:15 (original description, type locality Bahia, Brazil). Preoccupied by *Scarus spinidens* Quoy and Gaimard, 1824.

Scarus axillaris Steindachner, 1878: 384, pl. 3 (original description, type locality North Australia - clearly an error).

Sparisoma distinctum. Günther, 1862: 210 (listed). Ribeiro, 1915: 501 (description, distribution). Ribeiro, 1918: 145 (listed). Fowler, 1941: 175 (listed).

Sparisoma flavescens. Jordan, 1887: 672 (description, distribution). Ribeiro, 1915: 502 (description, distribution). Ribeiro, 1918: 145 (listed). Fowler, 1941: 175 (listed).

Sparisoma rubripinne. Rosa, 1980: 220 (listed). Menezes and Figueiredo, 1985: 39 (description, distribution, illustration). Carvalho-Filho, 1992: 189 (description, distribution, illustration). Begossi and Figueiredo, 1995: 714 (listed). Ferreira et al., 1995: 225 (listed). Rosa and Moura, 1997: 985 (listed). Rosa et al. 1997: 205 (listed). Rocha et al., 1998: 563 (listed).

Material Examined.—Fourteen spec. (99–370 mm SL): MZUSP 53027 (1-IP, 99 mm SL), Manoel Luís Reefs (00°52'S, 44°15'W), Maranhão, Brazil, coll. R. L. Moura, R. B. Francini-Filho and M. C. M. Rodrigues, Jun. 1998. MZUSP 49040 (1-TP, 345 mm SL; 1-IP, 205 mm SL), Rocas Atoll (03°52'S, 33°50'W), Rio Grande do Norte, Brazil, coll. R. S. Rosa and R. L. Moura, Jun. 1995. ZUEC 4655 (1-IP, 141 mm SL), Tamandaré (08°22'S, 35°05'W), Pernambuco, Brazil, coll. R. L. Moura and M. C. M. Rodrigues, Mar. 1997. MZUSP 52831 (3-IP, 120–225 mm SL), Abrolhos Archipelago (17°57'S, 38°41'W), Bahia, Brazil, coll. R. L. Moura, R. B. Francini-Filho, C. Sazima and I. Sazima, 22 Jan. 1998. MZUSP 50901 (1-IP, 225 mm SL), Buzios Island (23°48'S, 45°08'W), São Paulo, Brazil, coll. A. Begossi, 19 Feb. 1987. MZUSP 46413 (1-IP, 260 mm SL), Alcatrazes Archipelago (24°06', 45°42'W), São Paulo, Brazil, coll. R. L. Moura, 28 Apr. 1993. MZUSP 46655 (1-TP, 295 mm SL) same locality and collector as MZUSP 46413, 15 Apr. 1994. MZUSP 46411 (1-TP, 370 mm SL) same data as MZUSP 46413. MZUSP 46412 (1-TP, 290 mm SL) same data as MZUSP 46413. MZUSP 46400 (1-IP, 270 mm SL) same locality and collector as MZUSP 46413, Feb. 1994. MZUSP 46817 (1-IP, 252 mmSL), Laje de Santos (24°19'S, 46°11'W), São Paulo, Brazil, coll. A. Carvalho-Filho, Jan. 1976.

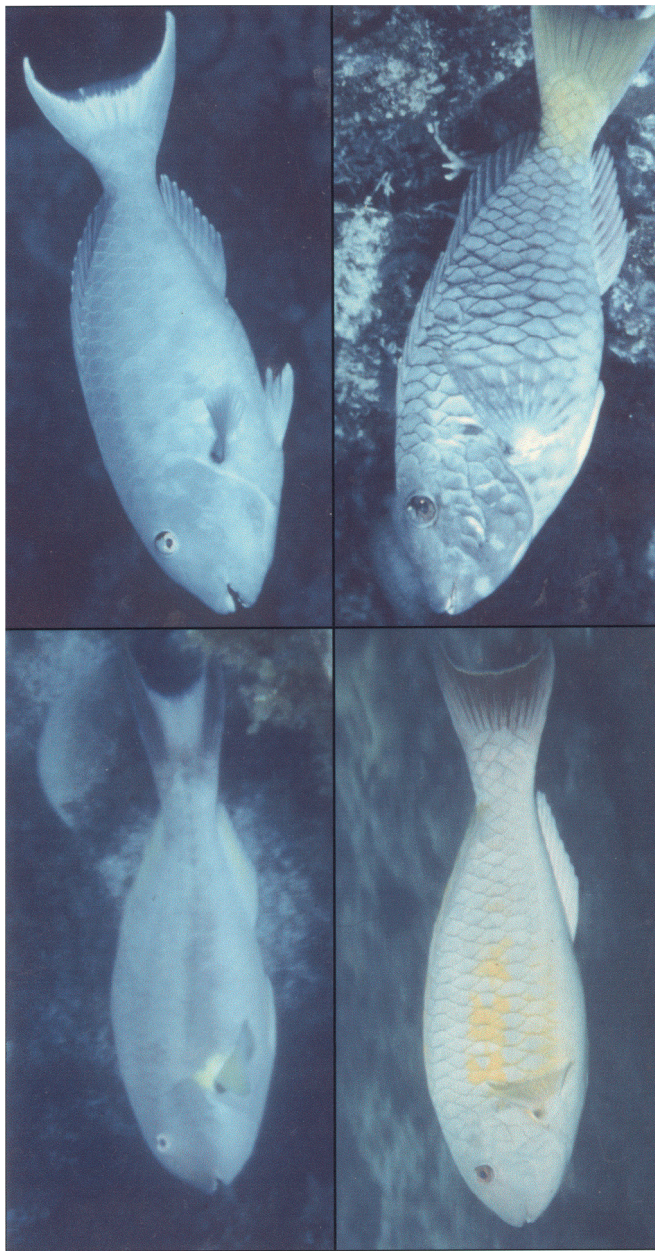


Figure 4. *Sparisoma axillare*, a species endemic to Brazil, and the similar species *Sparisoma rubripinne*, endemic to the Caribbean. Terminal phase (upper left) and initial phase (lower left) of *S. axillare*, Fernando de Noronha Archipelago, northeastern Brazil (photos R. L. Moura); terminal phase (upper right) and initial phase (lower right) of *S. rubripinne*, Bahamas (photos J. E. Randall).

Additional Material Examined.—MNHN 1763, holotype of *Scarus spinidens* Guichenot (1-TP, 365 mm SL), preserved in alcohol.

Comparative Material.—*Sparisoma rubripinne* (7 spec. 122–318 mm SL): UF 37293 (1-IP, 250 mm SL), Catherine's Reef, Honduras, coll. R. V. Geronimo Kid, 21 Apr. 1967. USNM 127083 (1-IP, 180 mm SL), Guanica, Puerto Rico, coll. U.S. Fisheries Comm., Jan. 1899. USNM 131442 (1-IP, 220 mm SL), Barbados, coll. F. Gardner. USNM 167707 (1 IP of 3, 132 mm SL), Key Largo, Florida, United States, coll. J. E. Randall, 31 Aug. 1954. USNM 319147 (1-IP, 122 mm SL), Bom Accord Lagoon, Tobago, coll. J. T. Williams, 11 Sep. 1990. USNM 175811 (1-TP, 297 mm SL), Nonsuch Island, Bermuda, coll. H. E. Winn, 03 Sep. 1956. USNM 175804 (1-IP, 318 mm SL), same locality and collector as USNM 175811, 21 Jul. 1956.

Diagnosis, Remarks and Distribution.—*S. axillare* (Steindachner, 1878) has been recently identified (e.g., Rosa, 1980; Menezes and Figueiredo, 1985; Carvalho-Filho, 1992; Begossi and Figueiredo, 1995; Ferreira et al., 1995; Rosa and Moura, 1997; Rocha et al., 1998) as the Caribbean species *S. rubripinne* (Valenciennes, 1839), the yellowtail parrotfish. However, the two species can be discriminated by color pattern and morphology (Fig. 4). *S. axillare* TP individuals are readily separated from TP individuals of *S. rubripinne* by the presence of a distinctive bright-yellow area on the pectoral-fin axil, blackish caudal fin margins, yellowish dorsal and anal fins, and general body coloration, which is grayish-white in *S. axillare* and blue-green in *S. rubripinne*. Initial phase individuals of *S. axillare* are brownish-gray with a yellow stain on the flanks and are readily discriminated from IP *S. rubripinne* by the absence of a bright-yellow area on the caudal peduncle and caudal fin. Also, the head profile is more rounded in *S. axillare* than it is in *S. rubripinne* (Fig. 4). We have not examined the syntypes (NMW 77759), but figure 1 on plate 3 of Steindachner's (1878) description clearly depicts a TP individual with rounded head profile, leaving no doubt about its identity.

S. axillare is restricted to the southwestern Atlantic, occurring from Manoel Luís Reefs, northern Brazil, south to the State of Santa Catarina coast, southern Brazil (from 0°52' to about 27°20'S). It also occurs at the oceanic islands of Fernando de Noronha, Atol das Rocas and Trindade (Rosa and Moura, 1997; pers. observ.). We recorded *S. axillare* dwelling in coral reefs, algal reefs, seagrass beds and rocky reefs, at depths ranging from 1 to at least 35m. Largest IP specimen examined 293 mm SL, smallest TP 290 mm SL. The common name 'gray parrotfish' is proposed.

Scarus trispinosus Valenciennes, 1840
(Fig. 3, right)

Scarus trispinosus Valenciennes in Cuvier and Valenciennes, 1839: 182. (original description, type locality Brazil). Guichenot, 1865: 23 (listed, notes on type). Jordan, 1887: 684 (listed). Pellegrin, 1901: 164 (comparison with *S. ghobban*). Ribeiro, 1915: 496 (description, distribution). Ribeiro, 1918: 145 (listed). Fowler, 1941: 175 (listed).

Scarus coelestinus. Ribeiro, 1915: 497 (description, distribution). Ribeiro, 1918: 143 (listed). Fowler, 1941: 175 (listed). Roux, 1973: 150 (description). Rosa, 1980: 220 (listed). Menezes and Figueiredo, 1985: 36 (description, distribution, illustration). Carvalho-Filho, 1992: 191 (description, distribution, illustration). Rocha et al., 1998: 563 (listed). Ferreira and Gonçalves, 1999: 352 (illustration).

Scarus coeruleus. Ribeiro, 1915: 497 (description, distribution). Ribeiro, 1918: 143 (listed). Fowler, 1941: 175 (listed). Menezes and Figueiredo, 1985: 37 (description, distribution, illustration). Carvalho-Filho, 1992: 191 (description, distribution). Figueiredo, 2000: 76 (illustration).
Scarus vetula. Begossi and Figueiredo, 1995: 714 (listed).

Holotype.—MNHN 2041, 605 mm SL, 170 mm BD, a dry specimen in very poor condition.

Additional Material Examined.—Six spec. (155–355 mm SL): MZUSP 53160 (1, 355 mm SL), Manoel Luís Reefs (00°52'S, 44°15'W), Maranhão, Brazil, coll. R. L. Moura, R. B. Francini-Filho and M. C. M. Rodrigues, 01 May 1998. MZUSP 47632 (1, 335 mm SL), Salvador (14°00'S, 38°30'W), Bahia, Brazil, coll. C. L. Sampaio, 19 Apr. 1994. MZUSP 47633 (1, 285 mm SL), same data as MZUSP 47632. MZUSP 52720 (1, 155 mm SL), Abrolhos Archipelago (17°57'S, 38°41'W), Bahia, Brazil, coll. R. L. Moura, R. B. Francini-Filho, C. Sazima and I. Sazima, 22 Jan. 1998. ZUEC 4656 (1, 160 mm SL), same data as MZUSP 52720. MZUSP 53002 (1, 175 mm SL), same locality as MZUSP 52720, coll. I. Sazima, C. Sazima, J. L. Gasparini and R. L. Moura, Jan. 1997.

Comparative Material.—*S. coelestinus* (6 spec. 175–283 mm SL): USNM 37126 (1, 282 mm SL), Cozumel, Yucatán, Mexico, coll. RV ALBATROSS, 28 Jan. 1885. USNM 30000 (1, 277 mm SL), Jamaica, coll. Kingston Public Museum, 28 Apr. 1881. USNM 164279 (1, 183 mm SL), Bache Shoal, Florida, United States, coll. J. E. Randall, 03 Sep. 1954. USNM 34923 (1, 219 mm SL), Curacao, Netherlands Antilles, coll. RV ALBATROSS, 10–18 Feb. 1886. USNM 164283 (2, 169–175 mm SL), Biscayne Bay, Florida, United States, coll. J. E. Randall, 26 Aug. 1954. USNM 10179 (1, 247 mm SL), Cuba, coll. F. Poey.

Scarus guacamaia (3 spec. 115–181 mm SL): USNM 319134 (1, 181 mm SL), Bon Accord Lagoon, Tobago, coll. J. T. Williams, 11 Sep. 1990. USNM 43304 (1, 115 mm SL), Bahia (14°00'N, 38°30'W), Brazil, coll. RV ALBATROSS, 1887. USNM 43324 (1, 157 mm SL), same data as USNM 43304.

Scarus coeruleus (2 spec. 205–226 mm SL): USNM 74413 (1, 205 mm SL), Loggerhead, Florida, United States, coll. E. W. Gudger, 1912. USNM 61076 (1, 226 mm SL), Tortugas, Florida, United States, coll. J. C. Thompson, 1902-3.

Diagnosis, Remarks and Distribution.—This species has been recently identified (e.g., Menezes and Figueiredo, 1985; Carvalho-Filho, 1992; Begossi and Figueiredo, 1995; Ferreira et al., 1995; Rocha et al., 1998) as the Caribbean species *S. coelestinus* Valenciennes, 1840, due to their similar morphology, bluish teeth, and color pattern. However, lack of a large pale area on the head, extending from throat to snout, readily separates *S. trispinosus* from *S. coelestinus* (see Fig. 3 and Randall, 1996; Humann, 1992), even in long preserved specimens at least to 200 yrs in alcohol. Besides this very distinctive character, *S. trispinosus* has roughly homogeneously-colored scales on flanks, while in *S. coelestinus* flank scales have distinct dark margins (see Fig. 3, right). Also, the lack of irregular bright-blue blotches on nape and around the eye discriminates *S. trispinosus* from *S. coelestinus*, even in preserved material. Juvenile *S. trispinosus* are similarly colored to the adults, but bear a yellowish area on nape, similar to that of *S. coeruleus* subadults (see Randall, 1996, p. 275). This distinct juvenile coloration, that disappears in preserved specimens, contrasts with that of *S. coelestinus*, in which all sexes and sizes are essentially the same in color (Randall, 1996).

Jordan (1887), Ribeiro (1915, 1918) and Fowler (1941) correctly assigned the presence of *S. trispinosus* Valenciennes, 1840 in Brazil, but the poor state of the holotype led

subsequent workers (Schultz, 1959; Bauchot and Guibé, 1960) to consider *S. trispinosus* as unidentifiable. Nevertheless, the presence of six predorsal scales and two scales on the third cheek row leave no doubt about the identity of the type specimen, since *S. zelindae* has seven predorsal scales and *S. guacamaia* has only one scale on the third row. Besides this, the holotype of *S. trispinosus* is 605 mm SL, well over the largest known TP *S. zelindae* (332 mm SL). Some characteristics of the type specimen such as white teeth and shallow body depth, which could cast doubt about its identity, are expected in a long-time preserved dry specimen.

Scarus trispinosus is restricted to the southwestern Atlantic, occurring from Manoel Luís Reefs, northern Brazil, south to the State of São Paulo coast, southeastern Brazil (from 0°52'S to about 24°20'S, the latter locality based on visual records). We recorded *S. trispinosus* dwelling in coral reefs, algal reefs, seagrass beds and rocky reefs, at depths ranging from 1 to at least 30m. The common name 'greenbeak parrotfish' is proposed, an allusion to the name applied by native Brazilian fishermen (*bico-verde*).

OTHER PARROTFISHES OCCURRING IN BRAZIL.—Besides the five species treated above, five other parrotfishes occur along the Brazilian coast, their record being substantiated by specimens in museums (see material examined). *Cryptotomus roseus* Cope, 1871 and *Sparisoma radians* (Valenciennes, 1840) are recorded throughout the Caribbean and, in Brazil, from Manoel Luís Reefs to Santa Catarina (from 0°52' to about 27°20'S, based on material examined and visual records), including the oceanic islands of Fernando de Noronha and Atol das Rocas (Menezes and Figueiredo, 1985; Moura et al. 1999a). *Nicholsina usta* (Valenciennes, 1840) and *Sparisoma atomarium* (Poey, 1861), also considered widespread in the west Atlantic (e.g., Randall, 1978, 1996), appear to be absent from northeastern Brazil and are restricted to the continental area between Espírito Santo and São Paulo (material examined and visual records from 21° to 24°S). The taxonomic status of *S. atomarium* needs to be better assessed due to the remarkable variation in its color pattern along the Caribbean (see Humann, 1992) and the greatly disjunct distribution of the Brazilian population. *S. guacamaia* Cuvier, 1829, common in the Caribbean, is a rare species in Brazil, its record based on two specimens from Bahia (about 13–14°S) and literature records (e.g., Roux, 1973; Menezes and Figueiredo, 1985; Randall, 1996).

Southwestern Atlantic records of *Sparisoma aurofrenatum* (Valenciennes, 1839), *S. chrysopterum* (Bloch and Schneider, 1801), *S. rubripinne* (Valenciennes, 1839), *S. viride* (Bonnaterre, 1783), *S. coeruleus* (Bloch, 1786), *S. coelestinus* Valenciennes, 1839, *S. iserti* Bloch, 1789, *S. taeniopterus* Desmarest, 1831 and *S. vetula* Bloch and Schneider, 1801 are not substantiated with specimens, being based on misidentifications or guesses (e.g., Ribeiro, 1915, Menezes and Figueiredo, 1985; Carvalho-Filho, 1992; Randall, 1996).

Material Examined.—*C. roseus* (7 spec. 43.6–81.4 mm SL): MZUSP 53074 (1, 43.6 mm SL), Abrolhos Archipelago (17°57'S, 38°41'W), Bahia, Brazil, coll. R. L. Moura, R. B. Francini-Filho, C. Sazima and I. Sazima, 09–15 Jan. 1998. MZUSP 52808 (1, 54.0 mm SL), Búzios (22°45'S, 41°51'W), Rio de Janeiro, Brazil, coll. J. L. Gasparini, 31 Jan. 1997. MZUSP 45646 (1, 77.1 mm SL), Alcatrazes Archipelago (24°06', 45°42'W), São Paulo, Brazil, coll. R. L. Moura, 28 Apr. 1993. MZUSP 46653 (1, 80.1 mm SL), same locality as MZUSP 45646, coll. R. L. Moura, 15 Apr. 1994. MZUSP 46654 (1, 81.4 mm SL), same data as MZUSP 46653. MZUSP 46780 (1, 68.4 mm SL), same data as MZUSP 45646. MZUSP 55425 (1, 95.7 mm SL), Arvoredo Island (27°18'S, 48°21'W), Santa Catarina, Brazil, coll. R. L. Moura, A. Carvalho-Filho, C. H. Flesh and R. B. Francini-Filho, 22 Dec. 1998.

N. usta (7 spec. 53.3–128.5 mm SL): MZUSP 52819 (4, 53.4–83.8 mm SL), Búzios (22°45'S, 41°51'W), Rio de Janeiro, Brazil, coll. J. L. Gasparini, 31 Jan. 1997. MZUSP 47492 (1, 82.5 mm SL), Arraial do Cabo (23°00'S, 41°50'W), Rio de Janeiro, Brazil, coll. C. E. L. Ferreira, 11 Nov. 1993. MZUSP 47627 (1, 88.2 mm SL), São Sebastião (24°05'S, 45°35'W), São Paulo, Brazil, coll. N. A. Menezes, 22 Nov. 1974. MZUSP 47628 (1, 128.5 mm SL), Alcatrazes Archipelago (24°06', 45°42'W), São Paulo, Brazil, no date and collector.

S. atomarium (10 spec. 62.6–137.9 mm SL): MZUSP 46046 (1, 73.7 mm SL), Alcatrazes Archipelago (24°06'S, 45°42'W), São Paulo, Brazil, coll. R. L. Moura, 25–27 Feb. 1994. MZUSP 46407 (1, 137.9 mm SL), same data as MZUSP 46046. MZUSP 46432 (1, 115.1 mm SL), same locality and collector as MZUSP 46046, 27 Apr. 1993. MZUSP 46441 (1, 63.1 mm SL), Laje de Santos (24°19'S, 46°11'W), São Paulo, Brazil, coll. R. L. Moura, 10 Feb. 1992. MZUSP 46442 (1, 72.2 mm SL), same locality and collector as MZUSP 46441, 1993. MZUSP 46443 (1, 77.4 mm SL), same data as MZUSP 46441. MZUSP 47496 (4, 62.6–80.9 mm SL), Arraial do Cabo (23°00'S, 41°50'W), Rio de Janeiro, Brazil, coll. C. E. L. Ferreira, 23 Mar. 1993.

S. radians (14 spec. 18.8–161.6 mm SL): MZUSP 48892 (2, 18.8–38.1 mm SL), Rocas Atoll (03°52'S, 33°50'W), Rio Grande do Norte, Brazil, coll. R. S. Rosa and R. L. Moura, 31 Jul. 1995. MZUSP 47613 (8, 46.3–90.7 mm SL), Ponta de Pedras (09°10'S, 35°10'W), Pernambuco, Brazil, coll. P. Montouchet, 4 Feb. 1969. MZUSP 51547 (2, 141.5–142.3 mm SL), Três Ilhas (20°37'S, 40°22'W), Espírito Santo, Brazil, coll. I. Sazima, J. L. Gasparini, R. L. Moura and C. Sazima. MZUSP 47494 (1, 113.5 mm SL), Arraial do Cabo (23°00'S, 41°50'W), Rio de Janeiro, Brazil, coll. C. E. L. Ferreira, 11 Nov. 1993. MZUSP 5201 (1, 161.6 mm SL) Ilha dos Búzios (23°50'S, 45°05'W), São Paulo, Brazil, coll. R. P. Lambalot, Feb. 1967.

S. guacamaia (2 spec. 117–158 mm SL): USNM (2, 117–158 mm SL), Bahia (no precise locality), Brazil, coll. RV ALBATROSS, 1887.

DISCUSSION

Along the wide latitudinal range where Brazilian-endemic scarids were collected, we recorded no variation in the non-overlapping characters that discriminate them from Caribbean congeners. The allocation of these distinguishable geographic forms, including *S. zelindae*, *S. amplum*, *S. frondosum*, *S. axillare* and *S. trispinosus*, to intraspecific ranking (i.e., subspecies) would imply phylogenetic and biogeographic relationships that may be unsupported by evidence, and could lead to unstable nomenclature (Gill, 1999). Moreover, because intraspecific forms are rarely distinguished in subsequent literature, information on their biology, morphology and distribution would not accumulate (Gill, 1999). Thus, these parrotfishes add to the recently recognized Brazilian-endemic reef fishes (review in Floeter and Gasparini, 2000), isolated from the Caribbean by the freshwater plume off the Amazon River mouth (see also references in introduction).

Parrotfishes reflect distribution trends and endemism levels of many southwestern Atlantic reef fish groups. There is an overall latitudinal decrease in the number of scarid species along the Brazilian coast, with seven species recorded in the northern coast and only three species recorded in the southern coast (see Moura et al., 1999a). However, the highest species richness is found within a narrow intermediate stretch of the latitudinal gradient (22–24°S), where nine scarid species occur together. This pattern is remarkable

and is recurrent in several reef fish groups (e.g., Labridae, Labrisomidae, Pomacentridae), where the syntopic occurrence of tropical and subtropical-restricted species appears related to the 'intermediate' oceanographic conditions of this region (ms in prep.).

The percentage of Brazilian-endemic parrotfishes in the southwestern Atlantic (50%) is within the range known for other well-studied reef fish groups of this region (Floeter and Gasparini, 2000). For instance, whereas surgeonfishes (Acanthuridae) have no Brazilian-endemic species, about 30–40% of wrasses and scaled blennies (Labridae and Labrisomidae), and about 60% of continental species of damselfishes (Pomacentridae) recorded in Brazil are endemic to the Southwestern Atlantic (q.v., Gasparini et al. 1999).

Finally, it is important to remark that we did not imply any phylogenetic relationships among Atlantic parrotfishes while comparing southwestern Atlantic species with the Caribbean congeners with which they have been confused. Phylogenetic evidence to support the idea that the sister taxon of any Brazilian-endemic scarid occurs in the Caribbean is still lacking. For instance, Heiser et al. (2000) recently reviewed a small group (three species) of Atlantic labroids (Labridae: *Clepticus*), suggesting (based on a single morphological synapomorphy) that the Brazilian and African species may represent a monophyletic clade, related to the Caribbean species. The Brazilian *Clepticus* has long been confused with the Caribbean one, but not with its 'true' west-African sister species, because the latter was only recently discovered. Since we are not sure about the generality of the biogeographic pattern found within *Clepticus*, and also because west African scarids are still poorly known and poorly represented in museum collections (pers. observ.), it is not yet possible to make reliable speculations about Atlantic parrotfishes interrelationships. For many Brazilian-endemic reef fishes, if not for most of them, there is little doubt that the sister taxon occurs in the Caribbean, but more phylogenetic studies are largely missing and desirable.

ACKNOWLEDGMENTS

We thank H. J. Paepke and Guy Duhamel for examining and photographing type specimens at ZMB and MNHN, respectively. B. P. Ferreira, C. L. Sampaio, A. Carvalho Filho, A. Amarante, E. Fernandes, L. Horta and M. Collucci for collecting specimens and/or providing field notes and photographs. N. A. Menezes, H. Choat and T. A. Munroe for critically reading the manuscript. J. E. Randall for suggestions, discussions and photographs of Caribbean specimens. R. P. Vari for sharing his office with RLM and providing a pleasant period at the Smithsonian Institution, where this work was finished. F. A. Bockmann, D. Ross Robertson, R. M. C. Castro and G. Bernardi for many helpful suggestions throughout this study. G. Burgess and J. Albert (Florida Museum of Natural History, USA), J.-C. Hureau and P. Pruvost (Muséum National d'Histoire Naturelle, France), J.-P. Haenni and C. Dufour (Musée d'histoire Naturelle de Neuchâtel, Switzerland), and S. Jewett (National Museum of Natural History, USA) for allowing us to examine material under their care. G. E. L. Moura, M. B. Silva, G. Sales, C. Bellinni, T. M. Sanches, C. Sazima, M. Villella, C. L. B. Francini and R. Francini-Filho for helping in the field and laboratory, and D. Serriperi for helping with literature. The Ibama, the SEMA/MA, and the Instituto Florestal, SMA/SP for collection permits. This study benefited from a Short-Term Fellowship provided by the Smithsonian Institution and grants FAPESP 96/0927-0 and 98/03491-3 to RLM, 96/5328-8 to IS, Finep/PRONEX 058-97 to N. A. Menezes, and CNPq 300992/79 to I.S.

LITERATURE CITED

- Bailey, R. M. 1951. The authorship of the names proposed in Cuvier and Valenciennes' "Histoire naturelle des poissons". *Copeia* 1951: 249–251.
- _____. 1957. Request for a ruling determining the authorship to be attributed to the various portions of the work entitled "Histoire naturelle des poissons" written partly by Cuvier and partly by Valenciennes and published in the period 1828–1850. *Bull. Zool. Nomencl.* 13: 309–312.
- Bauchot, M. L. and J. Guibé. 1960. Catalogue des types de poissons du Muséum National D'Histoire Naturelle. Famille des Scaridae. *Bul. Mus. natl. Hist. nat.*, 2 ser. 32: 290–301.
- Begossi, A. and J. L. Figueiredo. 1995. Ethnoichthyology of southern coastal fishermen: cases from Búzios Island and Sepetiba Bay (Brazil). *Bull. Mar. Sci.* 56: 710–711.
- Bellwood, D. R. 1994. A phylogenetic study of the parrotfishes family Scaridae (Pisces: Labroidae), with a revision of genera. *Rec. Aust. Mus.* 20(suppl.): 1–85.
- _____. and J. H. Choat. 1989. A description of the juvenile phase color patterns of 24 parrotfish species (family Scaridae) from the Great Barrier Reef, Australia. *Rec. Aust. Mus.* 41: 1–41.
- Brock, V. E. and Y. Yamaguchi. 1954. The identity of the parrotfish *Scarus ahula*, the female of *Scarus perspicillatus*. *Copeia* 1954: 154–155.
- Bruce, R. W. and J. E. Randall. 1985. A revision of the Indo-West Pacific parrotfish genera *Calotomus* and *Leptoscarus* (Scaridae: Sparisomatinae). *Indo Pacific Fishes* 5: 1–32.
- Carvalho-Filho, A. 1992. Peixes: costa brasileira. Ed. Marca D'água. São Paulo, 304 p.
- Choat, J. H. and J. E. Randall. 1986. A review of the parrotfishes (family Scaridae) of the great Barrier Reef of Australia, with description of a new species. *Rec. Aust. Mus.* 38: 175–228.
- Cuvier, G. and A. Valenciennes. 1831. *Histoire naturelle des poissons*, vol. 14. Pitois-Levrault. Paris xxii. +464 p.
- Ferreira, C. E. L. and J. E. A. Gonçalves. 1999. The unique Abrolhos reef formation (Brazil): need for specific management strategies. *Coral Reefs* 18: 352.
- Ferreira, B. P., M. Maida and A. E. T. Souza. 1995. Levantamento inicial das comunidades de peixes recifais da região de Tamandaré - PE. *Bol. Tec. Cient. CEPENE, Tamandaré* 3: 211–230.
- Figueiredo, M. O. 2000. Recifes de corais ou recifes de algas? *Ciência Hoje* 28 (166): 74–76.
- Floeter S. R. and J. L. Gasparini. 2000. The southwestern Atlantic reef fish fauna: composition and zoogeographic patterns. *J. Fish Biol.* 56: 1099–1114.
- Fowler, H. W. 1941. A list of the fishes known from the coast of Brazil. *Arq. Zool.*, S. Paulo 3: 115–184.
- Gasparini, J. L., R. L. Moura and I. Sazima. 1999. *Stegastes trinidadensis* n. sp. (Pisces: Pomacentridae), a new damselfish from Trindade Island, off Brazil. *Bol. Mus. Biol. Mello Leitão (N. Sér.)* 10: 3–11
- Géry, J., P. Bail and P. Keith. 1999. *Cynodon meionactis* sp. n., un nouveau characidé endémique du bassin du Haut Maroni en Guyane, avec une note sur la validité du genre *Cynodon* (Teleostei: Ostariophysi: Characiformes). *Rev. fr. Aquariol.* 25: 69–77.
- Gill, A. C. 1999. Subspecies, geographic forms and widespread Indo-Pacific coral-reef fish species: a call for change in taxonomic practice. Pages 79–87 in B. Serét and J. Y. Sire, eds. *Proc. 5th Indo-Pacific Fish Conf.*, Noumea, 3–8 November 1997. Société Française d'Ichtyologie and Institut de Recherche pour le Développement, Paris.
- Greenfield, D. W. 1988. A review of the *Lythrypnus mowbrayi* complex (Pisces: Gobiidae), with a description of a new species. *Copeia* 1988: 460–470.
- _____. 1989. *Priolepis dawsoni*, n. sp. (Pisces: Gobiidae), a third Atlantic species of *Priolepis*. *Copeia* 1989: 397–401.
- Guichenot, A. 1865. Catalogue des Scaridés de la collection du Musée de Paris. *Mém. Soc. Imp. Sci. Nat. Cherbourg* 11 (ser. 2, v.1): 1–75.

- Günther, A. 1862. Catalogue of the fishes in the British Museum. Catalogue of the Acanthopterygii, Pharyngognathi and Acanthini in the collection of the British Museum. Cat. Fishes, vol. IV: i-xxi + 534 p.
- Heiser, J. B., R. L. Moura and D. R. Robertson. 2000. Two new species of Creole Wrasse (Labridae:Clepticus) from opposite sides of the Atlantic. *Aqua. J. Ichthyol. Aq. Biol.* 4: 67–76.
- Humann, P. 1994. Reef fish identification: Florida, Caribbean, Bahamas, 2nd ed. Vaughan Press, Orlando, Florida. 426 p.
- Jordan, D. S. 1887. A review of the Labroid fishes of America and Europe. *Ann. Rpt. U. S. Comm. Fish Fisher.* 7: 599–698.
- Koike, J. and D. S. Guedes. 1981. Peixes dos arrecifes de Pernambuco e estados vizinhos. *In Ann. III Enc. Zool. Nordeste.* pp 35–83.
- Kottelat, M. 1988. Authorship, dates of publication, status and types of Spix and Agassiz's Brazilian fishes. *Spixiana* 11: 69–93.
- Leviton, A. E., J. H. Gibbs, Jr., E. Heal and C. E. Dawson. 1985. Standards in herpetology and ichthyology. Part I. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia* 1985: 802–832.
- Menezes, N. A and J. L. Figueiredo. 1985. Manual de peixes marinhos do sudeste do Brasil. V. Teleostei (4). São Paulo, Museu de Zoologia, Univ. São Paulo. 105 p.
- Moura, R. L. 1995. A new species of *Chromis* (Perciformes: Pomacentridae) from the southeastern coast of Brazil, with comments on other species of the genus. *Rev. fr. Aquariol.* 21: 91–96.
- _____, and J. E. Randall. 1998. *Scarus chrysopterus* Bloch and Schneider, 1801 (currently *Sparisoma chrysopterus*; Osteichthyes, Perciformes): proposed conservation of the specific name and designation as the type species of *Sparisoma* Swainson, 1839. *Bull. Zool. Nomencl.* 55: 151–154.
- _____, I. Sazima and J. L. Gasparini. 1999a. New records and range extensions of reef fishes in the western south Atlantic, with comments on reef fish distribution along the Brazilian coast. *Revta. Bras. Zool.* 16: 513–530.
- _____, R. B. Francini-Filho, M. C. M. Rodrigues and I. Sazima. 1999b. Unexpected richness of reef corals near the southern Amazon River mouth. *Coral Reefs* 18: 170.
- Pellegrin, J. 1901. Poissons recueillis par M. León Diguët dans le Golfe de Californie. *Bull. Mus. natl. Hist. nat.* 7: 160–167.
- Randall, J. E. 1963. Notes on the systematics of parrotfishes (Scaridae) with emphasis on sexual dichromatism. *Copeia* 1963: 225–237.
- _____. 1978. Scaridae. *In* W. Fisher, ed. FAO identification sheets, Fishing area 31 (Western Central Atlantic), not paginated.
- _____. 1996. Caribbean reef fishes. T.F.H. Publ. Inc. 368 p.
- _____, and J. H. Choat. 1980. Two new parrotfishes of the genus *Scarus* from the central and south Pacific, with further examples of sexual dichromatism. *Zool. J. Linn. Soc.* 63: 239–248.
- _____, and H. A. Randall. 1963. The spawning and early development of the Atlantic parrotfish, *Sparisoma rubripinne*, with notes on other scarid and labrid fishes. *Zoologica* 48: 49–60.
- Ranzani, C. 1942. De novis speciebus piscium. *Dissertatio IV. Novi Comment. Acad. Sci. Inst. Bonon.* 5: 340–365.
- Ribeiro, A. de M. 1915. Fauna Brasiliense. Peixes. V. (Eleutherobranchios Aspirophoros). *Physoclisti. Arch. Mus. Nac. Rio de Janeiro* 17. 679 p.
- _____. 1918. Fauna Brasiliense. Peixes. V. (Eleutherobranchios Aspirophoros). *Physoclisti. Resenha histórica, bibliografia e índice. Arch. Mus. Nac. Rio de Janeiro* 21: 1–227.
- Rocha, L. A. and I. L. Rosa. 1999. New species of *Haemulon* (Teleostei: Haemulidae) from the northeastern Brazilian coast. *Copeia* 1999: 447–452.
- _____, _____ and R. S. Rosa. 1998. Peixes recifais da costa da Paraíba, Brasil. *Revta. Bras. Zool.* 15: 553–566.
- Rosa, R. S. 1980. Lista sistemática de peixes marinhos da Paraíba (Brasil). *Rev. Nordestina Biol.* 3: 205–226.

- _____ and R. L. Moura. 1997. Visual assessment of reef fish community structure in the Atol das Rocas Biological Reserve, off northeastern Brazil. Proc. 8th Int'l. Coral Reef Symp. 1: 983–986.
- _____, I. L. Rosa and L. A. Rocha. 1997. Diversidade da ictiofauna de poças de maré da praia do Cabo Branco, João Pessoa, Paraíba, Brasil. Revta. Bras. Zool. 14 (1): 201–212.
- Roux, C. 1973. Résultats scientifiques des campagnes de la “Calypso”. Fasc. X. Campagne de la Calypso au large de côtes atlantiques de l’Amérique du Sud (1961-1962). Première partie (suite). 26. Poissons téléostéens du plateau continental brésilien. Paris, Masson et Cie. 207 p.
- Sazima, I., R. L. Moura and R. S. Rosa. 1997. *Elacatinus figaro* sp. n. (Perciformes: Gobiidae), a new cleaning goby from the western South Atlantic. Aqua J. Ichthyol. Aq. Biol. 2: 33–38.
- _____, J. L. Gasparini and R. L. Moura. 1998. *Gramma brasiliensis*, a new basslet from the western South Atlantic (Perciformes: Grammatidae). Aqua J. Ichthyol. Aq. Biol. 3: 39–43.
- Schultz, L. P. 1958. Review of the parrotfishes, family Scaridae. US Nat'l. Mus. Bull. 214: 1–143.
- _____. 1962. The taxonomic status of the controversial genera and species of parrotfishes with a descriptive list (Family Scaridae). Smithsonian. Contrib. Zool. 17: 1–49.
- Spix, J. B. and L. Agassiz. 1829–31. Selecta genera et species piscium quos in itinere per Brasiliam annis MDCCCXVII-MDCCCXX jussu et auspicii Maximiliani Josephi I. Bavariae regis augustissimi peracto collegit et pingendos curavit Dr. J. B. de Spix [...]. -C. Wolf, Monaco [München], i + 2 + xvi + ii + 6 + 138 p.
- Starks, E. C. 1913. The fishes of the Stanford Expedition to Brazil. Lel. Stanford Jr. Univ. Publ. Univ. Ser. 77 p.
- Steindachner, F. 1878. Ichthyologische Beiträge. VI. Sitzungsber. Akad. Wiss. Wien. 77(1): 379–392.
- Warner, R. R. and D. R. Roberston. 1978. Sexual patterns in the labroid fishes of the western Caribbean, II: The parrotfishes (Scaridae). Smithsonian. Contrib. Zool. 255: 1–26.
- Weitzman, S. H. 1996 (book review). Selecta/genera et species/piscium/quos/in itinere per Brasiliam/ annis MDCCCXVII-MDCCCXX/. Reprint edition, 1996. Copeia 1996: 1056–1058.
- Whitehead, P. J. and G. S. Myers. 1971. Problems of nomenclature and dating of Spix and Agassiz’s Brazilian Fishes (1829–1831). J. Soc. Bibliophy Nat. Hist. 5: 478–497.
- Winn, H. E. and J. E. Bardach. 1957. Behavior, sexual dichromatism, and species of parrotfishes. Science 125: 885–886.
- _____ and _____. 1960. Some aspects of comparative biology of parrotfishes at Bermuda. Zoologica 45: 29–34.

DATE SUBMITTED: June 2, 2000.

DATE ACCEPTED: January 16, 2001.

ADDRESSES: (R.L.M., J.L.F.) *Seção de Peixes, Museu de Zoologia, CP 42594 Universidade de São Paulo 04299-970 São Paulo SP Brazil. Email: <zelima@usp.br>.* (I.S.) *Departamento de Zoologia and Museu de História Natural, CP 6109 Universidade Estadual de Campinas 13083-970 Campinas SP Brazil. E-mail: <isazima@unicamp.br>.* CORRESPONDING AUTHOR: (R.L.M.) *E-mail: <rlmoura@usp.br>.*