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RESULTS OF THE BRANNER-AGASSIZ
EXPEDITION TO BRAZIL.

III.

THE FISHES.

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DURING his connection with the Branner-Agassiz Expedition to Brazil in the summer of 1899, Mr. A. W. Greeley made a small but interesting collection of fishes from that part of the coast lying between Mamanguape and Maceio. Most of the specimens were purchased from fishermen at Pernambuco and Maceio, but a few of the smaller kinds were collected in the tide-pools of the reefs. Of the 85 species obtained, 4 are here described as new, and a number of little known forms are redescribed. The collection is deposited in the Zoological Museum of Stanford University.

I take pleasure in expressing my indebtedness to Dr. J. C. Branner, who, as leader of the expedition, encouraged in every way the gathering of biological material.

1. *Ginglymostoma cirratum* (Gmelin).

A female about 12 feet long, obtained at Maceio, was found to contain young, many of which were preserved.

2. *Mustelus canis* (Mitchill).

Maceio.

3. *Scoliodon terrænovæ* (Richardson).

Maceio.

4. *Sphyrna zygaena* (Linnæus).

Maceio.

5. **Felichthys marinus** (Mitchill).

Pernambuco; Maceio.

In two young specimens the pectoral and the dorsal spines are about equal, and are much shorter than the length of the head. The anal fin has 21 rays. The occipital buckler tapers rapidly backward, its posterior half being very narrow and of nearly uniform width.

Eigenmann is probably right in referring *F. bahiensis* to the synonymy of this species.

6. **Selenaspis herzbergii** (Bloch).

Maceio.

7. **Aspistor luniscutis** (Cuvier & Valenciennes).

Pernambuco; Maceio.

8. **Netuma grandicassis** (Cuvier & Valenciennes).

Maceio.

9. **Tetragonopterus bahiensis** Steindachner.

Two specimens, 85 and 70 mm. long, from the stone reef at Mamanguape.

T. bahiensis seems to differ from *T. lacustris* in the slightly larger head and slenderer body. Our specimens agree well with the original description, differing only in having one or two more scales along the lateral line, and in having but two rudimentary anal rays.

The humeral and caudal spots are intensely black, with well-defined margins. The former is longitudinally oval, surrounded by a wide lighter area, the posterior portion of which is slightly darkened. The spot on caudal peduncle is widest opposite the base of the outer caudal rays and is continued as a narrow streak to the tips of the median rays. A faint darker band runs forward along the sides, and becomes fainter and narrower anteriorly.

The head is contained $2\frac{3}{5}$ times in the total length to base of caudal; depth $2\frac{2}{7}$. Eye $3\frac{1}{4}$ in head. Scales 34 or $35\frac{5\frac{1}{2}}{4\frac{1}{2}}$, the longitudinal rows counted from origin of dorsal to base of outer ventral ray. The lateral line is complete.

D. I, 10 or I, 11; A. II, 25 or II, 29.

The maxillary reaches to below the anterior part of the eye. The distance from the tip of the snout to the end of the maxillary is less than that from the tip of the snout to the hinder edge of the pupil. By the aid of a lens, the maxillary in the larger specimen can be seen to have its entire edge finely crenulated.

10. *Tetragonopterus unilineatus* Gill.

Two small specimens were obtained among the mangroves near Pernambuco.

11. *Ahlia egmontis* (Jordan).

One specimen, 150 mm. long, from the coral reef near Maceio. It agrees in nearly all respects with the description of the types. The dorsal fin begins behind the origin of the anal a distance equal to the length of the gape of the mouth. The pectorals are broad and rather short, their length slightly less than the length of the snout. The length of the head equals one-fifth the distance from the snout to the anus. The head and trunk are a little shorter than the tail. The teeth are in a single series in each jaw, there being a few stronger ones anteriorly on the head of the vomer. No teeth on the shaft of vomer. The color is rather bright olive, the upper parts being densely dusted with black specks. The only differences of importance between this specimen and the types as described consist in the smaller eye and smaller mouth in the Brazilian specimen. The eye is very small, about $\frac{1}{2}$ the length of the snout; but the apparently larger eye in the types may be due to imperfect state of preservation. The smaller mouth is doubtless dependent upon immaturity, the types being 15 inches long.

12. *Myrophis punctatus* (Lütken).

One specimen was obtained at the mouth of the Rio Goyanna. The head is contained $2\frac{5}{7}$ times in the trunk, $5\frac{1}{2}$ in the tail.

13. *Lycodontis moringa* (Cuvier).

Mouth of the Rio Goyanna; Pernambuco; coral reef near Maceio.

14. *Lycodontis funebris* (Ranzani).

Stone reef at Pernambuco.

15. *Albula vulpes* (Linnæus).

Pernambuco; Maceio.

16. *Stolephorus browni* (Gmelin).

Stone reef at Mamanguape.

17. *Lycengraulis grossidens* (Cuvier).

Pernambuco; one specimen.

Head $4\frac{1}{8}$; depth 4. D. II, 14; A. II, 25. Lateral line about 40.

There are about 14 large teeth in a series along the middle of the lower jaw. These are rather widely separated, the middle of the interspace being occasionally occupied by a smaller tooth. Both toward the angle of the jaw and toward the symphysis these larger teeth are

replaced by smaller ones continuing the series. The maxillary teeth are more uniform in size and about equal the smallest of those in the lower jaw. Along front and sides of jaw the teeth are slightly incurved and are directed downward and backward; laterally they become decidedly retrorse, pointing downward and forward.

The anal begins under the middle of the dorsal. The origin of the dorsal is midway between the base of the caudal fin and the middle of the eye. The fins are somewhat mutilated and the scales have fallen. There seems to have been a wide silvery band along the sides, on a level with the eye.

18. *Pœcilia vivipara* Bloch and Schneider.

Four specimens from a fresh-water swamp, and from the mangroves, near Pernambuco.

D. 6, 7 or 8; A. 7 or 8. L. L. 27. Basal half of dorsal dusky, with a narrow black convex cross-bar separating basal region from the distal area; the latter with a wide dusky margin. In the largest specimen the coloration of the side is nearly uniform, without spots. Smaller specimens show a black spot on each side of back, in advance of the origin of the dorsal fin. In the youngest specimens these spots are very conspicuous.

19. *Hyporhamphus roberti* (Cuvier & Valenciennes).

One specimen, 160 mm. long, from Pernambuco, seems to belong here rather than with *H. unifasciatus*, as the body is very slender (depth 9 in length) and the beak is very long, its length beyond the premaxillaries being half longer than the distance from tip of upper jaw to opercular margin. Dorsal with 15 rays; anal with 16.

20. *Hyporhamphus unifasciatus* (Ranzani).

Maceio.

21. *Mugil curema* Cuvier & Valenciennes.

Maceio.

22. *Mugil trichodon* Poey.

Stone reef at Mamanguape.

23. *Sphyræna barracuda* (Walbaum).

Maceio.

24. *Polydactylus virginicus* (Linnæus).

Pernambuco; Maceio.

25. *Myripristis jacobus* Cuvier & Valenciennes.

One specimen from a coral reef near Maceio.

In Jordan and Evermann's 'Fishes of North and Middle America' (Vol. I, p. 846), this species is described as having the head $\frac{1}{4}$ the length (to base of caudal), the depth $\frac{1}{3}$. These measurements are copied from Günther's Catalogue of Fishes, Vol. I, p. 19, no note being made of the fact that, as there given, they refer to $\frac{1}{4}$ and $\frac{1}{3}$ of the total length, including the caudal fin. In the specimen at hand the head is $\frac{1}{3}$ and the depth $\frac{2}{5}$ the length to base of caudal.

26. *Holocentrus ascensionis* (Osbeck).

Mouth of the Rio Goyanna.

27. *Upeneus maculatus* (Bloch).

Maceio.

28. *Upeneus dentatus* Gill.

Maceio.

29. *Upeneus caninus* new species.

One specimen, 200 mm. long, from Pernambuco.

Characterized by the large scales, the outer canines in upper jaw, the long hog-like snout, the profusely branched tubes of the lateral line and the coloration.

The profile rises in a straight or slightly incurved line from the tip of snout to front of orbit, thence in a well arched curve to front of dorsal, where the depth is greatest. The snout is very long. The distance from front of eye to tip of snout is greater by more than half the diameter of pupil than the distance from front of eye to end of opercular spine. The mouth is nearly horizontal, the maxillary greatly broadened at tip and hooked upward. The distance from tip of snout to the end of the maxillary is contained $2\frac{3}{5}$ times in the length of the head.

The teeth in the lower jaw are strong, bluntly conic, in a single series, none of them definitely canine-like. On the middle of one side of the jaw two of the teeth are larger than the others, but this is not true of the other side. The premaxillary teeth are in a single series, similar to those in the lower jaw, those anteriorly more widely spaced than those on the side of the jaw. In front of this series anteriorly are two strong canines on each side, the anterior of which is directed downward, the posterior one curved almost directly backward, parallel with the jaw. There are no teeth on the vomer or the palatines. There are three rows of scales on the cheeks, one on the interopercles, three on the opercles.

The angle of the preopercle and a portion of the vertical limb have fine cross-ridges, which form minute crenulations at the free margin

of the bone. Gill-rakers $6 + 21$, this number including five anterior spinigerous rudiments. The longest gill-raker is contained $1\frac{2}{5}$ times in the diameter of the pupil. Eye $2\frac{4}{5}$ in snout, 5 in head.*

The barbels extend to the anterior margin of the first median scale in front of the ventral base, their length $3\frac{3}{4}$ in length of fish (to base of caudal). Bony interorbital width $2\frac{4}{5}$ in the snout.

The dorsal spines are slender, rather high, the second and third about equal, half the length of the head. The ventrals reach the vent, and equal the length of the snout and eye. The pectorals are shorter, and equal snout and half eye.

D. VIII-I, 8; A. II, 6; P. 16; V. I, 5. 32 scales in the course of the lateral line, $2\frac{1}{2}$ rows above it, $5\frac{1}{2}$ rows below. The tubes of the lateral line are profusely branched, the branches covering the greater part of each scale, there being as many as 12 branches present along the middle of the course of the lateral line.

In spirits almost uniform olivaceous, with a remaining trace of red on some of the scales. Two narrow yellow streaks, separated by an interspace slightly less than diameter of pupil, run horizontally from the opercular spine, converging gently backward to meet where they join lateral line on caudal peduncle.

30. **Scomberomorus maculatus** (Mitchill).

Pernambuco; Maceio.

31. **Trichiurus lepturus** (Linnaeus).

Maceio.

32. **Oligoplites saliens** (Bloch).

A single specimen from Maceio, 235 mm. long, is very close to *O. saurus*, but differs from all specimens which I have seen of that species in the deeper body, the larger more oblique mouth, the narrower maxillary, the relative size and shape of the suborbital bones, and in having four instead of five detached spines in the first dorsal fin. As these are the characters said to distinguish *O. saliens*, I place it provisionally in that species. Abundant material will be needed to determine the status of these two forms.

The maxillary reaches the vertical from the posterior edge of the eye; its length is contained $1\frac{3}{5}$ times in the head. The mouth is considerably more oblique than in *O. saurus*, the maxillary is narrower at the tip, and does not curve downward so perceptibly. The mandible is also slightly slenderer. The tip of the snout is thus higher, being above the upper edge of the pupil, while in *O. saurus* it is plainly below the upper edge of the pupil. The snout is shorter than the eye.

The lower suborbital bone is a third wider than the one above it, a deep re-entering angle between the two. Such a concavity in the posterior margin of the suborbitals is supposed to characterize a distinct species or subspecies (*O. palometa*) from Lake Maracaibo. It is not probable that this character is of value. In our specimen, none of the suborbitals reach the preopercle.

The dorsal spines are but four in number and the anterior rays of the soft dorsal and anal are more elevated than in *O. saurus*, making the anterior profile of the fins decidedly falcate. The dorsal seems to have been yellow in life with a large black blotch on the anterior rays. The caudal was yellow, and traces of light yellow still persist on the anal fin.

The depth of the body is $3\frac{2}{5}$ in the length ($3\frac{5}{7}$ in *O. saurus* of equal length).

33. **Caranx bartholomæi** Cuvier & Valenciennes.

Maceio.

34. **Caranx hippos** (Linnæus).

Pernambuco.

35. **Caranx latus** Agassiz.

Maceio.

36. **Vomer spixii** (Swainson).

Maceio. Two specimens similar to those from Jamaica reported on by Jordan and Rutter,¹ and evidently agreeing with the figure and description by Agassiz and Spix which served as Swainson's basis for the species.

Our specimens are 210 and 230 mm. long. The head is contained $2\frac{3}{4}$ times in the total length to base of caudal, the depth $1\frac{1}{2}$ times. The eye is contained $3\frac{3}{5}$ times in the head.

The chord of the curved portion of the lateral line is contained $1\frac{1}{4}$ times in the straight portion (not " $1\frac{1}{4}$ the straight part," as given by Jordan and Rutter). The pectoral fins are longer, their tips reaching to or nearly to the middle of the straight part of the lateral line. The origin of the anal fin is slightly behind the front of the second dorsal (well in advance of this point in *V. setipinnis*). The eye is much nearer the anterior profile of the head than the gill opening in *V. setipinnis*; about equidistant between the two in *V. spixii*.

37. **Chloroscombus chrysurus** (Linnæus).

Stone reef at Mamanguape; coral reef near Maceio.

¹Proc. Acad. Nat. Sci., Phila., 1897, 101.

Four small specimens, the largest 66 mm. long, agree with *C. chrysurus* in all respects in which this species is said to differ from *C. ectenurus*. Compared with two specimens of *C. ectenurus*, 85 mm. long, from Jamaica (collector, J. S. Robert), these Brazilian specimens show a much deeper body, with a much more strongly arched abdominal profile, which rises rapidly toward the snout and also along base of anal fin. The eye is also larger, $2\frac{3}{5}$ in head, and the chord of the curved portion of lateral line is contained $1\frac{3}{5}$ times in the straight portion. In the young *C. ectenurus* referred to, the eye is $3\frac{1}{6}$ in the head, and the chord of the curved portion of the lateral line is contained $1\frac{3}{4}$ times in the straight portion.

D. VIII-I, 27; A. II-I, 26. Depth of body $2\frac{1}{5}$ to $2\frac{1}{4}$ in the length. Depth of caudal peduncle $1\frac{1}{3}$ to $1\frac{1}{2}$ in its length (the latter measured from base of last dorsal ray to base of first caudal ray).

The two species are probably valid, with their ranges overlapping.

The young specimens of *C. ectenurus* here referred to are not mentioned among the types of this species. They are from the same locality as the types, and were sent in by the same collector. They are numbered 4966 in the register of the Zoölogical Museum of Stanford University.

38. *Trachinotus falcatus* (Linnæus).

Maceio.

39. *Apogon brasiliensis* new species.

Type 61 mm. long. Mamanguape stone-reef, Brazil. June 23, 1899. A. W. Greeley, collector.

Closely related to *A. imberbis* and *A. dovii*, but without trace of a black spot on caudal peduncle. This spot becomes obscure with age in *A. dovii* and probably also in *A. imberbis* and may be wholly wanting in adults; but it is always conspicuous in young specimens of the size here described.

Total length	62 mm.
Length to base of caudal	47 mm.
Head (to end of opercular flap)	.38
Snout	.09
Interorbital width	.09
Eye	.13
Maxillary	.20
Pectoral	.24
Ventral	.21
Highest (2d) dorsal spine	.16
Highest soft dorsal ray	.23
Distance from last dorsal spine to first soft ray	.08

Second anal spine	.13
Longest anal ray	.21
Longest ray of upper caudal lobe	.32
Middle caudal ray	.24
Depth	.31
Depth of caudal peduncle	.16½
Length of caudal peduncle from base of last anal ray	.25

In outline closely resembling *A. dovii*, with snout acute as in that species, and the lower jaw included. There are broad bands of villiform teeth in the jaws, and narrow bands (sometimes scarcely more than irregular single series) on the vomer and the palatines. The mouth is oblique, the maxillary reaching a vertical midway between pupil and hinder edge of orbit. The eye is large, $1\frac{2}{5}$ times the inter-orbital width, which is equal to the snout. The vertical limb of the preopercle is rigid, its posterior margin finely serrulate; the horizontal limb is membranous, flexible, with entire margin.

The gill-rakers are long and slender, the longest half the diameter of the orbit; there are 3 movable ones on the vertical and 10 or 11 on the horizontal limb, and in addition 3 anteriorly-placed immovable tubercles.

The longest dorsal spine is contained $1\frac{1}{2}$ times in the longest soft ray. The ventrals reach the vent. The long narrow pectorals slightly overlap the front of the anal.

In life, doubtless reddish, sparsely dusted with coarse black specks, which are somewhat more numerous posteriorly; no indication of a black spot on caudal peduncle. A dark spot on opercle (black in the younger co-type) formed by the close juxtaposition of black specks. The vertical portion of the cheeks and the sides of snout are covered with coarse black specks. In the co-type these are concentrated into a small blotch behind the eye; those on side of snout suggesting a band such as is often seen in the young of *A. dovii*. Fins translucent, the caudal and the anterior dorsal and anal rays black-edged.

Scales ctenoid, 26 or 27 in the lateral line, $2\frac{1}{2}$ series between the lateral line and the base of the dorsal; 7 series between the lateral line and the base of the anal.

This species may eventually prove to be identical with *A. imberbis*, if the young of the latter are ever seen to lack the caudal spot and to possess an opercular spot. Such accounts as we have of the species do not indicate this.

The American records of *A. imberbis* are all doubtful, and the species should be omitted from our lists until its occurrence in American waters is verified. It seems improbable that this common Medi-

terranean form should have been found at Newport, Rhode Island, and at Fernando da Noronha Island, Brazil.

40. *Centropomus undecimalis* (Bloch).

Maceio.

41. *Bodianus fulvus* (Linnæus).

Maceio.

Four specimens, of which three represent the '*ruber*' phase, one the brown colored '*punctatus*' phase. The latter has a reddish tinge on the lower fins and on the lower half of the sides. It is extremely improbable that the red, yellow and brown forms (*B. ruber*, *B. fulvus* and *B. punctatus*) represent more than color phases of a single species.

42. *Epinephelus adscensionis* (Osbeck).

Maceio.

43. *Promicrops guttatus* (Linnæus).

Maceio.

44. *Alphestes afer* (Bloch).

Pernambuco.

45. *Lutjanus apodus* (Walbaum).

Maceio.

Four specimens, the longest 190 mm. These are darker in color than is usual in this species, three of the specimens being deep reddish-brown on the head, body, and fins, with a vertical light streak on the marginal half of each scale. The fourth specimen is lighter, but appears faded. The outer ventral ray and the anterior margin of the anal are whitish. The spinous dorsal has a deep maroon terminal bar. A series of small round, or rarely oblong, blue spots crosses the middle of the preorbital below the eye, and extends to, and sometimes across, the middle of the opercle. There are sometimes one or more spots present, belonging to a second series, parallel to the first, and extending from the preopercular notch across the cheek to just above the angle of the mouth. One or more spots may also be present in a line behind the middle of the orbit. All of these spots are distinctly bordered by a blackish ring and do not look like the remains of streaks which were uninterrupted at an earlier age.

In all structural details these specimens agree with *L. apodus*, having a deep body, large scales, an anchor-shaped patch of vomerine teeth, few gill-rakers, and low rounded fins. The caudal is shallowly forked, and the pectoral falcate, the latter reaching the vertical from the front of the anal. The scales above the lateral line run in series

parallel with the latter, but lose their orderly arrangement in characteristic fashion below the second dorsal.

46. **Lutjanus analis** (Cuvier & Valenciennes).

Pernambuco.

47. **Lutjanus synagris** (Linnæus).

Coral reef near Maceio.

The snout is marked by two parallel golden streaks, the lower of which curves around the lower border of the eye and extends backward across the opercle. A third streak traverses the middle of the cheek and opercle to just above the base of the pectoral. A fourth runs horizontally backward from the upper edge of the maxillary. The color agrees in other respects with current descriptions.

48. **Ocyurus chrysurus** (Bloch).

Pernambuco; Maceio.

49. **Hæmulon carbonarium** Poey.

Pernambuco.

50. **Hæmulon plumieri** (Lacépède).

Pernambuco; coral reef near Maceio.

51. **Bathystoma aurolineatum** Cuvier & Valenciennes).

Maceio.

52. **Conodon nobilis** (Linnæus).

Pernambuco; Maceio.

53. **Brachydeuterus corvinæformis** (Steindachner).

Pernambuco; Maceio.

54. **Eucinostomus harengulus** Goode & Bean.

Mouth of the Rio Goyanna; Maceio.

55. **Gerres rhombeus** Cuvier & Valenciennes.

Pernambuco; Maceio.

56. **Gerres lineatus** (Humboldt).

Gerres brasiliensis CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 458.

Gerres embryx JORDAN & STARKS, in Jordan and Evermann's Fishes of North and Middle America, p. 1379, 1898.

Maceio.

A single specimen, 170 mm. long, sustains the opinion expressed by Jordan and Evermann that the characters supposed to distinguish *G. brasiliensis* from *G. lineatus* would not be permanent. This specimen has the second dorsal spine decidedly longer than the third, and has 11 horizontal rows of scales between the vent and the lateral line, as in *G. lineatus* from the Pacific. No other characters have been

pointed out as separating the two, so I use the oldest name for the species. *Gerres embryx* is known from a single very large specimen, the size of which may well account for the slightly longer pectoral. There seems to be no other difference between the two.

57. *Cynoscion jamaicensis* (Vaillant & Bocourt).

Maceio.

Two specimens, which agree entirely with those reported on by Jordan and Rutter from Jamacia.¹

The species is evidently distinct from *C. obliquatus*, having a greater depth, a larger eye, a longer snout, a shorter anal fin, and biconcave caudal. Its relationship with *C. nothus* is much closer. I have no specimens of the latter at hand for comparison, but from current description can find nothing to distinguish *C. jamaicensis* but a somewhat longer head and deeper body. The anal may also be shorter. In *C. nothus*, the lateral line becomes straight under the seventh ray of the second dorsal, not under the seventh dorsal spine, as stated by Jordan and Eigenmann² and by Jordan and Evermann.³ *C. acoupa* is certainly different, as it has very different proportions and smaller fins.

58. *Cynoscion virescens* Cuvier & Valenciennes.

A fine specimen, 50 mm. long, agrees perfectly with Steindachner's account of *C. microps*. Steindachner is correct in enumerating 55 enlarged scales in the lateral line. Our specimen has 57. It is not clear what can have led Jordan and Eigenmann⁴ and later Jordan and Evermann⁵ to state that the lateral line contains 80 pores.

59. *Menticirrus martinicensis* (Cuvier & Valenciennes).

Maceio.

60. *Eupomacentrus fuscus* (Cuvier & Valenciennes).

Mamanguape. Maceio; Rio Goyanna.

This is certainly identical with *E. diencæus* Jordan and Rutter. The latter is based on very dark specimens from Jamaica. The dark pigment thus involves the whole axil of the pectorals, appearing in a dark spot below as well as above the base of the fin. In one of our Brazilian specimens, the dark color almost reaches the lower edge of the axil. The ventral fins are subject to much variation in this species,

¹ See Proc. Acad. Nat. Sci. Phila., 1897, 114.

² Report U. S. Com'r Fish and Fisheries (1886), 1889, 357.

³ Fishes of North and Middle America, p. 1406, 1898.

⁴ Review of the Sciaenidæ of America and Europe, Report Com'r Fish and Fisheries for 1886, p. 362.

⁵ Fishes of North and Middle America, p. 1415, 1898.

extending to the middle of the anal fin in some of our younger specimens. Whether the difference may be sexual is not evident. There is no apparent variation in the length of the axillary scale, which I find to be the same in one of the types of *E. diencæus* and in the specimens of *E. fuscus* with which the authors compared it. The apparent difference in the height of the vertical fins and in the forking of the caudal was due to the circumstance that the specimens of *E. fuscus* which the authors used for comparison had lost the tips of all the vertical fins, these being brittle owing to preservation in strong alcohol.

Ten young specimens from the coral reef near Maceio vary greatly in general tint, some being uniformly blackish with the margins of the scales still darker, and all of the fins except the pectorals blackish. Others have the hinder half of the body much lighter, this being in one specimen distinctly yellowish. The spots are as given in current descriptions.

61. **Abudefduf saxatilis** (Linnæus).

Stone reef at Rio Goyanna, at Mamanguape, and at Pernambuco.

62. **Iridio poeyi** (Steindachner).

Julis crotaphus CUV. & VAL., Hist. Nat. Poiss., XIII, 395; not of Cuvier, Règne Animal.

Iridio kirschii JORDAN & EVERMANN, Fishes of North and Middle America, p. 1598, 1898.

One specimen, 145 mm. long, from Pernambuco. The colors in alcohol (after prolonged immersion in formaldehyde) give doubtless but a faint clue to the colors in life. The sides of head and body are dull brownish violet, a line along middle of sides dividing into a darker dorsal and a lighter ventral half. Each scale on the back and sides has the basal half dusky (perhaps blue in life). There are two darker spots between the lateral line and the middle of the sides, one just behind the head, another beyond the tip of the pectorals, the latter most conspicuous. These may be the lower ends of dark bars from the back, or they may not have existed in life. The dark spot behind the eye is conspicuous. Behind it, on the uppermost part of the opercle, is a lighter spot, probably brightly colored in life, with a narrow dark crescent above and below it. Below this is a diffuse darker shade on the opercle. A darker shade proceeds from the postocular spot in a curve toward the angle of the mouth, a second similar streak from the corner of the mouth backward across the cheek. The narrow curved streak on the base of the pectoral is very evident. The opercular flap and the axil of the pectoral are greenish. No trace is evident of the blue

band described by Steindachner, and by Cuvier and Valenciennes, which is said to run obliquely from the opercle in front of the pectoral base to the ventral outline, nor of the second line described by Steindachner from the angle of the mouth to the base of the ventral fins. The vertical fins appear yellowish green and the caudal has no trace of the lines converging backward from the basal angles. The dorsal is margined with blue or violet, but exhibits no distinguishable marks at the base of any of the rays except the last two. On each of these is a small black spot extending onto the adjacent part of the back. The anal is more obscurely greenish than the dorsal, and may have shown bluish or violet shades in life. The margin is distinctly violet or blue. A narrow line of the same color is visible on the anterior part of the fin, running horizontally nearer the base than the margin. Below this are traces of the blue spots margined with yellow, as described by Steindachner.

This is evidently the *Iridio* [*Julis*] *crotaphus* of Cuvier and Valenciennes and of authors generally, a species common in Brazil and the West Indies. Dr. Jordan has pointed out that in Cuvier's first use of the name *crotaphus* it is a synonym of *I. radiatus*, and is hence not available for the present species, for which he therefore adopts Steindachner's later name *poeyi*. Subsequently Jordan and Evermann revise this judgment and point out certain alleged differences between the common Brazilian form, *crotaphus*, and Steindachner's description of *I. poeyi*. The former they now recognize as a distinct species under the name *I. kirschii*. The most important difference between the two is stated to be in the size of the eye, which is nearly 3 in snout, $6\frac{1}{2}$ in head in *I. poeyi*; $1\frac{2}{3}$ in snout, $4\frac{2}{3}$ in head, in *I. kirschii*. In the specimen before me, which is 2 inches shorter than the type of *I. poeyi*, the eye is $2\frac{1}{5}$ in snout, 6 in head, therein agreeing essentially with Steindachner's measurement. A more serious disagreement is in the depth of the body, stated by Steindachner to be $3\frac{1}{2}$ in the total length. In my specimen the depth is $3\frac{1}{2}$ in the length to base of caudal. The striking coincidences in the description and the comparatively unimportant differences lead me to adopt Dr. Jordan's earlier view, identifying *I. poeyi* with *I. crotaphus* (Cuvier & Valenciennes) and using the former as the earliest available name for the species.

63. *Sparisoma frondosum* (Cuvier).

Pernambuco; Maceio.

Closely related to *S. rubripinne*.

D. IX, 10; A. II, 9. Lat. L. 25, $\frac{11}{6}$.

Head 4 in length to end of middle caudal rays; depth $3\frac{3}{5}$ in the

same. Teeth as in *S. rubripinne*, distinctly outlined and slightly protruding convexly, the marginal teeth in each jaw forming an irregular cutting edge; no posterior canines. Subocular region and angle of preopercle covered with profusely branching canals. A series of five large scales below the eye, of which 3 are on the cheeks. The exposed portion of the eye $5\frac{1}{5}$, the orbit $4\frac{1}{5}$, in head.

The tubes of the lateral line branch profusely and cover the scales. This branching occurs sometimes pinnately from a horizontal stem, sometimes palmately from the base of the scales. The primary branches are sparingly forked.

The dorsal spines are slightly stiffer than in *S. rubripinne*, but are flexible. The longest equals $\frac{1}{3}$ length of head. The caudal is lunate. The pectorals are short, not reaching the vertical from the tips of the ventrals, $1\frac{2}{5}$ in head.

Color uniform dark purplish, apparently including all the fins except the caudal, which appears more nearly grayish. The middle caudal rays have a light margin, and the outer ones are alternately light and dark, as in *S. rubripinne*. I cannot make out, however, that these are the beginnings of light and dark cross-bars which, in *S. rubripinne*, traverse the fin.

The species seems to differ from *S. rubripinne* in the greater depth of the body, in the more steeply rising anterior profile, which describes an even curve, in the shorter, blunter snout, which is but little more than $\frac{1}{3}$ the head, in the somewhat more complexly branching tubes of the lateral line, and in the color.

The preceding notes are based on an adult specimen, 206 mm. long. A young specimen, 145 mm. long, shows a general reddish-gray tint, but is much lighter and more variegated in coloration. The pectoral is distinctly orange-red at base after immersion for some time in formaldehyde and alcohol. The caudal is shallowly concave, with produced points. It shows a distinct lighter margin and is very irregularly cross-barred with light and with dark reddish-brown. The dorsal is variegated, as in *S. rubripinne*. The tubes of the lateral line are typically branched.

Two specimens, each 190 mm. long, are darker and more uniformly vinaceous than the young one noticed. They seem to have been somewhat mottled with darker in life. All the fins are dark, of about the same tint as the body. The dorsal shows some obscure darker markings, without pattern, and the caudal has the irregular dark cross-bars most distinct near the upper and the lower margins. There is a very distinct narrow white border to the caudal. Other fins are uniform.

In one specimen there is a broad white transverse bar below the chin as in *S. rubripinne*; in the other this marking is not evident, and the bars on the caudal are indicated on the outer rays only.

64. **Scarus croicensis** (Bloch).

Two specimens, 93 and 76 mm. long, from the coral reef near Maceio. These show the characteristic lengthwise dark streaks, but not the narrow silvery lines along the sides of the belly. This may, however, be due to their preservation in formaldehyde, which dissolves silvery pigment.

65. **Chætodon ocellatus** (Bloch).

Mamanguape.

66. **Chætodon striatus** Linnæus.

Pernambuco.

67. **Teuthis bahianus** (Castelnau).

Mamanguape; mouth of the Rio Goyanna; Pernambuco.

In one specimen from Pernambuco, 160 mm. long, there is a very short dorsal fin, with but 20 soft rays. In the same specimen the anal formula is III, 22.

68. **Balistes vetula** Linnæus.

Maceio.

69. **Lagocephalus lævigatus** (Linnæus).

Maceio.

70. **Spheroides testudineus** (Linnæus).

Pernambuco; Maceio.

71. **Spheroides greeleyi** new species.

Two specimens from the coral reef near Maceio, 112 and 105 mm. long, the larger taken as the type of the species.

Very close to *S. spengleri*, from which it differs principally in coloration, as it entirely lacks the conspicuous series of black spots along the lower edge of the sides, which is so characteristic of *S. spengleri* and its near allies.

The space between the bony orbital ridges is narrow, concave, its least width $1\frac{1}{2}$ in the exposed portion of the eye, 4 in the snout. Eye 5 in head; snout half head. Width of gill-slit equaling exposed portion of the eye. Upper caudal rays longest, equaling distance from tip of snout to posterior edge of pupil. Dorsal with 8 rays, its height contained $2\frac{3}{5}$ times in head. Anal with 7 rays, its height contained 3 times in head. Pectorals broad, the width of the base contained $1\frac{3}{5}$ times in the longest ray, which is $2\frac{1}{3}$ in head. Pectoral rays 15.

Prickles cover the belly from the chin back to the anal fin and up on the sides as far as the base of the pectoral fins. They cover also the interorbital area and extend back as far as the origin of the dorsal fin, and send downward under the terminal portion of the pectoral fin a band connecting the prickly areas of the back and the belly. Along the line separating the ventral prickles from the smooth area of the sides is a series of conspicuous fleshy slips, all of which are white. A few smaller, dark-colored slips are scattered over the back and sides. Caudal peduncle and side of head without prickles.

Belly and lower side of head and caudal peduncle white. Back and sides thickly spotted with blackish, the two areas sharply distinguished along a lengthwise line running just below the pectoral fin. The spots grow somewhat larger along the lower part of the cheeks and the flanks, but none can be taken to represent the definite line of spots present in *S. spengleri*. The upper part of the back has its darker color broken up into polygonal areas by finely vermiculating light lines; these faintly-defined areas are still further indented or broken up into very small spots by incursions of light lines. The caudal is dusky at the base and on the terminal half, but has no well-defined bars. Other fins are unmarked.

72. **Prionotus punctatus** (Bloch).

One specimen, 210 mm. long, from Pernambuco.

It is perhaps as well to follow Cuvier's identification of this species as the very doubtful *Trigla punctata* of Bloch, awaiting the discovery of a West Indian species more nearly agreeing in color with Bloch's figure.

We have compared our specimen with the young individual from Bahia reported on by Jordan,¹ and find substantial agreement except that in our adult the minute spine present in the young on the middle of the cheek has been lost, and the groove behind the eye is still less conspicuous. The latter is in fact no groove at all, merely a wider interval between transverse lines of granulation.

The series of very fine serrations on the lateral margin of the snout terminates in a single stronger spine directed backward. A single spine is present halfway between the latter and the middle of the cheek. The center of radiation of the ridges on the cheek is without spine, a sharp low ridge beginning at that point and continuing on to the preopercular spine, which has a definite cusp at the base. The preopercular spine extends to or slightly beyond the subopercular margin. The nuchal ridge is obsolete on one side, very low on the

¹Proc. U. S. Nat. Museum, 1890, 328.

Proc. Wash. Acad. Sci., August, 1900.

other (these being higher and sharper, ending in spines in the young specimen). Spines otherwise as described.

Mouth large, $2\frac{1}{3}$ in head; interorbital space narrow, deeply concave, $1\frac{1}{3}$ in eye. Gill-rakers slender, $1 + 9$ movable ones, the longest $\frac{1}{3}$ diameter of orbit. The anal has 11 rays in both individuals (not 12, as given by Jordan and Evermann, *Fishes of North America*, p. 2169).

The color in spirits is brownish above, whitish below, the upper parts appearing faintly blotched and with obscure round spots. Two dusky blotches on spinous dorsal. Soft dorsal with roundish dusky spots arranged in about 10 oblique series. Caudal with four ill-defined dark cross-bars. Pectorals blackish, the upper rays with a black blotch at the end of the basal third, and a fainter one at the end of the second third of their length. These are also present in the young specimen, and seem responsible for the statement that the pectorals are barred. The younger specimen shows a distinct blue line along the lower margin of the pectoral, as well as some lighter markings on the upper part of the fin, which do not appear in our adult.

There are 53 pores in the lateral line, and about 98 vertical series of scales above the lateral line. In commenting on a specimen in the Paris Museum of Natural History, labeled *Trigla punctata*, "apparently in the handwriting of Valenciennes," Dr. Jordan states¹ "pores in lateral line 85 to 90." Unless reference is made to the vertical series of scales rather than to the pores, the specimen cannot belong with this species.

73. **Cephalacanthus volitans** (Linnæus).

Maceio.

74. **Dormitator maculatus** (Bloch).

From among the mangroves at Pernambuco.

75. **Guavina guavina** (Cuvier & Valenciennes).

Among the mangroves at Pernambuco.

76. **Gobius soporator** (Cuvier & Valenciennes).

Mouth of Rio Goyanna; Mamanguape.

77. **Echeneis naucrates** (Linnæus).

Maceio.

78. **Malacanthus plumieri** (Bloch).

Maceio.

This species had been previously reported from Brazil by Cuvier and Valenciennes and by Castelnau. Our specimen answers well to the detailed description given by the first named authors. Jordan and

¹ See Proc. U. S. Nat. Museum, 1886, 545.

Evermann are in error in ascribing to this species but 49 articulated rays in the dorsal fin. Cuvier and Valenciennes give the dorsal formula as VI, 55, Gunther gives it as VI, 59. Our specimen has the dorsal VI, 59, the anal 55.

The bright colors which are said to characterize this species in the fresh state are mostly lost in spirits. Our specimen still shows traces of the alternating blue and yellow streaks before the eye. The dorsal and caudal are bright yellow, the dorsal dusky at base. The lower margin of the caudal and the lower half of the upper lobe of the fin are black. The anal has a more reddish tinge, and the pectorals and ventrals are bluish or violet.

79. **Malacoctenus delalandi** (Cuvier & Valenciennes).

Mouth of the Rio Goyanna.

80. **Labrisomus nuchipinnus** (Quoy & Gainard).

Stone reef at Mamanguape; coral reef near Maceio.

Jordan and Evermann are in error in stating that *Labrisomus* has no palatine teeth, and in the further statement that *L. nuchipinnis* has the vomer provided "with a patch of smallish teeth."¹ The facts had been stated by Gill² with substantial correctness and in considerable detail. I have examined numerous specimens from Brazil, two from Sta. Lucia Island, one from Jamaica, and two from the Canary Islands. The teeth are strong, conic, rather widely spaced, arranged typically in a single angulated series on the vomer and on the anterior portion of the palatines. The anterior vomerine tooth is often enlarged, but in some specimens this is scarcely noticeable. The palatine teeth are usually in small number, there being often not more than two present, sometimes as many as six in the single series. Occasionally an inner tooth may be present along the inner side of the palatine series, or there may be two or three, thus forming a double series. The inner teeth are, when present, entirely similar to those of the outer row. This variation has been found in specimens from Brazil and from Sta. Lucia. In the two specimens from the Canary Islands two equally well developed series are present on both palatines, suggesting a permanent condition which may properly be investigated. In the Canary Island specimens there is also present a number of vomerine teeth behind those in the outer row. In two specimens only from the western Atlantic, from Brazil and from Sta. Lucia, respectively, have I found a single vomerine tooth occupying this inner position.

¹ See Fishes of North and Middle America, Vol. III, pp. 2361-2362, 1898.

² Proc. Acad. Nat. Sci. Phila., 1860, p. 106.

L. nuchipinnis and *L. xanti* do not appear to differ in dentition. In six specimens of *L. xanti* from Mazatlan, Mexico, five have the palatine teeth in two distinct series, as in the Canary Island specimens of *L. nuchipinnis*; in the sixth no palatine teeth were present. In the specimens of *L. xanti* examined, the vomer contained a single series in all but one individual, where a few teeth were present behind the outer row. The middle vomerine teeth are usually the largest.

L. xanti seems, however, to be sufficiently distinguished by its slightly more elongate form, and by one constant difference in coloration. The conspicuous round, black, opercular spot, universally present in *L. nuchipinnis*, is never developed in *L. xanti*. Our specimens of *L. nuchipinnis* from Brazil and elsewhere, show that this spot is normally surrounded by a white border, though this is sometimes wholly lacking.

BRANNERELLA new genus (*Blenniidae*).

Type, *Brannerella brasiliensis* new species.

Closely allied to *Starksia* Jordan and Evermann,¹ differing only in the elongate detached first anal spine and in the absence of any well-defined notch behind the third dorsal spine.

81. *Brannerella brasiliensis* new species.

Type, a specimen 31 mm. long, from the coral reef near Maceio.

D. XVIII, III, 7; A. I-I, 16. Lat. 1, 37 or 39. Form and general appearance much as in *Auchenopterus*, but the head is larger than is usual in that genus.

The mouth is large and very slightly oblique, the maxillary reaching to the vertical from the posterior margin of the orbit. The jaws are equal, the lips are thickened, the upper jaw is protractile. The pre-maxillaries have an outer close-set series of cardiform teeth and an inner band of villiform teeth. The teeth on the mandible are similar, but those on the outer series are slightly coarser and more conical. A single series of small conical teeth on the vomer and the front of the palatine.

Interorbital space very narrow, concave. The posterior nostrils are each in a short tube, which bears a slender cirrus. A similar cirrus on the upper posterior part of the eye, and one on each side of the median line of the nape. No nuchal fringe of filaments. The series of pores on the head are well developed. The branchiostegal rays are

¹ Fishes of North and Middle America, p. 2365.

6 in number, the membranes broadly joined, free from the isthmus. The opercle is rounded, without ridges or spines.

Scales large, cycloid, the lateral line running high anteriorly, descending to the middle of the flanks behind the pectoral fin, and traversing 37 to 39 scales.

Dorsal largely spinous, the last 7 rays articulated. A faint notch or none behind the third dorsal spine. A decided notch behind the eighteenth spine, the three following spines gradually increasing in length.

Two anal spines, the first elongate, detached, running along the posterior margin of a broad membranous or fleshy expansion, which extends beyond its tip. The second spine is much shorter and is joined by membrane in the usual way to the first soft ray. Both dorsal and anal fins are distinct from the caudal, the last dorsal membrane nearly touching the base of the first caudal ray. No hook on shoulder girdle.

Color in spirits, dark brown, with some lighter rivulations and with occasional black spots or blotches. A small black spot on the opercular membrane above the base of the pectoral. Back with ten dusky bars which are continued on to the basal portion of the dorsal fin, where each divides to form a pair of black blotches; 7 or 8 dark spots along the base of the anal. An irregular light-colored Y-shaped mark on the cheek; two or three small round spots on the opercle, and three vertically placed on the basal portion of the pectoral fin. All of these light markings may have been brightly colored in life.

Length to base of caudal	26½ mm.
Total length	31 mm.
Head (to end of opercular flap)	.34 of length.
Tip of snout to end of maxillary	.16
Snout	.06½
Orbit	.09½
Interorbital width	.02½
Depth of body	.21½
Least depth of caudal peduncle	.09
Length of caudal peduncle from last anal ray	.06
Tip of snout to base of first dorsal ray	.30
Tip of snout to base of first anal ray	.53
Tip of snout to base of first ventrals	.28
Longest pectoral ray	.23
Longest (inner) ventral ray	.18
Highest (middle) dorsal spines	.10
Shortest (18th) dorsal spines	.06
(19th) dorsal spines	.06 +
(20th) dorsal spines	.07½
(21st) dorsal spines	.10

Highest dorsal ray	.15
1st anal spine (including soft tip)	.10½
2nd anal spine	.06½
Highest anal ray	.13½
Caudal	.25

82. **Blennius cristatus** Linnæus.

Numerous specimens from the stone reef at the mouth of the Rio Goyanna, at Mamanguape, and at Pernambuco.

The following notes are principally corrections of statements in the description by Jordan and Everman.¹

Depth of preorbital slightly more than $\frac{3}{5}$ diameter of orbit. The interorbital space is slightly grooved, $\frac{2}{5}$ the diameter of the eye. The posterior canine in the lower jaw is much longer than the front teeth, but is declined. The supraocular flap is divided from the base into 4 or 5 filaments. The filaments on the nape are mostly in a linear series surmounting the dermal crest, but occasionally some are scattered at the sides of the crest; the number varies greatly, from 10 to 30 in our specimens. The dorsal formula is XII, 14 or 15. The anal, II, 16. No white spots are visible in this material, possibly because of its preservation in formaldehyde.

83. **Rupiscartes atlanticus** (Cuvier & Valenciennes).

Coral reef near Maceio. The three specimens in the collection have a narrow light margin to the dorsal. In one specimen the light area of the pectoral is decidedly yellow.

84. **Salariichthys textilis** (Quoy & Gaimard).

Mouth of Rio Goyanna; stone reef at Mamanguape and at Pernambuco.

85. **Syacium micrurum** Ranzani.

Two adult males, 230 and 235 mm. long, and a young specimen, 130 mm. long, from Maceio.

D. 88, 88, 89; A. 69, 70, 72.

The adults have the interorbital space very wide, shallowly concave, the front of the upper eye in a vertical falling slightly behind the middle of the lower eye. Interorbital width $\frac{1}{5}$ greater than the horizontal diameter of the lower eye; it equals the length of the snout and is contained $4\frac{2}{5}$ times in the length of the head. The gill-rakers are short and broad, scarcely $\frac{1}{3}$ the diameter of the pupil, 2+7 in number. (I find the same number in a specimen from Jamaica.)

The two upper pectoral rays are elongate, equally so in one male,

¹ Fishes of North and Middle America, pp. 2382-2383.

the lower very little produced in the others. The longest ray extends beyond the middle of the anal, and is contained $2\frac{1}{3}$ times in the length.

The color is light grayish-brown, finely mottled and with a number of rather definitely placed round light spots with darker centers. The most conspicuous of these form a series of five or six parallel with the dorsal outline, and a similar series parallel with the ventral outline. Others occupy the intermediate territory. A narrow curved dark bar extends from the upper eye obliquely across the interorbital space to the lower eye, bounded by a light line in front and behind; another dark line and another light line may follow these. From the front of the upper eye, a narrow scaleless area runs downward and forward to the profile of the snout. This area is bounded above and below by narrow, dark lines, which were probably dark blue in life. The upper line ceases opposite the origin of the dorsal; the lower extends down along the profile to the tip of the snout, and is continued along the mandible to its joint. A dark streak—also probably blue in life—runs along the back at the base of the anterior $\frac{2}{7}$ of the dorsal fin, on the colored side. This streak is formed of spots, one for each ray, the hinder ones more or less coalescent. The dorsal and anal fins are grayish, speckled with darker, a dark streak on the base of each eighth to tenth ray. Pectorals not barred. The blue streaks on the head have not been mentioned in any previous description of this species. They are doubtless developed only in adult males. I find a trace of them in a specimen from Jamaica (collector, Roberts).

PLATE IX.

- FIG. 1. *Brannerella brasiliensis* gen. and sp. nov. Type.
Maceio, Brazil.
2. *Upeneus caninus* sp. nov. Type.
Pernambuco, Brazil.
3. *Apogon brasilianus* sp. nov. Type.
Mamanguape, Brazil.
4. *Spheroides greeleyi* sp. nov. Type.
Maceio, Brazil.



Gilbert, Charles H. 1900. "Results of the Branner-Agassiz expedition to Brazil. III. The fishes." *Proceedings of the Washington Academy of Sciences* 2, 161–184.

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