DISTINGUISHING CHARACTERS OF TWO SPECIES OF RED SNAPPERS OF THE ATLANTIC COAST OF NORTH AMERICA

By

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Some doubt exists as to the number of species of red snapper occurring in the tropical and subtropical waters of the Atlantic Ocean, and more than one species has been described. Some American authors, however, have claimed that only one species exists.

The first account of which cognizance is to be taken under the international rules of scientific nomenclature of what appears to be a red snapper was published by Bloch.[1] This description was based on that of Prince Marcgrave, whose fish was said to have been obtained in Brazil. This fish is reported to have been known at that time in Brazil under the common name of *Acara aya*, and Bloch gave it the scientific name *Bodianus aya*. Just what this *B. aya* is is difficult to determine from the description, which seems to be inaccurate in some important details. This may perhaps be determined by a study of the fish called *aya* in Brazil, if it is still known there under that name. Most American authors, however, have come to regard this fish as identical with the common red snapper of the West Indies. This assumption may be allowed to stand until the contrary is proved. The question, however, remains. Is there only one species of red snapper in the Caribbean Sea, and is the red snapper from the Caribbean identical with the common one from the Gulf of Mexico?

Poey[2] described a species of red snapper, giving it the scientific name *Mesoprion campechanus*. It is not stated in the description where the specimen on which it is based was obtained. Judging from the description, this species differs from the common red snapper of Pensacola in having a larger eye, finer scales, and 8 instead of 9 soft rays in the anal.

Cope[3] described a fish that may have been a red snapper, from the island of St. Kitts, under the name of *Lutjanus torridus*, but the description is not detailed enough to admit of ready identification, and until a careful comparative study of the type is made it is not possible to state which species this author had.

[1] Bloch, Marc Éliéser: Ichtyologie, ou Histoire Naturelle, générale et particulière, des Poissons. Part VII, p. 33, Pl. CCXXVII. 1797. A Berlin chez l'Auteur.

[2] Memorias sobre la historia natural de la isla de Cuba, Tome 2, 1856–1858 (1860), p. 149. Habana.

[3] Transactions, American Philosophical Society, new series, vol. 14, 1871, p. 468.

Goode and Bean[4] described the common red snapper of the Gulf of Mexico, from the vicinity of Pensacola, under the name *L. blackfordii*. In the paper cited these authors make the following statement:

The well-known red snapper of our southern coast has, strangely enough, never been scientifically described. This is due to an erroneous identification of this species with a common West Indian form (*Lutjanus aya*) from which it differs in several particulars, notably in the size of the eye and of the scales. * * *.

This species is closely allied to the *L. torridus* of Cope, but differs in several particulars, notably (1) in the smaller eye, (2) the greater number of dorsal and anal rays, (3) the smaller and more numerous scales, (4) the less emargination of the tail, (5) the shorter ventral fin (according to figure of Cope), (6) the higher occipital crest, and (7) in coloration.

Goode,[5] in a catalogue of the fishes of Bermuda, calls the red snapper found in those waters *L. aya*. Although not directly stated by him, it seems that this author still regarded the Bermuda red snapper as distinct from the Pensacola red snapper, because in a list of species common to Bermuda and the West Indies, given on page 13 of the same paper, this red snapper is included, but it is not included in a similar list of species common to Bermuda and the coast of the United States which is also given in the same paper.

Jordan and Swain [6] described a red snapper under the name *Lutjanus vivanus* (Cuvier and Valenciennes). These authors evidently were of the opinion that there was only one species of red snapper, as they put the *Mesoprion campechanus* of Poey, the *L. torridus* of Cope, and the *L. blackfordii* of Goode and Bean in the synonymy of *L. vivanus*. They also placed the name *Bodianus aya* of Bloch in the synonymy of *L. vivanus*, prefacing it, however, with a query. The following quotations indicate the opinions of these authors regarding the identification of the red snapper.

We place here with doubt the names *aya* and *ruber*, based on the *Acara aya* of Marcgrave. This is said to be a red *Lutjanus*, 3 feet in length, and with a red circle around its iris. It is therefore much more likely to have been this species than the *Lutjanus profundus*, with which it has been identified by Cuvier. It seems to us, however, that this identification is too uncertain to warrant the use of the name for either species.

The name *vivanus* is based on two young specimens which Professor Jordan has examined and which he considers to belong to this species, although, as already stated, these specimens are for this species unusually slender.

The type of *Mesoprion campechianus* is a stuffed skin of a young fish apparently belonging to this species. In this specimen the eye is larger than it should be in a red snapper of that size, it being, as Poey has correctly stated, 4 in head. This large size is, however, probably due to the shrinkage of the orbit in drying.

Poey also counts "65 scales above the lateral line and 53 below," a larger number than others count in this species. This difference is doubtless dependent on the method of counting.

Lutjanus torridus, loosely described and poorly figured by Cope, seems to be also the red snapper. We have examined Professor Cope's type of *L. torridus* in the Museum of the Academy of Philadelphia. It is 11 inches in length and in poor condition, but it apparently belongs to this species. * * *.

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[4] "Descriptions of two new species of fishes, *Lutjanus blackfordii* and *L. stearnsii*, from the coast of Florida." Proceedings, U. S. National Museum, Vol. I, 1878 (1879), p. 176. Washington.

[5] "Catalogue of the fishes of Bermuda." Bulletin, U. S. National Museum, No. 5, 1876, p. 55.

[6] "A review of the species of Lutjaninæ and Haplopagrinæ found in American waters." Proceedings, U. S. National Museum, Vol. VII, 1884 (1885), pp. 453–455.

The type of *L. blackfordii* is, of course, specifically identical with the specimens which form the basis of the above descriptions. The description published under this name by Goode and Bean is the first tolerable account of this most valuable food fish. We regret, therefore, our inability to retain the appropriate name which these authors have bestowed on the species.

Jordan and Fesler [7] were also of the opinion that there was only one species of red snapper to which they apply the name *Lutjanus aya*. The name *L. vivanus* is applied by these authors to the silk snapper, the *pargo de lo alto* of the Cubans, and *L. torridus* of Cope is placed in the synonymy of the last-mentioned species.

Jordan and Evermann [8] were also of the opinion that there is only one species of red snapper. In a footnote to their description of the red snapper they state:

The type of *Mesoprion campechanus* examined by us at Habana is a stuffed skin of a young fish, apparently belonging to this species. In this specimen the eye is larger than it should be in a red snapper of that size, it being, as Poey has correctly stated, 4 in head. This large size is, however, probably due to the shrinkage of the orbit in drying. Poey also counts "65 scales above the lateral line and 53 below," a larger number than others count in this species. This difference is doubtless dependent on the method of counting. The type of *Lutjanus blackfordi* is, of course, the present species, and the first good description of the species is that published by Goode and Bean under this name. We are forced, however, to adhere to our original view that the name *campechanus* certainly belongs to the same fish, and the still older name *aya* is as well authenticated as the names given by Bloch are likely to be. We can not, therefore, make use of the name *blackfordi* as the specific name of the red snapper.

By a direct comparison of specimens the present writers find that there are at least two species of red snapper. The characters of the larger eye and finer scales are real and serve well to separate a red snapper found in the Caribbean Sea (and probably in other West Indian waters) from the common red snapper of Pensacola. There are other important characters by which these two species differ, as will be shown presently. The name *Lutianus campechanus* is here applied to the Caribbean red snapper, as it seems to agree with the original description of that species in all important details, and it seems to be the same fish which Poey had when he described that species, while the Pensacola red snapper must stand as *L. blackfordii*. In view of our study, it seems best to hold the name *aya* in abeyance, insofar as our red snappers are concerned, until a direct comparison is made of the Brazilian fish of that name with the more northern red snappers.

The Bureau of Fisheries has recently received, through the courtesy of F. W. Wallace, editor of the Fishing Gazette, and J. F. Taylor, president of the Warren Fish Co., Pensacola, Fla., a fine specimen of red snapper caught in the Caribbean Sea off the coast of Honduras. The expedition on which this fish was caught was superintended by F. W. Wallace and was for the purpose of seeking new fishing banks. In a letter accompanying the specimen Mr. Taylor stated:

We are shipping to the Bureau of Fisheries a specimen of red snapper caught in the Caribbean Sea on a recent trip of our vessel, *A. F. Warren*. As the species seems quite different from the ordinary, we thought it might prove interesting to you on examination, and we would be pleased to have your views after making this examination. The flesh of the fish appears to be much firmer, the scales smaller, and its contour different from the fish caught on Campeche Banks and offshore here.

[7] "A review of the sparoid fishes of America and Europe." Report, U. S. Commissioner of Fish and Fisheries, 1889–1891 (1893), p. 447. Washington.

[8] "The fishes of North and Middle America." Part II. Bulletin, U. S. National Museum, No. 47, Part II, 1898, p. 1264.

In this letter Mr. Taylor points out the striking differentiating characters which may be noted by a surface examination of the two species.

For the purpose of making a direct comparison of specimens the bureau has received, through the courtesy of the Warren Fish Co., a specimen of the common Pensacola red snapper of about the same size. We also had for study a specimen of red snapper caught at Rebecca Shoals, near Key West. The following descriptions and comparisons are based on these specimens.

Lutianus blackfordii Goode and Bean

Pensacola Red Snapper

Lutjanus blackfordii Goode and Bean, Proc., U. S. National Museum, I, 1879, p. 176. Pensacola, Fla.

Formulæ: D. X, 14. A. III, 9. Scales 58–63$\frac{7}{14}$. Gill rakers 9.

Upper profile rounded, somewhat gibbous, turning gradually downward at about origin of dorsal and making a broad, somewhat convex curve to the caudal peduncle; lower profile a nearly straight oblique line to the ventrals and in a nearly horizontal line from there to the anus.

Body comparatively deep, the depth (measured at origin of ventral fins) 2.57 to 2.61 in length; least height of caudal peduncle 3.03 to 3.32 in the head; head 2.77 to 2.80 in length (measured to end of bony part of opercle); margin of preopercle finely but distinctly denticulate, the denticles at angle coarser; upper limb with a broad emargination, into which fits the feebly developed knob of the interopercle; snout medium (measured to the free margin of the eye), 2.34 to 2.40 in head and 2.85 to 2.86 as long as the eye, very slightly longer than maxillary (the snout, when measured from edge of orbit, about 2.48 to 2.54 in head); mouth medium, the maxillary 2.40 to 2.43 in head, reaching almost but not quite to vertical through anterior margin of eye; articulation of mandible on vertical through about the middle of eye; eye (measured between the free margins of the skin) 6.71 to 6.85 in head (the orbit about 5.20 to 5.25 in head).

Upper jaw with a row of small canines in front, larger anteriorly, and gradually growing smaller posteriorly; a narrow band of smaller teeth behind the canines, extending to the angle of mouth and interrupted in middle; lower jaw with a row of small, subequal canines in front and with a narrow band of smaller teeth behind, interrupted at the symphysis and extending only a short distance at the sides; teeth on the vomer comparatively strong, in a somewhat anchor-shaped patch, rounded in front, tapering to a point behind, and with a pointed projection on either side, a little back of the anterior edge; teeth on tongue comparatively well developed, divided by a straight, narrow, transverse, bare streak into two parts; the anterior part of the Key West specimen consisting of a broad patch, nearly as broad as long, rounded in front, square behind, and with nearly straight sides; the Pensacola specimen differing in having an indentation on each side of the broad patch and with smaller patches of teeth projecting into the indentations, the posterior patch only a little longer than the anterior one, tapering behind nearly to a point.

Gill rakers on lower limb of anterior arch well developed, gradually growing smaller anteriorly, 9 in number and 3 tubercles in front; upper limb with two rather long gill rakers at the angle and with five short stumpy ones above these.

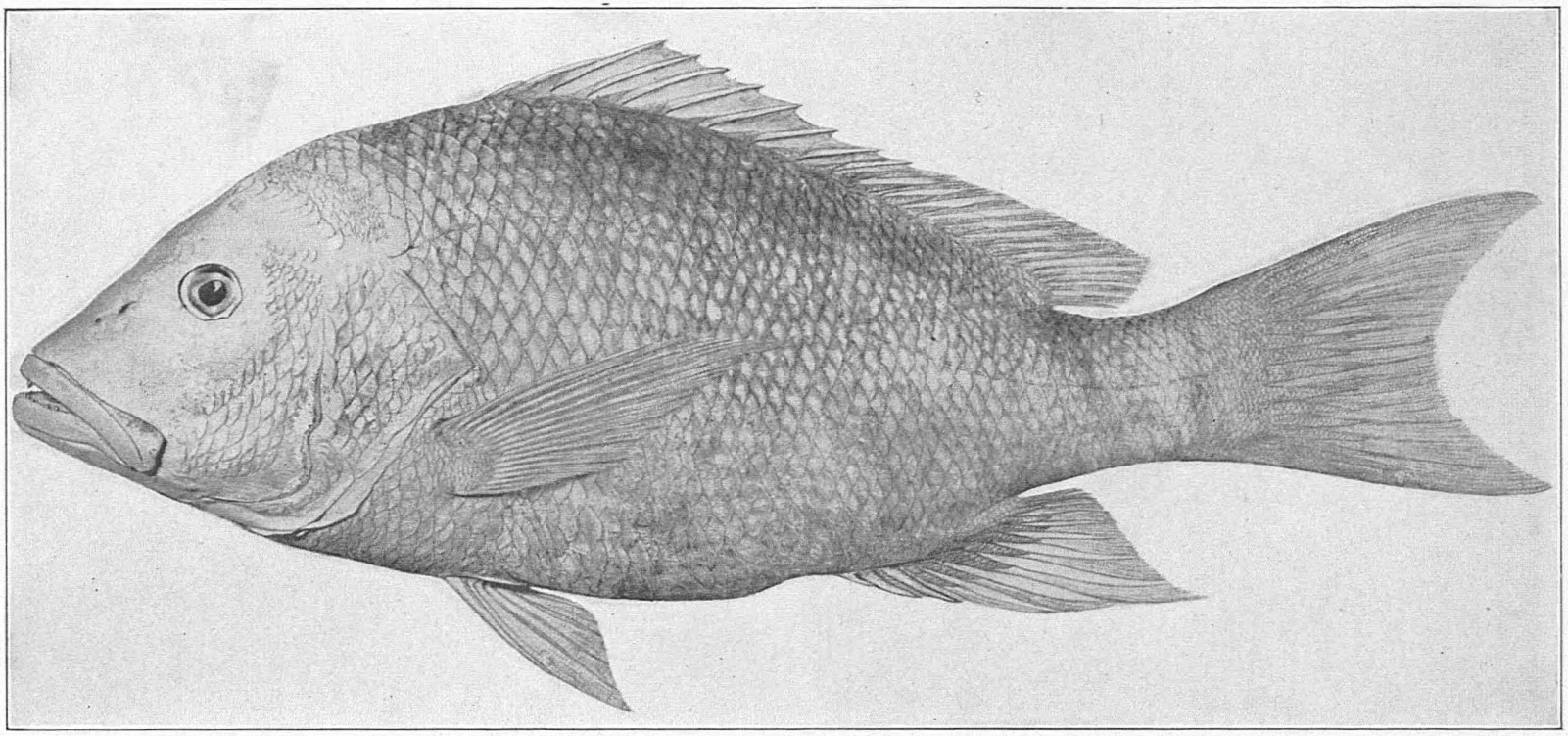

FIG. 1.—*Lutianus blackfordii*. Red snapper Photograph from a specimen 775 millimeters

The exposed portions of the scales on middle of side on anterior part of body about 1⅔ times as high as the exposed parts of the scales situated on middle of sides and over the anal fin; the number of oblique rows of scales above the lateral line, counting those running upward and backward, 58 to 63, those running downward and backward, 47 to 48; below the lateral line the rows running downward and forward number 47 to 48 and those running downward and backward number 43 to 44; scales in lateral line, 47 to 48 (all scale counts were made from the enlarged scale at the upper angle of the opercular opening to the base of the caudal); 7 scales between origin of dorsal and lateral line, counting downward and forward; 14 between origin of anal and lateral line, counting upward and backward, and oblique band of smaller scales in region of nape, running upward and forward from upper angle of gill opening to upper profile; scales of this band larger anteriorly, very small posteriorly, and followed abruptly by the ordinary large scales; opercle, subopercle, and interopercle scaly; a patch of scales directly behind the eye and a horizontal row of 4 to 6 more or less embedded, rather strongly ctenoid scales above this patch; 6 rows of scales on cheeks; snout, preorbital, and upper and lower sides of head naked; spinous dorsal bare; base of soft dorsal in a well-developed scaly sheath, rows of small scales extending for some distance on soft rays; base of anal in a scaly sheath, rows of small scales extending on soft rays; similar rows of scales on caudal rays extend to a short distance from their ends; a small patch of scales at base of pectoral fin, the rest of the fin being naked; scales on chest extending in midline a little beyond base of the ventrals; no scales on ventral fins.

The dorsal fin consisting of 10 spines and 14 soft rays, the fourth spine longest, 2.63 to 2.66 in head; the soft part somewhat angulated, the angle very little produced; distance of origin of dorsal from tip of snout 2.29 to 2.31 in length (1.21 as long as the head); origin of dorsal about an eye's diameter behind base of upper ray of pectoral; base of spinous part 1.17 to 1.18 in head; base of soft part 1.88 in head; anal fin angulated, the angle produced, longest soft ray about 1.82 in head; the first spine about one-half as long as the second, the latter 5.02 to 5.07 in head; the third spine 4.12 to 4.18 in head; origin of anal fin vertically under the base of first and second soft dorsal rays, its base 2.40 to 2.51 in head; pectorals, I, 16, falcate, rather long, 1.16 to 1.22 in head, reaching slightly past a vertical through the anal opening; distance of base of upper ray from tip of snout, 1.01 to 1.05 in head; ventrals 1.72 in head, their origin directly under that of dorsal, their tips at a distance from the vent equal to the distance of the latter from the anal fin.

Color in fresh condition (iced specimen).—Body, head, and fins scarlet red, the red color gradually becoming paler below; iris scarlet-red, with a short longitudinally elongate black spot near upper margin of eye; above the lateral line the red color of the body is suffused with a bluish green tinge; dorsal and caudal edged with a fine black streak; base of pectorals with a black, rather diffuse blotch. No distinct black lateral spot. In alcohol the red color, including that of the eyes, fades, but the short black band on the eye and the spot at the inner angle of the pectorals persist.

Localities.—Gulf of Mexico (Pensacola), specimen 775 millimeters long; Key West (Rebecca Shoals), specimen 790 millimeters long.

(Mr. Wallace states that this species was not taken in the Caribbean Sea on the expedition which he commanded.)

Lutianus campechanus (Poey)

CARIBBEAN RED SNAPPER

Mesoprion campechanus Poey, Memorias, II, 1860, p. 149. Locality not given.

Formulæ: D. X, 14. A. III, 8. Scales $70\frac{8}{15}$. Gill rakers 11.

Upper profile rounded, very slightly gibbous, line of profile turning gradually downward at about origin of dorsal and making a broad, rather convex curve to caudal peduncle; lower profile a nearly straight oblique line to about posterior edge of preopercle and a nearly horizontal line from there to origin of anal.

Body rather slender, depth (measured at origin of ventral fins) 2.82 in length; least height of caudal peduncle 2.9 in head; head rather short, 3.11 in length (measured to end of bony part of opercle); margin of preopercle finely but distinctly denticulate, the denticles at angle coarser, upper limb with a rather shallow emargination, interopercular knob obsolete; snout rather short, 2.64 in head (measured to free margin of eye), 2.03 as long as eye, shorter than maxillary (the snout when measured from edge of orbit about 2.81 in head); maxillary 2.39 in head, reaching a vertical through anterior margin of eye, articulation of mandible on a vertical through about middle of eye; eye rather large (measured between the free margins of the skin), 5.36 in head, and about as long as one-half the snout; (orbit about 4.78 in head).

Upper jaw with a row of small canines in front, larger anteriorly and gradually growing smaller posteriorly; a narrow band of smaller teeth behind the canines, interrupted in the middle and extending to angle of mouth; lower jaw with an outer row of small subequal canines, the smaller teeth behind the canines reduced to a short, elongate patch on either side of the symphysis; teeth on vomer comparatively strong, in a somewhat anchor-shaped patch, rounded in front, tapering to a point behind, and with a short, pointed projection on either side, a little back of the anterior edge, the part of the patch behind the pointed projections not much longer than the part anterior to the same; teeth on tongue comparatively well developed, divided by a straight, narrow, transverse, bare streak into two patches, the anterior patch broader than long, the posterior patch much longer than the anterior, the sides in front nearly parallel for their greater distance, abruptly turned behind and meeting in the center in gable-like manner. Gill rakers on lower limb of anterior arch well developed, gradually growing smaller anteriorly, 11 in number, and 3 tubercles in front, upper limb with 2 rather long gill rakers at the angle and 5 short, stumpy ones above.

The exposed portions of the scales on middle of sides on anterior part of body not much higher than the exposed portions of the scales situated on the middle of the sides over the anal fin; 69 oblique rows of scales above the lateral line counting those running upward and backward, 52 rows counting those running downward and backward; below the lateral line the rows running downward and forward number 53 and those running downward and backward number 48; 50 scales in lateral line; 8 scales between origin of dorsal and lateral line, counting downward and forward; 15 between origin of anal and lateral line, counting upward and backward; an oblique band of smaller scales in region of nape, running upward and forward from upper angle of gill opening to upper profile; scales of this band larger

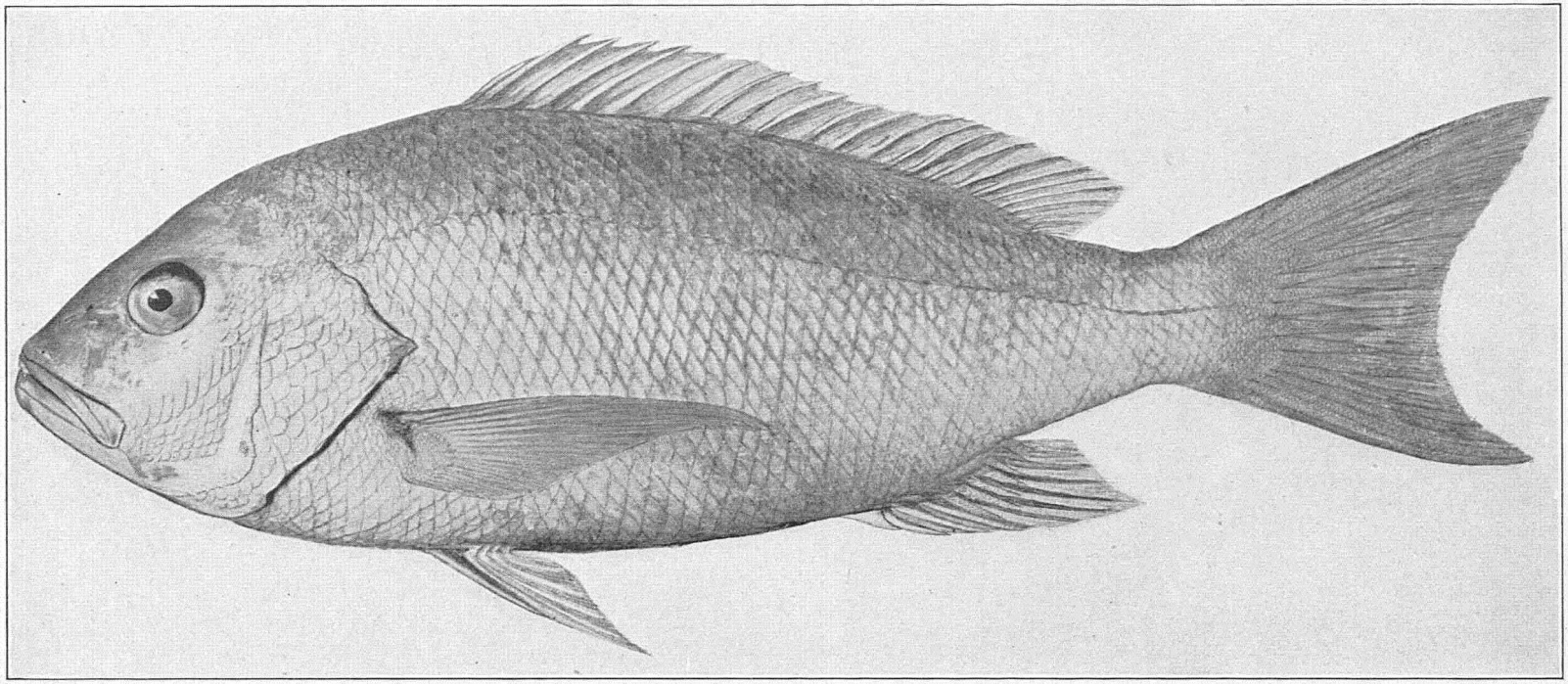

FIG. 2.—*Lutianus campechanus* Photograph from a specimen 725 millimeters

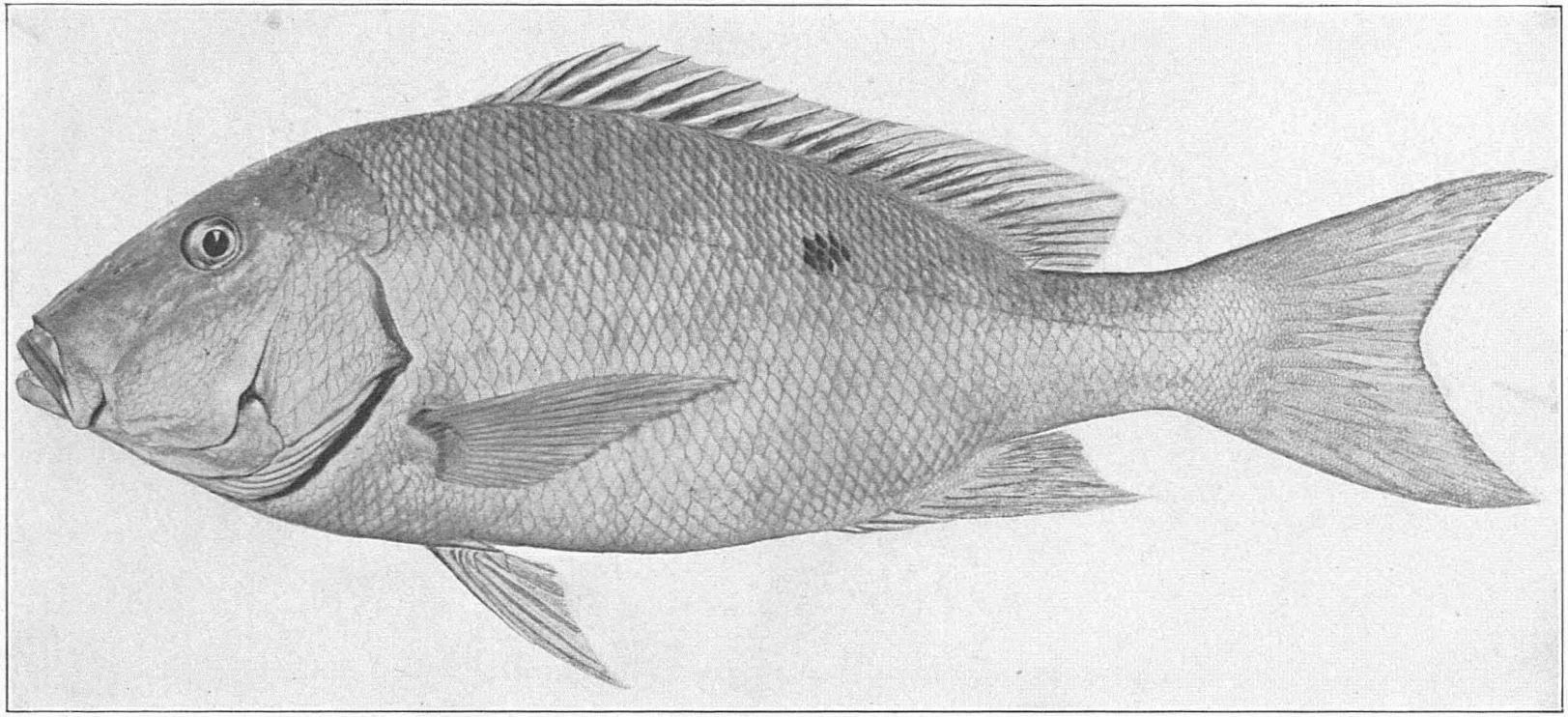

FIG. 3.—*Lutianus analis* Photograph from a specimen 650 millimeters

anteriorly, very small posteriorly, and followed abruptly by the ordinary larger scales; opercle, subopercle, and interopercle scaly, a patch of scales directly behind eye and a horizontal row of 6 more or less embedded, rather strongly ctenoid scales above this patch; 6 rows of scales on cheeks; snout, preorbital, and upper and lower sides of head naked; spinous dorsal bare, base of soft dorsal in a well-developed scaly sheath, rows of small scales extending for some distance on soft rays; base of anal in a scaly sheath, rows of small scales extending on soft rays; similar rows of scales on caudal rays nearly covering caudal fin and extending to a short distance from tips of rays; a small patch of scales at base of pectoral fin, rest of the fin naked; scales on chest extending in midline to a little beyond base of ventrals; no scales on ventral fins.

Dorsal fin consisting of 10 spines and 14 soft rays, the fourth spine longest, 2.24 in head; distance of origin of dorsal from tip of snout 2.59 in length (1.2 as long as head); base of spinous dorsal 1.07 in head, base of soft part 1.54 in head; anal fin angulated, the angle produced, longest soft rays about 1.8 in head, first spine one-half as long as second, the latter 4.43 in head, third spine 3.61 in head; origin of anal vertically under base of third soft dorsal ray, its base 2.36 in head; pectorals I, 16, falcate, 1.04 in head, reaching a vertical through anus, distance of base of upper ray from tip of snout 1.01 in head; ventrals 1.58 in head, their origin directly under that of dorsal, distance of their tips from vent a little greater than distance of latter from origin of anal.

Color in fresh condition (iced specimen).—Body, head, and fins deep red, the red color becoming fainter on lower parts; iris deep red with a longitudinally elongate black spot near upper margin of eye;[9] base of pectorals with a black blotch on inner and outer surfaces; dorsal and caudal with faint indications of a fine blackish edge; scales on upper part of body with greenish centers, giving somewhat the appearance of faint oblique streaks; no distinct black lateral spot. In alcohol the red color, including that of the eye, fades, but the short black band at the upper part of the eye and the black color at the base of the pectorals on both sides persist. After fading the body also shows a few short, faint, metallic blue crossbars.

Locality.—Caribbean Sea, off the coast of Honduras; specimen 725 millimeters long.

When two specimens, one of each species, of about the same size are placed side by side the most striking characters of the Caribbean red snapper are (1) the shorter, more compact head, (2) the shorter, blunter snout, (3) the somewhat larger eye, (4) the more slender body, and (5) the smaller scales. The difference in the size of the scales appears more striking than the actual count would indicate. This is because in the red snapper from Pensacola the scales on the anterior part of the body, especially those below the lateral line, are considerably deeper than the scales on the posterior part of the body, and this, together with their greater breadth, makes the difference in appearance quite striking. The number of rows of scales would seem to be a valuable differentiating character, and it is important to state just how the scales were counted, since the number of rows, as is shown in the foregoing descriptions, depends on the method of counting.

[9] Mr. Wallace states in his field notes that snappers taken off the coast of Honduras had a yellow ring around the eye. Such a ring was not noticed when the specimen here described was received.

In addition to the characters already mentioned, other important specific differences are set forth in the following comparative table in parallel columns. Because *Lutjanus campechanus* has nearly the same counts of scales and also fin rays as *L. analis*, the common muttonfish, and the two species are apt to be confused by a careless observer, the distinguishing characters of the last-mentioned species are included in the table. For this purpose we had a specimen 650 millimeters long, obtained in the Key West fish market. Another species which is closely related is the silk snapper, commonly called "*pago de lo alto*" in Cuba. When fresh, this last species apparently may readily be distinguished by the bright yellow color of the eye. In a comparative study of this kind it would have been advantageous, in order to understand the relationship, to have included this species. Unfortunately, however, no specimens are available for comparison.

L. BLACKFORDII	L. CAMPECHANUS	L. ANALIS
Head rather large, 2.77 to 2.80 in length.	Head rather small, 3.11 in length.	Head medium, 2.94 in length.
Snout medium, 2.34 to 2.40 in head, subequal to maxillary.	Snout short and blunt, 2.64 in the short head, 0.91 as long as maxillary.	Snout long, 1.97 in head, 1.34 as long as maxillary.
Mouth rather large.	Mouth rather large.	Mouth small.
Maxillary 2.40 to 2.43 in head, extending to a vertical slightly in front of eye.	Maxillary 2.39 in head, extending to a vertical through anterior margin of eye.	Maxillary short, 2.64 in head, extending to a vertical nearly an eye's diameter in front of anterior margin of eye.
Eye rather small, 6.71 to 6.85 in head, 2.85 to 2.86 in snout.	Eye rather large, 5.36 in head, 2.03 in snout.	Eye small, 7.0 in head, 3.56 in snout.
Interopercular knob feebly developed.	Interopercular knob obsolete.	Interopercular knob rather well developed.
Body rather deep, depth 2.57 to 2.61 in length.	Body more slender, depth 2.82 in length.	Body rather slender, depth 2.78 in length.
Teeth on vomer strong, in a comparatively large, somewhat anchor-shaped patch.	Teeth on vomer strong, in a comparatively large, somewhat anchor-shaped patch.	Teeth on vomer weaker, in a narrow, somewhat rounded band in front.
9 developed gill rakers on lower limb of anterior arch; 2 long ones on upper limb at angle.	11 developed gill rakers on lower limb of anterior arch; 2 long ones on upper limb at angle.	8 developed gill rakers on lower limb of anterior arch; only 1 long one on upper limb at angle.
Exposed portions of scales on middle of sides, in front, about 1⅔ as high as exposed parts of scales situated on middle of sides and over the anal fin.	Exposed portions of scales on middle of sides, in front, not much greater in height than exposed parts of scales situated on middle of sides and over the anal fin.	Exposed portions of scales on middle of sides, in front, not much greater in height than exposed parts of scales situated on middle of sides and over the anal fin.
58 to 63 oblique rows of scales above the 1. 1. (counting the rows running upward and backward).	69 oblique rows of scales above the 1. 1.	68 oblique rows of scales above the 1. 1.
7 scales between origin of dorsal and 1. 1., counting downward and forward.	8 scales between origin of dorsal and 1. 1.	8 scales between origin of dorsal and 1. 1.
14 scales between origin of anal and 1. 1., counting upward and backward.	15 scales between origin of anal and 1. 1.	15 scales between origin of anal and 1. 1.

6 rows of scales on cheeks.	6 rows of scales on cheeks.	8 rows of scales on cheeks.
9 soft anal rays.	8 soft anal rays.	8 soft anal rays.
Anal spines comparatively long, second 5.02 to 5.07 and third 4.12 to 4.18 in head.	Anal spines comparatively long, second 4.43 and third 3.61 in head.	Anal spines rather short, second 6.44 and third 4.54 in head.
Black lateral spot disappearing in large individuals.	Black lateral spot disappearing in large specimens.	Black lateral spot persistent in large specimens, distinct.