

A REVISION OF THE AMERICAN SPECIES OF THE GENUS GERRES.

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In the summer of 1883 we published in the Proceedings of the Academy of Natural Sciences of Philadelphia, pp. 116 to 124, a "Review of the Species of Gerres found in American Waters." In December of the same year, Dr. Jordan made a large collection of the Atlantic species of this genus at Cedar Keys, Key West and Havana. A large portion of this collection is now in the Museum of the Indiana University, and constitutes the material upon which the present paper is based.

The present collections contain numerous specimens of species not before examined by us, and, in the light of the new relationships which an examination of them discloses, we have thought it best to attempt an entire revision of the genus. We have therefore collected all the synonymy up to date, made an analytical key by which the species can be determined, and given a detailed description of all the species now before us. To the account of the Pacific Coast species, as given in the former paper, we have now nothing to add, as the very extensive collection of them studied by us has been since mostly destroyed by fire.

We take this opportunity of acknowledging our indebtedness to Dr. Jordan for the use of his library, and for other aids.

Genus GERRES Cuvier.

Gerres Cuvier. Règne Animal, ed. 2, ii, 104, 1829 (*rhombeus*, etc.).

Catochanum Cantor. Cat. Malayan Fishes, 55, 1850. (Proposed for *Gerres* Cuv., regarded by Cantor as preoccupied by *Gerris* Fabricius).

Diapterus Ranzani. Nov. Comment. Acad. Bonom., 1841 (*plumieri*, etc.).

Eucinostomus Baird and Girard. Ninth Smithsonian Report, 1855, 20 (*argenteus* = *gula*).

Synistius Gill. Proc. Acad. Nat. Sci. Phila., 1862, 238 (*longirostris*).

Mojarra Poey. Enum. Pisc. Cub., 50, 1875 (*rhombea* = *olisthostoma*).

Analysis of Species of Gerres.

- a. Preorbital and preopercle entire; body elongate, the depth $2\frac{1}{3}$ to 4 in length to base of caudal (*Eucinostomus* Baird and Girard).

- b. Premaxillary groove naked.
- c. Anal rays II, 8; body very elongate, its depth $3\frac{3}{5}$ in its length; eye $2\frac{3}{4}$ in head. *Lefroyi*. 1.
- cc. Anal rays III, 7.
- d. Premaxillary groove narrow, linear.
- e. Eye very large, its diameter much greater than length of snout, $2\frac{2}{3}$ in length of head. Exposed portion of maxillary small, triangular. *Dowi*. 2.
- ee. Eye small, more than 3 in head, its diameter about equal to length of snout. Exposed portion of maxillary triangular in front, oblong behind.
- f. Body elongate, the back little elevated; greatest depth $3\frac{1}{4}$ to $3\frac{1}{2}$ in length. Anal spines small, the second $4\frac{1}{2}$ in length of head. *Pseudogula*. 3.
- ff. Body more compressed, deeper, the back more elevated; greatest depth $2\frac{2}{3}$ in length. Anal spines larger, the second $3\frac{1}{2}$ in length of head. *Gracilis*. 4.
- dd. Premaxillary groove broad, oval, naked. Body elevated, compressed, its greatest depth $2\frac{1}{2}$ in its length.
- g. Caudal fin shorter than head, sides without dark vertical bars. Second anal spine short, 3 to 4 in head; ventrals short, little more than half the length of head, their tips not reaching vent; dark punctulations on body few or none; upper part of spinous dorsal becoming gradually blackish; other fins nearly plain; axil faintly dusky. *Californiensis*. 5.
- gg. Caudal fin longer than head. Sides with 7 to 9 dark bluish vertical bars, about as broad as pupil. Anal spines longer, the second $2\frac{2}{3}$ in length of head. Ventrals longer, $1\frac{2}{5}$ in length of head, scarcely reaching vent. *Cinereus*. 6.
- bb. Premaxillary groove scaled in front, forming a naked pit behind. Depth $2\frac{2}{3}$ in length; head 3 to $3\frac{1}{5}$ in length of body. Second anal spine about $3\frac{1}{2}$ in head. *Gula*. 7.
- aa. Preopercle distinctly entire.
- h. Preorbital entire; body without distinct dark streaks along the rows of scales. (*Moharra* Poey).
- i. Premaxillary groove broad, triangular or oval, and free from scales.

- j.* Body ovate, the outline somewhat regularly elliptical, depth $2\frac{1}{4}$ in length. Dorsal spines slender, but little flexible, the second scarcely stronger than the third, 2 in length of head. Second and third anal spines subequal, $2\frac{3}{5}$ in length of head; second stronger than third. *Aureolus.* 8.
- jj.* Body rhomboidal, short and deep, with angular outlines, the depth usually more than half the length; spines long and slender.
- k.* Anal rays III, 8; second dorsal spine $\frac{3}{4}$ or more length of head; second anal spine more than half length of head. *Peruvianus.* 9.
- kk.* Anal rays II, 9; second dorsal spine about $\frac{1}{3}$ length of head; second anal spine $1\frac{3}{4}$ in length of head. *Rhombeus.* 10.
- ii.* Premaxillary groove broad, oval, and covered with scales (these sometimes deciduous in poorly preserved specimens). Anal rays III, 8; second dorsal spine $1\frac{1}{4}$ in head; second anal spine $1\frac{2}{5}$ in head; teeth rather long and slender. *Olisthostoma.* 11.
- hh.* Preorbital serrate, a distinct dark streak along each row of scales on back and sides; body rhomboidal, with angular outlines; spines very strong; anal rays III, 8 or 9. (Gerres).
- l.* Ventrals blackish; upper margin of dorsal fin falcate; depth $2\frac{1}{5}$ in length; scales 5-38-9. *Brasilianus.* 12.
- ll.* Ventrals pale.
- m.* Spines moderate, the second dorsal spine $\frac{2}{3}$ to $\frac{3}{4}$ length of head.
- n.* Pectorals long, reaching to front of anal; caudal longer than head; lateral stripes numerous; depth nearly 2 in length. *Lineatus.* 13.
- nn.* Pectorals short, barely reaching vent; caudal shorter than head; lateral stripes few; depth about $2\frac{3}{5}$ in length. *Brevimanus.* 14.
- mm.* Spines very high, the second dorsal spine longer than head; second anal spine about equal to length of head; lateral stripes very distinct, about 12 in number; depth of body $2\frac{1}{6}$ in length. *Plumieri.* 15.

1. *Gerres lefroyi*.

Diapterus lefroyi Goode, Amer. Jour. Sci. and Arts, 123, 1874; Goode, Bull. U. S. Nat. Mus., 1876, 39 (Bermudas).

Gerres lefroyi Günther, Voyage Challenger, Fishes, 10, 1880 (name only); Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 118; Jordan, Proc. U. S. Nat. Mus., 1884, 130 (Key West); Jordan and Swain, Proc. U. S. Nat. Mus., 1884, 233 (Cedar Keys); Jordan, Cat. Fish. N. A., 1885, 95.

Eucinostomus productus Poey, Enum. Pisc. Cub., 55, 1875 (Havana); Poey, Ann. Lyc. Nat. Hist. N. Y., 1876 (Havana).

Habitat.—Atlantic coast of tropical America; West Indies; Bermudas; Cedar Keys; Key West; Havana.

The specimens examined by us are from Havana (8 specimens), Key West (5 specimens), and Cedar Keys (1 specimen). In size they range from 2 to $8\frac{1}{2}$ inches in length.

Head $3\frac{1}{3}$ to $3\frac{1}{2}$; depth $3\frac{2}{5}$; scales 5–47–9. D. IX, 10. A. II, 8. Body elongate, elliptical, not very strongly compressed; back little elevated; snout conical, not much pointed; mouth small, end of maxillary reaching scarcely beyond vertical from anterior margin of orbit, its length 3 in length of head, exposed portion nearly triangular, its greatest width 2 in its length, which is 5 in length of head. Top of head flattish. Premaxillary groove long, linear and naked. Eye large, $2\frac{3}{4}$ in head; snout $3\frac{1}{2}$ in head, inter-orbital area 3 in head. Gill-rakers weak, small, 7 or 8 below the angle. Dorsal spines all weak and flexible, second and third sub-equal, $5\frac{1}{2}$ in length of head; upper margin of the fin concave. Second anal spine moderate, its length 4 in head. Least depth of caudal peduncle $3\frac{2}{3}$ in length of head.

Color silvery, darker above, everywhere with fine dusky punctulations and traces of crossbars. Top of spinous dorsal black, dorsal, anal, and caudal dusky. Ventrals and pectorals paler, but with dusky punctulations; axil dusky; a dark spot on supra-orbital; snout dusky; no distinct stripes along rows of scales.

In form, size and color, this species resembles *G. dowi*, but is readily distinguished from the latter by the presence of two anal spines instead of three. This character is apparently a constant one, observed in many specimens.

2. *Gerres dowi*.

Diapterus dowi Gill, Proc. Acad. Nat. Sci. Phila., 1863, 162 (Panama).

Gerres dowi Günther, Fish. Centr. Amer., 448, 1866 (Description taken from Gill); Steindachner, Ichth. Beiträge, iv, 13, 1875 (No description), (Callao, Peru; Galapagos Islands); Jordan & Gilbert, Bull.

U. S. Fish Comm., 1881, 329 (Panama); Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 111 (Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 377 (Panama); Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 120 (Panama).

Gerres aprion Günther, Fish. Centr. Amer., 391, 1866 (Name only) (Panama).

Habitat.—Atlantic and Pacific coasts of tropical America; Galapagos Islands, Peru; Panama; Havana; Key West.

The specimens examined by us are from Havana (2 specimens, $5\frac{1}{2}$ and 6 inches in length), and Key West (5 specimens, 3 to 6 inches in length).

Head $3\frac{2}{5}$; depth 3; scales 5-45-10.

Body rather slender, compressed, elliptical, back little elevated, head flat, with a slight depression above front of orbit. Maxillary triangular and small, the width at posterior end being $\frac{1}{2}$ the length, which is about $\frac{1}{2}$ diameter of eye, also $\frac{1}{2}$ length of second dorsal spine. Preorbital and preopercle entire. Eye large, $2\frac{2}{3}$ in head; snout $3\frac{1}{2}$, and interorbital, $3\frac{1}{6}$ in head.

Second and third dorsal spines about equal, the third perhaps slightly longest, $1\frac{3}{4}$ in head, all weak and flexible. Second anal spine relatively strong, third weaker but slightly longer, $2\frac{3}{4}$ in head; base of anal $1\frac{2}{3}$ to $2\frac{1}{8}$ in length of head. Least depth of caudal peduncle $2\frac{2}{3}$ in head. Pectorals about $\frac{7}{8}$ length of head, their tips reaching vent. Ventrals $1\frac{3}{8}$ in head, reaching about $\frac{4}{5}$ distance to vent. Premaxillary groove narrow, linear and naked, and not extending quite to the vertical of centre of pupil.

Color silvery with bluish reflections, darker above lateral line. Tips of spinous dorsal black, ventrals dusky (lighter in Key West specimens); a black supraorbital spot, caudal dusky, body covered with very fine dark punctulations.

This species has not been hitherto recorded from the Atlantic.

3. *Gerres pseudogula*.

Euclinostomus pseudogula Poey, Enum. Pisc. Cub., 53, pl. i, 1875 (Havana).

Gerres jonesi Günther, Ann. and Mag. Nat. Hist., iii, 1879, 150, 389 (Bermudas); Günther, Voyage Challenger, Fishes, i, 10, 1880 (Bermudas); Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 120 (Bermudas); Jordan, Cat. Fish. N. A., 1885, 95.

Habitat.—West Indies; Bermudas; Cuba.

We have examined eight specimens of this species, all from Havana. They range from $2\frac{3}{4}$ to 7 inches in length.

Head $3\frac{1}{4}$ to $3\frac{1}{2}$; depth $3\frac{1}{4}$; scales 5-49-9; D. IX-10; A. III-7.

Body elongate, elliptical, not much compressed; back little elevated; profile evenly convex; top of head little convex; mouth rather small, end of maxillary reaching slightly past vertical from front of orbit; length of maxillary $3\frac{1}{4}$ in length of head, its exposed portion nearly triangular and about $\frac{1}{6}$ length of head, its greatest width $\frac{1}{2}$ its greatest length. Preorbital and preopercle entire. Snout not much pointed, conical; cheeks each with three rows of scales; seven gill-rakers below the angle. Eye $3\frac{1}{5}$ in head, snout $3\frac{1}{4}$ in head; interorbital area $3\frac{2}{5}$ in head. Dorsal spines all weak and flexible. Second and third dorsal spines subequal, $1\frac{1}{3}$ in length of head. Base of anal 2 in length of head, spines small, the second the stronger, its length $4\frac{1}{2}$ in length of head, about equal in length to third spine or slightly the shorter. Least depth of caudal peduncle 3 in length of head.

Tips of pectoral fins reaching vent, their length about $3\frac{2}{5}$ in length of body. Ventrals $1\frac{1}{2}$ in head, their tips reaching $\frac{3}{4}$ distance to vent. Premaxillary grooves long, linear and free from scales.

Color greenish above, with bluish reflections, silvery below; snout blackish; tips of spinous dorsal black; pectorals pale, dusky in axil. Ventrals and anal pale. Caudal reddish.

This species has been sometimes confounded with *Gerres gracilis*. It can easily be distinguished from the latter by its more elongate form and its comparatively small anal spines.

There seems to be no room for doubt of the identity of *G. jonesi* with *G. pseudogula*.

4. *Gerres gracilis*.

Diapterus gracilis Gill, Proc. Acad. Nat. Sci. Phila., 1862, 246 (Cape San Lucas).

Gerres gracilis Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 274 (Guaymas); Jordon & Gilbert, Bull. U. S. Fish Comm., 1881, 329 (Guaymas; Mazatlan; Panama); Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 108 (Mazatlan; Panama); Jordan, Proc. U. S. Nat. Mus., 1884, 130 (Key West); Jordan, Cat. Fish. N. A., 1885, 95.

Gerres aprion Günther, Cat. Fish. Brit. Mus., i, 352, 1859 (San Domingo; Jamaica; West Indies; South America); Günther, Cat. Fish. Brit. Mus., iv, 255, 1862 (San Domingo; Jamaica; Bahia); Bean & Dresel, Proc. U. S. Nat. Mus., 1884, 154 (Jamaica) (not of Cuv. & Val.).

Eucinostomus harengulus Goode & Bean, Proc. U. S. Nat. Mus., 1879, 132 (Western Florida).

Diapterus harengulus Goode & Bean, Proc. U. S. Nat. Mus., 1879, 339 (Clear Water Harbor, Florida).

Gerres harengulus Jordan & Gilbert, Syn. Fish. N. A., 584, 1883 (Pensacola, Florida); Bean & Dresel, Proc. U. S. Nat. Mus., 1884, 154 (Jamaica).

Habitat.—Atlantic and Pacific coasts of tropical America, and the West Indies (Cape San Lucas; San Domingo; Jamaica; Havana; Bahia; Western Florida; Panama; Guaymas; Mazatlan; Key West).

The numerous specimens examined by us are from Havana and Key West, and range from 1 to $7\frac{1}{2}$ inches in length. Head $3\frac{1}{3}$; depth $2\frac{2}{3}$ to $2\frac{4}{5}$; scales 5-45-9; Dorsal IX-10; A. III-7.

Body elliptical, compressed, back moderately elevated; anterior profile little convex, not very steep; snout rather pointed, mouth moderate, maxillary reaching almost to vertical from front of orbit, its length 3 in length of head; exposed portion of maxillary triangular in front, oblong behind, its width 2 in its length, which is $4\frac{3}{4}$ in length of head. Preorbital and preopercle entire. Eye not very large, its diameter $3\frac{1}{5}$ in length of head, snout $3\frac{1}{2}$ in head. Premaxillary groove long, linear, and naked. Gill-rakers small and weak, 7 below the angle.

Dorsal spines weak and flexible, the longest $4\frac{3}{4}$ to $2\frac{1}{10}$ in head; anal spines rather short, the second the stronger, its length $3\frac{1}{2}$ in length of head; ventral fins short, their tips reaching about half-way to anal, their length $1\frac{2}{3}$ in head.

Pectorals slender, their tips reaching about to vent; length of pectorals about equal to head; ventrals and caudal mostly covered with small scales; other fins naked, color in life silvery, greenish above; snout and upper part of caudal dusky; spinous dorsal punctate at base, usually abruptly black at tip; the dark areas are separated by a transparent horizontal bar (these markings wanting in some specimens, perhaps females); soft dorsal punctate; caudal with a faint dusky margin; ventrals pale.

This species is very common at Key West and Havana. There seems to be no difference between the "*harengulus*" of the East Coast and the West Coast "*gracilis*."

5. *Gerres californiensis*.

Diapterus californiensis Gill, Proc. Acad. Nat. Sci. Phila., 1862, 245 (Cape San Lucas).

Gerres californiensis Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 274 (Guaymas); Jordan & Gilbert, Bull. U. S. Fish. Comm., 1881, 319 (Guaymas); Jordan & Gilbert, Bull. U. S. Fish. Comm., 1882, 108 (Mazatlan); Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 120 (Guaymas; Mazatlan); Jordan, Cat. Fishes N. A., 1885, 95.

? *Gerres gula* Steindachner, Ichth. Beiträge, iii, 60, 1875 (name only; nec Cuv. & Val.); (Magdalena Bay).

Habitat.—Pacific Coast of Mexico (Mazatlan; Guaymas; Cape San Lucas).

This species is certainly close to *G. cinereus*, and it may eventually prove to be a variety of the latter.

6. *Gerres cinereus*.

Turdus cinereus peltatus Catesby, Nat. Hist., pl. ii, fig. 2, 1750 (Florida Keys; Bahamas).

Mugil cinereus Walbaum, Artedi Piscium, 228, 1792 (After Catesby).

Gerres cinereus Jordan & Gilbert, Bull. U. S. Fish. Comm., 1882, 108 (Mazatlan); Jordan & Gilbert, Syn. Fish. N. A., 935, 1883; Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 120; Jordan, Proc. U. S. Nat. Mus., 1884, 130, 148 (Key West); Jordan, Proc. U. S. Nat. Mus., 1884, 194 (identification of Catesby's figure); Jordan, Cat. Fishes N. A., 1885, 95.

Gerres zebra Müller & Troschel, Schomburgk Hist. Barbadoes, 668, 1848 (Barbadoes); Günther, Cat. Fish. Brit. Mus., i, 349, 1859 (copied); Günther, Cat. Fish. Brit. Mus., iv, 254, 1862 (copied); Steindachner, Ichthyol. Notizen, iv, ii, 1867 (Surinam); Steindachner, Zur Fisch-Fauna des Magdalenen-Stromes, 9, 1878 (Rio Magdalena. Identified with *Gerres squamipinnis* Günther); Jordan & Gilbert, Bull. U. S. Fish. Comm., 1881, 329 (Mazatlan); Bean & Dresel, Proc. U. S. Nat. Mus., 1884, 154 (Jamaica).

Gerres aprion Cuvier, Règne Animal, ed. 2, 104, 1829 (Based on Catesby); Cuvier & Valenciennes, Hist. Nat. Poiss., 461, 1830 (Martinique).

Diapterus aprion Poey, Enum. Pisc. Cuba, 51, 1875 (Havana).

Eucinostomus aprion Poey, Enum. Pisc. Cuba, 328, 1877 (Havana).

Gerres squamipinnis Günther, Cat. Fish. Brit. Mus., i, 349, 1859 (Jamaica; Guatemala); Günther, Cat. Fish. Brit. Mus., iv, 254, 1862 (Jamaica; Guatemala); Steindachner, Ichthyol. Notizen, iv, 12, 1867 (Surinam); Günther, Fish. Centr. Amer., 39, 1869 (Jamaica; Chiapam; Panama).

Eucinostomus zebra Poey, Enum. Pisc. Cuba, 51, 1875 (Havana).

Habitat.—Both coasts of Tropical America, and the West Indies (Havana; Jamaica; Chiapam; Panama; Guatemala; Martinique; Bahamas; Florida Keys; Barbadoes; Mazatlan.)

The specimens before us are from Key West and Havana. They range from $6\frac{1}{2}$ to 13 inches in length. This species seems to reach a larger size than any of the others here mentioned.

Head $3\frac{1}{3}$; depth $2\frac{1}{3}$ to $2\frac{3}{5}$; scales 6-45-10.

Body compressed, elongate, back moderately elevated, the dorsal profile being evenly convex. Mouth moderate, the maxillary extending but slightly beyond the vertical at anterior margin of orbit, its exposed portion triangular in form, and twice as long as wide, its length being contained five times in that of the head.

Preorbital and preopercle entire; premaxillary groove broad and free from scales; gill-rakers weak, 7 below the angle. Eye moderate, about $3\frac{1}{5}$ in head; snout $3\frac{1}{4}$, and interorbital space $3\frac{1}{5}$, in head. Distance from end of snout to dorsal fin $2\frac{1}{5}$ in length of body. Second dorsal spine longest, about $1\frac{1}{2}$ in head, and not much stronger than the others; all the dorsal spines are weak and flexible; general outline of the upper margin of the spinous dorsal falcate. Second and third anal spines subequal, second $2\frac{2}{3}$ to $2\frac{3}{4}$ in length of head, the pectorals scarcely reaching anal, their length being contained three times in that of the body. Ventrals contained $1\frac{2}{5}$ times in head, and scarcely reaching the vent.

Color silvery with bluish reflections above. Sides with 7 or 8 broken, bluish vertical bars, about equaling pupil in width. No dark stripes along the scales. Dorsal and caudal fins dusky, and slightly so; other fins pale, ventrals with a few dark punctulations; axil dark.

7. *Gerres gula*.

Gerres gula Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 464, 1830 (Martinique; Brazil); Jenyns, Zöol. Beagle, Fishes, 58, 1842; Günther, Cat. Fish. Brit. Mus., i, 346, 1859 (Bahia; San Domingo; Jamaica); Günther, Cat. Fish. Brit. Mus., iv, 255, 1862 (Bahia; San Domingo; Jamaica); Poey, Rep. Pisc. Cub., 316, 1865 (Havana); Goode, Bull. U. S. Nat. Mus., v, 1876, 39 (Bermudas); Jordan & Gilbert, Syn. Fish. N. A., 934, 1883; Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 122 (Bermudas; Beaufort, N. C.; Charleston, S. C.; Aspinwall; Pensacola); Jordan, Proc. Acad. Nat. Sci. Phila., 1883, 289 (Notes on original type); Jordan, Proc. U. S. Nat. Mus., 1884, 130 (Key West); Jordan & Swain, Proc. U. S. Nat. Mus., 1884, 233 (Cedar Keys); Jordan, Cat. Fish. N. A., 1885, 95.

Diapterus gula Poey, Syn. Pisc. Cub., 323, 1868 (Havana).

Eucinostomus argenteus Baird & Girard, Ninth Smith. Rept., 1855, 345 (New Jersey Coast); Girard, U. S. and Mex. Bd. Survey, Fishes, 17, Pl. ix, figs. 9-12, 1859 (Brazos Santiago, Indianola, and St. Joseph's Island, Texas).

? *Gerres argenteus* Günther, Cat. Fish. Brit. Mus., 256, 1862 (Texas).

Eucinostomus gulula Poey, Enum. Pisc. Cub., 54, Pl. 2, 1875 (Havana).

Diapterus homonymus Goode & Bean, Proc. U. S. Nat. Mus., 1879, 340, (Clear Water Harbor, Fla.).

Habitat.—Atlantic coast of America from New Jersey to Brazil, and the West Indies.

(New Jersey; Beaufort, N. C.; Charleston, S. C.; Clear Water Harbor, Fla.; Cedar Keys; Key West; Brazos, Indianola, and St. Joseph's Island, Texas; Aspinwall; Brazil; Bahia; Martinique; Jamaica, San Domingo; Havana; Bermudas.)

We have examined numerous specimens of this species from Cedar Keys, Key West, and Havana, varying in size from $1\frac{1}{2}$ to $6\frac{1}{2}$ inches in length.

Head $3\frac{1}{3}$; depth $2\frac{2}{5}$; D. IX, 10; A. III, 8; scales 5-42-9.

Body elliptical, compressed, back moderately elevated, mouth small; end of maxillary reaching slightly past vertical from front margin of orbit; exposed portion of maxillary nearly oblong, its width about 2 in its length, which is from 4 to 5 in the length of the head.

Preorbital and preopercle entire. Gill-rakers small and weak, 7 below the angle. Eye 3 in length of head, snout $3\frac{1}{2}$ in head. Interorbital area 3 in head. Premaxillary groove sealed in front, the posterior part naked, forming a sort of pit; longest dorsal spine $1\frac{1}{2}$ in head; second anal spine shorter and stronger than third, its length about $3\frac{1}{3}$ in head; ventrals reaching nearly to vent; their length $1\frac{2}{5}$ in length of head. Pectorals reaching front of anal, their length about 3 in length of body.

Color silvery, greenish, darker above; no distinct longitudinal lines except in very young; upper margin of spinous dorsal more or less black.

Dorsal and anal fins dusky, other fins pale.

The form of this species resembles that of *G. gracilis*, but the body is always less elongate than in the latter. The form of its premaxillary groove differing from that of any other species, affords the best character for distinction.

The many specimens of this species which we have examined present no marked differences or variations. They also agree very well with the description and drawing of *Eucinostomus gulula* of Poey.

We have no doubt of the identity of *gula*, *argenteus*, *gulula* and *homonymus*.

8. *Gerres aureolus*.

Gerres aureolus Jordan & Gilbert, Bull. U. S. Fish. Comm., 1881, 328 (Panama); Jordan & Gilbert, Bull. U. S. Fish. Comm., 1882, 111 (Panama); Everman & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 123 (Panama).

Habitat.—Bay of Panama. Only the original type of this strongly marked species is yet known.

9. *Gerres peruvianus*.

Gerres peruvianus Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 467, 1830 (Payta, Northern Peru); Lesson, Voyage Coquille, Poiss., 180, 1828; Jordan & Gilbert, Bull. U. S. Fish Comm., 1881, 330 (Mazatlan; Panama); Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 108, 111, 112 (Panama; Mazatlan; Punta Arenas); Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 123; Jordan, Proc. Acad. Nat. Sci. Phila., 1883, 289 (Notes on original type); Jordan, Cat. Fish. N. A., 1885, 95.

Gerres rhombus Günther, Fish Centr. Amer., 391, 1866 (Name only), (Chiapam); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 232 (Salina Cruz), (not of Cuv. & Val.).

Habitat.—West Coast of Tropical America (Mazatlan; Salina Cruz; Chiapam; Panama; Peru).

Dr. Jordan has examined the type of this species, of which he says: "The type of this species is apparently identical with the common west-coast species called by this name by Jordan and Gilbert (Bull. U. S. Fish Comm., 188, 330), and later by Evermann and Meek (Proc. Acad. Nat. Sci. Phila., 1883, 123)."

10. *Gerres rhombus*.

Stone bass Sloane, Nat. Hist. Jamaica, ii, pl. 253, fig. 1, 1727 (Jamaica).

Gerres rhombus Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 459, 1830 (Martinique; San Domingo); Günther, Cat. Fish. Brit. Mus., i, 341, 1859 (Cuba; Jamaica; Puerto Capello; South America; in part *G. olisthostoma* Goode & Bean); Günther, Cat. Fish. Brit. Mus., iv, 253, 1862 (Cuba; Jamaica; Puerto Capello); Steindachner, Zur Fisch-Fauna Magdalenen-Stromes, 9, 1878 (Rio Magdalena); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1883, 383 (Aspinwall); Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 123; Jordan, Proc. Acad. Nat. Sci. Phila., 1883, 290 (Notes on original type); Bean & Dresel, Proc. U. S. Nat. Mus., 1884, 154 (Jamaica).

Habitat.—West Indies and Atlantic Coast of Tropical America (Jamaica; San Domingo; Martinique; Puerto Capello; Havana; Aspinwall; Rio Magdalena).

We have examined a number of specimens from Havana, ranging from $2\frac{3}{4}$ to 10 inches in length.

Head $3\frac{1}{4}$; depth $1\frac{5}{8}$; scales 5-38-10. D. IX, 10; A. II, 9.

Body much compressed, rhomboidal in form, the back much elevated; profile evenly convex to supraorbital where there is a slight depression; snout somewhat pointed; mouth rather large; end of maxillary reaching to vertical from centre of pupil, its length 3 in head. Exposed portion of the maxillary oblong, its width about $2\frac{3}{4}$ in its length, which is $4\frac{1}{4}$ in head. Eye $3\frac{1}{4}$ in head; snout 4 in head; interorbital area $3\frac{1}{4}$ in head. Gill-rakers stronger than in *gula* or *olisthostoma* 18 below the angle. Premaxillary groove broad, oval and free from scales. Pectoral fins reaching to front of anal, their length 3 in length of body; ventral fins reaching beyond vent, their length $4\frac{1}{4}$ in length of body. Second dorsal spine stronger, but shorter than third and fourth, its length about $4\frac{1}{4}$ in length of body; margin of fin falcate. Suborbital entire; preopercle entire. Caudal peduncle $2\frac{2}{3}$ in length of head. Anal spine constantly *two* in number. Second anal spine $1\frac{3}{4}$ in length of head.

Color silvery, with bluish reflections, darker above; margin of dorsal fin black; fins rather pale; ventrals and anal with dusky punctulations; snout dusky; no distinct dark lines along the rows of scales.

11. *Gerres olisthostoma*.

Gerres rhombeus Poey, Rep. Pisc. Cub., 316, 1865 (Havana); Poey, Syn. Pisc. Cub., 321, 1868 (Havana).

Mojarra rhombea Poey, Enum. Pisc. Cub., 51, 1875 (Havana); Poey, Enum. Pisc. Cub., 327, 1877 (Havana) (not *Gerres rhombeus* C. & V.).

Gerres olisthostoma Goode & Bean, Proc. U. S. Nat. Mus., 1882, 423 (Indian River, Florida); Jordan & Gilbert, Syn. Fish. N. A., 934, 1883; Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 123; Jordan, Proc. U. S. Nat. Mus., 1884, 130 (Key West); Jordan, Cat. Fish. N. A., 1885, 95.

Habitat.—Coast of Florida and Cuba (Key West; Indian River, Fla.; Havana; San Matheos).

We have examined specimens from Key West, Havana and San Matheos. They range from 5 inches to a foot in length.

Head $3\frac{1}{3}$; depth $2\frac{1}{6}$; scales 5-38-9. D. IX, 10; A. III, 8.

Body compressed, rhomboidal in form, back very much elevated. Mouth large, maxillary extending to vertical from ante-

rior portion of pupil, its length $2\frac{3}{4}$ in head; exposed portion oblong, its width $2\frac{1}{2}$ in its length, which is 4 to $4\frac{1}{4}$ in head.

Preorbital entire; preopercle serrate; premaxillary groove broad, closely covered with small scales (an important diagnostic character); gill-rakers weak, 11 below the angle. Eye $3\frac{1}{2}$ in head; interorbital space $3\frac{1}{4}$, and snout about $3\frac{1}{3}$ in head. Distance from snout to dorsal fin about $2\frac{1}{4}$ in length. Second dorsal spine $1\frac{1}{3}$ to $1\frac{1}{3}$ in head; third about equal to second, the others decreasing in length, the sixth being but one-half length of second—the general outline of upper margin of spinous dorsal being sickle-shaped. Pectorals reaching slightly beyond front of anal, and equal a little less than one-third length of body. Ventrals reaching just beyond vent and are one-fourth length of body. Anal spines always 3. Second anal spine stout, about $1\frac{3}{5}$ in head. Least depth of caudal peduncle about $2\frac{1}{2}$ in head.

Color silvery with bluish reflections, darker above. No distinct dark lines along rows of scales. Dorsal, ventrals and anal dusky, other fins paler. A dark supraorbital spot; snout dusky.

This species has, until lately, been confounded with *G. rhombeus*.

12. *Gerres brasilianus*.

Gerres brasilianus Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 458, 1830 (Brazil; Porto Rico); Poey, Rep. Pisc. Cub., i, 315, 1865 (Havana); Poey, Syn. Pisc. Cub., 320, 1868 (Havana); Poey, Enum. Pisc. Cub., 50, 1875 (Havana); Poey, Enum. Pisc. Cub., 327, 1877 (Havana); Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 124; Jordan, Proc. Acad. Nat. Sci. Phila., 1883, 289 (Notes on type).

Gerres patao Poey, Memorias Cuba, ii, 192, 1858 (Havana); Poey, Syn. Pisc. Cub., 320, 1868 (Havana); Poey, Enum. Pisc. Cub., 50, 1875 (Havana); Günther, Cat. Fish. Brit. Mus., iv, 253, 1862 (Copied); Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 123.

We have examined a very large specimen of this species collected at Charleston, South Carolina, by Mr. Charles C. Leslie, as well as numerous smaller ones from Havana.

Head $3\frac{3}{7}$; depth $2\frac{1}{5}$; scales 5–38–9; D. IX–10; A. III–7 or 8.

Body compressed, rhomboidal; back very much elevated; profile nearly straight from spinous dorsal to premaxillary groove, where there is a slight depression. Snout conical, bluntish; mouth rather large; maxillary reaching slightly beyond the vertical from anterior margin of pupil, its length $2\frac{4}{5}$ in length of head. Exposed portion of maxillary oblong, its width $2\frac{1}{2}$ in its length, its length $4\frac{1}{2}$ in length of head.

Preorbital and preopercle serrate; premaxillary groove broad, narrowed posteriorly, entirely free from scales. Gill-rakers short and weak, 11 below the angle; eye small, $3\frac{2}{3}$ in length of head; snout $3\frac{1}{2}$ in length of head. Dorsal spines rather strong and stiff, second and third subequal in length, the second much the stronger, its length $1\frac{2}{3}$ in length of head, upper margin of dorsal fin falcate. Second and third anal spines subequal, the second much the stronger, its length $1\frac{2}{3}$ in length of head. Least depth of caudal peduncle $2\frac{1}{5}$ in length of head.

Color silvery gray, with bluish reflections, darker above, a dark streak along each row of scales, most conspicuous on upper part of body; fins all dusky except pectorals, which are pale; dorsal and anal blackish on their margins. A dark supraorbital spot; axil dusky.

The description of *Gerres brasilianus* Cuv. and Val. is very poor indeed. Dr. Jordan has examined the type, and we here give a copy of his notes: "The type of this species is in very bad condition, unfit for detailed description. Sides apparently with dark stripes along the rows of scales. Preorbital and preopercle serrate. Frontal groove broad, naked. Longest dorsal spine 5 in body. Second anal spine $5\frac{1}{4}$. Anal spines 3 in number. Caudal fin long. This species is allied to *G. plumieri*, but the back is less elevated and the spines smaller than in the latter."

The above agrees very well with our specimens from Charleston and Havana, the latter being evidently identical with the *Gerres patao* of Poey.

13. *Gerres lineatus*.

Smaris lineatus Humboldt, Observ. Zool., ii, 185, Pl. 46, 1807-1834 (Acapulco).

Gerres lineatus Cuvier and Valenciennes, Hist. Nat. Poiss., vi, 470, 1830 (Description from Humboldt); Jordan & Gilbert, Bull. U. S. Fish Comm., 1881, 330 (Mazatlan; San Blas); Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 108 (Mazatlan); Jordan & Gilbert, Bull. U. S. Nat. Mus., 1882, 377 (Fresh-water Lake at Acapulco); Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 123; Jordan, Cat. Fish. N. A., 1885, 95.

Gerres axillaris Günther, Proc. Zool. Soc. London, 1864, 102; Günther, Fish. Cent. Amer., 448, 1866 (Chiapam); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 232 (Name only) (San Blas).

Habitat.—West Coast of Mexico (Acapulco; Mazatlan; San Blas; Chiapam).

14. *Gerres brevimanus*.

Gerres brevimanus Günther, Proc. Zöol. Soc. London, 1864, 152; Günther, Fish. Centr. Amer., 448, 1869 (Chiapam); Evermann and Meek, Proc. Acad. Nat. Sci. Phila., 1883, 124; Jordan. Proc. Acad. Nat. Sci. Phila., 1883, 290 (Notes on type).

Habitat.—Pacific Coast of Tropical America.

Concerning this species, Dr. Jordan observes: "This species is distinct from *G. lineatus* (Humboldt), although closely allied to it. Only the original type is yet known. On this I have the following notes:—

"Head $3\frac{1}{4}$ in length; depth $2\frac{1}{3}$; eye $3\frac{1}{3}$ in head. Coloration of *Gerres lineatus*. Back much lower than in the latter, and pectoral fins very much shorter; their length $1\frac{1}{4}$ in head; their tips not reaching nearly to tips of ventrals, which are $1\frac{1}{4}$ in head; caudal 3 in body. Preorbital very little serrate, almost entire. Preopercle weakly serrate. Second dorsal spine $1\frac{2}{5}$ in head; second anal spine $1\frac{2}{3}$. Teeth small and short. No black on base of pectoral, or on lower fins. Spinous dorsal dusky above. Frontal groove broad and naked, as in *G. lineatus*."

15. *Gerres plumieri*.

Gerres plumieri Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 452, 1830, (Antilles; Porto Rico); Günther, Cat. Fish. Brit. Mus., i, 340, 1859 (San Domingo; Guatemala; Pernambuco; Bahia); Cat. Fish. Brit. Mus., iv, 253, 1862 (San Domingo; Guatemala; Pernambuco; Bahia); Poey, Rep. Pisc. Cub., 315, 1865 (Havana); Poey, Syn. Pisc. Cub., 321, 1868 (Havana); Poey, Enum. Pisc. Cub., 49, 1875 (Havana); Poey, Enum. Pisc. Cub., 327, 1877 (Havana); Steindachner, Zur Fisch-Fauna des Magdalenen-Stromes, 9, 1878 (Rio Magdalena); Jordan & Gilbert, Syn. Fish. N. A., 583, 1883; Evermann & Meek, Proc. Acad. Nat. Sci. Phila., 1883, 124 (Aspinwall; Indian River, Florida); Jordan, Proc. Acad. Nat. Sci. Phila., 1883, 290 (Notes on type); Bean & Dresel, Proc. U. S. Nat. Mus., 1884, 153 (Jamaica); Jordan, Cat. Fish. N. A., 1885, 95.

Habitat.—West Indies and Atlantic Coast of Tropical America (Antilles; Havana; Porto Rico; San Domingo; Jamaica; Indian River, Fla.; Pernambuco; Bahia; Aspinwall; Guatemala).

We have examined six specimens from Havana. They range from $5\frac{1}{4}$ to 6 inches in length.

Head 3; depth $2\frac{1}{6}$; scales 5–37–11. D. IV, 10; A. III, 8.

Body compressed, rhomboidal in form, back very much elevated. Mouth rather large, maxillary extending slightly beyond

vertical from anterior margin of pupil, its length $2\frac{5}{6}$ in head; exposed portion of maxillary oblong, its width $2\frac{1}{2}$ in its length, which is $4\frac{3}{4}$ in length of head.

Preorbital and preopercle serrate; premaxillary groove broad and entirely free from scales. Gill-rakers small, weak, 13 below the angle. Eye rather large, 3 in head; snout 4 in head. Distance from tip of snout to dorsal fin equals the greatest depth of fish. Upper margin of dorsal fin is sickle-shaped. Second dorsal spine very strong and long, its length $2\frac{2}{3}$ in length of body; the other spines rather weak and flexible. Second anal spine very long and strong, its length equals length of head; third anal spine shorter and much weaker than second. Pectoral fins reaching beyond the front of anal, their length $2\frac{2}{3}$ in length of body; ventral fins reaching past vent, almost to front of anal, their length $3\frac{2}{3}$ in length of body.

Color bluish-silvery above, silvery below; distinct dark longitudinal lines along each row of scales. Dorsal caudal and anal fins dusky; margin of dorsal fin black; a dark supraorbital spot. Pectoral and ventral fins pale.

The following is a list of the nominal species referred to in the foregoing paper, arranged in chronological order, with our identification of each. Tenable specific names are printed in italics.

<i>Nominal Species.</i>	<i>Year.</i>	<i>Identification.</i>
Mugil <i>cinereus</i> Walbaum,	1793,	Gerres <i>cinereus</i> .
Smaris <i>lineatus</i> Humboldt,	1830,	Gerres <i>lineatus</i> .
Gerres <i>plumieri</i> Cuvier and Valenciennes,	1830,	Gerres <i>plumieri</i> .
Gerres <i>brasilianus</i> Cuv. and Val.,	1830,	Gerres <i>brasilianus</i> .
Gerres <i>rhombeus</i> Cuv. and Val.,	1830,	Gerres <i>rhombeus</i> .
Gerres <i>apron</i> Cuv. and Val.,	1830,	Gerres <i>cinereus</i> .
Gerres <i>gula</i> Cuv. and Val.,	1830,	Gerres <i>gula</i> .
Gerres <i>peruvianus</i> Cuv. and Val.,	1830,	Gerres <i>peruvianus</i> .
Gerres <i>zebra</i> Müller and Troschel,	1848,	Gerres <i>cinereus</i> .
Eucinostomus <i>argenteus</i> Baird & Girard,	1855,	Gerres <i>gula</i> .
Gerres <i>patao</i> Poey,	1858,	Gerres <i>brasilianus</i> .
Gerres <i>squamipinnis</i> Günther,	1859,	Gerres <i>cinereus</i> .
Diapterus <i>californiensis</i> Gill,	1862,	Gerres <i>californiensis</i> .
Diapterus <i>gracilis</i> Gill,	1862,	Gerres <i>gracilis</i> .
Diapterus <i>dowi</i> Gill,	1863,	Gerres <i>dowi</i> .
Gerres <i>axillaris</i> Günther,	1864,	Gerres <i>lineatus</i> .
Gerres <i>brevimanus</i> Günther,	1864,	Gerres <i>brevimanus</i> .
Gerres <i>lefroyi</i> Goode,	1874,	Gerres <i>lefroyi</i> .
Eucinostomus <i>pseudo-gula</i> Poey,	1875,	Gerres <i>pseudo-gula</i> .
Eucinostomus <i>gulula</i> Poey,	1875,	Gerres <i>gula</i> .

<i>Nominal Species.</i>	<i>Year.</i>	<i>Identification.</i>
<i>Eucinostomus productus</i> Poey,	1876,	<i>Gerres lefroyi</i> .
<i>Gerres jonesi</i> Günther,	1879,	<i>Gerres pseudogula</i> .
<i>Eucinostomus harengulus</i> Goode and Bean,	1879,	<i>Gerres gracilis</i> .
<i>Diapterus homonymus</i> Goode and Bean,	1879,	<i>Gerres gula</i> .
<i>Gerres aureolus</i> Jordan and Gilbert,	1881,	<i>Gerres aureolus</i> .
<i>Gerres olisthostoma</i> Goode and Bean,	1882,	<i>Gerres olisthostoma</i> .

RECAPITULATION.

We have in this paper admitted 15 species of the American Gerridæ, and repeat here the list of species. The distribution of the species is indicated by the letters W. (West Indies and adjacent coasts), U. (Southern Atlantic coast of the United States), and P. (Pacific coast of Tropical America).

1. Genus GERRES Cuvier.

1. *Gerres lefroyi* Goode (W.).
2. *Gerres dowi* Gill (U. ; W. ; P.).
3. *Gerres pseudogula* Poey (W.).
4. *Gerres gracilis* Gill (U. ; W. ; P.).
5. *Gerres californiensis* Gill (P.).
6. *Gerres cinereus* Walbaum (U. ; W. ; P.).
7. *Gerres gula* Cuv. and Val. (U. ; W.).
8. *Gerres aureolus* Jordan & Gilbert (Panama).
9. *Gerres peruvianus* Cuv. & Val. (P.).
10. *Gerres rhombeus* Cuv. & Val. (W.).
11. *Gerres olisthostoma* Goode & Bean (W. ; U.).
12. *Gerres brasiliæus* Cuv. & Val. (W. ; U.).
13. *Gerres lineatus* Humboldt (P.).
14. *Gerres brevimanus* Günther (P.).
15. *Gerres plumieri* Cuv. & Val. (W. ; U.).