

in view of the range of specimens of *Mola* he had, and of the differences between *Mola* and *Molacanthus*, he failed to exercise his reasoning powers when he determined the latter to be the young of the former. In fact, the differences between *Molacanthus* and *Mola* when young are considerably greater than between the former and *Mola* when old.

A slight attention to the logic of facts, aided by a very moderate use of the reasoning faculties, might have convinced Dr. Günther of the wide differences between the forms in question.

"In Mr. Gill's system," so far as was expressed in his "Catalogue of the Fishes of the East Coast of North America" (1861, p. 57), the genus *Molacanthus* was simply differentiated from *Mola* or *Orthagoriscus* as a distinct subfamily; to this extent, at least, its differentiation is justified by anatomical contrasts. It is probable, however, that even family rank should be awarded to it in order to adequately express its decided and manifold differences, and to such rank I do now propose to elevate the group. There is not much doubt that the anatomical differences already known to exist will be supplemented by others when the osteology, and especially skulls of the two types, are compared.

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#### A REVIEW OF THE SPECIES OF LUTJANINÆ AND HOPLOPAGRINÆ FOUND IN AMERICAN WATERS.

By DAVID S. JORDAN and JOSEPH SWAIN.

In this paper is given the synonymy of the American species of the genera allied to *Lutjanus*, with descriptions of the species which we have been able to examine, and analytical tables by which these species may be distinguished.

We accept the views of Dr. Gill as to the relationships of these forms, placing them in the family of *Sparidae*, in which group they appear to constitute two subfamilies, *Hoplopagrinae* and *Lutjaninae*. We arrange the American species in eight genera. Three of these (*Ocyurus*, *Rhomboplites*, and *Tropidinius*) have formerly not been admitted by us as distinct from *Lutjanus*, from which genus they are not indeed distinguishable by any single external character of high importance. An examination of a series of skulls of West Indian species, kindly shown to us by Dr. Gill, has convinced us of the desirability of recognizing each of these groups as a genus separate from *Lutjanus*, as the secondary characters of each are accompanied by well-marked peculiarities of the cranium, the structure of which is very constant in species properly referred to *Lutjanus*. For the characters drawn from the skull in the following analysis of the genera, we are indebted to Professor Gill. The skull of *Hoplopagrus* has never been studied, and that of two of the more aberrant species of *Lutjanus* (*inermis*; *aratus*) should be examined before their position can be considered as definitely fixed. The latter is prob-

ably a true *Lutjanus*, the former perhaps a representative of a distinct genus.

In the division of the *Lutjaninæ*, the cranial character of the separation of the interorbital area from the occipital region is evidently of more importance than that of the squamation of the soft dorsal or the separation of the spinous dorsal, characters on which Dr. Bleeker has ranged the groups here noticed in three genera, *Lutjanus*, *Aprion*, and *Etelis*.

ANALYSIS OF AMERICAN GENERA ALLIED TO LUTJANUS.

- A. Nostrils remote from each other, the anterior tubular, near the end of the snout; vomer with about 3 large molar teeth; teeth in jaws coarse and blunt; dorsal spines 10; soft parts of dorsal and anal scaly. (*Hoplopagrinæ*).....HOPLOPAGRUS, 1.
- AA. Nostrils not far apart, the anterior not tubular and not placed at the end of the snout; vomerine teeth villiform, disposed in a patch which is  $\wedge$ ,  $\uparrow$ , or  $\diamond$ -shaped; teeth of jaws acute. (*Lutjaninæ*.)
- B. Interorbital area not flat nor separated from the occipital region, the median and lateral crests procurrent on it, and the frontal narrowed forward; dorsal fin continuous, the spines not separated by a notch from the soft rays.
- C. Prefrontals, with the articular facets arising from diverging **V**-shaped ridges; basi-sphenoid, with an anterior lobiform extension; soft dorsal and anal scaly; dorsal spines 10 or 11 (in American species); tongue with teeth (at least in adult specimens).
- D. Fronto-occipital crest ceasing anteriorly far from front of frontal; prefrontal with posterior areas impressed, long and cribriform; no pterygoid teeth; caudal fin lunate; gill-rakers rather few. .... LUTJANUS, 2.
- DD. Fronto-occipital crest continued on ethmoidal projection; prefrontals with posterior areas short and excavated above and in front; pterygoid teeth present (in the adult) in a narrow band; caudal fin very deeply forked; gill-rakers numerous.....OCYURUS, 3.
- CC. Prefrontals with the articular facets developed from simple tubercles and not **V**-shaped; basi-sphenoid not lobigerous; canines small.
- E. Prefrontals with the posterior areas cribriform; pterygoid, with a broad patch of teeth (in adult); hyoid bone and tongue with teeth; dorsal spines, 12 (or 13); soft dorsal and anal somewhat scaly. RHOMBOPLITES, 4.
- EE. Prefrontals with the posterior areas solid and somewhat tumid; pterygoids, hyoid bone, and tongue toothless; dorsal spines, 10; soft dorsal and anal scaleless.....TROPIDIUS, 5.
- BB. Interorbital area flat, separated by a transverse line of demarkation from the occipital, by which the median as well as the lateral crests are limited; frontals wide in front; tongue and pterygoids toothless.
- F. Dorsal fin continuous; frontals not cavernous; supraorbital margin crenate; periotic region much swollen outwards, and with the bones thin and polished; preorbital moderate; frontals behind, with funnel-shaped foramina; soft dorsal and anal scaleless; last rays of dorsal and anal produced ..... APRION, 6.
- FF. Dorsal nearly or quite divided into two fins by a deep notch; eyes very large; preorbital very narrow.
- G. Frontals not cavernous, simply normally perforate; supraorbital margins crenate; periotic region little convex and with the bones thick, unpolished; prefrontals behind, with funnel-shaped foramina; body comparatively elongate; head naked above and on snout; soft dorsal and anal naked; peritoneum and lining of gill-cavity pale; caudal deeply forked .....ETELIS, 7.

GG. Frontals cavernous (like those of Sciaenoids), with longitudinal osseous bars, leaving interspaces in front of transverse ridge and on each side near the front; supraorbital margins smooth; prefrontals behind, with simple foramina for olfactory nerves; body comparatively short and deep; head scaly above and on jaws and snout; soft dorsal and anal scaly at base; peritoneum and lining of gill-cavity black; caudal lunate ..... VERILUS, 8.

### I.—Genus HOPLOPAGRUS.

HOPLOPAGRUS, Gill, Phila. Proc. Ac. Nat. Sci., 1862, 253 (*Güntheri*)

One species of this remarkable generic type is known. With a close resemblance in nearly all respects to *L. cavis*, and other ordinary *Lutjani*, it differs in the structure of the nostrils and in the dentition entirely from all other fishes of this type.

#### 1. *Hoplopagrus güntheri*. Pargo (Mazatlan).

*Hoplopagrus güntheri*, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 253 (Cape San Lucas); Steindachner, Ichthy. Beiträge, vi, 1878, 1 (Altata); Jordan & Gilbert, Bull. U. S. Nat. Mus., 1882, 107, 112 (Mazatlan; Punta Arenas).

*Habitat*.—Cape San Lucas; Punta Arenas; Mazatlan.

Head,  $2\frac{3}{4}$  ( $4\frac{1}{3}$ ); depth,  $2\frac{1}{5}$  ( $3\frac{3}{4}$ ). D. X, 14; A. III, 9. Scales, 6–47–16. Length (29581, Mazatlan),  $6\frac{1}{2}$  inches.

Form oblong-ovate, the body shorter and deeper than in any American species of *Lutjanus*, the back compressed and somewhat arched, abruptly contracted to the base of the short caudal peduncle. Anterior profile very slightly and evenly convex from tip of snout to front of spinous dorsal.

Snout rather long and pointed, its length  $2\frac{1}{5}$  in head. Mouth small, the maxillary scarcely reaching to front of orbit. Its length 3 in head.

Teeth in jaws arranged as in the *Lutjani*, but coarse and blunt, the lateral teeth of both jaws rounded and molar-like, more blunt in large examples. Upper jaw with about 2 coarse, rather long canines. Vomer with about 3 coarse molar teeth. Palatines and tongue toothless. Lower jaw rather weak, included. Anterior nostril at the extreme front of the snout, close to the premaxillary, in the extremity of a barbel-like tube which hangs down above the mouth and is nearly half as long as the eye. Posterior nostril a rather long and narrow oblique slit, near the front of the eye. Eye small, near the middle of the length of the head,  $4\frac{1}{3}$  in head (young). Interorbital space rather broad and convex, its width  $4\frac{1}{3}$  in head. Preorbital broad, its least width  $3\frac{1}{2}$  to 4 in head. Vertical limb of preopercle oblique, sharply serrate, the teeth fine above, coarse at the angle.

Emargination of preopercle sharp and deep, more conspicuous than in any American species of *Lutjanus*, the knob of the interopercle conspicuous. Gill-rakers few and short, about seven developed on lower part of anterior arch, besides several rudiments. Opercle without spinous projections. Scapular scale serrate.

Scales rather small, regularly arranged; those above lateral line in series, which are throughout parallel with the lateral line; those below in horizontal series. Temporal region with a band of one or two series of large scales. Cheeks with about seven rows of scales.

Dorsal spines rather low and strong, the fin somewhat deeply emarginate. Soft dorsal high, angular, or pointed in outline, the last ray not two-fifths the height of the middle ones, which are two in head. Caudal short, feebly lunate, the upper lobe  $1\frac{3}{4}$  in head. Anal high and pointed, as in *Lutjanus analis*, *vivanus*, and *colorado*, the middle rays reaching base of caudal, a little more than half length of head. Anal spines strong, the second longer and stronger than third,  $2\frac{3}{4}$  in head. Pectoral long, 3 in head; ventral  $1\frac{1}{2}$ .

Color in spirits, olive brown, the body with about six rather conspicuous narrow whitish cross-bands, extending a little obliquely backwards, and broadest below. These are irregular in number and in width. A round, dusky blotch rather faint on base of last rays of soft dorsal. Fins mostly dusky olive, the pectorals pale, the ventrals and anal darkest. Top of head with some small dark spots.

This most remarkable species is a common food-fish of Mazatlan, where it is known as *Pargo*.

Dr. Gill has very properly considered it the type of a distinct subfamily, *Hoplopagrinae*. Its peculiarities are certainly stronger than those of the other genera associated with *Lutjanus*.

## II.—Genus LUTJANUS.

LUTJANUS, Bloch, *Ausländische Fische*, iv, 107 (*lutjanus*).

DIPTERODON, Lacépède, *Hist. Nat. Poiss.*, iv, 167, 1803 (*plumieri*=*synagris*, etc.).

DIACOPE, Cuv. & Val., *Hist. Nat. Poiss.*, ii, 410, 1828 (*sebae*, etc.) (preoccupied).

MESOPRION, Cuv. & Val., *Hist. Nat. Poiss.*, 441, ii, 1828 (*unimaculatus*, etc.).

GENYORGE, Cantor, *Malayan Fishes*, 1850, 12 (*notata*).

? MACOLOR, Bleeker, *Poiss. Amboine. Nederl. Tijdschr. Dierkunde*, 277, 1867 (*macolor*).

NEOMENIS, Girard, *U. S. Mex. Bound. Surv.*, 1859, 18 (*emarginatus*=*griseus*).

? PROAMBLYS, Gill, l. c., 236 (*nigra*=*macolor*).

HYPOPLITES, Gill, l. c., 236 (*retrospinis*).

EVOPLITES, Gill, l. c., 236 (*pomacanthus*=young of *L. bengalensis*).

### ANALYSIS OF SPECIES OF LUTJANUS.\*

a. Dorsal spines, normally 10.

b. Anal rays III, 7 to III, 9.

c. Gill-rakers comparatively few, 7 to 15 developed on lower part of anterior arch, sometimes preceded by 1 to 5 rudiments.

d. Anal fin rounded or but slightly angulated, its middle rays less than half length of head.

e. Lower jaw not projecting beyond upper.

f. Soft dorsal normally with 14 rays.

g. Developed gill-rakers, 7 to 9, with but one or two rudiments, if any; canines strong, no black lateral spot, preorbital, deep, caudal lunate.

\* In this analysis we omit *L. cyanopterus* and *L. lutjanoides*, species which we have never seen, and of which little is known.

*h.* Vomerine teeth forming an  $\uparrow$  (anchor) shaped patch, with a distinct backward prolongation on the median line; second anal spine longer and stronger than third; upper canines very strong; in lower, moderate or small.

*i.* Scales above lateral line in horizontal series which are throughout parallel with the lateral line; upper canines strong; snout long and pointed; pectoral fin long; color brownish, with faint silvery streaks along rows of scales on sides, a pale-blue streak along suborbital and preorbital; fins pale.

ARGENTIVENTRIS, 2.

*ii.* Scales above lateral line arranged in series which are not throughout parallel with the lateral line, being oblique and irregular at least below the second dorsal.

*j.* Body comparatively deep, the depth about  $2\frac{1}{2}$  in length; snout long and pointed; soft dorsal, anal, and caudal orange or yellow, becoming pale in spirits.

*k.* Scales unusually large; five or six in an oblique series from first dorsal to lateral line; about 45 vertical series above lateral line between gill-opening and base of caudal; lateral line with less than 40 pores; blue streak on suborbital region not permanent ..... CAXIS, 3.

*kk.* Scales moderate, about nine in an oblique series from first dorsal to lateral line; about 55 vertical series above lateral line between gill-opening and base of caudal; lateral line with more than 40 pores; a whitish area below eye; blue streak along suborbital region usually not disappearing with age..... JOCÚ, 4.

*jj.* Body comparatively elongate, the depth  $2\frac{3}{4}$  to 3 in length; snout rather pointed; mouth large; soft dorsal, anal, and caudal blackish, tinged with wine color, always becoming dusky in spirits; body dark greenish, more or less reddish below; blue streak on preorbital disappearing early.

GRISEUS, 5.

*hh.* Vomerine teeth forming a  $\Lambda$  or  $\uparrow$ -shaped patch, the backward prolongation on median line wanting or very short; scales above lateral line in oblique series, which are not throughout parallel with lateral line; body comparatively elongate, the depth 3 to  $3\frac{1}{2}$  in length; upper and lower canines very strong; mouth large; vertical fins dusky.

*l.* Maxillary reaching middle of eye,  $2\frac{1}{3}$  in head... CUBERA, 6.

*ll.* Maxillary barely reaching to opposite front of orbit,  $2\frac{2}{3}$  in head ..... NOVEMFASCIATUS, 7.

*gg.* Developed gill-rakers about ten, with about five rudiments before them; canines moderate; caudal somewhat forked; vomerine teeth in a  $\uparrow$ -shaped patch; eye large; color chiefly red; scales above lateral line in oblique series.

*m.* Iris golden yellow; no black blotch on base of pectoral; scales small; lateral line with 50 tubes; second anal spine moderate,  $3\frac{1}{4}$  in head; rose-color, with golden streaks; soft fins all rosy; lateral blotch disappearing with age. . . . . PROFUNDUS, 8.

*mm.* Iris orange red; base and axil of pectoral with a jet-black blotch; scales moderate, about 63 vertical rows above lateral line; second anal spine long,  $2\frac{2}{3}$  in head; crimson, caudal peduncle and caudal fin largely yellow; no lateral blotch.

BUCCANELLA, 9.

*ff.* Soft dorsal with 12 rays; body oblong, the back not greatly elevated; mouth rather small, the upper canines moderate, the lower obsolete; scales above lateral line in very oblique series.

*n.* Pectoral short,  $1\frac{2}{3}$  in head; teeth on vomer in a  $\uparrow$ -shaped patch; color olivaceous, no black lateral blotch.

BRACHYPTERUS, 10.

*nn.* Pectoral long, more than two-thirds length of head; color chiefly red; a large black lateral blotch.

*o.* Vomerine teeth in a  $\uparrow$ -shaped patch, with a distinct backward prolongation on median line; color red, back and sides with rows of dark bluish-gray spots following the series of scales; similar spots on sides of head; fins reddish.

GUTTATUS, 11.

*oo.* Vomerine teeth in a  $\Lambda$  or  $\uparrow$ -shaped patch, the prolongation on median line very short or wanting; color rosy, greenish above, the sides of head and body with numerous longitudinal stripes of golden yellow; soft dorsal and caudal red; lower fins yellow. . . . . SYNAGRIS, 12.

*ee.* Lower jaw projecting beyond upper; teeth on vomer in a  $\uparrow$ -shaped patch.

*p.* Scales above lateral line in oblique series. Mouth moderate; body rather elongate, compressed; eye small; scales small, the lateral line with about 50 pores; dorsal rays X, 13; caudal deeply forked; anal spines graduated; gill-rakers rather numerous, about 10 on lower part of anterior arch; reddish, with horizontal yellow streaks; no black lateral blotch.

AMBIGUUS, 13.

*pp.* Mouth large; body rather elongate, strongly compressed; eye very large, red; scales rather small, the lateral line with about 50 pores; dorsal rays X, 12; caudal little forked; second and third anal spines subequal; gill-rakers few; dark brown, pale below, flushed with deep red; fins mostly red; a large black lateral blotch.

MAHOGONI, 14.

*dd.* Anal fin angulated, its median rays produced, at least half length of head; body rather robust; upper canines rather large; lower, small.

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*q.* Scales above the lateral line arranged in series which are not throughout parallel with the lateral line; side with a black blotch, which usually disappears with age; anal fin bright red.

*r.* Teeth on vomer in a  $\uparrow$ -shaped patch, with a median backward prolongation; lingual teeth well developed; snout rather pointed; maxillary reaching front of eye,  $2\frac{1}{2}$  in head; scales rather large; about forty-eight pores in the lateral line; eight scales in an oblique series, from first dorsal spine to lateral line; color rose-red, nearly uniform.....VIVANUS, 15.

*rr.* Teeth on vomer in a  $\Lambda$ -shaped, without distinct prolongation on the median line; lingual teeth very few or none; snout rather pointed; maxillary scarcely reaching front of eye,  $2\frac{5}{7}$  in head; scales rather small; about five pores in lateral line; ten scales in an oblique series from first dorsal spine to lateral line; color, greenish above, rosy below; a small but distinct black lateral blotch; young with oblique blue streaks above; fins mostly brick red, especially the anal; a pearly streak below eye .....ANALIS, 16.

*qq.* Scales above the lateral line arranged in series, which are parallel throughout with the lateral line; no black lateral blotch; scales rather large; five or six between first dorsal spine and lateral line; lateral line with forty-seven pores; vomerine teeth in a  $\Lambda$ -shaped patch; lingual teeth well developed; maxillary reaching front of pupil,  $2\frac{3}{4}$  in head; color, red; dusky above; a blue streak on suborbital; anal and ventral fins dusky.

COLORADO, 17.

*bb.* Anal rays III, 11; body slender; snout short, pointed; mouth small; canines very small; teeth on tongue well developed; vomerine patch of teeth  $\uparrow$ -shaped, with a short backward prolongation; scales above lateral line in very oblique series; pectoral fins short; caudal deeply forked; anal spines very small; color, dusky, each scale with a shining silvery spot .....INERMIS, 20.

*aa.* Dorsal spines 11; body elongate; scales large, those above lateral line in about four series, which are fully parallel with the lateral line; soft dorsal and anal low; vomerine teeth in a  $\Lambda$ -shaped patch; lingual teeth present; gill-rakers few; color, brown, with distinct silvery stripes along the rows of scales; young with silvery cross-bars; lower fins dusky.

ARATUS, 21.

2. *Lutjanus argentiventris*. *Pargo amarillo*.

*Mesoprion argentiventris*, Peters, Berlin. Monatsber., 1869, 704 (Mazatlan).

*Lutjanus argentiventris*, Jordan, Proc. Ac. Nat. Sci. Phila., 1883, 285 (Mazatlan).

*Mesoprion griseus*, Günther, Fishes Central America, 1863, 385 (name only: Pacific) (not of C. & V.).

*Lutjanus argentivittatus*, Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 354; Jordan & Gilbert *loc. cit.*, Bull., 1882, 107, 110 (Mazatlan; Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 625 (Panama) (*lapsus calami* for *argentiventris*).\*

*Habitat*.—Mazatlan and Panama.

Head,  $2\frac{3}{5}$  ( $3\frac{1}{6}$ ); depth,  $2\frac{3}{5}$  ( $3\frac{1}{6}$ ). D. X, 14; A. III, 8. Scales 5-45-12. 45 pores. Length (28254, Mazatlan), 11 inches.

Body formed as in *Lutjanus caxis*, moderately compressed, the back considerably elevated. Profile straight or slightly concave from snout to nape. The nuchal region rather convex. Snout long and pointed, anteriorly somewhat depressed; its length 3 in head. Eye moderate,  $4\frac{1}{3}$  in head; interorbital space very gently convex; its width  $6\frac{1}{2}$  in head. Mouth large, maxillary reaching a little past front of orbit; its length 3 in head; upper jaw with two strong canines in front rather weaker than in *L. caxis*; lower jaw with the teeth in the outer series enlarged, some of the lateral teeth largest, but scarcely canine-like; teeth on tongue in a single large oblong patch; teeth on vomer forming an arrow-shaped patch, with a long backward prolongation on the median line.

Gill-rakers rather few and short, about 7 on lower part of anterior arch, these not preceded by rudiments.

Preopercle with its posterior margin extending downwards and forwards, very weakly emarginate, finely serrate above, almost entire at the angle.

Scales large, much as in *L. caxis*, the series above the lateral line almost horizontal, and throughout parallel with the lateral line; scales below lateral line anteriorly in series running somewhat upward and backward; posteriorly in horizontal series; six rows of scales on the cheek; a band of about three series of rather large scales on the temporal region. Soft dorsal and anal scaly; tubes of lateral line each with 4 or 5 branches.

Dorsal spines strong, the longest  $2\frac{5}{6}$  in head. Margin of soft dorsal well rounded, the middle rays 3 in head. Caudal not deeply forked, the upper lobe  $1\frac{3}{4}$  in head. Anal fin rather high, somewhat rounded, the longest rays  $2\frac{1}{6}$  in head. Anal spines strong, the second stronger and larger than third,  $3\frac{2}{3}$  in head. Ventrals 2 in head. Pectorals reaching about to front of anal,  $1\frac{1}{4}$  in head.

Color in spirits brownish above, paler below; each scale of sides somewhat silvery near its middle, these forming narrow and rather distinct dull silvery streaks which follow the direction of the rows of

\* Our only copy of Dr. Peters' paper at the time these papers were printed was a manuscript transcription. In this, by a slip of the pen of the copyist, *argentiventris* became "*argentivittatus*."



scales. A bluish horizontal streak below eye, most distinct in young examples. Fins pale; yellowish in life.

This species, the *Pargo Amarillo* of the Mazatlan fishermen, is generally common on the Pacific coast of Mexico and Central America. It bears considerable resemblance to *L. caxis*, *jocú*, and *griseus*, but is distinct from all of these.

### 3. *Lutjanus caxis*. *Schoolmaster*; *Cají*.

*Perca marina pinnis branchialibus carens* (the Schoolmaster), Catesby, Hist. Carolina, &c., 1743, tab. 4.

*Caxis*, Parra, Descr. Dif. Piezas, Hist. Nat., 1787, tab. 8, f. 2 (Havana).

? *Perca apoda* ("Forster, Catal. of Anim., 21"), Walbaum, Artedi Piscium, 1792, 351 (based on the Schoolmaster of Catesby).

*Sparus caxis*, Bloch & Schneider, Ichthyol., 1801, 284 (after Parra).

*Mesoprion caxis*, Poey, Repertorio, ii, 269, 1868.

*Lutjanus caxis*, Poey, Synopsis, 1868, 293 (Cuba); Poey, Enumeratio, 1875, 25; Jordan, Proc. U. S. Nat. Mus., 1884, 125 (Key West). (Not of most recent American writers.)

*Bodianus striatus*,\* Bloch & Schneider, Syst. Ichth., 1801, 335, tab. lxx (West Indies).

*Lutjanus acutirostris*, Desmarest, Prém. Dec., Ichthyol., 12, tab. 3, 1823 (Cuba).

? *Mesoprion cynodon*, Cuv. & Val., ii, 465, 1828 (Martinique; San Domingo); Bocourt, Ann. Nat. Hist., Paris, 1868, 224.

*Mesoprion linea*, Cuv. & Val., ii, 468, 1828 (Cuba; San Domingo).

*Mesoprion flavescens*, Cuv. & Val., ii, 472, 1828 (Martinique).

*Mesoprion albostratus*, Peters, Berliner Monatsberichte, 1865, 111 (on the type of Bloch & Schneider.)

*Habitat*.—West Indies, north to Florida Keys.

Head,  $2\frac{1}{2}$  in length ( $3\frac{1}{4}$  with caudal); depth,  $2\frac{1}{2}$  ( $3\frac{1}{4}$ ). D. X, 14; A. III, 8. Scales (5†)  $6\frac{1}{4}$ –42§ to 45–13; 36|| pores in lateral line. Length of an example from Key West, 9 inches.

Body comparatively deep, moderately compressed, the back considerably elevated. Profile almost straight from snout to nape, the nuchal region rather convex. Snout unusually long and pointed, its outline before eye a little depressed, its length  $2\frac{5}{7}$  in head. Eye moderate,  $4\frac{1}{3}$  in head. Interorbital space flattish or gently convex,  $5\frac{1}{2}$  in head. Mouth large, maxillary reaching front of orbit,  $2\frac{3}{5}$  in head. Upper jaw with a narrow band of villiform teeth, outside of which is a single series of larger teeth; four canines in front of upper jaw; one of them on each side very large, almost as long as pupil.

Lower jaw with a narrow villiform band in front only, and an enlarged series outside, these largest on side of jaw, where some of them are somewhat canine-like. Tongue with a single large oval patch of

\* Called *Bodianus albostratus* by a slip of the pen on page 237; the plate is named *Bodianus fasciatus*.

† Number of scales in a vertical line from first dorsal spine to lateral line.

‡ Number of scales as above, but in a series obliquely downward and backward.

§ Number of vertical rows of scales above lateral line, from head to base of caudal.

|| Number of pores in lateral line; these usually correspond very closely to the number of oblique series above the lateral line.

teeth, its length more than twice its width. Teeth on vomer forming an arrow-shaped patch with backward prolongation on median line, the length of which is twice the width of the arrow-patch in front. Gill-rakers rather short and thick, the longest about one-third diameter of eye, about nine on lower part of arch. Preopercle with its posterior margin directed somewhat obliquely forward, usually very weakly emarginate, finely serrate above, almost entire at the angle.

Scales large, decidedly larger than in *L. jocú*. The series below the lateral line almost horizontal; those above in rows parallel with the lateral line, these becoming more or less irregular posteriorly and extending upward and backward below soft dorsal. About seven rows of scales on the cheeks, one row on interopercle, one on subopercle, and seven on opercle. Temporal region with a few large scales in about two rows. Base of soft dorsal and anal scaly. Tubes of lateral line each with four or five branches.

Dorsal spines strong, the outline of the fin not greatly convex; the fourth spine longest,  $2\frac{2}{3}$  in head, the tenth spine 4 in head; margin of soft dorsal well rounded, the middle rays longest, twice length of last,  $2\frac{3}{4}$  in head. Caudal not deeply forked, the upper lobe longest,  $1\frac{1}{2}$  length of middle rays, which are 2 in head. Margin of anal well rounded; middle rays twice length of last,  $2\frac{2}{7}$  in head, the first ray reaching about to middle of last when the fin is depressed; anal spines strong, the second longer than third,  $3\frac{1}{3}$  in head. Ventrals 2 in head. Pectorals reaching to front of anal,  $1\frac{1}{3}$  in head.

Color of young in life, greenish, with about eight very narrow vertical paler bars on body. Scales of lower part of sides with central orange spots, forming faint streaks along the rows of scales. Belly pearly. Head greenish; a blackish streak from snout through eye to nape; a narrow, sharply-defined blue stripe below eye from snout to angle of opercle; no lateral spot. Spinous dorsal edged with orange. Ventrals, anal, and caudal pale orange-yellow. Pectorals paler.

The adult examples differ from the young in the vertical bars being fainter or obsolete, and in the absence, usually, of the blue stripe below eye and the dark stripe on temporal region. The soft dorsal, anal, and caudal are always yellow, of varying intensity, and the edge of the spinous dorsal is orange, not dusky. The whitish area below the eye, very constant in *L. jocú*, is wanting in *L. caxis*.

This species is very abundant in the markets of Havana, where it is still known as *Cají* (in old Spanish *Caxí*, of which "*Caxis*" seems to be a plural form). This persistence of the common name is the only certain basis of identification of Parra's *Caxis*. It is almost equally common at Key West, where, as in Catesby's time, it is known as the "Schoolmaster."

There seems to be little doubt that the names *striatus*, *linea*, and *flavescens* belong to this species, and in spite of the difference of color, which seems to be the fault of the printer, the *acutirostris* of Duméril

best fits here also. The *griseus* of Cuv. & Val. and of Günther, which Poey refers to the synonymy of *Caxis*, seems to us to better fit the *griseus* of Linnæus.

We refer the *Mesoprion cynodon* to the synonymy of this species on the strength of Bocourt's comparison of his *Mesoprion pacificus* (*novemfasciatus*) with *Mesoprion cynodon*. As one of the curators of the Museum at Paris, it is to be presumed that M. Bocourt had for examination the original types of *Mesoprion cynodon*, and from his description it appears that the latter species is less elongate than *L. novemfasciatus*; that its canines are smaller; that its lower jaw is less prominent, its pectoral fins longer, and the scales a little larger. The color is reddish brown above, with all the fins yellow. All these characters indicate the identity of *M. cynodon* with *Lutjanus eaxis*. Certainly it is not the *Cubera*.

Peters adopts for this species Schneider's name *albostriatatus* (apparently originally a mere slip of the pen for *striatus*), "because another species has been later named *Mesoprion striatus*." He identified Schneider's type with "*Mesoprion linea* C. & V."

This species is closely allied to *L. griseus* and still more nearly to *L. jocú*. The latter is very similar in form and coloration, but has decidedly smaller scales. The former is more elongate, and has the vertical fins always dark, while in *eaxis* and *jocú* yellowish colors predominate.

#### 4. *Lutjanus jocú*. Dog Snapper; *Jocú*.

*Jocú*, Parra, Deser. Dif. Piezas, Hist. Nat., i, 1787, taf. 25, f. 2 (Cuba).

*Anthias jocú*, Bl. & Seh., Syst. Ichthy., 310, 1801 (based on Parra).

*Mesoprion jocú*, Cuv. & Val., ii, 466, 1828 (Antilles; Martinique); Poey, Repertorio, 268, 1867 (Cuba).

*Lutjanus jocú*, Poey, Synopsis, 292, 1868 (Cuba); Poey, Enumeratio, 26, 1873; Vaillant & Bocourt, Miss. Sci. an Mex., iv, 1881? 129, pl. v, f. 1 (synonymy much confused); Jordan, Proc. U. S. Nat. Mus., 1884, 125 (Key West).

*Mesoprion litura*, Cuv. & Val., ii, 467, 1828 (Cayenne; St. Thomas).

*Mesoprion cynodon*, Günther, i, 194, 1859 (St. Domingo; Jamaica; not of Cuv. & Val.; excl. syn.).

*Habitat*.—Florida Keys, Cuba, San Domingo, Jamaica, Antilles, Martinique, St. Thomas, Cayenne.

Head,  $2\frac{1}{2}$  ( $3\frac{1}{4}$ ); depth,  $2\frac{4}{7}$  ( $3\frac{1}{3}$ ). D. X, 14; A. III, 8. Scales (7), 9-56-15; 45 pores. Length, 12 inches.

Body comparatively deep and compressed, the back elevated; profile steep and almost straight from snout to nape, thence little convex. Snout rather long and pointed,  $2\frac{2}{3}$  in head. Eye moderate,  $4\frac{5}{7}$  in head. Interorbital space narrow, gently convex,  $5\frac{2}{3}$  in head. Occipital keel moderate. Preorbital broad,  $4\frac{1}{3}$  in head. Mouth rather large; jaws subequal. Maxillary reaching front of orbit,  $2\frac{3}{5}$  in head. Upper jaw with a narrow band of villiform teeth, outside of which is a single series of larger teeth; 4 canines in front of upper jaw, two of them very large,

almost equaling in length the diameter of pupil. Lower jaw with a narrow villiform band in front only, and a series of larger teeth outside, the largest on the side of the jaw almost canine-like. Tongue with a single large oval patch of teeth, its length more than twice its width. Teeth on vomer forming a broadly arrow-shaped patch with a backward prolongation on median line twice the length of width of anterior part. Gill-rakers rather short and thick, the longest about  $\frac{1}{4}$  diameter of eye, about 9 on lower part of arch, with no rudiments in front of them. Preopercle with its posterior margin slanting obliquely downward and forward, the emargination very broad and shallow; preopercle finely serrate above, the teeth coarser at the angle, which is not salient.

Scales moderate, smaller than in *L. griseus* or *L. caxis*, in nearly horizontal series below, and obliquely upward and backward above the lateral line; about 7 or 8 rows of scales on the cheek; 1 row on interopercle, 1 on subopercle, and 7 on opercle. About 3 rows of large scales on the temporal region. Top of head, snout, and jaws naked. Tubes of lateral line branched. Bases of soft dorsal and anal scaly. Dorsal spines rather strong, the outline of the fin evenly curved, the fourth and fifth spines longest,  $2\frac{2}{3}$  in head; the tenth spine 4 in head. Margin of soft dorsal convex, the middle rays longest,  $2\frac{5}{8}$  in head. Caudal little forked, the upper lobe longest,  $1\frac{2}{3}$  length of middle rays,  $1\frac{2}{3}$  in head. Margin of anal well rounded, the middle rays about twice length of last ray; the first ray reaching nearly to tip of last ray when the fin is depressed. Pectorals slightly falcate, reaching almost to front of anal,  $1\frac{1}{2}$  in head. Anal spines strong, the second rather longest and strongest,  $3\frac{2}{5}$  in head. Color of adult in life, olivaceous above, paler below, much flushed, so that the general hue is everywhere coppery red. Sides of body with numerous narrow cross-bars, rather faint, the light and dark of about equal width, or the pale narrower. Scales of upper parts mesially bronzed. Head coppery, especially above. A broad whitish area from eye to angle of mouth, becoming rosy in spirits. An irregular line of small round or oblong blue spots below eye, from snout to angle of opercle. Soft fins, all plain light brick red, the anal somewhat orange, the caudal more or less yellowish. Spinous dorsal, with a light orange band at base and edge, the middle pearly. The blue stripe below eye persists longer than in any of the other species which possess it.

Young in life, greenish olive, the head and breast flushed with bright coppery red. Base of each scale bright orange yellow, this color more extensive than the dark ground color, so that the general hue of the body, especially below and posteriorly, is a rich golden yellow; a dusky spot on top of head. Temporal region with a dusky shade. An undulating blue stripe below eye from snout to angle of opercle. A similar fainter streak below it. Pectorals pale red or light orange. Ventrals orange. Other fins rich golden yellow, the front of the anal and the edge of the spinous dorsal rich, clear, bright orange.

This species is about equally abundant with *L. caxis* about Florida Keys and Cuba. The English-speaking fishermen call it Dog Snapper, the Spanish *Jocú*. The fishermen usually distinguish the *Jocú* by the presence of a pale area below the eye, but the only certain distinction lies in the size of the scales. These are much smaller in *L. jocú* than in *L. caxis*.

*Mesoprion litura*, Cuv. & Val. is apparently this species, as also *Mesoprion cynodon*, Günther. In the synonymy of the latter species several distinct species are confounded.

Several distinct species are confounded by Vaillant and Bocourt under the name *Lutjanus jocú*.

5. *Lutjanus griseus*. *Gray Snapper; Mangrove Snapper; Caballerote; Lawyer*.

*Turdus pinnis branchialibus carens* (the Mangrove Snapper), Catesby, Hist. Carolina, 1743, tab. 9.

*Caballerote*, Parra, Descr. Dif. Piezas, Hist. Nat., 1787, taf. 25, f. 1.

*Labrus griseus*, Linnæus, Syst. Nat., x, 1758, 283 (after Catesby); Linnæus, Syst. Nat., xii, 1766, 474; Gmelin, Syst. Nat., 1788, 1283 (copied); Bloch & Schneider, Systema Ichthyol., 1801, 268 (copied).

*Lutjanus griseus*, Jordan, Proc. U. S. Nat. Mus., 1884 (identification of Catesby's figure).

*Sparus tetracanthus*, Bloch, Ichthyol., pl. 279, about 1790 (on a drawing by Plumier).

*Cichla tetracantha*, Bloch & Schneider, Syst. Ichth., 1801, 338 (copied).

*Anthias caballerote*, Bloch & Schneider, Syst. Ichth., 1801, 310 (after Parra).

*Mesoprion caballerote*, Poey, Repertorio, ii, 1868, 157; Poey, Proc. Acad. Nat. Sci. Phila., 1863, 187 (Cuba).

*Lutjanus caballerote*, Poey, Synopsis, 293, 1868; Poey, Enumeratio, 1875, 26; Poey, Bull. U. S. Fish Comm., 1882, 118 (Key West); Jordan & Gilbert, Synopsis Fish. N. A., 1883, 921; Jordan, Bull. U. S. Fish Comm., 1884 (Key West); Jordan, Proc. U. S. Nat. Mus., 1884, 126 (Key West).

*Bodianus viranet*, Lacépède, iv, pl. 4, f. 3, 1803 (on a drawing by Plumier).

*Mesoprion griseus*, Cuv. & Val., Hist. Nat. Poiss., ii, 1828, 469 (San Domingo); Guichenot, Ramon de la Sagra, Hist. Cuba, 26 (Cuba); Günther, i, 194, 1859 (Cuba; Jamaica; Puerto Cabello; British Guiana).

*Lutjanus griseus*, Cope, Trans. Am. Philos. Soc., 1871, 470 (St. Kitt's).

*Lobotes emarginatus*, Baird & Girard, Ninth Smithsonian Report, 1855, 332 (Beesley's Point, New Jersey).

*Neomunis emarginatus*, Girard, U. S. Mex. Bound. Surv., pl. ix, figs. 5 to 8, 1859, 18 (Brazos Santiago).

*Lutjanus emarginatus*, Gill, Proc. Ac. Nat. Sci. Phila. 1861, 94 (Beesley's Point).

*Lutjanus caxis*, Gill, Rept. U. S. Fish Comm., 1872-3, 806; Goode, Bull. U. S. Nat. Mus., 1876, v, 54 (Bermudas); Goode & Bean, Proc. U. S. Nat. Mus., 1879, 137 (West Florida); Jordan, *op. cit.*, 1880, 19 (Indian River, Florida); Bean, *op. cit.*, 1880, 96 (Bermuda); Jordan & Gilbert, *op. cit.*, 1882, 118 (Pensacola); Jordan & Gilbert, Synopsis Fish. N. A., 1883, 573 (not *Sparus caxis*, Bloch & Schneider).

*Lutjanus stearnsi*, Goode & Bean, Proc. U. S. Nat. Mus., 1878, 179 (Pensacola); Jordan & Gilbert, *op. cit.*, 1882, 275 (Pensacola); Jordan & Gilbert, Synopsis Fish. N. A., 1883, 549 (copied); Goode & Bean, Proc. U. S. Nat. Mus., 1884.

*Habitat*.—New Jersey and Gulf of Mexico to West Indies.

Head,  $2\frac{3}{4}$  ( $3\frac{1}{2}$ ); depth,  $2\frac{7}{8}$  ( $3\frac{3}{4}$ ). D. X, 14; A. III, 8. Scales (6), 7-50-12; 47 pores. Length of an example from Key West,  $10\frac{3}{4}$  inches.

Body comparatively elongate, the back not strongly compressed, little elevated; profile almost straight from snout to nape, thence gently convex. Snout rather pointed, 3 in head. Eye rather small,  $4\frac{2}{3}$  in head. Interorbital space gently convex, 5 in head. Occipital keel little prominent. Preorbital rather broad,  $5\frac{1}{2}$  to  $6\frac{1}{2}$  in head. Mouth large; jaws subequal. Maxillary reaching front of pupil,  $2\frac{3}{5}$  in head. Upper jaw with a narrow band of villiform teeth, outside of which is a single series of enlarged teeth; 4 canines in front of upper jaw, 2 of them quite large—one-third diameter of eye. Lower jaw with a very narrow band of villiform teeth in front of jaw only; outside of these a single row of teeth larger than outer teeth of upper jaw, becoming canine-like in adult, but much smaller than in *L. cynodon*. Tongue with an oval patch of teeth, its width about one-half its length. Vomer with an arrow-shaped patch of teeth, with backward prolongation on the median line; its length about twice its width in front. Gill-rakers rather short and thick, their length about  $\frac{1}{3}$  diameter of eye; about 8 on lower arch, with no rudimentary ones before them. Preopercle with its posterior margin nearly vertical, with a rather broad and deep emargination. Preopercle finely serrate above the teeth, coarser at the angle. Scales comparatively large; the rows in horizontal series below the lateral line, those above running parallel with the lateral line until below the soft dorsal, where they become slightly irregular and oblique; 7 rows of scales on cheek; an imbedded row on interopercle; 1 row on subopercle, and 7 on opercle. Temporal region with about three rows of large scales. Top of head, snout, and jaws naked. Base of soft dorsal and anal scaly. Tubes of lateral line branched.

Dorsal spines rather strong; the outline of the fin gently convex; the fourth spine longest,  $2\frac{1}{2}$  in head, the tenth spine 4 in head. Margin of soft dorsal rounded; the ninth and tenth rays longest,  $1\frac{1}{3}$  length of first, and  $1\frac{3}{5}$  last ray,  $2\frac{1}{2}$  in head. Caudal emarginate, the upper lobe longest,  $1\frac{1}{3}$  length of middle rays, which are  $1\frac{3}{4}$  in head. Anal fin high; its margin slightly angulate; the middle rays longest, 2 times length of last ray,  $2\frac{1}{6}$  in head; first ray reaching almost to tip of last ray, where the fin is depressed; second anal spine slightly longer and stronger than third,  $3\frac{1}{4}$  in head. Ventrals  $1\frac{3}{4}$  in head. Pectorals shortish, scarcely reaching vent,  $1\frac{4}{7}$  in head. Color in life very dark green above, the middle part of each scale brassy black, its edge broadly pearly whitish. Below lateral line the duskiness of the middle of the scale passes into brassy, and below into bright coppery, the belly and lower parts of head being more or less distinctly bright coppery red; the lower jaw grayish. No blue stripe below eye, except in the very young. Top of head blackish olive. Dorsal blackish, its margin darker and tinged with maroon red; soft dorsal dusky anteriorly slightly edged with whitish; caudal violaceous or maroon black. Anal wine-color edged

with whitish. Pectorals pale flesh color. Ventrals whitish, faintly marked with reddish.

Young (as in *L. eaxis*) with a blackish band from snout through eye to nape, very distinct in life; a blue streak below eye. Spinous dorsal with a dark maroon-colored band along edge.

Fishes from deep water are much redder than those taken near the shore. In no case is the caudal yellowish or of any pale shade.

This species is very common along our South Atlantic and Gulf coasts and occasionally strays northward as far as New Jersey, being the northernmost in its range of any member of the genus in the Atlantic. It is everywhere generally known as Gray Snapper. In Florida and the Bahamas, where the coasts are lined by mangrove bushes among which the young of this species abounds, the name Mangrove Snapper comes into use. The name Lawyer is also occasionally heard, in allusion to the skill shown by the species in eluding nets. To the Spanish fishermen of Cuba and Key West the species is, as in the time of Parra, known as *Caballerote*. It inhabits water of varying depths, large specimens being often found very near the shore, while others may be taken in waters of considerable depth, in company with *Lutjanus vivanus*. These latter individuals are much redder than those found in shoal water; their general color is paler and the body is in general a trifle less elongate. Such correspond to the form named *Lutjanus stearnsi*.

The synonymy of this species is considerable. It is evidently the *Caballerote* of Parra, as Professor Poey has shown, and therefore the *Anthias caballerote* of Bloch & Schneider. Earlier than this comes *Labrus griseus*, L., based on the Mangrove Snapper of Catesby, a rough and inaccurate figure, but still resembling this species, and like the *Caballerote* identifiable by the persistent vernacular name. *Sparus tetracanthus* appears to be the same, as also *Bodianus vivanet*.

*Mesoprion griseus*, Cuv. & Val. is identified by Poey with *Lutjanus eaxis*, but to us the description resembles much more the present species, which has thus twice received the specific name of *griseus*.

*Lobotes emarginatus* is based on a young specimen of *Lutjanus griseus*, afterwards made the type of the wholly gratuitous "genus," *Neomænis*.

The identification by Poey of *Lutjanus eaxis* with *Mesoprion griseus* has led American writers to suppose this species to be the true *Lutjanus eaxis*, an error only recently corrected. The true *L. eaxis*, the *Cají* of the Havana markets, has not yet been seen north of Key West.

*Lutjanus stearnsi*, described from Pensacola, we are unable to separate from ordinary deep-water specimens of *L. griseus*. So far as we can see, the gradation is perfect. This identity has been already recognized by Dr. Bean.

Dr. Günther identifies with his *Mesoprion griseus* one or two species described by Cuvier and Valenciennes from the west coast of Africa. It is impossible from the brief descriptions to settle this question, and

the confusion in the synonymy given by Dr. Günther, shows that his material was insufficient to form any definite opinions.

This species is closely allied to *L. caxis* on the one hand and to *L. cubera* on the other; the former is deeper and differently colored, as already stated. The latter is similar in form and color, but has the dentition of lower jaw and vomer different.

This species rarely exceeds 6 or 8 pounds in weight, while *L. cubera* reaches a much greater size.

6. *Lutjanus cubera*. *Cubera*.

*Mesoprion cynodon*, Poey, Repertorio, ii, 268, 1868; Poey, Proc. Ac. Nat. Sci. Phila., 1863, 185 (Cuba; not of Cuv. & Val.).

*Lutjanus cynodon*, Poey, Synopsis, 1868, 294.

? *Genyroroge canina*, Steindachner, Ichth. Notizen, ix, 18, 1869 (Lagos; probably young).

*Lutjanus cubera*, Poey, Ann. Lyc. Nat. Hist. N. Y., 75, 1871 (Cuba); Poey, Enumeratio, 1875, 27.

? *Lutjanus dentatus*, (A. Duméril MSS.?) Vaillant & Bocourt, Miss. Sci. au Mex., 1881 (?) 125 (Brazil?; comparison with *L. pacificus*).

*Habitat*.—West Indies; Cuba; Brazil.

Head,  $2\frac{3}{4}$ ; depth, 3. D. X, 14; A. III, 8. Scales (6), 7–50–12; 50 pores. Length of a specimen from Cuba,  $17\frac{1}{2}$  inches.

Body elongate, rather robust, the back little elevated; profile from snout to nape nearly straight. Snout long, thick, rather acute in profile, 3 in head. Eye rather small,  $5\frac{2}{3}$  in head. Interorbital space flattish or gently convex,  $6\frac{1}{4}$  in head. Occipital keel low. Preorbital broad,  $4\frac{2}{3}$  in head. Mouth very large. Maxillary reaching middle of eye,  $2\frac{1}{3}$  in head. Canine teeth larger than in any other species, especially those in lower jaw. Upper jaw with a narrow band of villiform teeth, outside of which is a series of strong sharp teeth; 4 canines in front, two of them very long and strong, their length  $\frac{2}{3}$  diameter of eye. Lower jaw with 5 or 6 very strong canine-like teeth on each side; the largest little smaller than the canines of upper jaw; a few villiform teeth in front of jaw. Tongue with a large oblancoolate patch of teeth, pointed behind, its length about twice its greatest width; vomer with  $\Lambda$ -shaped patch of teeth, usually without backward prolongation on median line, but sometimes with a short median prolongation, ( $\wedge$ -) its length always less than the width of the patch in front. Pterygoid and hyoid bones without teeth. Gill-rakers rather short and thick, about  $\frac{1}{3}$  length of diameter of eye, about 8 on lower arch; no rudiments. Preopercle with posterior margin nearly vertical, the emargination broad and shallow. Preopercle finely serrate above the teeth, coarser just above the angle; lower limb almost entire.

Scales rather large, loosely attached; cheeks with about 8 rows, 1 row on interopercle, 1 row on subopercle, and about 7 on opercle. Temporal region with about two rows of large scales. Tubes of lateral line simple. Base of soft dorsal and anal scaly.



Dorsal spines rather strong, the outline of the fin gently convex, the fourth spine longest,  $3\frac{1}{4}$  in head; the tenth spine, 6 in head. Anal spines strong, the second spine stronger, slightly shorter than third, which is 5 in head. Caudal little forked. Pectorals about  $1\frac{2}{5}$  in head.

Color dusky gray, paler below, the belly sometimes tinged with reddish. Membranes of dorsal, anal, and caudal grayish black, the anal and soft dorsal especially blackish. Ventrals blackish at tip. Pectorals plain olivaceous, the base and inner margin dusky. Head dusky above, without markings.

No young specimens seen.

The adult *Cubera* as seen in the markets has a peculiarly ragged appearance, quite unlike the neat look of its nearest relative, *L. griseus*.

This species is common in the markets of Havana, where it is known as *Cubera*. It grows to a very considerable size, and specimens of less than five pounds weight are very rare in the markets. But one specimen was obtained by Professor Jordan, no others small enough to be readily preserved in alcohol being seen. The species seems to have an indifferent reputation as a food-fish, being often unwholesome. It has always a ragged appearance in the market, its scales being less firmly attached than those of other species. This species is very closely related to *L. griseus*, but so far as we have seen the two may always be distinguished by the difference in form of the vomerine patch of teeth, and by the development of the canines of the lower jaw. These are larger in *L. cubera* than in any other American species. This species is certainly not *Mesoprion eynodon*, Cuv. & Val., if we may rely on Bocourt's account of that species. It is, of course, certainly the *Lutjanus cubera* of Poey. The *Genyoroge canina* of Steindachner seems to be, most probably, the young of the same species. We have, however, hesitated to use the earlier name (*caninus*) until the identity of the two is fully proven. We suppose the name *Lutjanus dentatus*, Duméril to belong to this species, but are unable to find the original description, if any exists. The scanty characterization given by Vaillant and Bocourt agrees fully with *L. cubera*.

#### 7. *Lutjanus novemfasciatus*. Pargo Prieto.

*Lutjanus novemfasciatus*, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 251 (Cape San Lucas; very young); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881; Jordan & Gilbert, *loc. cit.*, 1882, 360 and 625 (Cape San Lucas; Panama); Jordan & Gilbert, Bull. U. S. Nat. Mus., 107, 110, 112 (Mazatlan; Panama; Punta Arenas).

*Mesoprion pacificus*, Bocourt, Ann. Sci. Nat. Paris, p. 223, 1868 (Taneseo; Pacific coast of Guatemala).

*Lutjanus pacificus*, Vaillant & Bocourt, Mission Scientifique au Mexique, 1881(?), 123, pl. iii, f. 2.

*Lutjanus prieto*, Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 232, 338, 353, 355 (San Blas; Mazatlan); Jordan & Gilbert, *loc. cit.*, 1882, 360, 361 (Cape San Lucas).

This large fish is the Pacific representative of *Lutjanus cubera*, to which it bears a strong resemblance. It is generally common on the

Pacific coast of tropical America, and at Mazatlan it is known as *Pargo Prieto*.

It was first described from very young specimens, which bear little resemblance to the adult, although comparison of specimens have assured us of their identity. The nine cross-bands, which suggested the inappropriate specific name, are characteristic only of the very young.

The name *Mesoprion pacificus* was overlooked by Jordan and Gilbert, who published the first satisfactory account of the species, under the name of *Lutjanus prieto*. This description having been already printed in these proceedings, need not be repeated here.

### 8. *Lutjanus profundus*. *Pargo de lo Alto*.

*Mesoprion aya*, Cuv. & Val., ii, 1828, 457 (San Domingo); Guichenot, Ramon de la Sagra, Hist. Cuba, 24 (Cuba); Günther, i, 198, 1859 (Jamaica); Poey, Repertorio Pisc. Cubens., i, 1867, 267 (probably not *Bodianus aya*, Bloch).

*Mesoprion profundus*, Poey, Memorias, ii, 150, 1860 (Cuba); Poey, Repertorio, ii, 1868, 157; Poey, Synopsis, 1868, 294.

*Lutjanus profundus*, Poey, Enumeratio, 1875, 28.

*Lutjanus purpureus*, Poey, Enumeratio Pisc. Cubens., 1875, 29 (name taken from *Mesoprion purpureus*, C. & V., ii, 471, 1828; the name *purpureus* evidently a slip of the pen for *aya*).

Head,  $2\frac{2}{3}$  ( $3\frac{1}{2}$ ); depth,  $3$  ( $\frac{4}{5}$ ). D. X, 14; A. III, 8. Scales (7), 8-72-17; 50 pores. Length of an example from Cuba, 10 inches.

Body rather slender, subelliptical, the back not greatly elevated; profile very slightly convex from snout to nape, thence more arched. Snout rather long and pointed, 3 in head. Eye rather large, 4 in head; interorbital space slightly convex,  $4\frac{1}{5}$  in head, the occipital keel not very prominent; preorbital rather broad,  $5\frac{1}{5}$  in head. Mouth rather small; jaws subequal; maxillary reaching front of pupil,  $2\frac{1}{2}$  in head; upper jaw with a narrow band of villiform teeth, outside of which is a single series of well-developed teeth; 4 moderate canines in front of jaw, the two longest about one-half diameter of pupil. Lower jaw with a single series of rather large, unequal teeth, inside of which is a very narrow band of villiform teeth in front of jaw only. Tongue with an oval patch of teeth, about twice as long as broad, in front of which is a roundish patch; no teeth on hyoid bone. Pterygoids toothless; vomer with a broadly arrow-shaped patch of teeth, with a backward prolongation on median line somewhat longer than width of the patch in front. Gill-rakers slender, their length almost equal to one-half diameter of eye, about 11 developed below the angle; in front of these about 5 rudiments. Preopercle, with posterior limb slanting slightly downward and forward, with a broad and rather shallow emargination, its margin finely serrate above; coarser teeth at the angle and on lower limb. Posterior nostril oval.

Scales very small, the rows running obliquely upward and backward above the lateral line, the rows below almost horizontal; 7 rows of scales on cheek, 2 rows on interopercle,  $1\frac{1}{2}$  rows on subopercle and about 8 on

opercle; temporal region, with 1 row of large scales, behind which are smaller ones; top of head, snout, and jaws naked; base of soft dorsal and anal scaly.

Dorsal spines rather strong, the outline of fin rather strongly convex and without deep emargination; fourth spine longest,  $2\frac{2}{5}$  in head; the tenth,  $3\frac{2}{5}$  in head. Margin of soft dorsal straightish, rounded behind, the ninth ray longest,  $1\frac{1}{3}$  length of first and two times last ray,  $2\frac{1}{2}$  in head. Caudal lunate, the upper lobe slightly longer than lower, its length  $1\frac{1}{2}$  times middle rays, which are 2 in head. Margin of anal angulate, the middle rays longest, 2 times length of last ray,  $1\frac{1}{5}$  in head; the first ray reaches almost to tip of last ray, when the fin is depressed. Ventrals,  $1\frac{2}{3}$  in head. Pectorals not quite reaching front of anal,  $1\frac{1}{5}$  in head. Second anal spine slightly longer than third,  $3\frac{1}{4}$  in head.

Color in life bright rose-color, paler below, some narrow undulating light golden streaks following the rows of scales above the lateral line. Iris always bright *yellow* (an important color mark); mouth reddish within. Traces of dark lateral spot in most specimens. Dorsal rosy, its base pale, its edge yellow; caudal rosy, dusky behind, sometimes blood-red at tip. Pectorals very pale yellow, ventrals and anal pale rosy, the latter yellowish behind.

The bright colors all fade and disappear in spirits. The scales of the upper parts, in spirits, are marked with dark dots which form streaks along the rows of scales.

This handsome species is rather common in the markets of Havana, where it is known as *Pargo de lo Alto*. When fresh it may always be known by the bright yellow color of the eye, a color which does not entirely fade in spirits. It is evidently the *Mesoprion aya* of Cuv. & Val., but it is apparently not the original *Bodianus aya* of Bloch, as the latter species is said by Maregrave and Bloch to have the iris red.

Poey recognizes, under the name of *Lutjanus purpureus*, a second species which differs from *L. profundus* only in having small scales very close to the eye. This seems to be a character of little importance on which to recognize a distinct species.

The name *purpureus* is credited to Cuvier, but, in the single place (vol. ii, p. 457) where the name occurs, *purpureus* is evidently a mere slip of the pen for *aya*. Probably it was originally a MS. name, for which the latter name taken from Bloch was taken.

#### 9. *Lutjanus buccanella*. *Sesí de lo Alto*.

*Mesoprion buccanella*, Cuv. & Val., ii, 1828, 455 (Martinique); Guichenot, Ramon de la Sagra, Cuba, 23 (Cuba); Günther, i, 198 (Cuba; Jamaica).

*Lutjanus buccanella*, Poey, Synopsis 1868, 295; Poey, Enumeratio, 27.

*Mesoprion caudanotatus*, Poey, Memorias, i, 440, about 1858, tab. 3, f. 2 (Cuba; young); Poey, Repert., ii, 158, 1868.

*Habitat*.—Martinique and Cuba.

Head,  $2\frac{1}{2}$  ( $3\frac{1}{3}$ ); depth,  $2\frac{1}{5}$  ( $3\frac{2}{5}$ ). D. X, 14; A. III, 8. Scales (6) 8-63-15; 50 pores. Length of an example from Cuba, 8 inches.

Body rather slender, subelliptical, the back moderately elevated; profile almost straight from snout to nape, thence convex; snout rather long and pointed,  $3\frac{1}{5}$  in head; eye large,  $3\frac{1}{2}$  in head. Interorbital space slightly convex,  $5\frac{2}{3}$  in head, the occipital ridge low. Preorbital rather narrow,  $7\frac{1}{2}$  in head; mouth rather small, the jaws subequal. Maxillary reaching almost to front of pupil,  $2\frac{2}{5}$  in head. Upper jaw with a narrow band of villiform teeth, outside of which is a series of moderately enlarged teeth; four rather strong canines, two of them longer, about one-half diameter of pupil; lower jaw with a single series of unequal teeth as strong as upper; inside of these is a narrow band of villiform teeth in front of jaw only. Tongue with a single long oval patch of teeth, its length more than twice its width. Vomer with a broadly arrow-shaped patch of teeth with a backward prolongation on median line, its length scarcely greater than width of patch in front. No teeth on pterygoid or hyoid bones. Gill-rakers numerous, about 12 developed on lower part of arch, besides five or six very small or rudimentary ones, those near the angle larger, their length  $2\frac{1}{4}$  in eye. Preopercle with its posterior margin oblique and nearly straight, a broad and rather shallow notch above its angle; its edge strongly serrate, the teeth coarser at angle and on lower limb.

Scales rather small, the rows above the lateral line running upward and backward, the rows below nearly horizontal; about six rows of scales on the cheeks, one or two rows on interopercle, one row on subopercle, seven or eight rows on opercle. Base of soft dorsal and anal scaly; the outline of the fin rather strongly convex. Temporal region with a band of large scales, behind which are small scales. Top of head, snout, and jaws naked.

Dorsal spines moderately strong, the fifth spine  $2\frac{4}{7}$  in head; the tenth spine  $3\frac{1}{2}$  in head; margin of soft dorsal nearly straight, its rays almost of equal length,  $3\frac{3}{4}$  in head; caudal moderately forked, the upper lobe slightly the longer,  $1\frac{2}{3}$  length of middle rays, which are  $2\frac{1}{5}$  in head; margin of anal gently convex, the middle rays slightly longer than last,  $2\frac{1}{3}$  in head; the tip of first soft ray almost reaching tip of last ray when the fin is depressed; anal spines strong, the second longer and stronger than third spine,  $2\frac{2}{3}$  in head. Ventrals,  $1\frac{1}{5}$  in head; pectorals reaching opposite first soft ray of anal,  $1\frac{1}{4}$  in head.

Color in life crimson, silvery below flushed with crimson, axil and base of pectorals jet black; eye orange, dorsal crimson, its edge scarlet; caudal orange yellow, as also part of caudal peduncle; last rays of soft dorsal, most of anal and ventrals yellow; pectorals, base of anal, and ventral spines pinkish. In spirits the bright colors fade, leaving the body pale reddish, the base of the pectoral within and without jet black.

This small and strongly marked species is common in the deeper waters about Havana, and is known in the markets as *Sesí* or *Sesí de lo Alto*.

The synonymy of the species offers no difficulty. A young specimen was once described by Poey as a distinct species under the name of

*Mesoprion caudanotatus*, but its identity with *L. buccanella* is unquestionable.

10. *Lutjanus brachypterus*.

*Lutjanus brachypterus*, Cope, Trans. Am. Phil. Soc., 1871, 470 (New Providence).

*Habitat*.—Bahama Islands.

Head,  $2\frac{3}{4}$ ; depth, 3. D. X, 12; A. III, 8. Scales (6), 8-51-x; 47 pores.

Form of *Lutjanus griseus*. Maxillary,  $2\frac{1}{2}$  in head, reaching to past front of eye. Canines very small, developed in upper jaw only. Tongue with an oval patch of teeth. Vomer with a  $\Lambda$ -shaped patch of teeth; there being a short backward projection on the median line. Eye rather small,  $4\frac{2}{5}$  in head. Gill-rakers few, arranged as in *L. griseus*.

Scales above lateral line arranged in very oblique series. Two bands of small scales on temporal region.

Anal fin low, its longest rays  $2\frac{3}{5}$  in head. Second anal spine about as long as third,  $3\frac{5}{6}$  in head. Caudal little forked, its longest rays  $1\frac{1}{2}$  in head. Pectoral fin short,  $1\frac{2}{3}$  in head. Color in spirits, olivaceous, with silvery luster below; rows of obscure dusky spots along the scales on sides and yellowish oblique streaks above the lateral line. Fins rather dark, the caudal not pale; no black lateral spot.

The above account is taken from Professor Cope's original type in the Museum of the Academy at Philadelphia. The species is allied to *L. griseus*, although apparently distinct from that species and from all others known to us. In its technical characters it approaches most closely to *L. synagris*, near which species it is convenient to place it in our analytical key. If we suppose the type of *L. ambiguus* to be a hybrid, *synagris-chrysurus*, we may suspect *L. brachypterus* to represent a hybrid of *griseus* and *synagris*. The evidence in the latter case is less striking than in the former.

11. *Lutjanus guttatus*. *Flamenco*.

*Mesoprion guttatus*, Steindachner, Ichthyol. Notizen, x, 18, 1869, taf. viii. (Mazatlan).

*Lutjanus guttatus*, Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 354; Jordan & Gilbert, *op. cit.*, 1882, 625 (Panama); Jordan & Gilbert, Bull. U. S. Fish Comm., 1882 (107), 110 (Mazatlan; Panama).

*Habitat*.—Mazatlan; Panama.

Head,  $2\frac{3}{4}$  ( $3\frac{1}{3}$ ); depth,  $2\frac{3}{4}$  ( $3\frac{1}{3}$ ). D. X, 12 (rarely XI, 11); A. III, 8. Scales, (6) 7-53-15; 53 pores. Length (29434, Mazatlan),  $10\frac{1}{2}$  inches.

Body oblong, compressed, the back rather more elevated than in *L. synagris*, the anterior profile nearly straight from snout to above eye, thence rather strongly convex. Snout pointed, rather long,  $3\frac{1}{5}$  in head. Eye large,  $4\frac{1}{2}$  in head. Interorbital space gently convex, its width  $5\frac{3}{4}$  in head. Occipital keel rather prominent. Preorbital narrow, its least width 7 in head. Maxillary extending to somewhat beyond front of orbit,

$2\frac{9}{10}$  in head. Teeth as in *L. synagris*, the canines in upper jaw small, those of lower jaw inconspicuous. Tongue with a single large oblong patch of teeth. Vomer with a  $\uparrow$ -shaped patch of teeth, the prolongation on the median line rather short.

Gill-rakers rather long, about 9 on lower part of arch, with a few rudiments in front of them. Posterior limb of preopercle extending downward and forward, the emargination broad and rather shallow. Teeth at angle of preopercle rather coarse, those above emargination much finer.

Scales rather large, those below lateral line in series which are almost horizontal, those above in series which are very oblique and for the most part regular and nearly straight. Cheek with six rows of scales, interopercle with one. Temporal region with a series of large scales, before and behind which is a broad band of small ones. Base of soft dorsal and anal scaly.

Dorsal spines rather slender and weak, the outline of the fin gently convex, the longest spine  $2\frac{2}{3}$  in head. Soft dorsal short and moderately high, its margin angulated, the eighth ray about one-third longer than last ray, and  $2\frac{4}{5}$  in head. Caudal lunate, the upper lobe  $1\frac{1}{2}$  in head. Anal moderate, rounded in outline, its longest ray  $2\frac{2}{5}$  in head; first soft ray reaching tip of last ray when the fin is depressed. Second anal spine stronger than third and of about equal length,  $4\frac{1}{3}$  in head. Ventrals  $1\frac{5}{6}$  in head. Pectorals long, nearly reaching front of anal,  $1\frac{1}{3}$  in head.

Color in spirits brown above, the sides bright silvery. A large, round, black lateral blotch, as large as eye, on lateral line below front of soft dorsal. Each scale above lateral line with a faint darker grayish median spot, these forming oblique streaks. Sides of head often with similar spots. Two or three similar streaks often present below lateral line, these straight and horizontal; each series of scales below lateral line with a narrow yellow stripe. Snout and preorbital with dark vermiculations. Fins all pale. In life the fins are brick red and the body is largely flushed with bright red.

This species represents *Lutjanus synagris* on the Pacific coast. It is a common food-fish both at Mazatlan and Panama.

## 12. *Lutjanus synagris*. Lane Snapper; Biajaiba.

*Salpa purpurescens variegata* (the Lane Snapper), Catesby, Hist. Nat. Carol., 1743, tab. 17.

*Sparus synagris*, Linnaeus, Syst. Nat., x, 280, 1758 (after Catesby); Linnaeus, *op. cit.*, xii, 470; Gmelin, Syst. Nat., 1788, 1275; Bloch & Schneider, Syst. Ichth., 1801, 274 (copied).

*Lutjanus synagris*, Poey, Enumeratio, 1875, 27 (Cuba); Poey, Bull. U. S. Fish Comm., 1882, 118 (Key West); Jordan & Gilbert, Synopsis Fish. N. A., 1883, 922; Jordan, Bull. U. S. Fish Comm., 1884 (Key West); Jordan, Proc. U. S. Nat. Mus., 1884, 125 (Key West).

*Sparus vermicularis*, Bloch & Schneider, Syst. Ichth., 1801, 275 (on a drawing by Plumier).

*Dipterodon plumieri*, Lacépède, Hist. Nat. Poiss., 1803, iv, 167 (on a drawing by Plumier).

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*Lutjanus aubricli*, Desmarest, Prém. Dec. Ichth., 17, 1823, pl. 2 (Cuba); Vaillant & Bocourt, Miss. Sci. au Mex., 1881 (?) 126 (Jamaica; Hayti; Cuba; Montevideo).

*Mesoprion uninotatus*, Cuv. & Val., ii, 449, 1828 (San Domingo; Martinique) Agassiz, Spix, Pisc. Brasil, 1829, pl. 65; Castelnau, Anim. nouv. ou rares Amér. Sud, 4; Guichenot, Ramon de la Sagra, Cuba, 21; Günther, i, 202, 1859 (Cuba; Puerto Cabello; San Domingo; Jamaica; Bahia).

*Lutjanus uninotatus*, Poey, Synopsis, 1868, 294; Cope, Trans. Am. Philos. Soc., 1871, 476 (St. Martin's).

? *Mesoprion ambiguus*, Poey, Memorias Cuba, ii, 152, 1860, tab. 12, f. 4 & tab. 13, f. 18 (Cuba); Poey, Synopsis, 295.

? *Lutjanus ambiguus*, Poey, Enumeratio, 1875, 30.

*Habitat.*—Pensacola to Aspinwall and Brazil.

Head,  $2\frac{3}{5}$  ( $3\frac{2}{5}$ ); depth,  $2\frac{1}{5}$  ( $3\frac{2}{5}$ ). D. X, 12; A. III, 8. Scales, (7) 8–60–15 (50 pores). Length of a specimen from Key West, 8 inches.

Body oblong, compressed, the back moderately elevated, profile almost straight from snout to nape. Snout rather pointed, 3 in head. Eye moderate, 5 in head. Interorbital space gently convex,  $5\frac{3}{4}$  in head. Occipital keel little prominent. Preorbital rather broad,  $4\frac{3}{4}$  in head. Maxillary reaching front of orbit,  $2\frac{3}{4}$  in head. Upper jaw with a narrow band of villiform teeth, outside of which is a single series of enlarged teeth; 4 rather small canines in front, two of them larger. Lower jaw with villiform band in front only, the single row of larger teeth nearly equal in size, none of them canines. Tongue with a single oval patch, its length more than twice its width. Vomer with a  $\wedge$  or  $\uparrow$  shaped patch of teeth, without backward prolongation on median line, or with only a very slight one. Gill-rakers rather long, their length slightly more than half diameter of eye, about 9 on lower part of arch, and no rudiments before them. Preopercle with its posterior margin slanting downward and forward, the emargination broad and moderately deep. Preopercle rather finely serrate above, with coarser teeth at the angle.

Scales rather small, the rows almost horizontal below the lateral line, above somewhat undulate, running upward and backward; tubes of lateral line simple; 7 rows of scales on the cheek, 1 row on the interopercle, 1 on the subopercle, and 6 on the opercle. Temporal region with a broad band of scales, arranged in several series. Base of soft dorsal and anal scaly. Dorsal spines rather weak and slender, the outline of the fin gently convex; the fourth spine longest,  $2\frac{1}{2}$  in head; the tenth spine  $3\frac{3}{5}$  in head. Soft dorsal short, its margin somewhat angulated, the eighth ray longest, twice the length of last ray and one and a half first,  $2\frac{2}{5}$  in head. Caudal moderately forked, the upper lobe the longest,  $1\frac{1}{2}$  length middle rays, which are two in head. Anal rather high, rounded in outline, its middle rays longest,  $1\frac{2}{3}$  length of last ray,

$2\frac{1}{7}$  in head; first ray reaching middle of last ray when the fin is depressed. Second anal spine stronger than third and of equal length,  $3\frac{2}{3}$  in head. Ventrals  $1\frac{3}{4}$  in head. Pectorals reaching front of anal,  $1\frac{1}{4}$  in head.

Color in life rose-colored, silvery tinged below, slightly olivaceous but not dark above. A large, round, maroon blotch, larger than eye, just above lateral line and below front of soft dorsal, always present. Series of stripes of deep golden yellow along sides; 3 on head, the upper from snout through eye; about 10 on body, the lower nearly straight and horizontal, the upper undulating and irregular, extending upward and backward. Belly white, its sides largely yellowish. Lips red; maxillary partly yellow; tongue yellowish; iris fiery red. Caudal deep blood-red. Spinous dorsal nearly transparent, with a marginal and basal band of golden. Soft dorsal light red, edged with golden. Ventrals and anal golden yellow. Pectorals pinkish.

Young specimens quite green above. Similarly striped Cuban specimens are generally duller, with the yellow stripes decidedly coppery.

In spirits the bright colors fade, only the lateral blotch and the streaks on the head being persistent.

This species is very common almost everywhere from Pensacola to Brazil. It reaches but a small size, rarely exceeding a foot, and it inhabits chiefly shallow waters. It is known about the Florida Keys and Bahamas as Lane Snapper, and in Cuba as *Biajaiba*. In Havana it is one of the most common food-fishes, in abundance not exceeded by any other species.

Its strongly marked coloration renders its recognition from descriptions easy, and little doubt exists in its extensive synonymy.

There is no doubt whatever as to the species intended by the Lane Snapper of Catesby. The name *synagris* of Linnaeus is, therefore, without doubt, the one which should be retained for the species.

The relation to this species of the *Lutjanus ambiguus* of Poey is discussed below.

### 13. *Lutjanus ambiguus*.

*Mesoprion ambiguus*, Poey, Memorias Cuba, ii, 152, 1860, tab. 12, f. 4; tab. 13, f. 18 (Cuba); Poey, Synopsis, 295.

*Lutjanus ambiguus*, Poey, Enumeratio, 1875, 30.

*Habitat*.—Cuba. One specimen known.

Head,  $2\frac{9}{10}$  ( $3\frac{2}{3}$ ); depth,  $3$  ( $3\frac{3}{4}$ ). D. X, 13; A. III, 9. Scales, (6) 9–53–15; 50 pores. Length (13036, Havana),  $9\frac{3}{4}$  inches.

Body oblong, compressed, formed much as in *L. synagris*, but more slender, the anterior profile nearly straight from tip of snout to nape, thence convex. Snout rather long and pointed, 3 in head. Eye small,  $4\frac{2}{3}$  in head. Interorbital space narrow, carinate, its width  $5\frac{1}{2}$  in head. Occipital keel rather prominent. Preorbital moderate, its least width 6 in head. Mouth moderate, slightly oblique, the lower jaw a little projecting, the maxillary extending to opposite front of pupil, its length



$2\frac{3}{4}$  in head. Teeth essentially as in *L. synagris*; canines of upper jaw small; enlarged teeth of lower jaw scarcely canine-like. Tongue with a single, large, oblong patch of teeth. Vomer with a  $\uparrow$ -shaped patch of teeth, the prolongation on the median line moderate. No pterygoid teeth. Gill-rakers longer than in most species of *Lutjanus*; about 15 developed on lower part of anterior arch.

Preopercle nearly vertical, its emargination very slight, its serræ distinct.

Scales rather small, those below lateral line in horizontal series; those above lateral line in regular and very oblique series, which are not parallel with the lateral line. Cheeks with 5 rows of scales. Temporal region scaled from the eye backwards, posteriorly with a band of rather large scales followed by smaller ones. Bases of soft dorsal and anal scaly. Dorsal fin little emarginate, the spines rather slender and low, the longest  $2\frac{1}{2}$  in head. Longest ray of soft dorsal  $2\frac{4}{5}$  in head. Caudal rather deeply forked, the longest rays  $1\frac{1}{4}$  in head, the median rays  $3\frac{2}{3}$ . Anal spines slender, regularly graduated, the second spine  $4\frac{4}{5}$  in head. Soft anal rounded, rather low, the longest rays  $2\frac{3}{5}$  in head. Pectorals long and falcate,  $1\frac{1}{6}$  in head. Ventrals  $1\frac{2}{3}$ .

In spirits this specimen is now nearly uniform brownish above, paler below, with pale streaks along the rows of scales. In life, according to Poey's figure, it had much the coloration of *Lutjanus synagris*.

Only Poey's original type of the species is yet known. From this the above description is taken.

As will be seen, the species is very well distinguished from *Lutjanus synagris* and from *Ocyurus chrysurus*. It, however, presents such a singular blending of the characters of the two as to lend much probability to Poey's conjecture that it is a hybrid of *Lutjanus synagris* with *Ocyurus chrysurus*.

#### 14. *Lutjanus mahogani*. *Ojanco*.

*Mesoprion mahogani*, Cuv. & Val., ii, 447, 1828 (Martinique); Günther, i, 203 (copied).

*Mesoprion ricardi*, Cuv. & Val., ii, 447, 1828 (Martinique).

*Mesoprion ojanco*, Poey, Memorias, ii, 150, tab. 13, f. 10, 1860 (Cuba); Poey, Synopsis, 295, 1868.

*Lutjanus ojanco*, Poey, Enumeratio, 1875, 28 (Cuba).

Head,  $2\frac{1}{2}$  ( $3\frac{1}{5}$ ); depth,  $2\frac{4}{5}$  ( $3\frac{3}{5}$ ). D. X, 12; A, III, 8. Scales, (6) 9-62-14; 50 pores. Length of a specimen from Cuba, 10 inches.

Body rather elongate, strongly compressed, the back well elevated, profile almost straight or slightly concave from tip of snout to nape, thence moderately convex. Snout rather slender and pointed, 3 in head. Eye large,  $3\frac{2}{3}$  in head. Interorbital area flattish, with a median keel, 6 in head. Preorbital rather broad, its least width  $6\frac{1}{5}$  in head. Mouth large, maxillary reaching front of pupil,  $2\frac{1}{2}$  in head. Lower jaw strongly projecting; upper jaw with a narrow band of villiform teeth, outside of which is a single series of enlarged but comparatively small teeth; 4

moderate canines in front of jaw, two of them larger, about two in diameter of pupil. Lower jaw with a single series of rather small teeth, none of them at all canine-like. Tongue with an oblaneeolate patch of teeth, tapering behind, its length more than twice its width. Vomer with a broadly arrow-shaped patch of teeth, with backward prolongation on median line, its length about equaling width of patch in front. Pterygoid and hyoid bones without teeth. Gill-rakers numerous, about ten developed on lower part of arch, besides four or five rudimentary ones, those near angle largest, their length almost one-half diameter of eye. Preopercle with its posterior margin almost vertical, broadly and rather deeply emarginate, very weakly or scarcely serrate above, the angle projecting backward and armed with several rather coarse teeth, the lower limb smooth.

Scales rather small, those below lateral line somewhat larger, the rows above the lateral line running obliquely upward and backward, those below in almost straight horizontal series. Cheeks with 6 rows of scales, 1 row on interopercle, 1 on subopercle, and 7 on opercle. Temporal region with a band of small scales, before and behind which is a series of larger ones. Top of head, snout, and jaws naked. Base of soft dorsal and anal scaly.

Dorsal spines rather weak and slender, the outline of the fin rather strongly convex; the fourth spine longest,  $2\frac{4}{7}$  in head; the tenth spine 4 in head. Margin of soft dorsal very gently convex, the first and last rays slightly shorter than rest of fin; median rays  $3\frac{1}{3}$  in head. Caudal not deeply forked, the upper lobe little longer than lower, its length  $1\frac{2}{5}$  in middle rays, which are  $2\frac{1}{3}$  in head. Margin of anal little rounded, the middle rays  $1\frac{2}{3}$  length of last ray, 3 in head; the first ray reaching almost to tip of last ray when the fin is depressed. Anal spines small, the second as long as third and stronger,  $4\frac{2}{5}$  in head. Ventrals  $2\frac{1}{5}$  in head. Pectorals scarcely reaching front of anal,  $1\frac{1}{3}$  in head. Color in life deep brown, silvery below, everywhere shaded with red, especially on head. Eye scarlet. A large blackish blotch on side, chiefly above lateral line and below first rays of soft dorsal. Maxillary yellow on covered parts. Narrow bronze streaks following the rows of scales, these streaks distinct chiefly above the lateral line. Dorsal fin pale, edged with blood-red; caudal deep red; anal, ventrals, and pectorals scarlet. The bright colors fade and disappear in spirits, leaving the back dark gray, the lower parts silvery, more or less flushed with red.

This species is rather common in the markets of Havana, where it is known as *Ojanco*, in allusion to the large size of the eye. It does not reach a large size.

This is, of course, the species described by Poey under the name of *Lutjanus ojanco*. There seems to be little room for doubt that the *Mesoprion mahogoni* and *ricardi* of Cuv. & Val. are of the same species. In coloration and in the small number of rays in the soft dorsal the agreement is perfect, and the scanty descriptions contain little else,

This species is one of the best marked of the genus, not strongly resembling any other.

15. *Lutjanus vivanus*. *Red Snapper*; *Pargo colorado*; *Pargo Guachinango*; *Silk Snapper*.

? *Acara aya*, Maregrave, Hist. Brasil, 167, 168, 1648.

? *Bodianus aya*, Bloch, Ichthyol., taf. 227, about 1797 (based on Maregrave);

? Lacépède, iv, 286, 287, 1803 (copied).

*Lutjanus aya*, Goode, Bull. U. S. Nat. Mus., v, 1876, 55 (Bermudas).

? *Bodianus ruber*, Bloch & Schneider, Syst. Ichthy., 1801, 330 (based on Maregrave).

*Mesoprion vivanus*, Cuv. & Val., ii, 454, 1828 (Martinique; young specimens).

*Lutjanus vivanus*, Jordan, Proc. Ac. Nat. Sci. Phila., 1883, 286 (redescription of types).

*Mesoprion campechanus*, Poey, Mem., ii, 149, 1860 (Cuba).

*Lutjanus campechanus*, Poey, Synopsis, 294, 1868 (Cuba); Poey, Ann. Lye. Nat. Hist. N. Y., 317, 1870 (Cuba); Poey, Enumeratio, 29, 1875 (Cuba); Poey, Bull. U. S. Fish Comm., 1882, 118 (Key West); Jordan & Gilbert, Synopsis Fishes North America, 1883, 921 (copied); Jordan, Proc. U. S. Nat. Mus., 1884, 125 (Key West).

*Lutjanus torridus*, Cope, Trans. Am. Philos. Soc., 468, 1869 (St. Kitt's).

*Lutjanus blackfordi*, Goode & Bean, Proc. U. S. Nat. Mus., 176, 1878 (Pensacola); Goode, Proc. U. S. Nat. Mus., 114, 1879 (St. John's River); Goode & Bean, *op. cit.*, 1879, 137, 156 (Pensacola); Bean, *op. cit.*, 1880, 96; Goode & Bean, *op. cit.*, 1882, 238; Jordan & Gilbert, *op. cit.*, 1882, 275 (Pensacola); Jordan & Gilbert, Syn. Fishes North America, 1883, 549; and of recent American writers generally.

*Habitat*.—Pensacola to Aspinwall and the Lesser Antilles.

Head,  $2\frac{3}{5}$  ( $3\frac{2}{5}$ ); depth,  $2\frac{3}{5}$  ( $3\frac{2}{5}$ ). D. X, 14; A. III, 9. Scales, (7) 8-60-15; pores 46. Length of a specimen from Key West, 16 inches.

Body rather deep, moderately compressed, the back well elevated, profile steep and almost straight from snout to nape. Snout rather pointed,  $2\frac{1}{5}$  in head. Eye moderate,  $5\frac{1}{2}$  in head (larger in young). Interorbital space angulate or strongly convex, 5 in head. Occipital keel strong. Preorbital rather broad, 5 in head. Mouth rather large, maxillary reaching front of orbit,  $2\frac{1}{2}$  in head. Upper jaw with a narrow band of villiform teeth, outside of which is a row of larger but comparatively small teeth; 4 canines in front, two (sometimes duplicated) of them larger, their length about one-third diameter of eye. Lower jaw with a single row of rather small teeth, usually largest on side of jaw, where some of them are almost canine-like. Within these is a very narrow band of villiform teeth in front of jaw only. Tongue with a broad oval patch of teeth, scarcely twice as broad as long; in front of this patch is a small irregular patch. Vomer with a broadly arrow-shaped patch, with a rather short backward prolongation on median line, its length about equaling width of patch in front. Gill-rakers moderate, their length about one-half diameter of eye, 8 on lower arch. Preopercle with its posterior margin about vertical, its emargination deep, its edge rather finely serrate above, coarser at the angle, dentate on the lower border.

Scales rather large, the rows horizontal below lateral line, the rows above running backward and upward; 6 rows of scales on cheek, 1 on interopercle, 1 on subopercle, and 7 on opercle. Base of soft dorsal and anal scaly. Pores of lateral line branched. Temporal region with a broad band of scales, with a few scattering ones below it. Top of head, snout, and jaws naked.

Dorsal spines rather strong, the outline of the fin moderately convex; the fourth and fifth spines longest,  $2\frac{4}{5}$  in head; the tenth spine about 1 in head. Margin of soft dorsal nearly straight, the fin pointed behind; the middle rays little longer than first ray,  $1\frac{1}{2}$  length of last, 3 in head. Caudal lunate, the upper lobe scarcely longer than lower, its length  $1\frac{2}{5}$  times length of middle rays, which are  $1\frac{6}{7}$  in head. Margin of anal strongly angulate, the middle rays reaching nearly to base of caudal,  $2\frac{1}{2}$  length of last ray,  $1\frac{4}{5}$  in head; the first ray reaches about to middle of last ray when the fin is depressed. Anal spines strong, the second scarcely as long as third, 4 in head. Ventrals  $1\frac{4}{5}$  in head. Pectorals reaching almost to middle of anal fin,  $1\frac{1}{5}$  in head.

Color in life deep rose-red, paler on throat, bluish streaks along rows of scales, above becoming fainter and disappearing with age. Fins brick-red; dorsal bordered with orange, with a narrow blackish edge; caudal narrowly edged with blackish. Eye red. A large blackish blotch above lateral line and below front rays of soft dorsal in young specimens, this spot disappearing with age. Axil of pectoral dusky.

The young specimens which formed the types of *Mesoprion vivanus*, very scantily described by Cuv. & Val., have been thus redescribed (Jordan, Proc. Ac. Nat. Sci. Phila., 1883, 286):

Head,  $2\frac{5}{6}$  in length; depth,  $3\frac{1}{6}$ . D. X, 14; A. III, 8. Lateral line with 50 pores.

Maxillary  $2\frac{4}{5}$  in head. Teeth rather strong; vomerine teeth in an arrow-shaped patch, being prolonged considerably backward on the median line. Posterior nostrils oval. Eye 4 in head. Nuchal scales in a band, scarcely separated from the scales of the body; scales above lateral line arranged in oblique series. Second anal spine long,  $2\frac{1}{2}$  in head. Caudal concave, the inner lobe  $1\frac{2}{5}$  in the outer.

Color reddish, faintly streaked with olive; traces of a blackish blotch under soft dorsal; tips of middle rays of caudal dusky.

These are rather slenderer than any young Florida specimens which we have seen, but they agree fairly in this regard with some young "Silk Snappers" brought by Mr. Gilbert from Aspinwall.

The species is very abundant in rather deep water in rocky places around the Florida coast. At Pensacola it is taken in great numbers. It is one of the most important food-fishes of our Southern coasts. About Key West it is also taken in large numbers, but only in the deeper waters, and it is taken thence alive in the wells of the fishing-smacks to the markets of Havana. On the American coast it is known everywhere as Red Snapper, or to the Spaniards as *Pargo Colorado*. In Havana it bears the name of *Pargo Guachinaugo*, "Mexican Snapper,"

because it is brought to that city from the Mexican coast. According to Poey it is comparatively rare in Cuban waters, although daily seen in the markets. Its synonymy is somewhat complicated, and some doubt exists as to the proper specific name.

We place here with doubt the names *aya* and *ruber*, based on the *Acara Aya* of Maregrave. 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 *Lutjanus torridus* in the Museum of the Academy at Philadelphia. It is 11 inches in length and in poor condition, but it apparently belongs to this species. In life it was probably red, with the posterior edge of the caudal narrowly black; no evident black lateral spot.

Head, 3; depth,  $3\frac{2}{5}$ . D. X, 14; A. III, 8. Scales (7) 11-58-x; 53 pores.

Maxillary  $2\frac{1}{2}$  in head, extending to past the front of the large eye, which is 4 in head. Preopercle strongly serrate. Dentition and gill-rakers as above described in *L. vivanus*. Longest ray of anal half head, the fin mesially elevated as in *L. vivanus*. Second anal spine  $2\frac{3}{4}$  in head.

The type of *Lutjanus blackfordi* is of course specifically identical with the specimens which form the basis of the above descriptions. The description published under this name by Goode & 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.

16. *Lutjanus analis*. Mutton-fish; Pargo; Pargo Criollo.

*Anthias Quartus Rondletii* (the Mutton-fish), Catesby, Nat. Hist. Carolina, 1743.

*Mesoprion analis*, Cuv. & Val., ii, 452, 1828 (San Domingo); Poey, Mem., ii, 146, 1860, tab. 13, fig. 9 (Cuba); Poey, Repertorio, i, 266, 1867 (Cuba); Poey, Synopsis, 294, 1868 (Cuba).

- Lutjanus analis*, Poey, Enumeratio, 1875, 29 (Cuba); Jordan, Proc. U. S. Nat. Mus., 1884, 125 (Key West); Vaillant & Bocourt, Miss. Sci. au Mexique, 1881 (?), 119, pl. v.
- Mesoprion sobra*, Cuv. & Val., ii, 453, 1828 (Martinique); Guichenot, in Ramon de la Sagra, Hist. Cuba, Poiss., 22; Günther, i, 209.
- Mesoprion isoodon*, Cuv. & Val., ix, 443, 1833 (San Domingo).
- Mesoprion isodon*, Günther, i, 1859, 206 (copied).
- Mesoprion vivanus*, Günther, i, 263, 1859 (Jamaica; Bahia; not of Cuv. & Val.).
- Lutjanus vivanus*, Cope, Trans. Am. Philos. Soc., 1869, 470 (New Providence; St. Croix).
- ? *Mesoprion rosaceus*, Poey, Ann. Lyc. Nat. Hist. N. Y., ix, 317, 1870 (Cuba).
- ? *Lutjanus rosaceus*, Poey, Enumeratio, 1875, 30.

*Habitat.*—Florida Keys to Brazil.

Head,  $2\frac{2}{3}$  ( $3\frac{2}{5}$ ); depth,  $2\frac{2}{3}$  ( $3\frac{2}{5}$ ). D. X, 14; A. III, 8. Scales, (7) 10-67-17; pores 51. Length of an individual from Key West, 11 inches.

Body rather deep and compressed, the back rather strongly elevated, profile steep and nearly straight from snout to nape. Snout rather long and pointed,  $2\frac{2}{5}$  in head. Eye rather small,  $5\frac{2}{5}$  in head in specimens a foot in length. Interorbital space gently convex,  $5\frac{2}{5}$  in head. Occipital keel moderate. Preorbital very broad, its least width 4 in head. Mouth moderate; maxillary scarcely reaching front of orbit,  $2\frac{5}{7}$  in head. Upper jaw with a narrow band of villiform teeth, outside of which is a single series of larger but small teeth; 6 rather strong canines in front, 4 of them larger, about equaling in length one-half diameter of pupil. Lower jaw with a narrow villiform band in front only and a series of larger teeth outside; these unequal, largest on side of jaw, some of them almost canine-like. Tongue with a single very small patch of teeth on its middle; this is wanting in young examples. Teeth on vomer forming a broadly  $\wedge$ -shaped patch, without backward prolongation on median line. Gill-rakers moderate, one-half length of diameter of eye, about 8 on lower arch, with no rudiments before them. Preopercle with its posterior margin almost straight, slanting gently downward and forward; the notch broad and very shallow. Edge of preopercle rather coarsely serrate, most so at the angle. Scales small, the rows almost horizontal below the lateral line, running backward and upward above. Tubes of lateral line branched. About 7 rows of scales on the cheeks; 1 row on interopercle, 1 on subopercle, and about 9 on opercle. Temporal region with about eight rows of scales, which become smaller posteriorly. Base of soft dorsal and anal scaly.

Dorsal spines weak and slender, the outline of the fin not greatly curved; the fourth spine longest,  $2\frac{2}{3}$  in head; the tenth spine  $3\frac{1}{3}$  in head. Margin of soft dorsal angulate; the ninth ray longest, twice last and  $1\frac{1}{2}$  times first ray, 2 in head. Caudal well forked; upper lobe the longest,  $1\frac{3}{5}$  length of middle rays, which are about  $2\frac{1}{6}$  in head. Anal angular, similar to soft dorsal, the middle rays more elevated than in any other species, longest  $2\frac{1}{4}$  length of last, 2 in head; first ray nearly reaching tip of last when the fin is depressed; the second and third anal spines

rather strong, of equal length,  $3\frac{3}{4}$  in head. Ventrals  $1\frac{2}{5}$  in head. Pectorals reaching slightly past origin of anal,  $1\frac{2}{10}$  in head.

Color in life, dark olive-green above; many of the scales with pale blue spots, these forming irregular oblique streaks upward and backward; similar stripes more regular and numerous on caudal peduncle, and above anal. In old fishes these blue spots and streaks disappear. Belly, white, strongly tinged with brick-red; about six narrow, dusky, vertical bars, a little broader than the interspaces and not well-defined between gill-opening and anal. Head, bronze-olive, darker above; a broad, undulating, pearly streak from snout below eye to upper edge of gill-opening; a narrow blue streak from eye to nostrils; iris, fiery red. Pectorals, caudal, anal, and ventrals, brick-red, the caudal narrowly margined with black and a little bronzed above. Dorsal, reddish along the rays and tips of membranes, otherwise yellowish; lateral blotch just above the lateral line, and below the first soft ray of dorsal distinct, about as large as pupil, smaller than in other species similarly marked, and seldom disappearing with age. Axil and bar across base of pectoral above pale or dusky olive. In spirits the markings become fainter, the lateral blotch and the bluish streaks on head usually persisting.

This species is rather common at Key West, where, as elsewhere in the West Indies, it is known as Mutton-fish. At Havana it is the *Pargo* (*par excellence*) or *Pargo Criollo*. It is perhaps the most important food-fish of the Havana markets, being always abundant, and its flesh always healthful. It reaches a large size, and its flesh is fairly flavored, although not very delicate.

The names *analis* and *sobra* of Cuv. & Val. seem to belong to this species without question. *Mesoprion isodon* is identified by Vaillant with *L. analis* on comparison of typical examples. *Lutjanus rosaceus* is described as a distinct species from a large specimen  $27\frac{1}{2}$  inches in length. The only tangible distinction which we find in the long description is that the eye is one-sixth the length of the head, while in *L. analis* of the same size the eye is  $8\frac{1}{2}$  in the head.

We hesitate to admit *L. rosaceus* as distinct from *L. analis*. The larger eye and redder coloration perhaps indicate a specimen from deeper water than usual.

**17. *Lutjanus colorado*. *Pargo colorado*.**

*Lutjanus colorado*, Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 338, 351, 355 (Mazatlan); Jordan & Gilbert, Bull. U. S. Nat. Mus., 1882, 107, 110 (Mazatlan; Panama).

*Habitat*.—Mazatlan and Panama.

This species, the Pacific representative of *Lutjanus analis*, is rather common along the Pacific coast from Mazatlan to Panama. It is a good food-fish and reaches a considerable size. At Mazatlan, it is known as "*Pargo Colorado*," which in English would be "Red Snapper." The original description already published in these proceedings need not now be repeated.

18. *Lutjanus cyanopterus*.

*Mesoprion cyanopterus*, Cuv. & Val., ii, 472, 1828 (Brazil).

*Mesoprion pargus*, Cuv. & Val., ii, 473, 1828 (Puerto Rico).

*Habitat*.—Brazil; West Indies.

We know nothing either of *cyanopterus* or *pargus* except from the descriptions of Cuv. and Val. These descriptions seem to refer to a single species, allied to *L. buccanella*, but with the canines stronger and the black spot above the base of the pectoral. The soft parts of the vertical fins in "*cyanopterus*" are said to be bluish black. According to Vailant and Boconrt this is one of the species which has the teeth on the vomer in a  $\wedge$ -shaped patch, without backward prolongation on the median line. It has also teeth on the tongue.

19. *Lutjanus lutjanoides*.

*Ocyurus lutjanoides*, Poey, Ann. Lyc. Nat. Hist., ix, 319, 1871 (Cuba).

*Lutjanus lutjanoides*, Poey, Enumeratio, 1875, 30.

*Habitat*.—Cuba. One specimen known.

This species is known to us only from Poey's description. Its describer has suggested the possibility of its being a hybrid between *O. chrysurus* and *L. caxis*.

The following is Poey's original description:

"The fish, if not undoubtedly belonging to the genus *Ocyurus* of Professor Gill, of which the *Mesoprion chrysurus* is the type, comes nearer to it than to any other genus, by the bifurcation of its caudal deeper than in *Lutjanus jocú*, *caxis*, *caballerote*, etc. The pointed snout and the long canines would bring it among these last. From its colors the fishermen are led to consider it a hybrid between the *M. chrysurus* and the *L. caxis*. They often thus dispose of a new fish, as in the case of the *Ocyurus ambiguus* and *aurovittatus*. But as such hybrids are rare among fish, and especially so among these genera, it is, I believe, right to consider the present species as a good one.

"Total length, 290 millimeters, or 11.45 inches. The height of the body, equal to the length of the head, is contained  $3\frac{2}{3}$  times in the total length. The eye is rather high up, and half way from snout to tip of opercle. The nostrils are on the middle of the snout, rather wide apart, the posterior one oblong. The mouth is small, for the ends of the maxillaries are under the posterior nostril. The preopercle is only slightly notched, finely denticulated; the opercle without a spinous point. The teeth are in one row, the canines rather long, and behind them there are asperities; the palatine arch has teeth, and the tongue is rough.

"The lateral line has about fifty-five scales, six rows above and fifteen below it; there are scales on the opercles and temples, the rest of the head naked. The scapular bones show outside. There are very small scales on the interstitial base of the soft rays of the vertical fins. D. 10, 14. A. 3, 8.

"The posterior borders of the dorsal and anal are rounded. The caudal lobes are elongated, but less so than in the *M. chrysurus*. The



pectoral is pointed, contained  $4\frac{1}{2}$  times in the total length. The three first spiny rays of the dorsal gradually increase in length, the last, or tenth one, not longer than the preceding ones. The soft rays of the dorsal and anal are all branched and flattened. The color is a brownish green, the abdomen paler, six brown bands fall vertically from back over the sides; a broad and interrupted stripe of a greenish color extends from the upper part of the opercle to the base of the caudal, resembling *Ocyurus chrysurus* and *aurovittatus*.

"I have seen this fish but once, and I sent the specimen to the United States, either to Professor Agassiz or to Mr. Brevoort. It bears my No. 163."

## 20. *Lutjanus inermis*.

*Mesoprion inermis*, Peters, Berliner Monatsber., 1869, 705 (Mazatlan).

*Lutjanus inermis*, Jordan, Proc. Ac. Nat. Sci. Phila., 285, 1883 (Mazatlan).

*Habitat*.—Mazatlan.

The following notes are taken from Professor Peters's original type:

Head, 3 in length; depth,  $3\frac{1}{4}$ . Lateral line with 50 tubes. Scales 53. Dorsal X, 13; A., III, 11.

Body slender and fusiform, not strongly compressed, the back not elevated. Snout very pointed; mouth unusually small, the maxillary  $2\frac{1}{2}$  in head, reaching to front of pupil. Eye very large, about 4 in head. Band of vomerine teeth slightly produced backward on the median line. Teeth on tongue well developed; canine teeth unusually small and slender, 2 in upper jaw and 3 or 4 on each side of lower. Nostrils well separated, subequal, the posterior oblong, the anterior round. Pre-orbital two-fifths depth of eye. Preopercle not serrate, scarcely notched behind. Temporal region with a band of large scales, on each side of which are small scales. Scales above lateral line arranged in very oblique series, which are not parallel with the lateral line.

Pectoral fins very short, reaching little past tips of ventrals,  $1\frac{3}{4}$  in head. Dorsal spines very slender. Second anal spine longer than third, very small, 7 in head. Soft dorsal and anal low, scaly. Caudal fin rather deeply forked, the middle rays not half the length of the outer, which are  $1\frac{1}{3}$  in head.

Color in spirits, dusky above, pale below, with distinct dark stripes, those below parallel with the lateral line, those above very oblique; these stripes extend along the edges of the rows of scales, the middle of each scale being whitish, its base dusky.

According to Peters, the color was violet brown; middle of each scale with a silvery shining spot; belly silvery. Base of pectoral above and below brown.

Only one specimen is known; it is in the museum at Berlin, and is said to have come from Mazatlan. It is quite unlike any other American species. It is, perhaps, related to *Lutjanus mitchelli*, a species lately described by Dr. Günther, from Madras.



This species, the "*Pargo Roizero*" of the Mazatlan fishermen, is generally common on the Pacific coast, and reaches a considerable size. It bears little resemblance to any other American species, its squamation resembling that of *Hamulon maculicauda*.

III.—Genus OCYURUS.

OCYURUS, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 226 (*cyprinus*).

The skull of the single species now referred to *Ocyurus* deviates so far from that of the ordinary *Lutjanus* that its separation as a distinct genus seems to be fully justified. The species shows numerous minor peculiarities, as the peculiar form of the body, the large caudal fin, the small head, as well as an increased number of gill-rakers, and the presence (in the adult) of pterygoid teeth.

ANALYSIS OF SPECIES OF OCYURUS

a. Gill-rakers long and numerous, about 20 developed on lower part of arch: mouth small, lower jaw projecting: canines small, in upper jaw only: body elliptical, elongate, with very slender caudal peduncle: caudal fin deeply forked, longer than head: eye small: occipital keel high: preorbital narrow: teeth on vomer in a 4-shaped patch: adults with a narrow band of teeth on pteropods: scales small, those above lateral line in very oblique series: soft dorsal and anal low: anal spines weak: olivaceous, somewhat rosy tinged: a broad yellow lateral band with yellowish blotches above it and some yellow streaks below it: caudal deep yellow: other fins mostly yellow ..... UNDETERMINED 21.

22. *Ocyurus chrysurus*. Yellow-tail: Eschschsch.

*Loxos pitambá*, Marcgrave, Hist. Brasil, 1648, 133.  
*Robie sibia*, Parra, Descr. Dif. Piezas, Hist. Nat., pl. 20, l. 1, 1757 (Cuba).  
*Sparus chrysurus*, Bloch, Ichthypol., taf. 992, about 1795 (after Marcgrave: Lacépède, Hist. Nat. Poiss., iv, 115, 1803 (copied)).  
*Grammistes chrysurus*, Bloch & Schneider, Syst. Ichthypol., 1801, 157 (copied).  
*Mesoprius chrysurus*, Cuv. & Val., ii, 409, 1828 (Martinière): Guichenot, Esmon de la Sagra, Hist. Cuba, 24, about 1859 (Cuba); Günther, 2, 135, 1859 (Puerto Cabello: Jamaica: Trinidad).  
*Ocyurus chrysurus*, Gill, Proc. Ac. Nat. Sci. Phila. (name only): Poey, Synopsis, 226, 1876: Cope, Trans. Am. Philos. Soc., 1871, 408 (St. Martin's: New Providence: St. Croix): Poey, Enumeratio, 1873, 49 (Cuba): Poey, Bull. U. S. Fish Comm., 1882, 116 (Key West).  
*Lutjanus chrysurus*, Vaillant, Miss. Sci. au Mexique, 1875, 133, pl. v, 1882: Jordan & Gilbert, Synopsis Fish. N. A., 1883, 921: Jordan, Proc. U. S. Nat. Mus., 1884, 125 (Key West).  
*Axilia rubicincta*, Bloch & Schneider, Syst. Ichth., 1801, 309 (after Parra).  
*Sparus umbra*, Lacépède, Hist. Nat. Poiss., iv, 141, 1803 (on a copy of a drawing by Plummer).  
*Mesoprius curvicauda*, Agassiz, Spix, Fisch. Brasil, pl. 66, 1829 (Frankf.).  
*Ocyurus curvicauda*, Poey, Synopsis Fish. Cubens., 1866, 205: Poey, Enumeratio, 31 (Cuba).  
*Ocyurus melanurus*, Goode, Proc. U. S. Nat. Mus., 1879, 114 (name only: after *Percis melanura*, L., which is a *Hamulon* and not a *Lutjanus*).  
*Lutjanus melanurus*, Jordan & Gilbert, Synopsis Fish. N. A., 1883, 345.  
*Ocyurus cyprinus*, Cope, Trans. Am. Phil. Soc., 1871, 405 (St. Martin's).

Habitat.—Florida to Brazil.

Head,  $3(4\frac{1}{4})$ ; depth,  $2\frac{7}{8}(4\frac{1}{6})$ . D. X, 13; A. III, 9. Scales, (7) 10-65-15; 51 pores. Length of an example from Key West, 12 inches.

Body elliptical, comparatively elongate; the back little elevated; the profile straight from the tip of the snout to the nape, thence rather strongly arched; caudal peduncle long and slender; snout pointed, of moderate length, 3 in head; eye small, 5 in head; interorbital space very convex, with a sharp median keel, 4 in head; preorbital narrow, its least width  $6\frac{2}{3}$  in head.

Mouth small, oblique; lower jaw projecting; maxillary reaching very slightly beyond front of orbit,  $2\frac{5}{7}$  in head; upper jaw with a narrow band of villiform teeth, outside of which is a single series of larger teeth, 5 or 6 of those in front being somewhat canine-like, but small; lower jaw with a single series of moderately strong teeth, none of them large enough to be called canines; tongue with a large, oval patch of teeth, in front of which is a smaller but similar patch; teeth on vomer forming a broadly arrow-shaped patch, with a backward prolongation on the median line, which is nearly twice the width of the patch; a narrow band of pterygoid teeth behind the patch on the vomer, this not evident in young examples; gill-rakers rather long and slender, the longest about half diameter of eye, about 21 below angle of arch, none of them rudimentary.

Preopercle with its posterior margin almost vertical, with a slight but distinct emargination above the angle; serrations of preopercle very feeble, the teeth at the angle scarcely enlarged; nostrils well separated, the posterior slit-like; scales small, those above lateral line arranged in very oblique series, those below in rows nearly horizontal; cheeks with 5 or 6 rows of scales, about two rows on interopercle; temporal region with two or three series of large scales before and behind which are many small scales; top of head, snout, and jaws naked; bases of soft dorsal and anal scaly.

Dorsal spines rather long and slender, the fin not deeply emarginate; fifth spine longest,  $2\frac{2}{3}$  in head, tenth spine  $3\frac{3}{4}$ ; soft dorsal and anal similar, their margins nearly [straight], the last rays slightly shortened; median rays about 3 in head; caudal fin long, very deeply forked, the upper lobe longest, three times as long as middle rays, which are  $2\frac{1}{2}$  in head; pectorals long and slender, almost reaching anal,  $1\frac{1}{5}$  in head; ventrals  $1\frac{1}{4}$  in head; anal spines rather weak, the third one-third longer than second, 4 in head.

Color in life olivaceous above, rather pale, and somewhat violet-tinged; a number of large, irregular deep yellow blotches on sides of back; a deep yellow stripe from tip of snout straight through eye to caudal peduncle, there broadening and including all of tail above lateral line and behind dorsal fin. Above this a pearly-purplish area; below it a flesh-colored or rosy area or band, two scales broad, then a succession of about 16 narrow streaks of alternating flesh-color and yellow,

growing fainter progressively below; the yellow on the edges of the scales, the reddish on their middles; iris fiery red. Lower parts of head flesh-color with some yellow spots; maxillary mostly yellow; caudal deep yellow, its edges reddish. Dorsal chiefly yellow; anal faintly yellow; ventrals and pectorals translucent. In spirits all the markings fade, leaving the fins yellowish, the upper parts grayish, the lower rosy-silvery.

This species is very abundant at Key West, where it is known as Yellow Tail. In Cuba it is perhaps next to *L. analis* and *L. synagris*, the commonest of the genus. It is there known as *Rabirubia*.

The synonymy of this species offers little difficulty. The earlier names, *chrysurus*, *rabirubia*, *semiluna*, seem to admit of no doubt. *Aurovittatus* is admitted as a distinct species by Poey, who has seen it but once, and distinguishes it by the absence of yellow spots on the back. Without further evidence, we cannot regard the claims of *aurovittatus* to distinction as worthy of consideration.

The use of the name *melanurus* for this species by Professor Goode is certainly an error. There can be no reasonable doubt of the pertinence of *Perea melanura*, L. to *Hamulon melanurum* (*dorsale*, Poey).

The specimens from Saint Kitt's, described by Professor Cope, under the name of *Ocyurus rijgersmæi*, are without much doubt simply brightly colored adults of this species.

We have lately examined these specimens in the Museum of the Academy of Natural Sciences at Philadelphia. None of them have more than ten dorsal spines although twelve are counted by Professor Cope. In color they agree exactly with *O. chrysurus*, except that the yellow markings of that species are in the types of *O. rijgersmæi* replaced by brown; a change, doubtless, due to the action of the alcohol. In form, dentition, gill-rakers, scales, and fin-rays, they agree exactly. In one specimen the head is  $3\frac{1}{4}$  in length, the depth  $3\frac{1}{3}$ ; scales (7) 11—50—x. Maxillary,  $3\frac{1}{2}$  in head, barely reaching front of eye. D. X, 13; A. III, 9. Eye, 5 in head. Second anal spine, 5; caudal, 3 in body; pectoral,  $3\frac{1}{2}$ .

#### IV.—Genus RHOMBOPLITES.

RHOMBOPLITES, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 237 (*aurorubens*).

This genus is closely allied to *Lutjanus*, but the cranial peculiarities and extension of the villiform teeth over the pterygoid and hyoid bones seem to warrant generic separation. The form of the vomerine patch of teeth is also somewhat peculiar. But one species is known.

##### ANALYSIS OF SPECIES OF RHOMBOPLITES.

- a. Eye large,  $3\frac{1}{2}$  to 4 in head; scales small, 72 in a longitudinal series; gill-rakers numerous; dorsal spines twelve; caudal rather deeply forked; color vermilion red, with golden-streaks ..... AURIRUBENS, 23.

23. *Rhomboplites aurirubens*. *Cagou de lo Alto*.

*Centropristis aurorubens*, Cuv. & Val., Hist. Nat. Poiss., iii, 45 (Brazil; Martini-  
que; San Domingo); Storer, Synopsis, 1846, 288 (copied).

*Mesoprion aurorubens*, Günther, i, 207, 1859 (Jamaica).

*Rhomboplites aurorubens*, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 236; Goode &  
Bean, Proc. U. S. Nat. Mus., 1879, 136 (Charleston; Pensacola); Bean, Proc.  
U. S. Nat. Mus., 1880, 96 (Charleston); Jordan, Proc. U. S. Nat. Mus.,  
1884 (Pensacola).

*Lutjanus aurorubens*, Vaillant & Bocourt, Miss. Sci. au Mexique, 1875; Jordan  
& Gilbert, Synopsis Fish. N. A., 1883, 549.

*Mesoprion elegans*, Poey, Memorias, ii, 153, 1860 (Cuba).

*Rhomboplites elegans*, Poey, Repertorio, ii, 158, 1868; Poey, Synopsis, 1868, 295;  
Poey, Enumeratio, 1875, 31.

*Aprion ariommus*, Jordan & Gilbert, Proc. U. S. Nat. Mus., 1883, 142 (Pen-  
sacola).

Head,  $3\frac{1}{6}$  (4); depth,  $3\frac{1}{6}$  (4). D. XII, 11; A. III, 8. Scales (7), 10-  
72-19; 50 pores. Length of a specimen from Cuba,  $12\frac{1}{2}$  inches.

Body elongate, irregularly elliptical, the back not greatly elevated,  
highest at the nape; profile regularly and strongly convex from above  
eye to spinous dorsal. Snout rather short and bluntish,  $3\frac{2}{5}$  in head, its  
upper profile straight and steep. Eye very large,  $3\frac{3}{4}$  in head. Inter-  
orbital space very convex,  $3\frac{1}{2}$  in head; preorbital narrow, its least  
width  $7\frac{1}{2}$  in head. Mouth small, oblique, the lower jaw somewhat pro-  
jecting. Maxillary sealeless, reaching front of orbit,  $2\frac{5}{7}$  in head. Upper  
jaw with a broad band of villiform teeth, outside of which is a row of  
enlarged but comparatively small teeth; no canines. Lower jaw with  
one series somewhat stronger than outer teeth of upper jaw; inside of  
these is a rather broad villiform band of teeth in front of jaw only.  
Tongue with a very broad irregularly ovate patch of teeth, its width  
almost as great as width of tongue,  $1\frac{1}{2}$  in its length; in front of this  
patch is a large roundish patch of teeth; an oblong patch of teeth on  
the hyoid bone. Vomer with a rhomboid ( $\diamond$ -shaped) patch of teeth,  
forming almost a right angle in front, with a broadly wedge-shaped  
backward prolongation on the median line, its length about twice its  
width. Palatine band of teeth very wide. Pterygoids with a large  
patch of teeth; these teeth undeveloped and covered by skin in young  
examples. Gill-rakers numerous, the longest about one-half diameter  
of eye; about 21 on lower part of arch. Preopercle with posterior  
margin almost straight and vertical, slightly emarginate, weakly serrate  
above, the teeth coarser at the angle and on lower border. Posteri-  
or nostril largest; nearly round. Scales very small, the rows above the  
lateral line running upward and backward, the rows below rather wavy,  
almost horizontal. Temporal region covered with small partially im-  
bedded scales, in 4 or 5 rows; cheeks with 7 rows of scales; 4 rows on  
interopercle, 3 rows on subopercle, and 7 on opercle. Snout, pre-orbital,  
and jaws naked; top of head scaly to near middle of eye. Soft dorsal  
and anal with but few scales at base.

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Dorsal spines long and slender, the fourth spine longest,  $2\frac{1}{4}$  in head, the length of the spines thence gradually decreasing to twelfth spine, which is  $3\frac{1}{3}$  in head. Margin of soft dorsal truncate, its rays of subequal length, 4 in head; last ray slightly shorter. Caudal deeply forked, the upper lobe longer than lower, its length  $1\frac{3}{4}$  times middle rays, which are 2 in head; upper lobe of caudal scarcely shorter than head. Anal similar to soft dorsal, its rays 3 in head; second anal spine shorter than third, 4 in head. Ventrals  $1\frac{1}{2}$  in head. Pectorals somewhat falcate, reaching opposite vent,  $1\frac{1}{5}$  in head.

Color in life, vermilion; paler below. Faint brown lines running obliquely forward and downward from dorsal along the rows of scales. Sides with narrow sinuous streaks of golden yellow, some of them longitudinal, others oblique. Dorsal rosy, its margin chiefly orange; anal pale at base, rosy at extremity; pectorals yellowish, ventrals rosy, caudal vermilion; iris vermilion red; inside of mouth dusky.

The bright colors grow faint or disappear in spirits.

This species is not uncommon in deep water as far north as Charleston and Pensacola. It is not unfrequently seen in the markets of Havana, where it is known as *Cagon*, or *Cagon de lo Alto*. Specimens from Pensacola and Havana are fully identical.

Specimens from the coast of South Carolina are somewhat deeper than those from Cuba, and with the yellow streaks more pronounced, becoming dark brown in spirits. One of these, in the U. S. National Museum, has 13 dorsal spines. It is not, however, otherwise essentially different.

We see no reason to doubt that this species is the original *Centropristis aurorubens* of Cuv. & Val. We therefore adopt the earlier name instead of the name *elegans*, given to it by Poey.

The young specimens taken from stomachs of red snappers, at Pensacola, and described by Jordan and Gilbert as *Aprion ariommus*, seem to be the young of this species. The pterygoid teeth are undeveloped, and covered by skin in young examples.

#### V.—Genus TROPIDINIUS.

?*APSILUS*, Cuv. & Val., Hist. Nat. Poiss., vi, 1830, 548 (*fuscus*).

*TROPIDINIUS*, (Gill MSS.), Poey, Synopsis Piscium Cubensium, 1868, 296 (*arnillo = dentatus*).

This very distinct genus has essentially the cranial structure of *Lutjanus*, with the scaleless fins, peculiar squamation and dentition of *Aprion*. But one species of the genus is as yet known, although it is possible that the same characters may be found to exist in *Apsilus fuscus*. The description of the latter species does not seem to indicate any very close relation to *Tropidinius dentatus*. We may therefore regard *Tropidinius* as generically different from *Apsilus*.

## ANALYSIS OF SPECIES OF TROPIDIINIUS.

- a. Scales small, regularly arranged, those above lateral line in series parallel with the lateral line; gill-rakers numerous, about 17 on lower part of arch; mouth rather small, the canines moderate; tongue toothless; vomerine teeth in a  $\Lambda$ -shaped patch; caudal well forked; dorsal spines 10; last rays of anal slightly produced; body rather deep (depth,  $2\frac{2}{3}$  in length); head large; caudal dusky violet, without distinct markings.....DENTATUS, 24.

24. *Tropidinius dentatus*. *Arnillo*.

*Apsilus dentatus*, Guichenot, in Ramon de la Sagra, Hist. Cuba, Poiss., 29, pl. 1, f. 2, 1845.

*Mesoprion dentatus*, Günther, i, 188, 1859 (Jamaica).

*Mesoprion arnillo*, Poey, Mem., ii, 154, 1860 (Cuba).

*Tropidinius arnillo*, (Gill MSS.) Poey, Synopsis, 236, 1868 (Cuba); Poey, Enumeratio, 30, 1875.

*Lutjanus arnillus*, Cope, Trans. Am. Philos. Soc., 470, 1869 (St. Croix).

*Habitat*.—Cuba; Jamaica; St. Croix.

Head, 3 ( $3\frac{2}{10}$ ); depth,  $2\frac{2}{7}$  ( $3\frac{1}{2}$ ). D. X, 10; A. III, 8. Scales, (7), 7-60-16; 60 pores. Length of an example from Cuba,  $11\frac{1}{2}$  inches.

Body rather deep, oblong, elliptical, compressed, the back somewhat elevated; profile, from snout to nape, little convex; the nape strongly keeled and considerably convex. Snout rather short and blunt,  $3\frac{1}{2}$  in head. Eye large,  $3\frac{5}{6}$  in head. Interorbital space convex,  $3\frac{4}{5}$  in head, its median line becoming on the occiput a sharp keel. Preorbital very narrow,  $7\frac{2}{3}$  in head. Mouth small. Maxillary broad, almost reaching pupil,  $2\frac{1}{2}$  in head. Upper jaw with a narrow band of villiform teeth, outside of which is a series of larger, which are scarcely large enough to be called canines. Lower jaw with a single series of small teeth, about 6 of those in front larger, scarcely canine-like, similar to the larger teeth of upper jaw. Inside of this series is a comparatively wide band of villiform teeth in front of jaw only. Tongue without teeth. Vomer with a  $\Lambda$ -shaped patch of teeth, without backward prolongation on median line. Gill-rakers numerous, the longest two-fifths diameter of eye, about 17 on lower half of arch. Preopercle with its posterior margin nearly vertical, very slightly emarginate, scarcely serrate except at angle, where the teeth are quite small.

Scales rather small, very regularly arranged, the rows running parallel with the lateral line both above and below; 7 rows on cheek, the scales of upper row little enlarged, two rows on interopercle,  $1\frac{1}{2}$  on subopercle, 6 on opercle. Temporal region with four rows of moderate scales; top of head, snout, and jaws naked. Base of soft dorsal and anal scaleless.

Dorsal fin not strongly emarginate, the spines rather slender, the outline of the fin rather strongly convex; 4th spine longest,  $2\frac{1}{5}$  in head, 10th spine  $3\frac{1}{4}$  in head. Margin of soft dorsal gently rounded, the middle rays little longer than first rays,  $2\frac{1}{7}$  in head; last ray not shorter than middle rays. Caudal deeply forked, the upper lobe slightly longer than lower,  $2\frac{1}{4}$  length of middle rays, which are  $2\frac{1}{4}$  in head. Upper lobe about as long as head. Margin of anal nearly straight, the



rays about of equal length, except the last, which is somewhat produced,  $2\frac{1}{2}$  in head; first ray reaching about to base of last ray, when the fin is depressed; anal spines rather weak, the third rather longest, 3 in head. Ventrals,  $1\frac{1}{2}$  in head. Pectorals somewhat falcate, reaching first soft ray of anal, about as long as head.

Color in life, dusky violet, paler below. Mouth within and fins all similar in hue, the anal and ventrals with blackish tips; soft dorsal, with some olive shades, the edge grayish. In spirits, nearly uniform dusky gray, paler below.

This beautiful little fish is rather common in the markets of Havana, where it is known as *arnillo*.

The peculiarly unfortunate name *dentatus* is set aside by Poey in favor of his later name, *arnillo*, because the species is a *Lutjanus* and not an *Apsilus*, and all the *Lutjani* are dentate. Such reasons are not sufficient to warrant interference with the law of priority.

## VI.—Genus APRION.

APRION, Cuv. & Val., Hist. Nat. Poiss., vi, 1830, 543 (*virescens*).

? APSILUS, Cuv. & Val., Hist. Nat. Poiss., vi, 1830, 548 (*fuscus*).

CILEOPTERUS, Temminck & Schlegel, Fauna Japonica, Poiss., 78, 1850 (*dubius*).

PRISTIPOMOIDES, Bleeker, Natuurk. Tijdschr. Nederl. Ind., 1852, iii, 574 (*typus*).

PLATYINIUS, Gill, Proc. Ac. Nat. Sci. Phila., 1863, 237 (*vorax* = *macrophthalmus*).

SPAROPSIS, Kner, Fische Mus. Godeffroy, 1868, 303 (*elongatus*).

We accept this genus as defined by Bleeker, who gives a synonymy similar to that above. The superficial characters separating it from *Lutjanus* are not very important, but the structure of the upper part of the cranium (in the only species examined, *macrophthalmus*) differs most widely from that of *Lutjanus*, *Oeyurus*, and *Rhomboplites*, closely resembling that of *Etelis*, with which genus *Aprion* has very near affinities.

The American species (*macrophthalmus*) has been made by Professor Gill the type of a genus *Platyinius*, regarded as distinct from *Aprion*. The skull of *Aprion virescens* has never been examined. It may or may not agree with that of *Platyinius*, but, in our opinion, there is, as yet, no sufficient reason to doubt the close affinity of *A. macrophthalmus* with *A. virescens*.

### ANALYSIS OF SPECIES OF APRION.

a. Scales large, regularly arranged, those above lateral line in series parallel with the lateral line; gill-rakers numerous, about 17 on lower part of arch; mouth rather small, the canines feeble; tongue toothless; vomerine teeth in a **A**-shaped patch; caudal well forked; dorsal spines ten; body oblong-elliptical, the depth 3 in length; last ray of dorsal and anal produced; color rose-red, with some pearly markings..... MACROPHTHALMUS, 25.

#### 25. *Aprion macrophthalmus*. Foraz.

*Centropristis macrophthalmus*, Müller & Troschel, in Schomb. Hist. Barbadoes, 666, 1848 (young).

*Elastoma macrophthalmus*, Cope, Trans. Am. Philos. Soc., 468, 1869 (St. Martin's; New Providence; St. Croix).

*Mesoprion vorax*, Poey, Mem., ii, 151, 1860 (Cuba).

*Platyinius vorax*, Gill, Proc. Acad. Nat. Sci. Phila., 1862 (generic diagnosis); Poey, Synopsis, 292, 1868, Poey; Enumeratio, 31, 1875.

*Habitat.*—Barbadoes; St. Martin's; New Providence; St. Croix; Cuba. Head, 3 ( $3\frac{3}{4}$ ); depth, 3 ( $3\frac{3}{4}$ ). D. X, 11; A. III, 8. Scales, (7) 7-60-15; 52 pores.

Body oblong-elliptical, moderately compressed; the back not greatly elevated; profile convex anteriorly, almost straight above eye; the nape again convex, its keel low and placed well back. Snout rather blunt,  $3\frac{2}{5}$  in head. Eye large,  $3\frac{2}{5}$  in head. Interorbital space broad and flat, 4 in head. Preorbital narrow,  $7\frac{1}{2}$  in head; mouth small, oblique; lower jaw slightly projecting. Maxillary about reaching middle of eye,  $2\frac{1}{3}$  in head. Upper jaw with a narrow band of villiform teeth, outside of which is a row of larger teeth, the canines in front little differentiated. Lower jaw with a single series of rather large teeth, scarcely large enough to be called canines; inside of this series is a comparatively wide band of villiform teeth in front of jaw only; a few larger teeth among the villiform teeth. Tongue without teeth. Vomer with a rather narrow  $\Lambda$ -shaped patch of teeth, without backward prolongation on median line. Gill-rakers numerous, the longest about two-fifths diameter of eye, 15 on lower part of arch. Preopercle with posterior margin almost straight and vertical, without emargination, very finely serrate above; the teeth coarser on angle and lower limb.

Scales rather small, regularly arranged; the rows running parallel with the lateral line both above and below it; 7 rows of scales on the cheek, the scales of upper row not greatly enlarged, two rows on interopercle, and 8 on opercle. Temporal region with about 4 rows of large scales; top of head, snout, and jaws naked. Base of soft dorsal and anal scaleless.

Dorsal little emarginate; the spines rather slender; the outline of the fin moderately convex; third spine longest,  $2\frac{3}{5}$  in head; 10th spine, 3 in head; margin of soft dorsal nearly straight, the first soft ray, 3 in head; last ray exerted, 2 in head. Caudal well forked, the upper lobe slightly longer than lower,  $2\frac{2}{5}$  length of middle rays, which are 3 in head; margin of anal similar to spinous dorsal, the last ray filamentous,  $2\frac{1}{2}$  in head; anal spines rather slender, the third slightly longer than second,  $3\frac{1}{4}$  in head. Ventrals,  $1\frac{1}{2}$  in head. Pectorals long and pointed, reaching to first soft ray of anal,  $1\frac{1}{10}$  in head.

Color in life, rosy-red with silvery luster, quite silvery below; faint pearly markings on scales of upper parts, these forming a decided stripe along base of dorsal. Head all rosy, darker above; iris silvery; mouth white within; sides with pearly spots, faint and diffuse, irregularly scattered, each about as large as a scale. Base of dorsal yellowish olive, its edge scarlet, the fin otherwise rosy. Caudal rosy, becoming scarlet behind. Pectorals, ventrals, and anal slightly rosy. In spirits the bright colors all fade, leaving irregular pearly markings on a silvery ground.

This species is rather common in the markets of Havana, where it is known as *Vorax*, by which the specific name *vorax* has been suggested.

According to Poey the *Centropristis macrophthalmus* of Müller & Troschel was based on the young of this species; if so, the latter name has the right of priority. This species agrees well with the descriptions of *Aprion filamentosus*, (C. & V.) from the islands east of Africa, but it would be premature to write two species from such widely separated localities without actual comparison of specimens.

The resemblance of the cranium of this species to that of *Etelis ocellatus* has already been noticed by Poey and Gill.

## VII.—Genus ETELIS.

ETELIS, Cuv. & Val., Hist. Nat. Poiss., ii, 127, 1828 (*carbunculus*).

ELASTOMA, Swainson, Nat. Hist. Fishes, etc., ii, 168, 202, 1839 (*ocellatus*).

HESPERANTHIAS, Lowe, Fishes of Madeira, 1843, 14 (*ocellatus*).

MACROPS, Duméril, Ichth. Analytique, 1856, 279 (*ocellatus*).

ETELIS, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 447.

The synonymy and relations of this interesting genus have been well discussed by Dr. Gill in the paper above cited. In spite of the difference in the form of its dorsal, the relations of *Etelis* with *Aprion* are very close. The skulls in the two are almost identical, as has already been noticed by Poey and Gill.

### 26. *Etelis ocellatus*. *Cachucho*.

*Serranus ocellatus*, Cuv. & Val., ii, 1828, 266 (Martinique).

*Elastoma ocellatus*, Swainson, Nat. Hist. Fishes, etc., ii, 168, 202, 1839 (generic diagnosis).

*Hesperanthias ocellatus*, Lowe, Fishes Madeira, 1843, 14 (generic description).

*Centropristis ocellatus*, Müll. & Trosch., in Schomb. Hist. Barbadoes, 666, 1848.

*Anthias ocellatus*, Günther, i, 92, 1859 (Jamaica; Madeira).

*Etelis ocellatus*, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 447 (Cuba); Poey, Synopsis, 292, 1868 (Cuba); Poey, Enumeratio, 31, 1875.

*Macrops ocellatus*, Duméril, Ichth. Analytique, 1856, 279 (fide Gill).

*Habitat*—Martinique, Madeira, Barbadoes, Jamaica, Cuba.

Head, 3 ( $4\frac{1}{5}$ ); depth,  $3\frac{1}{2}$  (5). D. X, 11; A. III, 8. Scales, 5 (4)–53–12; 50 pores. Length of an example from Cuba, 15 inches.

Body elongate, somewhat fusiform, moderately compressed; the back moderately elevated; caudal peduncle long and very slender; profile convex on snout, thence straightish to occiput; the nape low, not keeled. Snout short, rather pointed,  $3\frac{5}{8}$  in head. Eye very large, 3 in head. Preorbital very narrow, its least width 14 in head. Mouth moderate, oblique, the lower jaw projecting. Maxillary reaching middle of eye,  $2\frac{1}{10}$  in head, its surface scaly. Interorbital space slightly concave, 4 in head, the supraorbital ridges prominent. Upper jaw with a narrow band of villiform teeth, outside of which is a row of moderate teeth, the two canines (sometimes duplicated) in front very sharp and projecting forward and downward, their length about 3 in diameter of pupil. Lower jaw with villiform teeth in front of jaw only, the larger teeth of the outer row smaller and more numerous than in the upper jaw; canines of lower jaw not differentiated. Tongue without teeth.

Vomer with a narrow  $\Lambda$ -shaped patch of teeth, bluntish in front and without backward prolongation on median line; no teeth on hyoid or pterygoid bones; gill-rakers long and slender, their length about  $\frac{2}{5}$  diameter of eye, about 15 developed on lower part of arch. Posterior margin of preopercle almost straight and vertical, scarcely emarginate, very finely serrate; the teeth a little coarser at the angle.

Scales rather large, the rows all running parallel with the lateral line. Maxillary with about 12 scales; region behind eye well scaled; 7 rows of scales on cheek; 4 rows on interopercle, 2 on subopercle, and 8 on opercle. Temporal region with about 4 rows of large scales. Top of head and snout naked. Lower jaw with a few imbedded scales. Base of soft dorsal and anal scaleless.

Spinous and soft dorsals connected. Dorsal spines rather high and strong, the first spine short,  $\frac{2}{7}$  length of second or longest spine, which is 2 in head, the spines thence becoming almost regularly and gradually shorter to last spine, which is little longer than first spine. Margin of soft dorsal straight, the rays 3 in head, the last ray slightly elongate, its length  $2\frac{1}{2}$  in head. Anal similar to soft dorsal; its last ray considerably produced; its first soft rays when depressed reaching little beyond the base of the last ray; anal spines slender and regularly graduated, the third  $3\frac{2}{3}$  in head. Caudal very deeply forked, the upper lobe the longer, its length 4 times length of middle rays, which are  $3\frac{1}{3}$  in head. Upper lobe almost filamentous, longer than head. Ventrals,  $1\frac{2}{3}$  in head. Pectorals falciform, reaching almost to anal,  $1\frac{1}{5}$  in head.

Color in life, brilliant rose-red; bases of the scales deeper, sides and belly abruptly paler, rosy. Mouth reddish within; lining of gill-cavity reddish. Fins all rosy. Spinous dorsal and caudal bright red, the other fins paler. In spirits these colors fade, the fish becoming rosy white. This most beautiful species is abundant in the markets of Havana, where it is known as *Cachucho*. It is found in rather deep water, with such forms as *Lutjanus profundus*, *buccanella*, *mahogani*, *Rhomboplites aurirubens*, *Aprion macrophthalmus* and *Tropidinius dentatus*. These fishes are a little lower down in the bathymetric scale than *Lutjanus vivanus* which in turn inhabits deeper water than the other Lutjani. In still deeper water than any of these, is found *Verilus sordidus*, which is a true deep-water fish.

The *Cachucho* reaches a length of two feet or more, and is esteemed as a food-fish. The synonymy of the species offers no complications, although its generic relations have been often misunderstood. This and some other Cuban *Lutjaninae* bear considerable resemblance to certain Japanese types, but it is improper to regard them as specifically identical with their Asiatic representatives until specimens have been fully compared.

#### VIII.—Genus VERILUS.

VERILUS, Poey, *Memorias de Cuba*, ii, 125, 1860 (*sordidus*).

The genus is technically close to *Etelis*, although the single known species is very different in appearance from *Etelis oculatus*. The cav-

ernous character of the skull is the most striking feature of the genus *Verilus*.

### 27. *Verilus sordidus*.

*Verilus sordidus*, Poey, *Memorias*, ii, 125, 1860, tab. 12, f. 6 (Cuba); Poey, *Repertorio*, ii, 157, 1867; Poey, *Synopsis*, 291, 1868; Poey, *Enumeratio*, 32, 1875.

*Habitat*.—About Cuba, in deep water.

Head,  $2\frac{2}{5}$  ( $3\frac{2}{5}$ ); depth, 3 ( $3\frac{7}{10}$ ). D. IX, I, 10; A. III, 7. Scales (4), 4-43-9; 41 pores. Length of a specimen from Havana, 11 inches.

Body oblong, compressed, rather robust; caudal peduncle short and thick; head large; profile almost straight from snout to origin of spinous dorsal, and not at all steep. Snout very short and blunt, 4 in head. Eye very large,  $2\frac{7}{8}$  in head. Interorbital space flat, its width  $4\frac{2}{5}$  in head. Occipital keel very low. Preorbital very narrow, 7 in eye, nearly 20 in head. Maxillary reaching middle of eye, 2 in head. Mouth large, oblique, the lower jaw projecting. Upper jaw with a rather broad band of villiform teeth, the outer row scarcely enlarged; two moderate canines in front of jaw, curved inward. Lower jaw with a single series of teeth on sides of jaw, this series giving place to a very narrow villiform band in front, with two (sometimes duplicated) small canines directed nearly horizontally backward. Vomer with a narrowly  $\wedge$ -shaped patch of teeth, without backward prolongation on median line. Tongue and pterygoids without teeth. Gill-rakers numerous, their length almost half diameter of eye; 17 on the lower part of the arch, all developed. Preopercle with posterior margin weak and flexible, almost entire, becoming somewhat serrate at the angle and on lower limb; no distinct emargination, but the angle salient, membranaceous. Scales large, the rows horizontal below the lateral line; those above rather irregular, the series running upward and backward. Head scaly everywhere, the scales generally smaller than on body; opercle with 3 rows of scales, very large, one row on subopercle; cheeks with many rows of scales, those in the middle very small; one or two rows on interopercle. Base of soft dorsal and anal somewhat scaly. Branchiostegals 7. Spinous and soft dorsals entirely separate; first spine  $4\frac{1}{5}$  in second, which is  $2\frac{1}{6}$  in head, the spines thence becoming gradually shorter to ninth spine, which about equals length of first spine. Last rays of dorsal and anal not produced; margin of soft dorsal slightly concave, the anterior rays longest,  $2\frac{3}{8}$  in head; anal similar to soft dorsal, its margin rather more concave; first soft rays extending beyond tips of last rays, when the fin is depressed. Anal spines moderate, the third slightly longer than second,  $2\frac{3}{8}$  in head; caudal fin short, broad, moderately forked, the upper lobe longer, its length scarcely twice that of middle rays, which are  $2\frac{2}{5}$  in head. Pectorals long, reaching to origin of anal,  $1\frac{1}{5}$  in head; ventrals  $1\frac{2}{3}$  in head.

Color in spirits dusky grey, slightly paler below; tips of spinous dorsal and ventrals jet black, the fins otherwise colored as the body;

posterior edge of caudal dusky; lining of gill-cavity, peritoneum, and posterior part of mouth jet black.

This species is rarely taken in deep water off the coast of Cuba. It is known to the fishermen as *Escolar chino*. It has never been seen elsewhere.

*List of nominal species arranged in order of date, with identifications.*

(Tenable specific names are printed in italics.)

Nominal species.	Year.	Identifications.
<i>Sparus synagris</i> , Linnæus.....	1758	<i>Lutjanus synagris</i> .
<i>Labrus griseus</i> , Linnæus.....	1758	<i>L. griseus</i> .
<i>Sparus tetracanthus</i> , Bloch.....	*1790	<i>L. griseus</i> .
<i>Sparus chrysurus</i> , Bloch.....	*1795	<i>L. chrysurus</i> .
<i>Bodianus aya</i> , Bloch.....	*1797	? <i>L. vivanus</i> .
<i>Sparus vermicularis</i> , Bl. & Sch.....	1801	<i>L. synagris</i> .
<i>Sparus caxis</i> , Bloch & Schneider.....	1801	<i>L. caxis</i> .
<i>Anthias rabinubia</i> , Bl. & Sch.....	1801	<i>L. chrysurus</i> .
<i>Anthias caballeroi</i> , Bl. & Sch.....	1801	<i>L. griseus</i> .
<i>Anthias jocii</i> , Bl. & Sch.....	1801	<i>L. jocii</i> .
<i>Bodianus ruber</i> , Bl. & Sch.....	1801	? <i>L. vivanus</i> .
<i>Bodianus striatus</i> , Bl. & Sch.....	1801	<i>L. caxis</i> .
<i>Bodianus vivanet</i> , Lacépède.....	1803	<i>L. griseus</i> .
<i>Sparus semiluna</i> , Lacépède.....	1803	<i>Ocyurus chrysurus</i> .
<i>Dipterodon plumieri</i> , Lacépède.....	1803	<i>L. synagris</i> .
<i>Lutjanus acutirostris</i> , Desmaret.....	1823	<i>L. caxis</i> .
<i>Lutjanus aubrieti</i> , Desmaret.....	1823	<i>L. synagris</i> .
<i>Etelis oculatus</i> , Cuv. & Val.....	1828	<i>Etelis oculatus</i> .
<i>Mesoprion mahogani</i> , Cuv. & Val.....	1828	<i>L. mahogani</i> .
<i>Mesoprion ricardi</i> , Cuv. & Val.....	1828	<i>L. mahogani</i> .
<i>Mesoprion unnotatus</i> , Cuv. & Val.....	1828	<i>L. synagris</i> .
<i>Mesoprion analis</i> , Cuv. & Val.....	1828	<i>L. analis</i> .
<i>Mesoprion sobra</i> , Cuv. & Val.....	1828	<i>L. analis</i> .
<i>Mesoprion vivanus</i> , Cuv. & Val.....	1828	<i>L. vivanus</i> .
<i>Mesoprion buccanella</i> , Cuv. & Val.....	1828	<i>L. buccanella</i> .
<i>Mesoprion litura</i> , Cuv. & Val.....	1828	<i>L. jocii</i> .
<i>Mesoprion linea</i> , Cuv. & Val.....	1828	<i>L. caxis</i> .
<i>Mesoprion griseus</i> , Cuv. & Val.....	1828	<i>L. griseus</i> .
<i>Mesoprion flavescens</i> , Cuv. & Val.....	1828	<i>L. caxis</i> .
<i>Mesoprion cyanopterus</i> , Cuv. & Val.....	1828	<i>L. cyanopterus</i> .
<i>Mesoprion pargus</i> , Cuv. & Val.....	1828	<i>L. cyanopterus</i> .
<i>Mesoprion aurorubens</i> , Cuv. & Val.....	1829	<i>Rhomboplites aurirubens</i> .
<i>Mesoprion isodon</i> , Cuv. & Val.....	1833	<i>L. analis</i> .
<i>Centropristis macrophthalmus</i> , Müller & Troschel.....	1848	<i>Aprion macrophthalmus</i> .
<i>Apsilus dentatus</i> , Guichenot.....	1850	<i>Tropidinius dentatus</i> .
<i>Lobotes emarginatus</i> , Baird & Girard.....	1855	<i>L. griseus</i> .
<i>Mesoprion caudanotatus</i> , Poey.....	1858	<i>L. buccanella</i> .
<i>Verilus sordidus</i> , Poey.....	1860	<i>Verilus sordidus</i> .
<i>Mesoprion campechanus</i> , Poey.....	1860	<i>L. vivanus</i> .
<i>Mesoprion profundus</i> , Poey.....	1860	<i>L. profundus</i> .
<i>Mesoprion ojanco</i> , Poey.....	1860	<i>L. mahogani</i> .
<i>Mesoprion vorax</i> , Poey.....	1860	<i>Aprion macrophthalmus</i> .
<i>Mesoprion ambiguus</i> , Poey.....	1860	? <i>L. ambiguus</i> .
<i>Mesoprion elegans</i> , Poey.....	1860	<i>Rhomboplites aurirubens</i> .
<i>Mesoprion arnillo</i> , Poey.....	1860	<i>Tropidinius dentatus</i> .
<i>Lutjanus novemfasciatus</i> , Gill.....	1862	<i>L. novemfasciatus</i> .
<i>Hoplopagnrus güntheri</i> , Gill.....	1862	<i>Hoplopagnrus güntheri</i> .
<i>Mesoprion aratus</i> , Günther.....	1864	<i>L. aratus</i> .
<i>Mesoprion albostratus</i> , Peters.....	1865	<i>L. caxis</i> .
<i>Mesoprion aurovittatus</i> , Poey.....	1868	<i>L. chrysurus</i> .
<i>Mesoprion pacificus</i> , Bocourt.....	1868	<i>L. novemfasciatus</i> .
<i>Mesoprion argenteiventris</i> , Peters.....	1869	<i>L. argenteiventris</i> .
<i>Genyroge canina</i> , Steindachner.....	1869	<i>L. caninus</i> .
<i>Lutjanus guttatus</i> , Steindachner.....	1869	<i>L. guttatus</i> .
<i>Lutjanus torridus</i> , Cope.....	1869	<i>L. vivanus</i> .
<i>Mesoprion inermis</i> , Peters.....	1869	<i>L. inermis</i> .
<i>Lutjanus cubera</i> , Poey.....	1871	<i>L. cubera</i> .
<i>Mesoprion rosaceus</i> , Poey.....	1870	? <i>L. analis</i> .
<i>Mesoprion lutjanoides</i> , Poey.....	1870	<i>L. lutjanoides</i> .
<i>Ocyurus rijgersmaei</i> , Cope.....	1871	<i>Ocyurus chrysurus</i> .
<i>Lutjanus brachypterus</i> , Cope.....	1871	<i>L. brachypterus</i> .
<i>Lutjanus purpureus</i> , Poey.....	1875	<i>L. profundus</i> .
<i>Lutjanus blackfordi</i> , Goode & Bean.....	1878	<i>L. vivanus</i> .
<i>Lutjanus stearnsi</i> , Goode & Bean.....	1878	<i>L. griseus</i> .
<i>Lutjanus prieto</i> , Jordan & Gilbert.....	1881	<i>L. novemfasciatus</i> .
<i>Lutjanus colorado</i> , Jordan & Gilbert.....	1881	<i>L. colorado</i> .
<i>Aprion ariommus</i> , Jordan & Gilbert.....	1883	<i>Rhomboplites aurirubens</i> .
<i>Lutjanus dentatus</i> , A. Duméril.....	1883?	<i>L. cubera</i> .

RECAPITULATION.

We have in this paper admitted 27 species of American *Hoplopagrinae* and *Lutjaninae*. We repeat here the list of the species, with a notice of the nature of the doubts yet remaining to be solved. The distribution of the species is indicated by the letters W. (West Indies, etc.) U. (Coasts of United States), P. (Eastern Pacific, Panama, Mazatlan, &c.).

HOPLOPAGRINÆ.

I.—GENUS HOPLOPAGRUS, Gill.

1. *Hoplopagrus güntneri*, Gill. (P.)

LUTJANINÆ.

II.—GENUS LUTJANUS, Bloch.

2. *Lutjanus argentiventris*, (Peters). (P.)
3. *Lutjanus caxis*, Bloch & Schneider. (W., U.)
4. *Lutjanus jocú*, Bloch & Schneider. (W., U.)
5. *Lutjanus griseus*, L. (W., U.) (Name perhaps questionable.)
6. *Lutjanus cubera*, Poey. (W.) (Name perhaps uncertain, possibly to be called *L. caninus*.)
7. *Lutjanus noremfasciatus*, Gill. (P.)
8. *Lutjanus profundus*, Poey. (W.)
9. *Lutjanus buccanella*, (Cuv. & Val.). (W.)
10. *Lutjanus brachypterus*, Cope. (W.)
11. *Lutjanus guttatus*, (Steind.). (P.)
12. *Lutjanus synagris*, (L.). (W., U.)
13. *Lutjanus ambiguus*, Poey. (W.) (Perhaps a hybrid between *O. chrysurus* and *L. synagris*.)
14. *Lutjanus mahogani*, Cuv. & Val. (W.)
15. *Lutjanus vivanus*, (Cuv. & Val.). (W., U.) (Name to be adopted not quite certain; possibly two different species included in the synonymy.)
16. *Lutjanus analis*, (Cuv. & Val.). (W., U.)
17. *Lutjanus colorado*, Jor. & Gill. (P.)
18. *Lutjanus cyanopterus*, (Cuv. & Val.). (W.) Species unknown to us; imperfectly described.
19. *Lutjanus lutjanoides*, Poey. (W.) (Species unknown to us; possibly a hybrid between *O. chrysurus* and *Lutjanus caxis*.)
20. *Lutjanus inermis*, (Peters). (P.)
21. *Lutjanus aratus*, (Günther). (P.)

III.—GENUS OCYURUS, Gill.

22. *Ocyurus chrysurus*, (Bloch). (W., U.)

IV.—GENUS RHOMBOPLITES, Gill.

23. *Rhomboplites aurirubens*, (Cuv. & Val.). (W., U.)

V.—GENUS TROPIDINIUS, Gill.

(Possibly identical with *Apsilus* or some other earlier genus.)

24. *Tropidinius dentatus*, (Guichenot). (W.)

## VI.—GENUS APRION, Cuv. &amp; Val.

(Our species possibly a distinct generic group, *Platyminius* Gill.)

25. *Aprion macrophthalmus*, (Müller & Troschel). (W.) (Possibly identical with *Aprion filamentosus* from the Isle de France.)

## VII.—GENUS ETELIS, Cuv. &amp; Val.

26. *Etelis oculatus*, Cuv. & Val. (W.)

## VIII.—GENUS VERILUS, Poey.

27. *Verilus sordidus*, Poey. (W.)

INDIANA UNIVERSITY,  
August 12, 1884.

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DESCRIPTION OF FOUR NEW SPECIES OF CYPRINIDÆ IN THE  
UNITED STATES NATIONAL MUSEUM.

By DAVID S. JORDAN and SETH E. MEEK.

1. *Chiola camura*, sp. nov.

Head,  $4\frac{1}{5}$  in length to base of caudal; depth,  $3\frac{1}{2}$ . D. 8; A. 9. Scales, 6-38-4. Teeth, 1, 4-4, 1. Length (12256, Arkansas River at Fort Lyon, Colorado), 4 inches.

Subgenus *Cyprinella*, Girard.

Body oblong, compressed, rather robust; the back considerably elevated, especially anteriorly. The anterior profile rather steep and slightly concave, there being a slight depression over anterior part of eye. Snout bluntly decurved at tip; its length  $3\frac{1}{2}$  in head; the height of its vertical tip nearly equal to diameter of eye. Eye small, about  $4\frac{1}{3}$  in head; mouth small, somewhat oblique, the lower jaw included, the maxillary reaching vertical from front of orbit; its length  $3\frac{1}{2}$  in head. Premaxillary in front on a line with lower margin of eye.

Scales large, not very closely imbricated along sides of body. Breast scaly; 16 scales in front of dorsal. Lateral line strongly decurved.

Teeth, 1, 4-4, 1, hooked, with narrow grinding surface; the edges slightly crenate.

Insertion of dorsal slightly behind that of ventrals, a little nearer tip of snout than base of caudal. Dorsal fin higher than long; its base  $1\frac{4}{5}$  in head; its longest rays  $1\frac{1}{5}$  in head. Anal rather low and short; tips of ventrals reaching vent; length of the fin  $1\frac{2}{3}$  in head. Tips of pectorals not reaching more than  $\frac{2}{3}$  distance to origin of ventrals; the length of the fin  $1\frac{1}{2}$  in head.

Color, in alcohol, brownish above; sides and below silvery; tips of anterior rays of caudal dusky. A large black blotch on posterior rays of dorsal; other fins plain.

The two specimens (one 3, the other 4, inches in length) upon which