

REDESCRIPTION OF THE BRAZILIAN LABRISOMID FISH *STARKSIA BRASILIENSIS*

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Abstract.—*Starksia brasiliensis* (Gilbert), known only from southern Brazil, is redescribed based on 16 specimens collected from near São Paulo, Brazil, and all *S. brasiliensis* specimens mentioned in earlier literature. *Starksia brasiliensis* is distinguished from other species in the *S. ocellata* complex by a combination of the following characters: narrow, pale Y-shaped mark on cheek; ring-shaped marks on cheek bright red in life; no bars on lips; typically 16 (range 15–17) scales in arched part of lateral line; and typically 7 (range 7–9) total gill rakers on the first arch.

The known geographic range of *Starksia brasiliensis* is extended from Maceió and Salvador, Brazil, some 1600 km south to São Paulo, Brazil.

Starksia brasiliensis, a poorly known labrisomid (sensu George and Springer 1980) previously represented by only five specimens, inhabits rocky, coralline areas in the shallow coastal waters of southern Brazil. Sixteen specimens of *S. brasiliensis*, collected by one of us (AMS) near São Paulo, allow an expanded analysis of character variation. The variation reported herein significantly increases the ranges for meristic characters given by Greenfield (1979), and has made it necessary to redescribe the species. These specimens also extend the geographic range of the species southward to São Paulo, Brazil.

The taxonomic validity of *Starksia brasiliensis* (Gilbert, 1900) has been in doubt since it was described. Longley and Hildebrand (1941) placed it in the synonymy of *S. ocellata* (Steindachner, 1876). They did not give reasons for taking this action, although they did examine one specimen of *S. brasiliensis* collected off the coast of Salvador, Brazil. Böhlke and Springer (1961) reviewed *Starksia* and commented on the low anal-fin ray and scale counts of a paratype of *S. brasiliensis*. Because there was so little material available, they chose to retain *S. brasiliensis* in the synonymy of *S. ocellata*. In his review of the *S. ocellata* complex, Greenfield (1979) examined four specimens (including both types) from southern Brazil and gave this population species status based on three major characters: a narrow, pale Y-shaped mark on the cheek, no bars on the lips, and a single row of infraorbital pores. We find the first two characters useful for species recognition but the infraorbital pores are frequently in a double row, thus limiting the usefulness of these pores as a distinguishing character.

Counts and measurements follow Greenfield (1979). In addition, tooth counts refer only to the teeth in the outermost row. The cephalic sensory pore series are delimited as shown in Fig. 1 (counts include all pores in each series). Predorsal, preanal, and prepelvic lengths refer to the distance from the snout tip to the anterior of the base of the respective fin. Procurent caudal-fin rays are those caudal elements with less than two segments.

The following institutional abbreviations are used: BMNH—British Museum (Natural History); CAS-SU—Stanford University collection at the California Academy of Sciences; GCRL—Gulf Coast Research Laboratory in Ocean Springs,

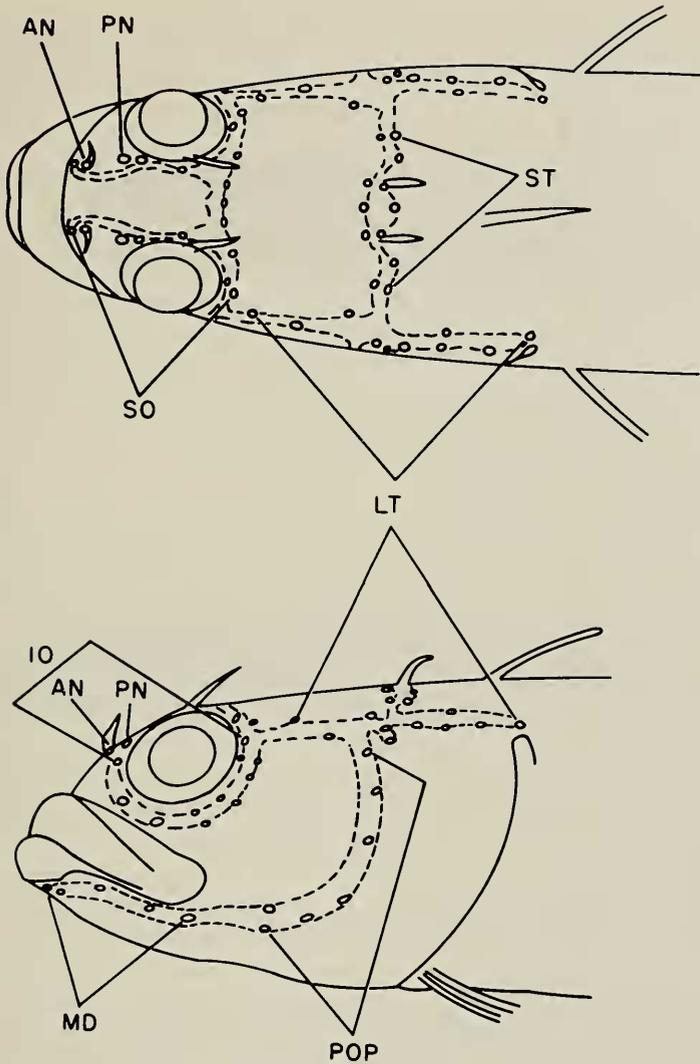


Fig. 1. Semidiagrammatic illustration of cephalic sensory pore series. Lines indicate first and last pores in each series. Abbreviations: AN, anterior nostril; IO, infraorbital series; LT, lateral temporal series; MD, mandibular series; PN, posterior nostril; POP, preopercular series; SO, supraorbital series; ST, supratemporal series.

Mississippi; MZUSP—Museu de Zoologia da Universidade de São Paulo; UF—Florida State Museum. Other abbreviations: IO, infraorbital pore series; LT, lateral temporal pore series; MD, mandibular pore series; POP, preopercular pore series; SO, supraorbital pore series; ST, supratemporal pore series.

Starksia brasiliensis (Gilbert, 1900)

Fig. 2

Brannerella brasiliensis Gilbert, 1900:180, pl. 9, fig. 1 (holotype CAS-SU 7750; type locality: coral reef near Maceió, Brazil).

Diagnosis.—Distinguished from other species in the *Starksia ocellata* complex by the following combination of characters: cheek with very narrow, pale Y-shaped mark; ring-shaped marks on cheek bright red in life; pigment on lips restricted to tips of jaws; typically 16 scales in arched part of lateral line (range 15–17); typically 7 total gill rakers on first arch (range 7–9).

Description.—Ranges for selected meristic characters are as follows: dorsal fin XX–XXI, 7–9 (mode XXI, 8); total dorsal elements 28–30 (mode 29); anal fin II, 16–18 (mode 17, spines not connected in males); pectoral fin 13–14 (mode 14); pelvic fin I, 2 apparent (a third rudimentary ray observable in some radiographs); caudal-fin rays 7 on dorsal hypurals, 6 on ventral hypural plate, none branched; procurrent dorsal caudal-fin rays 5–6 (mode 6); procurrent ventral caudal rays 4–6 (mode 5); precaudal vertebrae (those without distinct hemal spine) 10; caudal vertebrae (those with distinct hemal spine, plus the complex hypural bearing centrum) 23–25 (mode 24, CAS-SU 53510 paratype with 20 is anomalous); scales in arched part of lateral line 15–17 (mode 16), scales in straight part 19–22 (mode 20); gill rakers on first arch 2–3+1+4–6 (mode 2+1+4); last pleural rib on vertebra 10; last epipleural rib difficult to discern, but approximately on vertebra 17–19 (discernable in radiographs of only 3 specimens); pseudobranchial filaments 3–5 (mode 4); premaxillary teeth 46–57 (13 specimens); dentary teeth 51–73 (8 specimens); vomerine teeth 8–14 (mode 12); palatine teeth (left–right) 3–2 to 5–5 (mode 4–4). Cephalic sensory pores (Fig. 1, range followed by mode in parentheses): ST 12–13 (13), LT 8–11 (9), POP 7–11 (9), SO 6–10 (7), IO 8–13 (11–12), MD 5.

Upper and lower jaws each with outer rows of stout conical teeth enclosing band of small conical teeth near symphyses. Vomer and palatines with row of stout conical teeth, sometimes flanked posteriorly, or mesially, respectively, by small conical teeth. Small, conical upper pharyngeal teeth in rounded patch of about 3 irregular rows.

Pigmentation of preserved specimens as described by Greenfield (1979). Life colors taken from kodachrome slides of freshly collected specimens as follows: iris of eye yellow; bright red ring-like marks on cheeks, two on base of each pectoral fin, and one at upper end of gill opening. Red spots scattered over dorsal, anal, and caudal fins. Other markings the same as in preserved specimens.

Of the 21 known specimens of *Starksia brasiliensis*, there are 12 females and nine males. The largest female is 34.1 mm SL and the largest male is 30.9 mm SL.

The data for the São Paulo population (available on request) were analyzed for sexual differences using a t-test, but no statistically significant sexual differences were found for any of the characters examined. The northern and southern populations have mean numbers of segmented dorsal-fin rays (northern 7.4 vs. southern 8.1), segmented anal-fin rays (16.8 vs. 17.7), and total vertebrae (33.0 vs. 33.9) that are significantly different as indicated by t-tests (dorsal rays $P < 0.001$, $t = 6.182$; anal rays $P < 0.001$, $t = 7.877$; vertebrae $P < 0.001$, $t = 7.728$). These differences may represent clinal variation, but this cannot be confirmed until specimens from geographically intermediate areas become available.

Distribution.—*Starksia brasiliensis* is known from Maceió, south to São Paulo, Brazil, in depths to 13 m. One specimen collected from a cable was reported from 61 m (Longley and Hildebrand 1941; label with specimen gives 55–62 m), but

A



B



Fig. 2. *Starksia brasiliensis*. A. Male, 27.2 mm SL (MZUSP uncat.). B. Female, 31.8 mm SL (MZUSP uncat.).

we are hesitant to consider this depth within the normal range for the species (reasons discussed below).

The São Paulo specimens represent a southward range extension of approximately 1600 km to 23°44'S. We believe that the apparent disjunction in the species' distributional range reflects the limited collecting efforts in the intervening area and that the species will be commonly found in rocky and coral bottom habitats in that area.

The southern Brazil collecting sites were along the leeward shores of two steeply sloping, heavily forested islands. Large boulders (up to 5 × 5 × 2 m) covered the slopes above and below water, with those underwater covered with algae, bryozoans, sponges, small corals and other encrusting organisms. Small shrimp, lobsters, crabs, snails, and nudibranchs were observed on the encrusting growth.

Remarks.—The paratype (CAS-SU 53510) of *Starksia brasiliensis* has caused confusion regarding the range of certain counts. Böhlke and Springer (1961) commented on the low anal-fin ray and scale counts, and Greenfield (1979) gave an unusually low vertebral count for this specimen. Close examination of radiographs

of this specimen reveals that two pairs of centra, 6–7 and 14–15, are almost completely fused, each pair appearing as only one centrum. Nonetheless, the complex nature of the centra is evident since each bears two neural spines and two hemal arches or two hemal spines. If each fused centrum is counted as two centra, a count of $10 + 23 = 33$ vertebrae is obtained for the paratype. This count is in the range of the total number of vertebrae (33–35) for other specimens of this species. The low anal-fin ray count may be a result of the same factor that caused the fusions, which would make this count anomalous as well.

Comparisons.—Greenfield (1979) proposed that *Starksia ocellata* be recognized as a superspecies containing six allospecies, including *S. brasiliensis*. These allospecies are distinguished with certainty only by color pattern, all meristics and morphometrics overlapping to some extent among the species. Based on meristics and head color pattern, *S. brasiliensis* is most similar to a species group that includes *S. occidentalis* of the western Caribbean, *S. variabilis* of the southwestern Caribbean, and *S. guttata* of the southeastern Caribbean and the southern islands of the Lesser Antilles. Within this group, *S. brasiliensis* has a head color pattern that differs from that of *S. guttata* only in having a narrower Y-shaped marking on the cheek. *Starksia brasiliensis* also differs from *S. guttata* in having a mode of 16 scales in the arched portion of the lateral line (vs. 17), a mode of 20 scales in the straight portion of the lateral line (vs. 21), and a mode of 36 total lateral line scales (vs. 38, all counts for *S. guttata* based on Greenfield 1979). The two species overlap in each of these counts, but the least overlap occurs in the number of scales in the arched portion of the lateral line. Both *S. brasiliensis* and *S. guttata* have a dark area on the lips, restricted to the anterior tips of the jaws, and lack the dark bars on the lips found in *S. occidentalis* and *S. variabilis* (*S. culebrae* of the Lesser Antilles also has bars on the lips). *Starksia brasiliensis* differs from all of these in having a narrow Y-shaped mark on the cheek. Modes for all meristic characters are the same for *S. brasiliensis*, *S. occidentalis*, and *S. variabilis*. An additional character that distinguishes *S. brasiliensis* from, at least, *S. occidentalis* and *S. variabilis* is the color of the ring-like marks on the cheek. Greenfield (1979) stated that these marks were white in *S. occidentalis* and lemon yellow in *S. variabilis*. In our specimens of *S. brasiliensis*, these marks are bright red. The color of these marks has not been reported for *S. guttata* or *S. culebrae*, but it is orange in *S. ocellata* from the Tortugas (Longley and Hildebrand 1941) and from the eastern Gulf of Mexico (pers. observ. by JTW).

A cursory survey of the gill-raker counts for *Starksia* specimens in the Florida State Museum suggests that *S. brasiliensis* has fewer gill rakers on the first arch than other species in the *S. ocellata* superspecies. A specimen of *S. occidentalis* has a total gill-raker count of 10 (left)-9 (right), one *S. variabilis* has 9-9, and one *S. ocellata* has 11-11. This character also shows overlap as *S. brasiliensis* has 7 to 9 (one specimen with 9) gill rakers, but may prove useful in distinguishing some of the allospecies.

Additional support for the recognition of *Starksia brasiliensis* as a valid species in the *S. ocellata* superspecies comes from its geographic isolation from other allospecies. Collete and Rützler (1977) suggested that the fresh silt-laden waters of the Amazon and Orinoco rivers might serve as a barrier to dispersal of reef fishes confined to depths shallower than about 50 m. Although one specimen in the British Museum (Natural History) was collected from a cable in 55–62 m,

there is some doubt as to the accuracy of this depth recording. This specimen was collected around 1890 when depths presumably were determined by taking soundings at regular intervals, thus the 55 and 62 m depths probably correspond to two soundings taken at separate points along the cable. Since the bottom topography between the two soundings is unknown, it is conceivable that a rocky or coralline outcropping on the bottom could significantly alter the 55–62 m depth range. Aside from this one specimen, no specimens belonging to the *S. ocellata* superspecies have been reported from depths greater than 25 m. One of us (JTW) has collected *S. ocellata* at a depth of about 36 m in the eastern Gulf of Mexico (specimens deposited in University of South Alabama Ichthyological Collection), but this is still much shallower than the Brazilian record. We feel that it would be premature to suggest that *S. brasiliensis* commonly occurs at depths of 50 m or more until additional collections are made at these depths. In view of the typically shallow (less than 13 m) depth distribution of *S. brasiliensis*, it seems likely that the Amazon-Orinoco barrier effectively isolates *S. brasiliensis* from its northern congeners, but additional collecting is needed to confirm its absence from this region.

In view of the distinctness of the Brazilian population from other populations of *Starksia* based on coloration, pigment pattern, and certain meristic characters, we agree with Greenfield (1979) and recognize *S. brasiliensis* as a valid species in the *S. ocellata* superspecies.

Material examined.—CAS-SU 7750 and 53510 (holotype and paratype, respectively, of *Brannerella brasiliensis*) both from near Maceió, Brazil, 1899. GCRL 9476 (2) Brazil, Bahia, Isla Itaparica, Barra do Gil, 13°00'00"S, 38°37'00"W, tidepools just inside outer edge of reef, rock-sand bottom, algae, bryozoa, 25 Aug 1972, 0–2 m. BMNH 1890.1.27.19(1), Brazil, 11°50'S, 38°47'W, from cable in 55–62 m. UF 32889(4), Brazil, Ilha das Couves, 23°25'05"S, 44°51'50"W, coral encrusted rocks on sand bottom, 18 Jul 1981, 10–13 m. MZUSP uncat. (3), same data as UF 32889. UF 32887 (1), Brazil, Ilha da Vitoria, 23°44'40"S, 45°01'40"W, bottom with large boulders encrusted with sponges, small corals, and sparse algal growth, 25 May 1981, 10–13 m. MZUSP uncat. (1), same data as UF 32887. UF 32888 (3), Brazil, Ilha da Vitoria, 23°44'S, 45°01'W, bottom with large boulders encrusted with corals and sponges, 14 Jun 1981, 10–13 m. MZUSP uncat. (4), same data as UF 32888.

Comparative material examined.—*Starksia ocellata*: UF 16018 (1), Delray Beach, Palm Beach County, Florida. *Starksia occidentalis*: UF 23348 (1 paratype), Frenchman's Cay, Belize. *Starksia variabilis*: UF 23349 (1 paratype), Santa Marta, Colombia.

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