

1788. *Harpurus* Forster (MSS ?) = Teuthis.  
 1788. *Harpurus* vel *Acanthurus* Forster in Gmelin = Teuthis.  
 1792. *Harpurus* Forster in Walbaum = Teuthis.  
 1801. *Monoceros* (Bloch) Schneider = MONOCEROS.  
 1801. *Amphacanthus* (Bloch) Schneider = Siganus.  
 1801. *Acanthurus* (Bloch) Schneider = Teuthis.  
 1802. *Naso* Lacépède = Monoceros.  
 1802. *Aspisurus* Lacépède = Teuthis.  
 1803. *Buro* Commerson in Lacépède = Siganus.  
 1803. *Opisotomus* Commerson *fide* Day = Siganus.  
 1803. *Prionurus* Lacépède = PRIONURUS.  
 1815. *Nasouus* Rafinesque = Monoceros.  
 1817. *Siganus* Cuvier = Siganus.  
 1829. *Naseus* (Commerson) Cuvier = Monoceros.  
 1829. *Axinurus* Cuvier = Monoceros.  
 1829. *Priodon* Cuvier = Monoceros.  
 1832. *Teuthis* Bonaparte (subg. of Teuthis).  
 1832. *Acanthurus* Bonaparte (subg. of Teuthis).  
 1832. *Scopas* Bonaparte (subg. of Teuthis) = Zebrasoma ?  
 1832. *Ctenodon* Bonaparte (subg. of Teuthis) = Ctenochætus ?  
 1832. *Priodontichthys* Bonaparte = Monoceros (= Priodon Cuvier).  
 1835. *Keris* Cuvier & Valenciennes = Monoceros.  
 1839. *Acanthurus* Swainson = Teuthis.  
 1839. *Teuthys* Swainson = Teuthis.  
 1839. *Ctenodou* = Teuthis.  
 1839. *Harpurus* = Zebrasoma.  
 1839. *Zebrasoma* = ZEBRASOMA.  
 1839. *Callicanthus* = Monoceros.  
 1839. *Teuthis* Gray = Teuthis.  
 1854. *Teuthis* Gronow = Siganus.  
 1854. *Acronurus* Gronow = Teuthis.  
 1861. *Acronurus* Günther = Teuthis.  
 1861. *Rhombotides* Bleeker = Teuthis.  
 1861. *Scopas* Kner = Zebrasoma.  
 1876. *Rhombotides* Day = Teuthis.  
 1876. *Ctenodon* Day = Ctenochætus.  
 1876. *Harpurus* Day = Zebrasoma.  
 1884. CTENOCHÆTUS Gill.  
 1884. COLOCOPUS Gill.

## A REVIEW OF THE SPECIES OF THE GENUS HÆMULON.

By DAVID S. JORDAN and JOSEPH SWAIN.

In the present paper is given the synonymy of the known species of the genus *Hæmulon* Cuvier, with an analysis of their characters, and re-descriptions of the species which have been collected by Professors Jordan and Gilbert.

All the species of *Hæmulon* are American. The genus is very closely related to *Pomadasys*, Lac. (= *Pristipoma*, Cuv.), the only tangible points of difference being the large mouth with curved gape, and the closely

scaled soft dorsal and anal fins. All the species have more or less of orange on the inside of the mouth, a trait of coloration not found in *Pomadasys*. The amount of redness is greatest in those species having the largest mouth. It is true that certain species of *Pomadasys* (*crocro*, *humilis*, &c.), have the mouth larger than in certain species of *Hæmulon* (*tæniatum*, *chrysargyreum*). It is also true that while the soft dorsal and anal in many of the species referred to *Pomadasys* are free from scales, in certain of the subgenera of the latter genus (*Hæmulopsis*, *Anisotremus*) these fins are scarcely less scaly than in *Hæmulon*. It is probably also true that certain species of *Hæmulon* (*tæniatum*) are more closely related to species of the section *Hæmulopsis* of *Pomadasys* (*axillaris*, *nitidus*, *leuciscus*) than this section is to some other species usually placed in the same genus.

There is no doubt, however, that the species of *Hæmulon* form a natural group, and no writer since Desmarest and Cuvier has questioned the right of this group to generic rank.

It has been generally conceded that the group will not admit of further subdivision. The most aberrant of the species (*maculicauda*) was, in 1862, recognized by Dr. Gill as the type of a distinct genus *Orthostæchus*, distinguished by the arrangement of its scales. In 1862 these fishes were the subject of an elaborate study by Mr. Samuel H. Scudder. Nothing has, however, been published by this writer, our knowledge of his conclusions being limited to a nominal list published by Mr. F. W. Putnam. (Bulletin Mus. Comp. Zool., 1863, 12.)

In this list four generic names are recognized, two of them new, but not defined, and hence undeserving of notice. The species are thus grouped:

HÆMYLUM, *formosum* (*plumieri*), *elegans*, *ararà* (*plumieri*).

DIABASIS, *albus*.

ANARMOSTUS, *flavolineatus*, *serratus* (*parræ*).

BATHYSTOMA, *melanurum* (*aurolineatum*), *chrysopterum* (*rimator*).

Later, another genus, *Brachygenys*, likewise left undefined, was proposed by Mr. Scudder for *tæniatum*, Poey. It is mentioned by Poey, (Syn. Pisc. Cubens., 1868, p. 319.)

We are unable to see any distinction whatever for the groups called *Hæmylum*, *Diabasis*, and *Anarmostus*, and think that if these be recognized as genera, most of the remaining species should be elevated to the same rank. *Bathystoma* and *Brachygenys* are better differentiated, but neither in our opinion should be regarded as a distinct genus. No advantage to science comes from such minute generic subdivision.

Most writers have adopted for this genus the very appropriate name of *Hæmulon*, given to it by Cuvier in 1829. This name is not strictly correct in its form, and it has been sometimes written with a greater approach to classical exactness *Hæmulum*, which is an abridgment of the full form, *Hæmatulum*. By a curious blunder several purists have written *Hæmylum*, which is much worse than *Hæmulon*. The name is

expressly stated by Cuvier to be derived from *αἷμα*, blood, and *δύλον*, gums.

The name *Diabasis* of Desmarest (1823) has priority over *Hæmulon*, and has been substituted for the latter by Bennett, Bleeker, Jordan and Gilbert and by others. This name is, however, preoccupied\* in Coleoptera by the genus *Diabasis*, Hoffmannsegg, 1819. There appears, therefore, to be no doubt of the propriety of the retention of the name *Hæmulon*. *Hæmulon sciurus* (Shaw) (*elegans* Cuvier), the first species mentioned by Cuvier, may be regarded as the type of the genus.

Twenty species of *Hæmulon* are recognized by us as probably valid. These we group in five sections or subgenera of rather slight value, for which we adopt the names *Hæmulon*, *Bathystoma*, *Brachygenys*, *Lythru- lon*, and *Orthostæchus*. Of these, *Hæmulon* contains most of the species, and exhibits a greater range of variation than the others.

The young fishes in this group differ in proportions considerably from the adults. Besides the changes usual in other fishes we may observe that in *Hæmulon* the young have the snout proportionally much shorter, so that the maxillary, although also shorter in proportion, extends further back in comparison with the eye. Nearly all the species have, when young, two more or less sharply-defined, dark, longitudinal stripes along the side, one or more along the top of the head, and a dark spot at the base of caudal. These markings persist longer in some species than in others, but traces of them, at least, may be found in the young of nearly all the species of *Hæmulon* and *Pomadasy*s. In a few species these markings persist during life.

The species are all essentially alike in respect to the pores at the chin, the height and form of the soft dorsal, the form of the nostrils, the squamation of the fins, the direction of the lateral line, &c. These common characters are, therefore, not mentioned in the following descriptions. The peritoneum is black in all species examined:

#### SYNONYMY OF THE GENUS HÆMULON.

DIABASIS, Desmarest † *Première Décade Ichthyologique*, 1823, 34 (*parra*; *flavolineatus*; not of Hoffmannsegg, Coleoptera, 1819; also used in botany).

HÆMULON, Cuvier, *Règne Animal*, ed. 2, 1829 (*elegans*, etc.).

ORTHOSTÆCHUS, Gill, *Proc. Ac. Nat. Sci. Phila.*, 1862, 255 (*maculicauda*).

HÆMYLUM, (Scudder MSS.) Putnam, *Bull. Mus. Comp. Zoöl.*, 1863, 12 (*elegans*, etc.).

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\* Bleeker, *Systema Percarum Revisum*, adopts the name *Diabasis*, assigning the date "1818?" The date given on the title page of Desmarest's paper is 1823. It is stated by Desmarest that the paper was read before the Linnæan Society of Paris, December 16, 1822.

† Le poisson que je viens de décrire me paraît, selon les principes de classification ichthyologique de M. Cuvier, devoir former un genre à part. Je lui donne le nom de *Diabasis Διαβασις* (*transitio*) pour indiquer ses rapports, d'une part, avec les *Acanthopterygiens* des genres Lutjan et Pristipome, et de l'autre avec les poissons placés dans la famille des Squamipennes.

DIABASIS, (Scudder MSS., Putnam, *l. c.* (*album*) (name only).

ANARMOSTUS, (Scudder MSS.) Putnam, *l. c.* (name only; *flavolineatum*, etc.).

BATHYSTOMA, (Scudder MSS.) Putnam, *l. c.* (name only: *jeniguano*, etc.).

BRACHYGENYS, (Scudder MSS.) Poey, Synopsis, Piscium Cubensium, 1868, 319 (name only; *taniatum*).

LYTHRULON, Jordan & Swain (subgenus nova; *flavoguttatum*).

HÆMULON, Cuvier & Valenciennes, Günther, Gill, Steindachner, Poey, Goode et auct.

DIABASIS, Bennett, Bleeker, Jordan & Gilbert, Bean et auct.

#### ANALYSIS OF SPECIES OF HÆMULON.

- a. Scales above lateral line arranged in very oblique series, not parallel with the lateral line.
- b. Jaws subequal, or the lower included; mouth little oblique; gill-rakers comparatively few and short.
- c. Dorsal spines 12 (sometimes 11 in *H. scudderi*); scales large; gill-rakers few and small (10 to 14 on lower part of anterior arch).
- d. Mouth moderate or large, its cleft more than one-third length of head; back more or less elevated; second anal spine strong, notably longer than third (*Hæmulon*).
- e. Scales below lateral line anteriorly not especially enlarged.
- f. Scales above lateral line anteriorly not much enlarged.
- g. Maxillary about two-fifths length of head, not reaching center of eye (in adult).
- h. Back and sides without yellow or blue stripes; each scale above with a median blackish spot, these forming undulating lines (spots rarely obsolete); maxillary about  $2\frac{1}{2}$  in head.
- i. Snout long, pointed, more than two-fifths length of head; preorbital very deep, its least breadth greater than length of eye (in adult); back elevated; profile usually more or less concave above eye; mouth large, the maxillary not reaching front of eye in adult; anal rather high.
- j. Sides with about six dark vertical bars; sides of head with blackish spots like the body.... **SEXFASCIATUM**, 1.
- jj. Sides without dark bars; head unspotted.
- k. (Color grayish; side with a median longitudinal band from eye to upper part of tail; two or three dark bands above this and one below; second anal spine little longer than third.)  

MACROSTOMA, 2.
- kk. Color pearly or grayish, immaculate, or with small dark spots and a faint dark lateral band; anal fin low, its first soft rays when depressed not reaching tips of last rays; second anal spine longer than third; preopercle finely serrate.  

GIBBOSUM, 3.
- ll. Snout shorter, less than two-fifths length of head; preorbital narrower, its least width not more than length of eye; back elevated; profile not concave; maxillary reaching about to front of eye in adult; spots on scales distinct, forming undulating streaks; head unspotted.

*Analysis of species of Hamulon*—Continued.

l. Series of scales from scapular scale extending backward to front of soft dorsal; snout rather long and pointed; mouth small; the maxillary  $2\frac{3}{4}$  to 3 in head; dorsal rays XII, 16; pectoral fins long,  $\frac{3}{4}$  length of head; black spots on sides coalescing in continuous stripes.

PARRÆ, 4.

ll. Series of scales from scapular scale not extending farther backward than the middle of spinous dorsal; snout shorter, not very acute; mouth larger, the maxillary about  $2\frac{1}{2}$  in head; dark spots on scales not coalescent.

m. Depth of body about  $2\frac{3}{8}$  in length; pectoral fins short, less than  $\frac{2}{3}$  length of head; scales above lateral line scarcely enlarged; dorsal spines 12, the soft rays usually 17..... ACUTUM, 5.

mm. Depth of body  $2\frac{1}{2}$  in length; pectoral fins long, more than  $\frac{2}{3}$  length of head; dorsal spines usually 11; the soft rays usually 16; scales above lateral line somewhat enlarged (in adult).

SCUDDERI, 6.

hh. Back and sides with persistent black longitudinal streaks; black spots few or none; maxillary between half and two-fifths length of head, about reaching front of pupil in the adult; snout long, about  $2\frac{1}{8}$  in head; anal spines strong, the second nearly reaching tip of last ray, its length  $2\frac{2}{3}$  in head; body rather deep. . FREMEBUNDUM, 7.

hhh. Back and sides with distinct horizontal, orange-yellow stripes, fading, but not disappearing, in spirits; no black spots anywhere; vertical fins usually dusky yellow; scales of sides slightly enlarged; maxillary  $2\frac{1}{2}$  in head, reaching front of pupil; body not very deep; snout short, not one-third length of head; second anal spine, when depressed, reaching tip of last ray, its length about half head.

CARBONARIUM, 8.

gg. Maxillary nearly or quite half length of head, reaching center of eye in adult; no black spots or stripes anywhere in the adult (except under angle of preopercle).

n. Back and sides with rows of round, silvery spots, one on each scale, these forming streaks which follow the direction of the rows of scales; anal high, its first soft rays extending, when depressed, beyond base of fin; a black blotch at base of caudal; fins all yellow; body rather elongate, the depth nearly 3 in length; snout pointed; maxillary about  $2\frac{1}{2}$  in head; second anal spine longer than third.

STEINDACHNERI, 9.

*Analysis of species of Hæmulon*—Continued.

- nn.* Back and sides with continuous yellow stripes, which are horizontal and do not everywhere follow the direction of the rows of scales; ground color bluish gray; back with a well-defined blackish area from base of dorsal to base of caudal, this color covering most of soft dorsal and caudal fins; body rather elongate, the depth 3 in length; snout moderate; longest anal rays when depressed not extending beyond tip of last ray; second anal spine  $2\frac{1}{2}$  in head.....MELANURUM, 10.
- nnn.* Back and sides of head and body with continuous blue stripes, horizontal, and not everywhere following the rows of scales; ground color bright yellow; fins yellow, the caudal dusky at base; snout moderate; teeth very strong, the anterior canine-like; longest soft rays of anal reaching beyond tip of last ray; second anal spine  $2\frac{1}{2}$  in head; depth  $2\frac{3}{8}$  in length.....SCIURUS, 11.
- ff.* Scales above lateral line anteriorly much larger than the other scales; sides of head with bright blue stripes, which extend for a short distance only on body; body without distinct markings; mouth very large, its cleft rather more than half head (in adult); anterior profile somewhat concave, the snout sharp, projecting; anal rather high, its second spine  $2\frac{1}{2}$  in head...PLUMIERI, 12.
- ee.* Scales below lateral line anteriorly much enlarged; head, back, and sides with continuous bright yellow stripes, those below following the direction of the scales, and therefore extremely undulating for the most part; fins yellow; posterior teeth canine-like; body rather deep; snout short; mouth not large, the maxillary  $2\frac{1}{2}$  in head; anal high, its second spine 2 in head.  
FLAVOLINEATUM, 13.
- dd.* Mouth small, its cleft less than one-third length of head; body rather elongate; second anal spine small; back and sides with longitudinal yellow stripes; dorsal spines 12; teeth weak; gill-rakers rather few and small (*Brachygenys*).
- o.* (Body moderately elongate, the depth more than length of head, about  $2\frac{4}{5}$  in body; snout shorter than eye, which is 3 in head, maxillary scarcely reaching front of eye; longest dorsal spine half height of body; anal rather high, its second and third spines subequal; dorsal and caudal fins blackish; other fins yellowish) ....CHRYSARGYREUM, 14.

*Analysis of species of Hæmulon*—Continued.

oo. Body elongate, the back not elevated, the depth less than length of head,  $3\frac{2}{3}$  in body; snout very short,  $3\frac{1}{3}$  in head; eye very large, 3; maxillary  $3\frac{1}{2}$  in head, reaching little past front of eye; longest dorsal spine more than half depth of body; anal low, its spines small, the second  $2\frac{1}{4}$  in head; fins all yellow.

TÆNIATUM, 15.

cc. Dorsal spines 13; anal fin low; preorbital low; gill-rakers in moderate or rather large number, 12 to 18 on lower part of arch; lower jaw not projecting; mouth little oblique; body comparatively elongate, the depth  $2\frac{1}{4}$  to  $3\frac{1}{2}$  in length; body with longitudinal yellowish stripes; scales rather small; size small (*Bathystoma*).

q. Mouth large, the maxillary reaching middle of eye, its length about half head; gill-rakers rather short and few; scales moderate, 50 to 55 in the lateral line; second anal spine scarcely larger than third,  $2\frac{1}{4}$  or more in head.

r. Body oblong, the back moderately elevated, the depth  $2\frac{1}{4}$  to 3 in length..... RIMATOR, 16.

rr. Body subfusiform, the back little elevated, the depth  $3\frac{1}{2}$  to  $3\frac{1}{2}$  in length.

AUROLINEATUM, 17.

qq. Mouth rather small, the maxillary not reaching to opposite middle of eye, its length not quite half head; gill-rakers numerous, rather long; scales small, about 70 in lateral line; second anal spine notably longer than third, more than  $\frac{2}{3}$  length of head; body more elongate than in any other species, the depth about  $3\frac{1}{2}$  in length.... QUADRILINEATUM, 18.

bb. Lower jaw projecting beyond upper; gill-rakers comparatively long and slender, about 22 on lower part of anterior arch (*Lythrulon*).

t. Mouth small, very oblique, the maxillary reaching pupil,  $2\frac{1}{2}$  in head; head short,  $3\frac{2}{3}$  in length; snout very short, acute; body rather deep; anal fin very low, its longest ray, when depressed, not nearly reaching middle of last ray; second anal spine little longer than third; scales of back and sides each with a pearly spot, these forming undulating streaks..... FLAVOGUTTATUM, 19.

aa. Scales above lateral line arranged in longitudinal series, which are throughout parallel with the lateral line; dorsal spines 13 (or 14) (*Orthostæchus*).

*Analysis of species of Hæmulon*—Continued.

- u. Body oblong, the depth 3 in length; snout short; mouth small, the maxillary reaching middle of the small eye, its length  $2\frac{1}{2}$  in head; eye large; fins low; first soft rays of anal scarcely reaching beyond tips of last rays; second anal spine little larger than third,  $2\frac{2}{3}$  in head; fourth dorsal spine, 2; sides with alternate stripes of dark brown and light grayish, the latter formed by a light pale spot on the center of each scale; a dark blotch at base of caudal; vertical fins gray.

MACULICAUDA, 20.

1. *Hæmulon sexfasciatum*.

*Hæmulon sexfasciatum*, GILL, Proc. Ac. Nat. Sci. Phila., 1862, 254 (Cape San Lucas); STEINDACHNER, Ichth. Beitr. iii, 13, 1875 (Panama).

*Diabasis sexfasciatus*, JORDAN and GILBERT, Bull. U. S. Fish Comm., 1881, 324, 1882, 107, 110 (Mazatlan, Panama); JORDAN & GILBERT, Proc. U. S. Nat. Mus., 1882, 361, 372, 626 (Cape San Lucas, Colima, Panama); JORDAN, Proc. Ac. Nat. Sci. Phila., 1883, 286 (on Peters's type of *maculosum*).

*Hæmulon maculosum*, PETERS, Berliner Monatsberichte, 1869, 705 (Mazatlan).

*Habitat*.—Pacific Coast of Tropical America, Cape San Lucas to Panama.

Head, 3 in length of body,  $3\frac{3}{4}$  in total length with caudal; depth,  $2\frac{2}{5}$  ( $3\frac{1}{8}$ ). D. XII, 17. A. III, 9. Scales, \* 6-51-14. Length (30997, Colima), 8 inches.

Form of *Hæmulon gibbosum*: Body comparatively deep, the back elevated and compressed, the anterior profile steep and nearly straight from tip of snout to above eye, where a slight angle is formed, thence rising more steeply and forming a somewhat steep curve before the dorsal. Snout pointed, of moderate length,  $2\frac{3}{4}$  in head (in specimen 8 inches in length); proportionately longer in the adult.

Mouth not very large, the maxillary reaching front of eye in young (8 inches), not nearly reaching eye in adult; its length  $2\frac{1}{2}$  to  $2\frac{3}{4}$  in head, lower jaw included. Teeth rather slender, the antrorse teeth of posterior part of lower jaw inconspicuous. Eye small ( $4\frac{1}{2}$  in head in young of 8 inches). Interorbital space convex, about 4 in head. Preorbital deep, its least depth greater than length of eye in adult,  $4\frac{2}{3}$  in head in young (8 inches). Preopercle finely and rather sharply serrate. Gill-rakers small, about 12 below angle.

\* In this paper the scales above the lateral line are counted vertically from the first dorsal spine to the lateral line; those below the lateral line from the first anal spine obliquely upward and forward to the lateral line. The scales in a longitudinal series are, as here given, the number of vertical rows above the lateral line from head to base of caudal. This number is practically the same in all species of the genus, the variations above or below 50 being slight. The number of oblique series of scales, or of pores in the lateral line is in all cases about ten fewer, or about 40.

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Scales moderate, those above lateral line not enlarged, arranged in very oblique series; those below lateral line also not enlarged, their series more nearly horizontal. Soft fins scaled as usual.

Dorsal spines rather slender, the fourth highest, 2 in head; longest soft rays 3 in head. Caudal lobes subequal,  $1\frac{1}{3}$  in head; longest anal rays high,  $2\frac{1}{3}$  in head; second anal spine longer and a little stronger than third, its tip when depressed about reaching middle of last anal ray; its length  $2\frac{3}{5}$  in head; free margin of anal somewhat concave, the tips of the first rays when depressed reaching tips of last rays. Ventral fins,  $1\frac{1}{2}$  in head; pectorals,  $1\frac{1}{4}$ .

Color pearly-grayish, with six or seven sharply defined dusky cross-bands from back to lower part of sides, fading below. These are of nearly equal width, and except the sixth and seventh of about equal distinctness, and extend slightly backward below. They are rather wider than eye, and about equal to the paler interspaces. The first is at the nape, extending to base of pectoral; the second under front of spinous dorsal; the third near middle of spinous dorsal; the fourth under last spines; the fifth and sixth under soft dorsal; the seventh, when evident, on caudal peduncle. Cheeks, opercles, and anterior part of sides with distinct roundish spots of brownish-black; these largest and best defined on the opercle. Fins nearly plain dusky-grayish.

This species is the Pacific coast representative of *Hæmulon gibbosum*, from which it differs most strikingly in its coloration. It reaches a similarly very large size, specimens of upwards of 2 feet in length having been obtained at Mazatlan by Professor Gilbert. It is generally common along the Pacific coast of tropical America.

We have examined the types both of *Hæmulon sexfasciatum* and *Hæmulon maculosum*. There is no doubt of their identity. The very young examples, types of the former species, show the cross-bands of the adult, but not the spots on the head.

## 2. *Hæmulon macrostoma*.

*Hæmulon macrostoma*, GÜNTHER, Cat. Fishes Brit. Mus. i, 308, 1859 (Jamaica).

*Habitat*.—West Indies.

This species is known to us only from the description of Dr. Günther. It is evidently related to *H. gibbosum*, and may be the young of that species. The coloration and some of the details of the form are, however, different. In coloration and some other respects it approaches *H. fremebundum*, but we cannot reconcile Dr. Günther's description with the specimens of the latter species in the National Museum.

3. *Hæmulon gibbosum*. *Margate-fish*; *Jallaó*; *Margaret Grunt*.

*Perca marina gibbosa* (the MARGATE-FISH), CATESBY, Nat. Hist. Carolina, p. 2, pl. 2, 1742 (Bahamas).

*Calliodon gibbosus*, BLOCH & SCHNEIDER, Syst. Ichthyol., 1801, 312 (name and part of description from Catesby; excl. syn. pars).

*Hæmulon gibbosum*, JORDAN, Proc. U. S. Nat. Mus., 1884, 126 (Key West); BEAN & DRESEL, Proc. U. S. Nat. Mus., 1884, 158 (Jamaica).

*Hæmulon album*, CUV. & VAL., v., 241, 1830 (St. Thomas); POEY, Repertorio, i, 310, 1867; POEY, Syn. Pisc. Cubens., 1868, 312 (Cuba, Key West); POEY, Enum. Pisc. Cubens., 1875, 45; GÜNTHER, i, 311, 1859 (Jamaica); POEY, Bull. U. S. Fish. Comm., 1882, 118 (Key West).

*Diabasis albus*, PUTNAM, Bull. Mus. Comp. Zool., 1863, 12 (name only); JORDAN & GILBERT, Syn. Fish. N. A., 924, 1883 (copied).

*Hæmulon microphthalmum*, GÜNTHER, i, 306, 1859 (America).

*Perca chromis*, BROUSSONET, MSS.

*Hæmulon chromis*, CUV. & VAL., v., 242, 1830 (Jamaica).

*Hæmulon chrysopteron*, GOODE, Bull. U. S. Nat. Mus., v., 1876, 53. (excl. syn.).

*Habitat*.—West Indies; Florida Keys to Brazil.

Head, 3 ( $3\frac{3}{5}$ ); depth,  $2\frac{2}{3}$  ( $3\frac{1}{3}$ ). D. XII, 16. A. III, 7. Scales 7 or 8—46 to 48—16. Length,  $11\frac{1}{2}$  inches. (D. XII, 18, in a second example; depth,  $2\frac{2}{5}$  in a third.)

Body comparatively deep, the back more elevated and more sharply compressed than in any other of our species; the anterior profile steep and nearly straight from tip of snout to above eye, where a slight angle is formed, the profile thence rising more steeply and forming a somewhat steep curve before the dorsal. In most specimens, especially the larger ones, the concavity above the eye is well marked, not, however, in all. Snout long, pointed, its length  $2\frac{1}{4}$  to  $2\frac{2}{5}$  in head; ventral outline nearly straight; caudal peduncle rather long.

Mouth large, the maxillary extending very nearly to front of eye, its length  $2\frac{2}{5}$  to  $2\frac{3}{5}$  in head, lower jaw included. Teeth not very large, in narrow bands, the antrorse teeth of the posterior part of lower jaw less developed than in some other species; eye small, 5 to 7 in head; inter-orbital space strongly convex, its width  $3\frac{3}{4}$  in head; preorbital deep, its least breadth  $4\frac{1}{8}$  in head; preopercle finely but sharply serrate, the teeth coarser above. In most of the specimens these serrations are distinct, but in one, not otherwise peculiar, they are scarcely distinguishable; gill-rakers rather small, about 12 below the angle.

Scales moderate, those above lateral line not enlarged, arranged in very oblique series; those below more nearly horizontal; soft parts of dorsal and anal covered with thin translucent scales.

Dorsal spines rather slender, the fourth highest, about  $2\frac{1}{5}$  in head; longest soft rays 5 in head; caudal lobes subequal,  $1\frac{1}{8}$  in head; anal moderate, its longest rays 4 in head; second anal spine stronger and longer than third,  $3\frac{1}{5}$  in head, reaching past base of the last ray when depressed; first soft rays when depressed not reaching tips of last rays; ventrals,  $1\frac{2}{3}$  in head; pectorals,  $1\frac{1}{2}$ .

Color in life of adult fishes ( $1\frac{1}{2}$  to 2 feet in length) pearly white, somewhat olivaceous above, where a few of the scales have very faint dark spots at their bases; still fainter spots visible along the scales of lower part of sides; mouth orange within; lips and a faint blotch on each side of snout light yellow; a dusky shade under edge of preopercle (much more distinct in young); fins all light olive; the soft dorsal somewhat dusky; head without stripes or spots.

Young more distinctly spotted, the spots small, round, blackish, each with a pearly edge; one under each scale of back and sides, very distinct when the fish is alive, or after its scales are removed, but disappearing almost entirely with death. In life a broad dusky lateral band is also distinct, but all traces of this disappear with death. The Cuban specimens are more dusky in color and less distinctly spotted; the coloration above rather brassy than pearly.

In all the species of *Hæmulon* Cuban specimens are decidedly more dusky than those from Key West. In several species, however, certain Cuban specimens are much paler than the average even of Key West examples. This is true notably of *sciurus*, *carbonarius*, and *parra*. The pale form of *sciurus* has even received a different specific name (*multilineatum*), but we have no doubt that these differences are dependent on character of the water or the bottom, and not on difference of species.

*Hæmulon gibbosum* reaches a length of two feet or more, and is an important food-fish both at Key West and Havana. English-speaking fishermen everywhere call it Margate-fish, while the Spanish call it Jallaó.

This is evidently the *Hæmulon album* of Cuvier & Valenciennes, and apparently their *H. chromis* also. Günther's *H. microphthalmum*, and apparently his *H. macrostoma* also, belongs to the same species. Poey has suggested that *H. schranki*, Agassiz may have been based on the young of this species, but this supposition seems to us very doubtful, not to say impossible.

The Margate-fish of Catesby, erroneously referred by Linnæus to his *Perca chrysoptera* (*Pristipoma fulvomaculatum*), and by Cuvier to his *Hæmulon chrysopterum* (*aurolineatum*), evidently belongs here.

The *Calliodon gibbosus* of Bloch & Schneider is apparently based on the figure of Catesby, which, together with the *Perca chrysoptera*, L. is quoted in the synonymy.

Schneider has evidently observed the discrepancy between the Linnæan diagnosis of *Perca chrysoptera* and Catesby's figure of the Margate-fish, and has changed the former to make it correspond with the latter. His name *gibbosus* therefore, in our opinion, belongs with the *Hæmulon* rather than with the *Pomadasy*s. It has thus priority over the name *album* of Cuvier & Valenciennes. The name *gibbosus* is, of course, suggested by the *Perca marina gibbosa* of Catesby.

4. *Hæmulon parræ*. *Black Grunt: Rouco Prieto.*

*Diabasis parra*, DESMAREST, Prem. Décade Ichthyol., 30, tab. 2, f. 2, 1823 (Havana); JORDAN & GILBERT, Bull. U. S. Fish Comm., 1881, 322.

*Hæmulon canna* ?? GÜNTHER, i., 311, 1859 (Jamaica; Puerto Cabello); POEY, Repertorio, i., 1867, 309 (not of C. & V.).

*Hæmulon caudimacula*, CUVIER, Règne Animal, ed. 2, 1829 (on *Uribaco* Maregrave, and *Diabase de Parra*, Desmarest); CUV. & VAL., v., 236, 1830 (Bahia; Cuba); GÜNTHER, i, 1859, 313 (copied); POEY, Repertorio, i, 1867, 310; SAUVAGE, MSS.; JORDAN & GILBERT, Bull. U. S. Fish Comm., 1881, 322 (redescription of original type).

*Hæmulon notatum*, POEY, Memorias, ii, 179, 1860 (Cuba); POEY, Synopsis, 317; POEY, Enumeratio, 46.

*Hæmulon retrocurrens*, POEY, Repertorio Pisc. Cubens., ii, 236, 461, 1868 (Cuba).

*Hæmulon continuum*, POEY, Enumeratio Piscium Cubensium, 1875, 46 (Cuba); POEY, Anales Soc. Hist. Nat., Madrid, 1881, 210 (Puerto Rico).

*Habitat.*—West Indies.

Head,  $2\frac{4}{5}$  ( $3\frac{2}{5}$ ); depth,  $2\frac{2}{3}$  ( $3\frac{1}{5}$ ). D. XII., 15. A. III., 8. Scales, 5-44-10 (40 pores). Length (33,258) 9 inches.

Body oblong, compressed, the back considerably elevated; head rather long; the snout pointed, rather longer and sharper than in *H. acutum*, the anterior profile straight, or a very little concave before the eyes. Snout  $2\frac{2}{3}$  in head (in young of 9 inches). Mouth rather small, smaller than in *H. acutum*, the maxillary barely reaching front of eye, its length 3 in head. Teeth of moderate size, the outer and posterior somewhat enlarged. Eye moderate,  $4\frac{2}{3}$  in head; interorbital space flat-tish, its width  $4\frac{1}{4}$  in head; preorbital moderate, its least width  $4\frac{4}{5}$  in head; preopercle moderately serrate. Gill-rakers few and small, about 12 on lower part of arch.

Scales larger than in *H. acutum* or any other of the species; those above and below lateral line about equal in size; those above arranged in series which are less oblique and more undulating than in related series, the series from the scapular scale following the direction of the lateral line for about 10 scales, then turning abruptly reaching the base of the last dorsal spine, or sometimes the anterior part of soft dorsal; soft fins scaly, as usual.

Dorsal spines of moderate strength, the fourth  $2\frac{3}{5}$  in head; longest ray of soft dorsal, 4 in head; caudal,  $1\frac{2}{3}$  in head; anal high, the second spine and the longest rays extending, when depressed, well beyond tip of last ray; longest soft ray  $2\frac{3}{4}$  in head; second spine longer and stronger than third,  $2\frac{2}{3}$  in head; pectorals long,  $1\frac{1}{3}$  in head; ventrals,  $1\frac{3}{4}$ .

Color, in spirits, pearly gray; center of each scale brownish-black, these coalescing and forming very sharply-defined continuous undulating stripes; about 16 of these between front of dorsal and front of anal. The sixth stripe extends from the scapular scale to last dorsal spine. Base of caudal blackish; fins dusky.

This species is known to us only from several specimens in the U. S. National Museum, from different points in the West Indies, to which our attention has been called by Dr. Bean. It is closely allied to *H.*

*acutum*, differing in the color, in the larger size of the scales, and the differences in their arrangement, and in the longer snout and smaller mouth.

The synonymy of this species and the next is badly entangled, and we are not sure that we have correctly distributed it all. Our fish seems to correspond to *Hæmulon canna* of Günther, and apparently to the *Hæmulon notatum*, *continuum* and *retrocurrans* of Poey. The other names of Poey (*acutum*, *albidum* and *serratum*) seem to refer rather to the next species. This species seems to be the one to which the name *Diabasis parra* and its synonym *Hæmulon caudimacula* were originally given. It agrees much better than any of the other species with the account of the type of *parra* and *caudimacula* sent to us by Dr. H. E. Sauvage, and published by us in the Bull. U. S. Fish Comm. 1881, 322. If this identification is correct, the specific name *parra* is the one to be adopted, having clear priority over all others.

NOTE ON THE DÉCADE ICHTHYOLOGIQUE OF DESMAREST.\*

We are indebted to Professor Poey for a copy of this rather rare work. It is in some regards an imitation of the excellent Ichthyologia of Broussonet (1782), and like that work was intended as one of a series of publications which should give detailed descriptions and accurate figures instead of the miserably brief diagnoses which prevailed in zoölogical works at that time. The work of Desmarest compares very favorably with most others published before Cuvier. The descriptions are fair, and the figures, except for a certain uniform snuffy brownness of the coloration, are well executed and characteristic. All the species mentioned by him were collected in Havana by Marcellin Fournier.

The following are the species mentioned with our identification of them :

- Trijonobatus torpedinus*, p. 6 (pl. 7)† = *Urolophus torpedinus*.  
*Priacanthus Cepedianus*, p. 9 (pl. 1) = *Priacanthus cepedianus*.‡  
*Lutjanus acutirostris*, p. 13 (pl. 3, f. 1) = *Lutjanus caxis*, (Bl. & Schn.).  
*Lutjanus Aubrietii*, p. 17 (pl. 4, f. 1) = *Lutjanus synagris*, (L.).  
*Umbriua F[ornieri]*, p. 22 (pl. 3, f. 2) = *Micropogon fournieri*.  
*Acanthurus Broussonetii*, p. 26 (pl. 4, f. 2) = *Acanthurus cæruleus*, Bloch.  
*Diabasis Parra*, p. 30 (pl. 2, f. 2) = *Hæmulon parra*.  
 Genus *Diabasis*, p. 34 = *Hæmulon* Cuv.  
*Diabasis flavolineatus*, p. 35 (pl. 22, f. 1) = *Hæmulon flavolineatum*.  
*Eques punctatus* Schneider, p. 40 (pl. 4) = *Eques punctatus*, Schn.  
*Holocanthus coronatus*, p. 44 (pl. 6) = *Holocanthus ciliaris*, (L.).

\* Première Décade Ichthyologique, ou Description complète de dix espèces de Poissons nouvelles, ou imparfaitement connues, habitant la mer qui baigne les côtes de l'île de Cuba. Par M. A.-G. Desmarest. Paris, 1823. Extrait du deuxième volume des Mémoires de la Société Linnéenne de Paris.

† The plates are placed at the end of the memoir without numbers. Their order does not correspond with that intended by the author, who quotes, in the text for *T. torpedinus*, "pl. 1, f. 1," and, for *P. cepedianus*, "pl. 1, f. 2."

‡ A species distinct from *P. catalufa*, according to Poey.

5. *Hæmulon acutum*. *Sailors' choice*; *Ronco Blanco*; *Bastard Margaret*.

*Hæmulon canna*, AGASSIZ, SPIX, Pisc. Brasil., 1829, p. 130, pl. 69 (not of C. & V.)  
*Hæmulon chromis*, GÜNTHER, Cat. Fish. Brit. Mus., i, 310 (Bahia; Jamaica);  
 not of C. & V.

*Diabasis chromis*, JORDAN & GILBERT, Syn. Fish N. A., 1883, 924 (Garden Key); BEAN, Cat. Fish, Exp., London, 1883, 58 (Garden Key).

*Hæmulon acutum*, POEY, Memorias de Cuba, ii, 180, 354, 1860 (Cuba); POEY, Synopsis, 315, 1868; POEY, Enumeratio, 45, 1875; BEAN and DRESEL, Proc. U. S. Nat. Mus., 1884, 158 (Jamaica).

*Hæmulon albidum*, POEY, Memorias, ii, 181, 1860 (Cuba); POEY, Synopsis, 316, POEY, Enumeratio, 46.

*Hæmulon serratum*, POEY, Memorias, ii, 181, 1860 (Cuba); POEY, Synopsis, 317; POEY, Enumeratio, 46; POEY, Anal. Hist. Nat. Madrid, 1881, 201 (Puerto Rico).

*Anarmostus serratus*, PUTNAM, Bull. Mus. Comp. Zoöl., 12, 1863 (name only).

*Hæmulon parræ*, JORDAN, Bull. U. S. Fish Comm., 1884; JORDAN, Proc. U. S. Nat. Mus., 1884, 126 (Key West) (not of Desmarest.)

? *Hæmulon brevirostrum*, GÜNTHER, Fishes, Centr. Amer., 1869, 419 (in part; specimen from Puerto Cabello).

*Habitat*.—West Indies; Southern Florida to Brazil.

Head, 3 ( $3\frac{2}{3}$ ); depth,  $2\frac{2}{3}$  ( $3\frac{1}{4}$ ). D. XII, 17; A. III, 7. Scales, 5-50-14. Length,  $10\frac{1}{2}$  inches.

Body comparatively deep, the back compressed and arched; anterior profile rather steep and convex; steep and nearly straight from tip of snout to opposite front of eye; here an obtuse angle is formed, and to the base of dorsal there is a rather even curve. In other specimens there is little or no prominence before eye. Snout comparatively high and obtuse, its length in specimens of moderate size 3 in head. Snout shorter in young specimens than in the adult, the maxillary in the young extending farther back although proportionately shorter. Mouth rather small for the genus, the maxillary usually extending a little beyond vertical from front of eye, in young nearly to middle of eye, its length  $2\frac{2}{3}$  in head; maxillary in adult barely reaching front of eye. Jaws subequal, the lower slightly included. Teeth rather strong, in moderate bands, the outer large, the antrorse teeth of the posterior part of lower jaw well developed.

Eye large, 4 in head. Interorbital space convex, its width  $4\frac{1}{3}$  in head. Preorbital rather deep, its least breadth  $5\frac{2}{3}$  in head. Preopercle finely but sharply serrate, the teeth near the angle further apart than the others but scarcely larger. In regard to the serration of the preopercle we find much variation among our specimens, some of those from Cuba corresponding more or less perfectly to *serratum*, Poey, have the preopercle always strongly serrate, while others, certainly corresponding to *acutum*, Poey, have the serrations very inconspicuous. The Key West specimens are in this respect mostly intermediate, and none of them show any other distinctive character correlated with the differences in the preopercle.

Gill-rakers small, about 15 on lower part of arch. Scales rather large,

those above lateral line not especially enlarged, arranged in very oblique series; those below more nearly horizontal; soft fins well scaled. Series of scales from scapular scale reaching fourth to sixth dorsal spine.

Dorsal spines stout, the fourth highest,  $2\frac{1}{5}$  in head; longest soft rays  $3\frac{3}{4}$  in head. Upper caudal lobe rather longest,  $1\frac{2}{5}$  in head; longest anal rays  $2\frac{1}{3}$  in head, reaching when depressed beyond the tips of the last rays. Second anal spine stronger and longer than third,  $2\frac{2}{5}$  in head, reaching when depressed nearly to the tip of the last ray. Ventrals,  $1\frac{5}{6}$  in head; pectorals short,  $1\frac{4}{7}$ .

Color in life, dull pearly grayish; belly, plain grayish, each scale on body above with a conspicuous spot of dull olive-brown, these forming interrupted, oblique, and wavy streaks; head not spotted; mouth not much red, usually faintly orange near the angle in young specimens, a black spot on opercle under angle of preopercle; iris gilt; fins all dull, blackish-gray, the ventrals more or less tipped with blackish.

Younger specimens have dark lateral stripes arranged precisely as in *H. fremebundum* and *H. rimator* and also a dark blotch at base of caudal. In the very young the spots on the scales are indistinct. Cuban specimens are mostly more dusky in color, the vertical fins mostly black, and the spots on the scales larger and almost black. In some these spots coalesce into stripes, but more usually they remain distinct. Other Cuban specimens (*albidum*) are very pale, the dark spots light brown, and specimens of every intermediate shade are in the collection. There are never any shades of blue or yellow on body or fins.

This species is common at Key West, where it is known as Sailor's Choice. It is not very often brought into the market, on account of its rather small size. The young are abundant along the shores, in numbers inferior only to *H. plumieri* and *H. rimator*. At Havana it is still more common, being brought into the market in large numbers every day. The darker specimens are called by the fishermen *Ronco prieto*, the paler ones *Ronco blanco*.

While in Havana, Professor Jordan took especial pains to select specimens representing every variety of form and coloration in this species. In the very large collection secured we find specimens answering fairly to Poey's *serratum*, *albidum*, *Hæmulon acutum* as well as other specimens variously intermediate. A type of *Hæmulon acutum* sent by Poey to the United States National Museum is identical with the types of our description. *H. chromis* of Günther is also certainly this species, but the original *chromis* of Broussonet and Cuvier seems to have been *H. gibbosum*.

If our view of the identity of these various nominal species with black spots be correct, the name *acutum* is the one to be retained. It is not impossible that the synonymy given above may be found to include more than one distinct species. If the identity of *Hæmulon canna*, Agassiz, with this species is regarded as certain, the name *canna* should supercede *acutum*. Its use by Agassiz is prior to its application to a differ-

ent species by Cuvier, although *canna* was originally a manuscript name of the latter author.

6. *Hæmulon scudderi*. *Mojarra prieta*.

*Hæmulon scudderi*, GILL, Proc. Ac. Nat. Sci. Phila., 1862, 253 (Cape San Lucas); STEINDACHNER, Ichth. Beitr. iii, 18, 1875.

*Diabasis scudderi*, JORDAN & GILBERT, Bull. U. S. Fish Comm., 1881, 324; 1882, 107, 110, (Mazatlan, Panama); JORDAN & GILBERT, Proc. U. S. Nat. Mus., 1882, 361, 626 (Cape San Lucas, Panama.)

*Hæmulon brevirostrum*, GÜNTHER, Fishes Centr. Amer., 1869, 418, (Panama ?? Puerto Cabello.)

*Hæmulon undecimale*, STEINDACHNER, Ichth. Beitr. iii, 1875, 11, (Acapulco, Panama).

*Habitat*.—Pacific coast of tropical America; Cape San Lucas to Panama.

Head,  $3\frac{1}{8}$  ( $3\frac{4}{5}$ ); depth,  $2\frac{1}{2}$  ( $3\frac{1}{8}$ ). D. XI, 16 (sometimes XII, 15). A. III, 7. Scales,  $5\frac{1}{2}$ –49–13. Length (29282, U. S. Nat. Mus., Panama)  $9\frac{1}{2}$  inches.

Body short and deep, still deeper than in *H. acutum*, the back compressed and arched; anterior profile very steep and nearly straight from the tip of the snout to the nape, then evenly convex. Snout low and short, but not obtuse, its length in specimens of moderate size, 3 in head.

Mouth comparatively small, the maxillary extending in adult barely to front of pupil, its length  $2\frac{1}{2}$  in head. Lower jaw slightly included. Teeth moderate, the posterior teeth of lower jaw largest.

Eye large, 4 in head. Interorbital space convex, its width  $3\frac{3}{8}$  in head. Preorbital rather deep, its least breadth 5 in head. Preopercle rather strongly serrate; the teeth near the angle larger and farther apart than the others.

Gill-rakers rather small, about 5 on lower part of arch.

Scales rather large; those above lateral line somewhat enlarged, notably larger than those below, and arranged in very oblique series; series of scales from scapular scale reaching fifth dorsal spine. Soft fins well scaled.

Dorsal spines stout; the fourth highest, 2 in head; longest soft rays,  $3\frac{1}{8}$  in head; upper caudal lobe,  $1\frac{2}{5}$ ; longest anal rays,  $2\frac{1}{2}$  in head, reaching when depressed beyond the tip of the last rays, the free margin of the fin straight. Second anal spine longer and stronger than third,  $2\frac{1}{10}$  in head, reaching when depressed nearly to the tip of the last ray. Ventrals,  $1\frac{1}{2}$  in head; pectorals long,  $1\frac{1}{10}$ .

Coloration precisely as in *Hæmulon acutum* and undergoing the same changes with age. Adult dull pearly grayish, light or dark, with a roundish dusky blotch at base of each scale of back and sides, these not coalescent, but forming dark interrupted lines in the direction of the rows of scales. Head unspotted, a black blotch under angle of preopercle. Fins dusky grayish, the pectorals palest.

This species is the Pacific representative of *Hæmulon acutum*. It reaches a similar size, is equally abundant, and passes through a similar range of variations and coloration.

Most of the specimens collected by Professor Gilbert at Mazatlan and Panama have 11 dorsal spines and correspond to the *Hæmulon undecimale* of Steindachner. Two or three of them have, however, 12 dorsal spines, as in the original types of *H. scudderi* and *H. brevirostrum*. We are unable to detect any other difference of importance among these specimens, and refer all to *H. scudderi*, regarding it as a species with the number of spines indifferently 11 or 12. No other species of *Hæmulon* ever has fewer spines than 12. If these should finally prove to be specifically distinct, the form with 11 spines should stand as *Hæmulon undecimale*, that with 12 spines as *Hæmulon scudderi*. The above description is especially taken from a specimen of the *undecimale* type.

#### 7. *Hæmulon fremebundum*.

*Hæmulon fremebundum*, GOODE & BEAN, Proc. U. S. Nat. Mus., 1879, 340 (Clear Water Harbor, Florida: Young); BEAN & DRESEL, Proc. U. S. Nat. Mus., 1884, 159 (Jamaica).

*Diabasis fremebundus*, JORDAN & GILBERT, Synopsis Fish. N. A., 1883, 553 (copied); BEAN, Cat. Fishes Exh. London, 1883, 57 (Garden Key, Florida).

?? *Hæmulon macrostoma*, GÜNTHER, i, 308, 1859 (Jamaica).

*Habitat*.—Southern Florida to Jamaica.

Head,  $2\frac{4}{5}$  ( $3\frac{3}{5}$ ); depth,  $2\frac{3}{4}$  ( $3\frac{1}{3}$ ). D. XII, 16. A. III, 8. Scales, 7–51–13 (9 above in an oblique series). Length (26555 U. S. Nat. Mus., Key West), 9 inches.

Body oblong, moderately compressed, the anterior profile almost straight, snout rather long and pointed, its length  $2\frac{1}{2}$  in head. Eye large,  $3\frac{4}{5}$  in head. Mouth rather large, the maxillary reaching front of pupil,  $2\frac{1}{6}$  in head. Least width of preorbital about 5 in head. Teeth moderate, the outer row in the upper jaw and the posterior teeth in both jaws considerably enlarged. Preopercle moderately serrate. Gill-rakers small.

Scales moderate, those above lateral line not enlarged; those below very slightly enlarged; scales above arranged in very oblique series, the series below oblique anteriorly becoming horizontal posteriorly.

Dorsal spines strong, the longest  $2\frac{1}{4}$  in head; soft dorsal rather high. Caudal lobes subequal,  $1\frac{2}{3}$  in head. Anal spines strong, the second longest and strongest,  $2\frac{2}{3}$  in head, its tip reaching, when depressed, beyond tip of last ray. Soft anal very high, its free margin concave, its longest ray,  $2\frac{3}{5}$  in head, reaching much beyond tip of last ray. Pectorals,  $1\frac{3}{5}$  in head. Ventrals,  $1\frac{2}{3}$ .

Color, in spirits, pearly gray, with conspicuous narrow dark streaks, arranged essentially as in the young of all the other species of *Hæmulon*, but in this species persistent through life. A median streak from tip of snout to dorsal, one from snout above eye, along sides of back, to

last ray of soft dorsal, two below this from eye above to last ray of soft dorsal, the upper one more or less interrupted behind. A fourth streak from eye nearly straight to base of caudal; traces below this of a fifth streak. A short streak from eye to gill opening, between the third and fourth streaks; this is continued on the body in a series of irregular marks and dots. A large black blotch on opercle under angle of preopercle. Fins all dusky olive, the pectorals palest, ventrals darkest.

The above description is taken from a specimen in the United States National Museum (26555), collected at Key West, in 1880, by Mr. Silas Stearns. Another specimen from Jamaica has been recorded by Dr. Bean. The original types from Clearwater Harbor, Florida, and some other specimens in the National Museum, from Garden Key, Florida, are very immature, but to all appearance are identical with the two larger examples.

These specimens are all at present recorded as belonging to *H. frembundum*, and none of the earlier names or references seem to belong to the species. We have placed in the synonymy *Hæmulon macrostoma* of Günther with much doubt, thinking it unlikely that the two species can be identical. *Hæmulon frembundum* must be a rare species. It was not obtained by Professor Jordan either at Key West or Havana, and none of Poey's accounts seem to refer to it.

We are indebted to Dr. Bean for calling our attention to the characters which distinguish this species from *H. acutum*.

**8. *Hæmulon carbonarium*. Ronco Carbonero.**

*Hæmulon carbonarium*, POEY, Memorias de Cuba, II, 176, 1860 (Cuba); POEY, Synopsis, 1868, 315; POEY, Enumeratio, 44, 1875.

*Habitat*.—Coasts of Cuba.

Head, 3 ( $3\frac{3}{4}$ ); depth,  $2\frac{4}{5}$  ( $3\frac{3}{5}$ ). D. XII, 16. A. III, 8. Scales, 7-55-14. Length, 9 inches.

Body oblong; the back not greatly elevated; the profile nearly straight or slightly convex from tip of snout to above eye; thence gibbous to front of dorsal; snout short, moderately pointed, its length  $3\frac{1}{6}$  in head.

Mouth not very large; the gape somewhat curved; the maxillary extending nearly or quite to front of pupil, its length  $2\frac{1}{2}$  in head. Lower jaw rather included. Teeth strong, much as in *H. sciurus*, but a little shorter.

Eye large,  $3\frac{3}{8}$  in head; interorbital space flattish, 4 in head; preorbital moderate, its least breadth 6 in head; preorbital finely but rather sharply serrate; gill-rakers small.

Scales moderate, those below lateral line anteriorly moderately enlarged, their series nearly horizontal; series above lateral line very oblique.

Dorsal spines slender and high, the fourth,  $1\frac{7}{8}$  in head; longest soft rays,  $3\frac{1}{2}$ ; upper caudal lobe a little longer than lower,  $1\frac{1}{2}$  in head;

longest anal rays,  $2\frac{1}{2}$  in head, their tips when depressed reaching beyond the tips of the last rays; second anal spine strong, 2 in head, its tip reaching when depressed about to the tip of the last soft ray; ventrals,  $1\frac{1}{2}$  in head; pectorals,  $1\frac{2}{7}$ .

Color in life light bluish-gray, much as in *plumieri*; body with 7 or 8 deep brassy-yellow stripes which are horizontal above, those below the lateral line a little curved, following the rows of scales; stripes narrower than interspaces of ground-color; 3 stripes above lateral line, 3 or 4 below, the latter paler; little black under angle of preopercle; caudal blackish-yellowish at tip; soft dorsal, anal, and ventrals yellowish-gray, the distal portion blackish; spinous dorsal bluish, deep yellow at base and edge; a yellowish stripe along middle of fin; pectoral plain, a yellowish bar across its base; mouth deep red, its angle dusky.

In spirits this fish is grayish, more or less shaded with dusky, the stripes rather faint orange-brown.

A few specimens of this species have the ground-color much paler, the yellow stripes lighter, and the fins all bright yellow without dusky shades. All these were procured of the same fisherman. They probably represent a variation due to the character of the bottom, and are apparently analogous to the form of *H. sciurus*, which has been called *H. multilineatum*.

This species is common at Havana, where it is known as Ronco Carbonero. It reaches a length of about 10 inches. It has not yet been noticed outside of Cuba, unless *Hæmulon schranki* or some of the names of Cuvier referred by us to the synonymy of *H. flavolineatum* should prove to belong here. The relations of this species are probably rather with *H. flavolineatum* than with *H. sciurus*.

#### 9. *Hæmulon steindachneri*.

*Hæmulon schranki*, AGASSIZ, SPIX, Pisc. Brasil., 1829, 121, pl. 69.

*Hæmulon caudimacula*, STEINDACHNER, (Brazil), Ichthyol. Beiträge, iii, 15, 1875 (Acapulco, Rio Janeiro, Rio Grande do Sul, Maranhão; not of Cuv. & Val.).

*Diabasis steindachneri*, JORDAN & GILBERT, Bull. U. S. Fish. Comm., 1881, 322 (Mazatlan, Panama); JORDAN & GILBERT, Bull. U. S. Fish. Comm., 1882, 107, 110 (Panama; Mazatlan); JORDAN & GILBERT, Proc. U. S. Nat. Mus., 1882, 361, 372 (Cape San Lucas, Colima).

*Hæmulum flaviguttatum*, BEAN, Proc. U. S. Nat. Mus., 1880, 96 (Colima; no description; not of Gill).

*Habitat*.—Pacific coast of tropical America; coast of Brazil.

A species of small size, generally common on the Pacific coast of tropical America. According to Steindachner it also occurs in abundance on the southeast coast of Brazil.

As this species has been already fully described in the Bulletin of the U. S. Fish Commission, no further notice of it is necessary here.

The very unsatisfactory description and figure of *H. schranki*, Agassiz

do not permit us to identify the species. It resembles the present species as much as any, but not enough to lend even probability to an identification.

10. *Hæmulon melanurum*. *Jeniguana*.

*Perca marina cauda nigra* (the BLACK-TAIL), CATESBY, Hist. Carolina tab. 7, f. 2 (Bahamas).

*Perca melanura*, LINNÆUS, Syst. Nat., x, 292, 1858; xii, 486, 1766 (based on Catesby's figure); GMELIN, Syst. Nat., 1788, 1319.

*Bathystoma melanurum*, PUTNAM, Bull. Mus. Comp. Zoöl., 1863, 12 (name only).

*Hæmulon melanurum*, COPE, Trans. Am. Philos. Soc., 1871, 471 (New Providence, St. Martin's, St. Croix).

*Hæmulon dorsale*, POEY, Memorias, ii, 179, 1860 (Cuba); Synopsis, 1868, 308; Enumeratio, 1875, 44).

*Habitat*.—West Indies.

Head, 3 ( $3\frac{3}{4}$ ); depth, 3 ( $3\frac{3}{4}$ ). D. XII, 16; A. III, 8. Scales, 6-50-15. Length, 10 inches.

Body comparatively elongate, the back not much elevated, the profile slightly convex from tip of snout to front of eye; thence more convex to front of dorsal. Snout of moderate length, rather pointed,  $2\frac{3}{4}$  in head.

Mouth rather large, the gape a little curved, the maxillary reaching past front of pupil, its length 2 in head; teeth moderate, those in front somewhat enlarged; antrorse teeth of posterior part of jaws not very large.

Eye moderate, 5 in head; interorbital width, 4; preorbital low, its least breadth 7 in head; gill rakers, small.

Scales moderate, those above lateral line not enlarged, their arrangement about as in *D. elegans*.

Dorsal species rather slender, the fourth,  $2\frac{1}{5}$  in head. Upper caudal lobe,  $1\frac{1}{3}$  in head. Longest anal rays, 3 in head; their tips, when depressed, not extending beyond last ray. Second anal spine,  $2\frac{3}{4}$  in head, reaching, when depressed, rather beyond middle of last ray. Ventrals,  $1\frac{3}{4}$  in head; pectorals,  $1\frac{1}{2}$ .

Color in life, pearly gray. Back and sides with about ten horizontal stripes of golden yellow, narrower than the interspaces of the ground color. Snout above bluish dusky. A dusky stripe through eye from tip of snout to behind gill opening. A well-defined black area on back and caudal fin, bounded below by an almost straight line from first dorsal spine to tip of lower caudal lobe; middle part of both caudal lobes black, the edges gray. A black spot under angle of preopercle; mouth within very red; pectoral, ventrals, and anal gray, not yellow. Soft dorsal dusky along the base.

This species is rather common at Havana, where it is known as *Jeniguana*. It reaches a length of about a foot. There seems to be little doubt

of its identity with the Black-tail of Catesby, on which is based the *Perca melanura* of Linnæus. Goode has, however, identified this, without good reason, it seems to us, with the Yellow-tail of the fishermen, *Iutjanus chrysurus*.

11. *Hæmulon sciurus*. *Yellow grunt*; *Ronco Amarillo*.

*Anthias formosus*, BLOCH, Ichthyol., taf. 323, about 1795, (Antilles); BLOCH & SCHNEIDER, Syst. Ichthyol., 1801, 305. (Not *Perca formosa* L., with which it is identified; the latter is *Serranus (Diplectrum) formosus*.)

*Sparus sciurus*, SHAW, General Zoölogy, iv, 1803, pl. 64 (based on the description and figure of Bloch).

*Hæmulon sciurus*, JORDAN, Proc. U. S. Nat. Mus., 1884, 126 (Key West).

*Hæmulon elegans*, CUVIER, Règne Animal, 1829 (no description; on the figure of Bloch); CUV. & VAL., v, 227, 1830; GÜNTHER, i, 1859, 306 (Jamaica); PUTNAM, Bull. Mus. Comp. Zoöl., 1863, 12 (name only); POEY, Répertoire, i, 309, 1867; COPE, Trans. Am. Philos. Soc., 1871, 471 (St. Croix).

*Diabasis elegans*, JORDAN & GILBERT, Syn. Fish. N. A., 923 (specimen from Aspinwall); BEAN, Cat. Fish. Exh., London, 1883, 58 (Key West).

*Diabasis obliquatus*, BENNETT, Zoölogical Journal, London, v, 1835, 90 (Jamaica).

*Hæmulon luteum*, POEY, Memorias, ii, 174, 354, 1860 (Cuba); POEY, Synopsis, 317; POEY, Enumeratio, 44; POEY, Anales, Hist. Nat., Madrid, 1881, 201, (Puerto Rico).

*Hæmulon multilineatum*, POEY, Memorias, ii, 178, 1860 (Cuba); POEY, Synopsis, 318; POEY, Enumeratio, 44.

*Habitat*.—West Indies; Florida Keys to Brazil.

Head  $2\frac{3}{4}$ , ( $3\frac{1}{2}$ ); depth  $2\frac{3}{5}$ , ( $3\frac{1}{3}$ ). D. XII, 16; A. III, 8. Scales, 7-53-14. Length, 10 inches.

Body oblong; the back not specially elevated; the profile nearly straight or slightly concave from tip of snout to before eye, thence a little gibbous to base of dorsal; snout moderately acute,  $2\frac{1}{2}$  in head.

Mouth large, the gape curved, the maxillary reaching a little past front of pupil, its length 2 in head; lower jaw slightly included; teeth strong; upper jaw in front, with about three strong canines on each side, these stronger than any of the other teeth; front teeth of lower jaw rather strong, as also the antrorse teeth of the back part of both jaws.

Eye moderate, 4 in head; interorbital space convex,  $3\frac{5}{8}$  in head; preorbital moderate, its least breadth  $6\frac{2}{3}$  in head; preopercle finely serrate; gill-rakers small, about 17 below angle.

Scales moderate, those above lateral line, not at all enlarged, arranged in oblique series, those below in nearly horizontal ones.

Dorsal spines rather slender, the fourth longest,  $2\frac{2}{5}$  in head; longest soft rays, 4; upper caudal lobe longer than lower,  $1\frac{1}{3}$  in head; longest anal rays,  $2\frac{1}{4}$  in head, their tips, when depressed, extending beyond the tips of the last rays. Second anal spine stronger and longer than third,  $2\frac{1}{3}$  in head, its tip, when depressed, reaching past the middle of the last ray; ventrals,  $1\frac{2}{3}$  in head; pectorals,  $1\frac{2}{5}$ .

Color in life deep brassy yellow, scarcely paler below or darker above; head and body with about 12 conspicuous slightly wavy, longitudinal stripes of sky-blue, deepest on the snout, each with a very narrow edge of dusky olive; these stripes on the head curving upward below eye, the first stripe below eye forking near the posterior margin of preopercle and inclosing an oblong area of the ground color; iris gilt, a dark spot under the angle of preopercle; spinous dorsal, edged and shaded with yellowish, its membrane mostly bluish. Soft dorsal yellowish; caudal yellowish, broadly dusky at base, the degree of this duskiness being variable; mouth deep orange within; pectorals pale yellowish; anal and ventrals deeper yellowish. The young have more yellow on fins and less on body, with traces of a dark caudal spot. The coloration becomes fainter in spirits, the blue lines becoming gray.

Specimens from Cuba are slightly darker, but not otherwise different. Among them are two which evidently correspond to *Hæmulon multilineatum* of Poey. These, in life, showed the following coloration: Clear bright yellow, with brassy tinge, the stripes clear sky-blue, without darker edge; iris yellow, no black at base of caudal. Mouth deep red, no black under angle of preopercle; fins yellow; pectorals and ventrals little yellow. Color in life notably different from that of *Hæmulon sciurus*, but the difference consists really in the absence of dusky shading, and disappears entirely in spirits, these specimens being now scarcely distinguishable from the ordinary *sciurus*.

This species is common both at Key West and Havana, and is known as "Yellow Grunt" or "Ronco Amarillo." It is sometimes called "Boar Grunt" by fishermen who imagine it to be the male of *H. plumieri*.

This species was first noticed by Bloch, who called it *Anthias formosus*, identifying it incorrectly with *Perca formosa* of Linnæus. This name is changed by Shaw, who, still supposing it to be *Perca formosa* of Linnæus, changes the name arbitrarily to *Sparus sciurus*. A fair description and figure are given, taken, we believe, from Bloch. In our opinion the name *sciurus* should be retained for the species, although so far as Shaw was concerned its introduction was a piece of meddling impertinence. Shaw's synonymy includes the Linnæan fish, and the name *sciurus* is taken from the common name (*Squirrel-fish*) of the latter. The species which he had in mind is, however, the present one, and it had before him received no tenable specific name. This confusion was first detected by Cuvier, who, however, failed to discriminate between the Linnæan type (*Serranus formosus*) and the figure of Catesby (representing *Hæmulon plumieri*), referred by Linnæus to the same species. Cuvier called the species *elegans*. Later Poey, on the basis of inaccuracies in coloration in a plate representing *H. elegans*, has considered the Cuban fish as distinct under the name of *luteum*, while a pale variety discussed above has been called *multilineatum*. There is no doubt that both these names should be regarded as synonyms of *elegans*.

The *Diabasis obliquatus*\* of Bennett is much more like this species than any other of the genus yet known. We think that it belongs here, although the blue stripes are represented as more oblique and more numerous than we have ever seen them.

12. *Hæmulon plumieri*. Common Grunt; Ronco ronco.

*Guaibi Coara Brasiliensibus*, MARCGRAVE, Hist. Bras., 1648, 163, (Brazil).

*Perca marina capite striato* (the GRUNT), CATESBY, Hist. Carolina, &c., tab. 6, 1743. (Bahamas, &c.)

*Labrus plumieri*, LACÉPÈDE, Hist. Nat. Poiss., iii, 480, 1802, pl. 2, f. 2 (on a copy of a drawing by Plumier, identified with this species by Cuvier).

*Diabasis plumieri*, JORDAN & GILBERT, Proc. U. S. Nat. Mus., 1882, 603 (Charleston); JORDAN & GILBERT, Syn. Fish. N. A., 1883, 971; BEAN, Cat. Fishes Exh., London, 1883, 58 (Key West).

*Hæmulon plumieri*, JORDAN, Proc. U. S. Nat. Mus. 1884, 126 (Key West).

*Hæmulon formosum*, CUVIER, Règne Animal; CUVIER & VALENCIENNES, v., 1830, 230 (Martinique); GÜNTHER, i, 305, 1859 (Pernambuco, Jamaica); DE KAY, New York Fanna, 1842, 86 (? New York); COPE, Trans. Am. Phil. Soc., 1871, 470 (St. Croix; New Providence) (not *Perca formosa* L.).

*Hæmylum formosum*, PUTNAM, Bull. Mus. Comp. Zool., 1863, 12 (name only).

*Diabasis formosus*, JORDAN & GILBERT, Proc. U. S. Nat. Mus., 1882, 276 (Pensacola); JORDAN & GILBERT, Synopsis N. A., 553.

*Hæmulon arcuatum*, CUV. & VAL., ix, 481, 1833 (Charleston); HOLBROOK, Ichth. S. Car., 1860, 124, pl. xvii (Charleston); GOODE, Proc. U. S. Nat. Mus., 1879, 113 (St. Augustine; no descr.); BEAN and DRESEL, Proc. U. S. Nat. Mus., 1884, 158 (Jamaica.)

*Hæmulon arara*, POEY, Memorias, ii, 1860, 177 (Cuba); POLY, Synopsis, 1868, 318; POEY, Enumeratio, 45, 1875.

*Hæmylum arara*, PUTNAM, Bull. Mus. C. Z., 1863, 12 (name only).

*Hæmulon subarcuatum*, POEY, Memorias, ii, 1860, 419 (Cuba); POEY, Synopsis, 1868, 318; POEY, Enumeratio, 1875, 45.

*Habitat*.—West Indies; South Carolina and West Florida to Brazil. Head,  $2\frac{2}{3}$  ( $3\frac{1}{4}$ ); depth,  $2\frac{2}{3}$  ( $3\frac{1}{4}$ ). D. XII, 1.6; A. III, 8. Scales, 5–50–17. Length, 8 inches.

Body moderately elongate, the back elevated and somewhat compressed. Head long the snout sharp and projecting, its length,  $2\frac{1}{5}$  in head. Anterior profile more or less S-shaped, nearly straight from tip

\* The following is Bennett's original description, for a copy of which we are indebted to Dr. Edw. J. Nolan, of Philadelphia:

"DIABASIS OBLIQUATUS.—*Diabasis flavescens*, capite vittis cœruleis duodecim, corpore lineis cœruleis obliquis numerosis. D.  $\frac{11}{8}$ ; P. 16; V.  $\frac{1}{8}$ ; A.  $\frac{3}{2}$ ; C. 16.

"On a yellowish, somewhat fuscous, ground (perhaps altered by the spirit in which the specimen has been immersed for about three months) the markings are pale blue, in numerous vittæ; those on the head and opercula, which are somewhat broader and more deeply coloured than those of the body, are nearly longitudinal, about twelve in number; those of the body are oblique, directed upwards and backwards. The latter are formed by lines passing across the middle of each scale, and are consequently numerous, not less than sixteen or seventeen being crossed by a line drawn from the junction of the spinous and soft portions of the dorsal fin to the belly in front of the anus. On the tail, behind the dorsal and anal fins, the markings become longitudinal, in about nine rows. The fins, especially their scaly, soft portions, are more fuscous than the body; into these the markings do not extend. The lateral line, de-

of snout to before eye, there concave and thence gibbous to the front of dorsal, old specimens having the nape more gibbous than young ones.

Mouth very large, the gape curved. Maxillary reaching to a little beyond front of eye, its length  $1\frac{1}{2}$  in head; lower jaw slightly included. Teeth strong, in rather broad bands, those of the outer series enlarged; antrorse teeth of posterior part of both jaws strong.

Eye small, 5 to 6 in head. Interorbital space convex, 4 in head. Pre-orbital rather deep, its least breadth 6 in head. Preopercle finely serrate.

Gill-rakers small, about 15 below angle. Scales rather large, those above lateral line anteriorly very much enlarged, arranged in irregular and very oblique series, those below also oblique.

Dorsal spines stout, the fourth longest,  $2\frac{2}{3}$  in head; longest soft rays,  $3\frac{3}{4}$  in head; caudal lobes subequal, 2 in head; longest anal rays,  $2\frac{1}{4}$  in head, their tips when depressed about reaching tips of the last rays. Second anal spine stronger and longer than third,  $2\frac{1}{2}$  in head, its tip when depressed at least reaching middle of last ray. Ventrals,  $1\frac{3}{4}$  in head; pectorals  $1\frac{1}{2}$ .

Color in life bluish-gray, the base of the scales above bright bronze, tinged with olive. Bases of scales below lateral line also bronze, this color forming very oblique stripes running upward and backward: anterior region above lateral line with three or four sky-blue stripes, ill defined, apparently continuations of stripes of head. Head golden-bronze with many narrow stripes of deep clear blue, as if painted on, these nearly horizontal, except before eye, where a few curved ones cross the forehead; also these lines curve slightly upward below eye. Lips dusky. Inside of mouth deep orange, bordered anteriorly on the jaws by yellow; a greenish bar on opercle, partly concealed by the preopercle. Dorsal grayish, with a narrow yellow edge on spinous portion; caudal plain gray; anal, gray, tinged with yellow; ventrals, gray, with a clear blue luster, which disappears after death; pectorals, gray, a dusky bar at base. There is considerable variation in the depth of color in this species. The young is similar to the adult in color, but has traces

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flected opposite to the extremity of the dorsal fin, is yellow, and is accompanied below by a blue line; a similar line, but more distinct, passes along its upper edge. The caudal fin is forked; the spines of the dorsal are filamentous.

"The front and the extreme teeth in each jaw, especially in the upper, are longer and stronger than the others, and are somewhat hooked, a variance from the generic mark 'dents en velours' indicated by M. Cuvier. His characters may be erroneous in this respect, or the structure may be peculiar to the present species, the only one of the genus I have yet examined.

"In this description I have omitted several points which form part of the generic mark indicated by M. Cuvier, whose name for the genus (*Hosmulon*) should give way before the prior claim of that of *Diabasis*, proposed by M. Desmarest. It is to be feared, however, that in such a case the weight M. Cuvier's authority will bear down all opposition, and that even the principles of nomenclature, if he persists in retaining the appellation he has proposed, will in vain be urged against one who has engaged in his favor the gratitude of every ichthyologist."

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of two lateral bands, and a dusky caudal spot. The color in spirits differs only in the blue becoming dusky.

This species is the "Grunt" par excellence of our South Atlantic coast. It is not rare in West Florida and on the Carolina coast, while at Key West it is the most abundant food-fish, the amount taken during the year exceeding that of all other shore species combined. At Havana it is proportionally much less common, though still the most abundant of its genus. It does not usually exceed a foot in length, although individuals 18 inches long are sometimes taken. These large Grunts have the back and nape more elevated, and correspond to Cuvier's *H. arenatum*.

This species was well represented by Catesby, but Linnæus has referred Catesby's figure to the synonymy of his *Perca formosa*, which is a *Serranus*. From this mistake it has come that the name *formosum* has been transferred from the *Serranus* to the *Hæmulon*. This is inadmissible. The oldest name ever actually given to this species is that of *Labrus plumieri*, Lacépède. This name is based on a rough copy of a drawing by Plumier. Cuvier, who had examined this drawing, referred it to the present species, so that there seems to be no doubt that the name *plumieri* belongs here. Poey's *H. subarcuatum* seems to be a color variety of his *H. arara*, which is the ordinary *plumieri*.

**13. *Hæmulon flavolineatum*. French Grunt; Open-mouth Grunt; Ronco Condonado.**

*Diabasis flavolineatus*, DESMAREST, Prem. Décade Ichth., 1823, 35, pl. 2, f. 1; DESMAREST, Dictionnaire Classique, v., 235, about 1825, tab. 98, f. 1 (Cuba).

*Anarmostus flavolineatus*, PUTNAM, Bull. M. C. Z., 1863, 12 (name only).

*Hæmulon flavolineatum*, POEY, Repertorio, i, 309, 1867; POEY, Synopsis, 318; POEY, Enumeratio, 45; JORDAN, Proc. U. S. Nat. Mus., 1884, 126 (Key West).

*Hæmulon heterodon*, CUVIER, Règne Animal, ed. 2, 1829 (*Diabase rayée* of DESMAREST); CUV. & VAL., v, 1830, 255 (Martinique); POEY, Repertorio, i, 1867, 309.

? *Hæmulon canna*, CUV. & VAL., v, 253, 1830 (Martinique).

? *Hæmulon bonariense*, CUV. & VAL., v, 1830, 254 (Buénos Ayres).

*Hæmulon xanthopteron*, CUV. & VAL., v, 1830, 254 (Martinique).

*Hæmulon xanthopteron*, GÜNTHER, i, 312, 1859 (Martinique; Jamaica; Trinidad; Puerto Cabello).

*Hæmulum xanthopteron*, COPE, Trans. Am. Philos. Soc., 1871, 471 (St. Croix).

*Hæmylum xanthopteron*, BEAN, Proc. U. S. Nat. Mus., 1850, 96 (Bermuda; no descr.).

*Habitat*.—West Indies. Florida Keys and Bermudas to Brazil.

Head, 3 ( $3\frac{4}{5}$ ?); depth,  $2\frac{3}{4}$  ( $3\frac{4}{7}$ ). D. XII, 14. A. III, 8. Scales, 6–50–11. Length, 7 inches.

Body, oblong-ovate, comparatively deep and compressed; back somewhat elevated. Anterior profile, nearly straight from the tip of the

snout to the nape, thence gently convex. Snout, rather short, acute; its length 3 in head.

Mouth, not very large; the gape curved; the maxillary reaching about to opposite front of the pupil; its length  $2\frac{1}{3}$  in head. Teeth of moderate size, the outer enlarged; antrorse teeth in the posterior part of each jaw considerably enlarged; those of the upper jaw canine-like, larger than any of the other teeth.

Eye large,  $3\frac{1}{2}$  in head; interorbital width,  $3\frac{1}{2}$ ; preorbital, low; its least width,  $7\frac{1}{2}$  in head. Preopercle rather evenly and shapely serrate.

Scales, large; those of the anterior and middle parts of the body, down to the level of the lower part of pectoral, much enlarged, having nearly double the depth of the scales above lateral line. Rows above lateral line running very obliquely upward and backward; those below somewhat wavy, most of them forming a curve with the convexity downward and backward.

Dorsal spines, moderate; the fourth, 2 in head; upper caudal lobe,  $1\frac{2}{5}$ . Longest anal rays,  $2\frac{1}{3}$  in head, their tips extending when depressed beyond the tip of the last ray. Second anal spine much longer and stronger than third, 2 in head, its tip when depressed reaching nearly to tip of last ray; ventrals,  $1\frac{2}{3}$  in head; pectorals,  $1\frac{1}{3}$ .

Color in life, light bluish-gray as ground color. A bronze-yellow on the upper part of each scale, these forming continuous undulating stripes on the whole body and head, wider than the interspaces of the ground color. On caudal peduncle they are nearly straight; on anterior part of the body below lateral line they are broader and very oblique. A horizontal stripe, crossing the others, runs along the side of back from occiput to last rays of soft dorsal, of the same golden-yellow; yellow around eye; yellow shades and streaks on cheeks, not strongly marked as in *sciurus* and *plumieri*; yellow stripes on top of head; angle of mouth black, inside brick-red. A large black blotch under angle of preopercle; fins bright golden-yellow; the pectoral and spinous dorsal paler. In spirits the ground color becomes grayish and the stripes brownish or dusky.

This species is rather rare at Key West, where it is known as the *French Grunt* or *Open-mouth Grunt*. In Havana, it is more common, and is called *Ronco Condonado*. It reaches a length of nearly a foot. Its peculiar coloration and large lateral scales render it one of the most easily recognizable of the species.

There is no doubt as to the name to be retained for this species, the name *flavolineatus* of Desmarest having clear priority over all the names of species described by Cuvier, the description and figure given by him being very good. In the first description of the genus *Hæmulon*, the *Diabasis flavilineatus* is expressly mentioned, by Cuvier, as one of the species to be referred to the genus.

The synonymy of the species is, however, rather uncertain. *H. heterodon*, Cuv., certainly belongs here, and most probably *H. xanthopteron* also. *H. canna* and *H. bonariense* are so very briefly described as to be prac-

tically unrecognizable, but the account of the coloration suggests this species rather than either *H. continuum* or *H. carbonarium*.

14. *Hæmulon chrysargyreum*.

*Hæmulon chrysargyreum*, GÜNTHER, i, 314, 1859 (Trinidad); GÜNTHER, Shore Fishes, Challenger, 7 (Fernando Noronha).

*Habitat*.—West Indies to Brazil.

We know this species only from the description of Dr. Günther. It is certainly very close to *H. tæniatum* and may prove to be the adult form of that species.

15. *Hæmulon tæniatum*.

*Hæmulon tæniatum*, POEY, Memorias, ii, 182, 1860 (Cuba); POEY, Synopsis Piscium Cubens., 319; JORDAN, Proc. U. S. Nat. Mus., 1884, 126 (Key West).  
*Brachygenys tæniata*, POEY, Enumeratio Pisc. Cubens., 1875, 47.

*Habitat*.—West Indies. Florida Keys; Cuba. Head,  $3\frac{1}{5}$  ( $4\frac{1}{5}$ ); depth,  $3\frac{2}{7}$  ( $4\frac{1}{3}$ ). D. XII, 14; A. III, 9. Scales, 7-52-13. Length  $5\frac{1}{3}$  inches.

Body, more elongate than in any of the other species, except *D. auro-lineatum*, moderately compressed, the back little elevated; the profile forming a weak but nearly regular curve from in front of eyes to dorsal; before the eyes is a slight angle and the profile of the snout is rather more steep. Snout very short and obtuse, its length  $3\frac{2}{3}$  in head.

Mouth very small for the genus, smaller than in any other species, its gape but little curved; maxillary reaching a little past front of eye, its length,  $3\frac{1}{4}$  in head; teeth, weaker than in any other of our species, the posterior teeth scarcely enlarged.

Eye very large, 3 in head; interorbital space broad, convex, its breadth 4 in head; preorbital very low, its least breadth  $7\frac{1}{2}$  in head. Preopercle evenly and rather sharply serrate.

Scales small, very regularly arranged, those above lateral line in very oblique series, those below in horizontal series.

Dorsal spines slender and high, the fourth  $1\frac{3}{4}$  in head. Upper caudal lobe 1. Longest anal rays 2 in head, their tips not nearly reaching, when produced, to the tips of the last rays. Second anal spine short and weak,  $2\frac{3}{4}$  in head, not longer than third, and but little stronger, its tip when depressed reaching to base of the median soft rays and not to the tip of the third spine. Ventrals,  $1\frac{3}{5}$  in head; pectorals,  $1\frac{2}{5}$ . Color in life, bluish above, white below, sides with five stripes of clear bronze orange, four most distinct, all of equal width, about half pupil; a median stripe from middle of interorbital space to dorsal; the next pair from tip of snout above to last rays of dorsal, becoming median on caudal peduncle; one from nostril above eye to below last rays of soft dorsal; one through snout and eye, straight to base of caudal; one below eye to lower part of caudal; a very faint one from angle of mouth and along lower part of sides. Axil slightly dusky. Fins all light orange yellow, unmarked; dorsal and anal with very narrow dusky edge; no trace of dark caudal spot; mouth pale reddish within, in young, light orange in adults. In spirits the body and head are bluish silvery.

This little fish, the smallest of the genus, is abundant both at Key West and Havana. None of the specimens seen exceed 6 inches in length. This species approaches more closely than any other to the genus *Pomadasys*. It is possible it may prove to be the young of *H. chrysargyreum*, in which case the latter name has priority.

16. *Hæmulon rimator*, nom. sp. nov. *Tom-tate*; *Redmouth Grunt*; *Cæsar*.

? *Perca striata*, LINNÆUS, Syst. Nat., ed. x, 1758, 293 (North America); *ibid.*, ed. xii, 1766, 487; GMELIN, Syst. Nat., 1788, 1319 (copied).

*Hæmulon chrysopteron*, CUVIER & VALENCIENNES, v, 1830, 240 ("brought by Milbert from New York;" erroneously identified with *Perca chrysoptera*, L., which is a *Pomadasys*); DE KAY, New York Fauna, Fishes, 1842, 85, pl. vii, f. 22 (New York market); HOLBROOK, Ich'h., S. Car., 121, 1860 (Charleston).

*Hæmulon chrysopteron*, GÜNTHER, i, 313, 1859. (Jamaica; Trinidad).

*Bathystoma chrysopteron*, PUTNAM, Bull. Mus. Comp. Zool. 13, 1863 (name only).

*Diabasis chrysopterus*, JORDAN & GILBERT, Synopsis Fish. N. A., 1883, 553; BEAN, Cat. Fish. Exh., London, 1883, 53 (Pensacola).

*Hæmulon quadrilincatum*, HOLBROOK, Ichth. S. Car., 1860, 195 (Charleston; not of C. & V.).

*Hæmulon* ? *caudimacula*, POEY, Synopsis Pisc. Cubens., 1868, 319 (Cuba; not of C. & V.).

*Hæmulon parrae*, POEY, Enumeratio Pisc. Cubens., 1875, 47 (not *Diabasis parrae*, DESM.).

*Diabasis aurolineatus*, JORDAN & GILBERT, Proc. U. S. Nat. Mus., 1882, 276, 307 (Pensacola); *ibid.*, 1882, 602 (Charleston); JORDAN & GILBERT, Syn. Fish. N. A., 973, 1883; BEAN, Cat. Fishes Exh., London, 1883, 58 (Pensacola); JORDAN, Proc. U. S. Nat. Mus., 1884, 126 (Key West). (Not *Hæmulon aurolineatum*, C. & V.)

*Hæmulon rimator*, (JORDAN & SWAIN, MSS.) BEAN, Proc. U. S. Nat. Mus., 1884, 158 (Jamaica).

*Habitat*.—West Indies; North Carolina to Trinidad; apparently more abundant on our South Atlantic coast than southward.

Head,  $2\frac{5}{7}$  ( $3\frac{2}{5}$ ); depth,  $2\frac{5}{8}$  ( $3\frac{1}{2}$ ). D. XIII, 15. A. III, 8. Scales 7-52-13. Length, 8 inches. (In another example, depth 3 in length.)

Body rather elongate but not fusiform, the back somewhat elevated, the profile straight or slightly convex from tip of snout to behind eye where it becomes gradually more convex. Snout short, rather pointed, about 3 in head.

Mouth large, the maxillary reaching middle of pupil, its length 2 in head. Teeth not very strong, those of the outer series a little enlarged; the antrorse posterior teeth rather large.

Eye rather large,  $4\frac{1}{4}$  in head; interorbital space convex,  $3\frac{3}{4}$  in head; preorbital low, its least breadth 8 in head. Gill-rakers small.

Scales rather small, those above lateral line regularly arranged in oblique series, the series below nearly horizontal.

Dorsal spines slender and high, the fourth 2 to  $2\frac{1}{3}$  in head; upper caudal lobe  $1\frac{1}{2}$  in head. Longest anal rays 3 in head, their tips not reaching tips of last rays when depressed. Second anal spine but little longer than third,  $2\frac{5}{8}$  in head, the two more nearly equal than usual in this genus, their tips when depressed barely reaching middle of last ray. Ventrals,  $1\frac{3}{4}$  in head; pectorals,  $1\frac{1}{2}$ ; color in life silvery white,

slightly bluish above, with iridescent reflections. Edges of scales of body light yellow, these forming continuous light yellow lines, those below lateral line horizontal, those above very oblique. Besides these, a narrow continuous streak of light yellow above lateral line, from head to end of soft dorsal, and another from eye to middle of caudal. Head silvery yellowish above; inside of mouth red; no black under preopercle; traces of black blotch at base of caudal. Fins colorless, the lower slightly yellowish. The young are light olivaceous, grayish-silvery below; a dark bronze band, narrower than pupil, darkest in the younger specimen from snout through eye straight to base of caudal; above this, two or three dark streaks, the middle one most distinct, from eye to above gill-opening; another, beginning on top of snout on each side, passing above eye, and extending parallel with the first-mentioned stripe straight to last ray of dorsal, where it meets its fellow of the opposite side; a dark streak from tip of snout along median line to front of dorsal; a large rounded black blotch at base of caudal, some obscure dusky shading below soft dorsal and at base of pectoral; fins all plain, upper slightly dusky; anal nearly white; pectorals, caudal, and ventrals light yellow; lining of opercle plain orange; inside of mouth scarlet. In the large specimen (5½ inches long) the dark stripes are fainter, paler, and more yellowish; several fainter bands occur between the broader ones, and faint oblique streaks of light bronze follow the rows of scales, those above lateral line oblique. In spirits the adult is plain silvery. This species is very common about Charleston, where it is one of the most abundant food-fishes. About Pensacola and Key West the adult are less numerous, but at the latter place the young swarm everywhere about the wharves and shores. At Key West it is known as "Tom-tate." From its small size (rarely reaching a foot in length) it is held in low esteem, and is not often brought into the market. It was not observed by Professor Jordan at Havana.

The synonymy of this species has been much confused, although most of the confusion has been unnecessary.

This is perhaps the species indicated by Linnæus under the name *Perea striata*. The number (13) of dorsal spines and the comparison with *P. melanura* renders it likely that either this species or *H. quadrilineatum* was intended. There is nothing, however, in the description by which we can ever hope to decide which of the two should retain the name *striatum*. We are therefore not justified in applying it to either.

The following is Linnæus's account:

"striata, 22. P. pinnis dorsalibus unitis, cauda bifida, corpore striato.

"D.  $\frac{13}{28}$ . P. 15. V.  $\frac{1}{6}$ . A.  $\frac{3}{11}$ . C. 17.

"Habitat in America septentrionali. Mus. de Geer.

"Opercula subserrata. Radius secundus analis validissimus. Cauda nigra non est, qua differt a *P. Melanura*."

The name *chrysopterum* has been generally applied to the present species. This name comes from the *Perca chrysoptera* of Linnæus.

This *Perca chrysoptera* was based on a specimen sent from Charleston by Dr. Garden. This specimen is still preserved in London, and it belongs, according to Dr. Bean, who has examined it, to the species called by Cuvier *Pristipoma fulvomaculatum*. This species should therefore be known as *Pomadasys chrysopterus*. With this *Perca chrysoptera* Linnæus wrongly associates the Margate-fish of Catesby, which is *Hæmulon gibbosum (album)*. Cuvier has identified both Catesby's fish and the Linnæan *Perca chrysoptera* with the present species, which he calls *Hæmulon chrysopteron*. It is evident from the above that the name *chrysopterum* cannot properly be retained for this or any other species of *Hæmulon*.

The name *aurolineatum* has been applied by Jordan & Gilbert to this species, but erroneously, as is shown beyond. We have, therefore, no alternative but to give to the present species a new name, as none of those names by which it has been called (*chrysopterum*, *aurolineatum*, *caudimacula*, *parræ*) were originally intended for it. We have, therefore, proposed the name *Hæmulon rimator*, in allusion to the inquisitive habits shown by the young of the species. They swarm about the wharves and are a nuisance to the fisherman, nibbling off his bait.

Both *Hæmulon rimator* and *H. plumieri* have been recorded from "New York," but no good evidence exists that either species passes to the northward of Cape Hatteras. None of the others range far north of the Tropic of Cancer.

#### 17. *Hæmulon aurolineatum*. *Jéniguan*o.

*Hæmulon aurilineatum*, CUVIER & VALENCIENNES, Hist. Nat. Poiss., 1830, v, 237 (Brazil; San Domingo); GÜNTHER, i, 318 (Pernambuco); ? COPE, Trans. Am. Philos. Soc., 1871, 471 (St. Martins; name only).

*Hæmulon jéniguan*o, POEY, Memorias, ii, 183, 1860 (Cuba); POEY, Synopsis, 319; POEY, Enumeratio, 47.

*Bathystoma jéniguan*o, PUTNAM, Bull. Mus. Comp. Zool., 1863, 12 (name only).

*Diabasis jéniguan*o, JORDAN & GILBERT, Synopsis Fish. N. A., 925, 1883 (Garden Key); BEAN, Cat. Fish. Exh. London, 1883, 58 (Garden Key).

*Habitat*.—West Indies; Florida keys to Cuba.

Head, 3 ( $3\frac{2}{3}$ ); depth,  $3\frac{2}{7}$  ( $4\frac{1}{7}$ ). D. XIII, 15; A. III, 8. Scales, 8-51-13. Length, 6 to 8 inches.

Body compressed, fusiform, the back not elevated; the profile forming a weak but nearly regular curve from the tip of the snout to the front of the dorsal. Snout short, moderately pointed, 3 in head. Mouth large, curved, the maxillary reaching to slightly beyond middle of pupil, its length  $1\frac{5}{6}$  in head. Teeth not very strong, about as in *H. rimator*.

Eye large,  $3\frac{3}{4}$  in head; interorbital space convex, its width 4 in head; preorbital very low, its least breadth about 7 in head. Gill-rakers

small, about 12 on lower part of arch. Scales rather small, arranged about as in *Hæmulon rimator*.

Dorsal spines slender, rather high, the fourth  $2\frac{1}{3}$  in head. Upper caudal lobe,  $1\frac{1}{3}$  in head. Longest anal rays,  $2\frac{4}{5}$  in head, their tips not reaching nearly to tips of last rays. Second anal spine not very much longer than third; about 3 in head, reaching when depressed little past the base of the last ray. Ventrals,  $1\frac{4}{5}$  in head; pectorals,  $1\frac{1}{2}$ .

Color in life dusky gray, with seven or eight yellow longitudinal streaks, the one through eye widest; mouth very red; no dusky spot under the angle of preopercle; fins gray; dorsal scarcely yellowish.

In spirits the vertical fins and snout are somewhat dusky; the paired fins are grayish, the golden stripes faint.

This little fish is very abundant at Havana, where it is often brought into the market. It reaches a smaller size than any other of the genus except *H. taniatum*. It has been taken at Garden Key, Florida, but was not observed at Key West by Professor Jordan. In its relations it is extremely close to *H. rimator*. It is more slender and fusiform in outline, and its coloration is usually of a deeper yellow, otherwise we are unable to point out any differences of importance.

We have adopted the name *aurolineatum* for this species, and not for *H. rimator*, on the strength of the following account of the typical specimen of *Hæmulon aurolineatum* received from Dr. H. E. Sauvage, of the museum at Paris.

"*Hæmulon aurolineatum*, Brazil, Delalande, type.

"Length of the body, 0.220<sup>m</sup>, height of the body, 0.055<sup>m</sup>, length of head, .060<sup>m</sup>. Height of the body contained nearly four times in the total length, and  $3\frac{1}{2}$  without the caudal."

As the description of Cuvier & Valenciennes agrees in other respects equally well with either species, the above measurements leave no doubt of the identity of their type with *H. jéniguanu*. *Hæmulon rimator*, young or old, is never so slender as the above measurements would indicate.

#### 18. *Hæmulon quadrilineatum*. *White Grunt*.

? *Capeuna brasiliensibus*, MARCGRAVE, Hist., &c., Brasil., i, 1648, 155, fig, p. 163.

? *Grammistes trivittatus*, BLOCH & SCHNEIDER, Syst. Ichthyol., 1801, 188 (on the description of Marcgrave).

*Diabasis trivittatus*, JORDAN & GILBERT, Syn. Fish., N. A., 1883, 554 (erroneously ascribed, after Holbrook, to the Carolina fauna).

? *Serranus capeuna*, LICHTENSTEIN, Abhandl. Berlin Akad., 1821, 288 (on the description of Marcgrave).

? *Hæmulon capeuna*, CUVIER, Règne Animal, 1829 (no description; after Marcgrave).

*Hæmylum capeuna*, GOODE, Bull. U. S. Nat. Mus., v., 1876, 53, (Bermuda).

*Hæmulon quadrilineatum*, CUV. & VAL., v., 1830, 238, pl. 120 (San Domingo);

GÜNTHER, i, 316, 1859 (copied); POEY, Repertorio, i, 310, 1867; ii, 161;

POEY, Synopsis, 1868, 319 (Cuba); POEY, Enumeratio Pisc. Cubens., 1875, 47; COPE, Trans. Am. Philos. Soc., 1871, 471 (St. Croix).

*Hæmulon quinquelineatum*, POEY, Memorias, ii, 419, 1860 (Cuba).

*Habitat*.—West Indies; Bermudas to Brazil.

Head,  $3\frac{1}{2}$  ( $4\frac{1}{2}$ ); depth,  $3\frac{1}{2}$  ( $4\frac{1}{2}$ ). D. XIII, 13; A. III, 7. Scales, 7-10-18. Length (9839, Cuba),  $7\frac{1}{2}$  inches.

Body elongate, fusiform; more slender than in any other of the species; the back little elevated; not much compressed; the anterior profile gently convex; not steep.

Head small, the snout short and not very acute, its length  $3\frac{1}{2}$  in head. Mouth comparatively small, smaller than in *H. aurolineatum*, the maxillary extending to beyond front of pupil; its length  $2\frac{1}{2}$  in head. Teeth rather small, the outer and posterior a little enlarged. Lower jaw slightly included. Eye large,  $3\frac{2}{5}$  in head. Preorbital narrow, its least breadth 9 in head. Interorbital space broad, convex, its width  $2\frac{2}{5}$  in head. Preopercle moderately serrate.

Gill-rakers much longer and more numerous than in *H. aurolineatum* and other species, about 18 on lower part of anterior arch, the longest three-fourths least depth of preorbital.

Scales notably smaller than in any other species of the genus, those above lateral line in very oblique series, those below more nearly horizontal, and none of them specially enlarged. Soft fins scaly as usual.

Dorsal spines slender, rather low, the fourth or longest,  $2\frac{1}{10}$  in head. Soft dorsal long and low, the longest ray,  $3\frac{2}{5}$  in head; caudal deeply forked, the upper lobe,  $1\frac{1}{10}$  in head. Anal rather low and small, its longest rays,  $3\frac{1}{2}$  in head, not reaching when depressed to the tip of the last rays. Second anal spine notably longer and stronger than third,  $2\frac{2}{5}$  in head, reaching when depressed a little past base of last ray; ventrals  $1\frac{3}{5}$  in head; pectorals  $1\frac{3}{5}$ .

Color in spirits pearly-gray, with continuous brown streaks (golden in life), one on the median line above from tip of snout to dorsal; four on each side of top of head above eye; three of these extending on the body, but only the second continuous, this very distinct and reaching last ray of dorsal. Below these, two extending backward from eye, the uppermost distinct anteriorly, fading behind, the lowest fading anteriorly; below this traces of another dusky stripe. There are thus three or four distinct longitudinal streaks on body, with two or three fainter ones. Fins pale, probably yellowish in life.

This is one of the smaller species, probably never exceeding a foot in length. It is allied to *H. aurolineatum* and *H. rimator*, but deviates from the ordinary *Hamulon* type more than either of these.

We have not seen this species in life, it not having been obtained by Professor Jordan either at Key West or Havana. It has been included in most recent lists of our Atlantic coast species, apparently on the authority of Dr. Holbrook. But Dr. Holbrook's figure of *quadrilineatum* evidently represents a rather slender and brightly-colored individual of *H. rimator*. There remains then no reason why *H. quadrilineatum* should be retained in lists of fishes of the United States.

Poey rejects the earlier names *capeuna* and *trivittatus*, based on the description of Maregrave, because from its imperfection the latter "does not merit to be cited."

Goode has "made use of the specific name *capeuna* because it seems to have priority over that usually accepted. The name *trivittata* can scarcely stand, since it is not only inapplicable but sure to mislead, as is evident from the two other names which have been given the species, viz: *quadrilineatum* and *quinquelineatum*."

But this reason for rejecting *trivittatum* is insufficient. If Maregrave's *capeuna* can be shown to be this species, we must call it *Hæmulon trivittatum*. If Maregrave's fish cannot be identified, the species must stand as *H. quadrilineatum*.

The following is a copy of Maregrave's description, for which we are indebted to the kindness of Professor Poey:

CAPEUNA BRASILIENSIBUS Maregrave (page 155).

Piscis est corpore oblongo non lato, qui in septem digitorum longitudinem exerescit. Os illi obtuse acuminatum; habetque in superiore arque inferiore mandibula unam seriem minimorum denticulorum: tota cavitas oris cum lingua sanguinei coloris insignis. Oculi illi parvi, stuferi magnitudine, crystallini, circulo partim argenteo colore variegato. Pinnae obtinet septem; in quolibet latere post branchiam unam oblongam, tennem quasi triangularem: duas triangulares in infimo ventre; unam post anum firma spina munitum; unam per dorsi longitudinem excurrentum, ejus anterior medietas spinas munita quam recondere potest, posterior mollis et sine spinis: cauda bicornis, molli pinna. Tegitur squamulis parvis argenteis, in quibus aliquid aurei transplendet. In quolibet latere habet duas lineas crassas aurei coloris, unam a summitate oris per oculos et mediam latus tendentem ad caudam, alteram magis superius per dorsi latus pergentem. In summitate capitis livescit. Pinnae omnes sunt cinerae: "venter albus ut et ejus pinna. Coctus boni est saporis. Capitur in mari inter scopulos."

This description is accompanied by a rough figure (accidentally interchanged in the text with a figure intended to represent *Hæmulon plumieri*, the *Guaibi Coara Brasiliensibus* of Maregrave). This figure shows an elongate body, the depth less than one-third the length, and a rather large mouth the maxillary about  $2\frac{1}{3}$  in head, but still not reaching the front of the small eye. It must apparently be one of these three species, *quadrilineatum*, *ronco*, *aurolineatum*, but even this is not certain. On the whole, it most resembles *quadrilineatum*, with which it has been usually identified, but there is not much ground for this opinion, and on the whole we must agree with Poey, that it "scarcely merits citation," although it very likely belongs here.

19. *Hæmulon flaviguttatum*.

*Hæmulon flaviguttatus*, GILL, Proc. Ac. Nat. Sci., Phila., 1862, 254 (Cape San Lucas).

*Hæmulon flaviguttatum*, STEINDACHNER, Ichth. Beitr. iii, 14, 1875; Mazatlan; Acapulco; Altata; Panama); STREETS, Bull. U. S., Nat. Mus., vii, 79, 1877 (Lower California).

*Diabasis flaviguttatus*, JORDAN & GILBERT, Bull. U. S. Fish Comm., 1881, 324; 1882, 107, 110 (Mazatlan, Panama); JORDAN & GILBERT, Proc. U. S. Nat. Mus., 1882, 361, 381, 626 (Cape San Lucas, Panama).

*Hæmulon margaritifera*, GÜNTHER, Proc. Zool. Soc., 1864, 147; GÜNTHER, Fishes Centr. Amer., 1869, 419, pl. lxxv, fig. 2 (Panama).

*Habitat*.—Pacific coast of tropical America; Cape San Lucas to Panama.

Head,  $3\frac{3}{4}$  ( $4\frac{2}{3}$ ); depth,  $3\frac{1}{3}$  ( $4\frac{1}{8}$ ). D. XII or XIII, 15. A. III, 9. Scales 5-50-14. Length, (17,543, Gulf of California) 12 inches.

Form different from that of the other species of *Hæmulon*, of an elongate oval, compressed; the back elevated; the snout sharp; the caudal peduncle long and slender; the ventral outline more curved than usual in this group.

Head small and short, with short, pointed snout, which is  $3\frac{3}{5}$  in its length; anterior profile slightly concave before eye, thence steep and slightly convex to front of dorsal. Mouth small, quite strongly oblique, the maxillary extending to or slightly beyond front of pupil, its length  $2\frac{2}{3}$  in head, lower jaw considerably projecting, teeth all very small, the outer and posterior scarcely enlarged. Eye large,  $3\frac{1}{2}$  in head in adult. Interorbital space very broad,  $3\frac{2}{3}$  in head. Preorbital very narrow, its least breadth  $7\frac{1}{3}$  in head. Preopercle finely and sharply serrate, its angle projecting backward and broadly rounded.

Gill-rakers much longer and more numerous than in any other species of *Hæmulon*, the longest about equal to least breadth of preorbital, about 22 on the lower part of the arch.

Scales of moderate size, those above lateral line arranged in very oblique series, and very slightly enlarged; soft fins, scaly as usual.

Dorsal spines 12 (sometimes 13) in number, low and rather slender, the longest  $2\frac{2}{3}$  in head. Soft dorsal, long and low, the longest ray  $4\frac{1}{3}$  in head. Caudal widely forked, its upper lobe scarcely shorter than head. Anal fin long and low, the anterior rays not reaching nearly to base of last ray when depressed, their length  $3\frac{1}{2}$  in head. Second anal spine 3 in head, little longer or stronger than third. Ventrals,  $1\frac{2}{3}$  in head. Pectorals long,  $1\frac{1}{5}$ .

Color, in spirits, dark steel-gray; a small very distinct pale spot on each scale of back and sides, surrounded by darker. This spot is, in spirits, light yellowish; in life of a pearly blue. Head plain; a small dusky blotch under angle of preopercle. Fins plain (probably yellow in life). Young with a large black blotch at base of caudal, as in *H. steindachneri* and *H. maculicauda* and without the dusky horizontal streaks seen in most of the other species.

This species is generally common along the Pacific coast of tropical America. It has no analogue among the Atlantic species. On account of the peculiarities of the form of the body, the mouth, and the vertical fins, and especially the increased development of the gill-rakers, we may regard it as the type of a distinct subgenus, which we may call *Lythru-lon*. Its cranium has not been examined, but it will probably be found to differ somewhat from the usual type in *Hæmulon*.

20. *Hæmulon maculicauda*.

*Orthostachus maculicauda*, GILL, Proc. Ac. Nat. Sci., Phila., 1862, 255 (Cape San Lucas).

*Hæmulon maculicauda*, STEINDACHNER, Ichth. Beitr., iii, 14, 1875 (Mazatlan; Acapulco).

*Diabasis maculicauda*, JORDAN & GILBERT, Bull. U. S. Fish Comm., 1881, 325; 1882, 110 (Panama); JORDAN & GILBERT, Proc. U. S. Nat. Mus., 1882, 362, 372, 626 (Cape San Lucas; Panama; Colima).

*Hæmulon mazatlanum*, STEINDACHNER, Ichth. Notizen, viii, 12, taf., vi, 1869 (Mazatlan).

*Habitat*.—Pacific coast of tropical America, Cape San Lucas to Panama.

Head,  $3\frac{1}{8}$  ( $3\frac{4}{5}$ ); depth,  $2\frac{6}{7}$  ( $3\frac{1}{2}$ ). D. XIII (rarely XIV), 15; A. III, 10. Scales, 5 $\frac{1}{2}$ –51–11. Length (29256, Panama),  $8\frac{1}{5}$  inches.

Body oblong-elliptical, not much compressed; the back little elevated. Head rather large, moderately pointed anteriorly; the profile nearly straight from the snout to the nape. Snout short, low, rather pointed, its length  $3\frac{1}{2}$  in head. Mouth small, a little oblique, the maxillary extending to front of pupil, its length  $2\frac{4}{5}$  in head. Lower jaw slightly included. Teeth small, the outer and posterior little enlarged. Preorbital narrow, its least breadth  $7\frac{2}{3}$  in head. Eye large;  $3\frac{3}{4}$  in head in adult. Interorbital space moderate, convex,  $3\frac{4}{5}$  in head. Preopercle moderately serrate. Gill-rakers slightly longer and more numerous than in most other species, about 16 on lower part of arch, the longest about half depth of preorbital.

Scales large, very uniform in size over the body, arranged *above* as well as below lateral line, in longitudinal series, those above lateral line being everywhere parallel with the lateral line. Soft fins, scaly, as usual.

Dorsal spines usually 13, but sometimes 14, in number, rather slender and low, the longest  $2\frac{1}{10}$  in head. Soft dorsal low, the longest rays  $3\frac{1}{2}$  in head. Caudal moderate, the upper lobe  $1\frac{3}{5}$  in head. Anal rather low, the longest rays not reaching, when depressed to middle of last rays, their length about 3 in head. Second anal spine stronger and longer than third,  $2\frac{1}{3}$  in head, its tip about reaching base of last ray. Ventrals,  $1\frac{3}{4}$  in head; pectorals,  $1\frac{1}{5}$ .

Color dark brown; each scale of back and sides with a light, pearly gray spot on its middle, these coalescing into continuous light stripes which are sharply defined, one for each row of scales; head plain; fins plain grayish; a large dusky area on base of caudal.

This small species is rather common on the Pacific coast of tropical America. Its peculiar squamation, rendered more noticeable by the corresponding features of coloration, give it an appearance quite distinct in this genus. In other respects it departs less from the usual type than do *H. flaviguttatum* and *H. quadrilineatum*. At present, therefore, we cannot regard *Orthostæchus* as a group of higher than subgeneric value.

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

[Tenable specific names are in italics]

Nominal species.	Date.	Identifications.
<i>Perca melanura</i> , Linnæus .....	1758	<i>Hæmulon melanurum</i> .
<i>Perca striata</i> , Linnæus .....	1758	? <i>H. rimator</i> .
<i>Perca gibbosa</i> , Walbaum .....	1792	<i>H. gibbosum</i> .
<i>Grammistes trivittatus</i> , Bl. & Schn .....	1801	? <i>H. quadrilineatum</i> .
<i>Calliodon gibbosus</i> , Bl. & Schn .....	1801	<i>H. gibbosum</i> .
<i>Labrus plumieri</i> , Lacépède .....	1802	<i>H. plumieri</i> .
<i>Sparus sciurus</i> , Shaw .....	1803	<i>H. sciurus</i> .
<i>Serranus capeuna</i> .....	1821	? <i>H. quadrilineatum</i> .
<i>Diabasis parra</i> , Desmarest .....	1823	<i>H. parrae</i> ,
<i>Diabasis flavolineatus</i> .....	1823	<i>H. flavolineatum</i> .
<i>Hæmulon elegans</i> , Cuvier .....	1829	<i>H. sciurus</i> .
<i>Hæmulon heterodon</i> , Cuvier .....	1829	<i>H. flavolineatum</i> .
<i>Hæmulon caudimacula</i> , Cuvier .....	1829	<i>H. parrae</i> .
<i>Hæmulon schrankii</i> , Agassiz .....	1829	?? <i>H. steindachnerii</i> .
<i>Hæmulon canna</i> , Agassiz .....	1829	?? <i>H. acutum</i> .
<i>Hæmulon canna</i> , Cuv. & Val. ....	1830	? <i>H. flavolineatum</i> .
<i>Hæmulon bonariense</i> , Cuv. & Val. ....	1830	? Do.
<i>Hæmulon xanthopteron</i> , Cuv. & Val. ....	1830	? Do.
<i>Hæmulon aurolineatum</i> , Cuv. & Val. ....	1830	<i>H. aurolineatum</i> .
<i>Hæmulon quadrilineatum</i> , Cuv. & Val. ....	1830	<i>H. quadrilineatum</i> .
<i>Hæmulon album</i> , Cuv. & Val. ....	1830	<i>H. gibbosum</i> .
<i>Hæmulon chromis</i> , Brouss .....	1830	Do.
<i>Hæmulon arenatum</i> , Cuv. & Val. ....	1830	<i>H. plumieri</i> .
<i>Diabasis obliquatus</i> , Bennett .....	1835	<i>H. sciurus</i> .
<i>Hæmulon microphthalmum</i> , Günther .....	1859	<i>H. gibbosum</i> .
<i>Hæmulon macrostoma</i> , Günther .....	1859	<i>H. macrostoma</i> .
<i>Hæmulon chrysargyreum</i> , Günther .....	1859	<i>H. chrysargyreum</i> .
<i>Hæmulon luteum</i> , Poey .....	1860	<i>H. sciurus</i> .
<i>Hæmulon carbonarium</i> , Poey .....	1860	<i>H. carbonarium</i> .
<i>Hæmulon arará</i> , Poey .....	1860	<i>H. plumieri</i> .
<i>Hæmulon multilineatum</i> , Poey .....	1860	<i>H. sciurus</i> .
<i>Hæmulon dorsale</i> , Poey .....	1860	<i>H. melanurum</i> .
<i>Hæmulon notatum</i> , Poey .....	1860	? <i>H. parrae</i> .
<i>Hæmulon acutum</i> , Poey .....	1860	<i>H. acutum</i> .
<i>Hæmulon serratum</i> , Poey .....	1860	Do.
<i>Hæmulon albidum</i> , Poey .....	1860	Do.
<i>Hæmulon teniatum</i> , Poey .....	1860	<i>H. teniatum</i> .
<i>Hæmulon jeniguano</i> , Poey .....	1860	<i>H. aurolineatum</i> .
<i>Hæmulon subarcuatum</i> , Poey .....	1860	<i>H. plumieri</i> .
<i>Hæmulon quinquelineatum</i> , Poey .....	1860	<i>H. quadrilineatum</i> .
<i>Hæmulon scudderii</i> , Gill .....	1862	<i>H. scudderii</i> .
<i>Hæmulon sexfasciatus</i> , Gill .....	1862	<i>H. sexfasciatus</i> .
<i>Hæmulon flaviguttatus</i> , Gill .....	1862	<i>H. flaviguttatum</i> .
<i>Orthostæchus maculicauda</i> , Gill .....	1862	<i>H. maculicauda</i> .
<i>Hæmulum margaritifera</i> , Günther .....	1864	<i>H. flaviguttatum</i> .
<i>Hæmulon retrocurrens</i> , Poey .....	1868	<i>H. parrae</i> .
<i>Hæmulon brevisrostrum</i> , Günther .....	1869	<i>H. scudderii</i> .
<i>Hæmulon mazatlanum</i> , Steindachner .....	1869	<i>H. maculicauda</i> .
<i>Hæmulon maculosum</i> , Peters .....	1869	<i>H. sexfasciatus</i> .
<i>Hæmulon undecimale</i> , Steindachner .....	1875	<i>H. scudderii</i> .
<i>Hæmulon continuum</i> , Poey .....	1875	<i>H. parrae</i> .
<i>Hæmulon fremebundus</i> , Goode & Bean .....	1879	<i>H. fremebundum</i> .
<i>Diabasis steindachneri</i> , Jordan & Gilbert .....	1881	<i>H. steindachneri</i> .
<i>Hæmulon rimator</i> , Jordan & Swain .....	1884	<i>H. rimator</i> .

#### RECAPITULATION.

We have in this review admitted twenty species of *Hæmulon* as probably valid. We give here a list of the species with an indication of the doubts remaining to be solved in each case. The general distribution of

the species is indicated by the letters W. (Western Atlantic; West Indies, &c.); U (coasts of United States); P. (Eastern Pacific, Mazatlan; Panama, &c.)

Genus HÆMULON, Cuvier.

§ Subgenus *Hæmulon*.

1. *Hæmulon sexfasciatum*, Gill (P.).
2. *Hæmulon macrostoma*, Günther (W.) (Doubtful species, unknown to us; perhaps identical with *H. gibbosum*; possibly with *H. fremebundum*.)
3. *Hæmulon gibbosum*, (Bloch & Schneider), (W. U.). (Possibly more than one species included in synonymy.)
4. *Hæmulon parra*, Desmarest, (W.). (Possibly more than one species included in synonymy.)
5. *Hæmulon parra*, (Desmarest) (W. U.). (Possibly more than one species included; possibly should stand as *H. canna*.)
6. *Hæmulon scudderi*, Gill (P.). (Possibly but improbably two species confounded.)
7. *Hæmulon fremebundum*, Goode & Bean, (W. U.). (Possibly has some older name.)
8. *Hæmulon carbonarium*, Poey (W.).
9. *Hæmulon steindachneri*, Jordan & Gilbert, (P. W. ?) (Possibly should stand as *H. schranki*.)
10. *Hæmulon melanurum*, L. (W.).
11. *Hæmulon sciurus*, Shaw (W. U.).
12. *Hæmulon plumieri*, Lacépède (W. U.).
13. *Hæmulon flavolineatum*, (Desmarest) (W. U.). (Some of the synonymy doubtful.)

§ Subgenus *Brachygenys*, Scudder.

14. *Hæmulon chrysargyreum*, Günther (W.). (Species unknown to us.)
15. *Hæmulon tæniatum*, Poey (W. U.). (Possibly young of *chrysargyreum*.)

§ Subgenus *Bathystoma*, Scudder.

16. *Hæmulon rimator*, Jordan & Swain (W. U.). (Possibly should stand as *Hæmulon striatum*.)
17. *Hæmulon aurolineatum*, Cuv. & Val. (W. U.).
18. *Hæmulon quadrilineatum*, Cuv. & Val. (W.). (Should possibly stand as *H. trivittatum*.)

§ Subgenus *Lythrulon*, Jordan & Swain.

19. *Hæmulon flavoguttatum*, Gill (P.).

§ Subgenus *Orthostæchus*, Gill.

20. *Hæmulon maculicauda*, Gill (P.).

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