

SOME COLD-BLOODED VERTEBRATES OF THE FLORIDA KEYS.

BY HENRY W. FOWLER.

During June of 1904 the writer, accompanied by Mr. Stewardson Brown, of the Botanical Section of the Academy, was enabled through the generosity of Mr. Clarence B. Moore to visit the Florida Keys. The chief object of the expedition was to explore the islands for land snails of the genus *Liguus*. Incidentally we were enabled to study the flora and fauna of this most interesting region. We availed ourselves of every opportunity to gather information, but only data which I feel to be absolutely reliable is here included. The vernacular names of the different species, so far as I could judge, are those of the fishermen and residents.

Our operations extended from between a point directly south of Cape Sable, or from Grassy Key west to the Marquesas, covering an area about fifty miles in length. We did not visit the Tortugas, which are the most western of the Keys and more isolated than the Marquesas. Making Key West our headquarters, we set out after exploring that island for the Marquesas, stopping at Boca Grande Key on our way. The Marquesas bank comprises a number of islands, disposed in a more or less circular or atoll-like manner with great shallows all about, though mostly inside. Few places we visited repaid us as well as these islands. On our return we skirted the southern shores of the Keys toward Key West, stopping at Ballast Key. We then left Key West again and travelled along the southern shores of the Keys eastward to Grassy Key, stopping at Boca Chica, Sugar Loaf, Big Pine, No Name, Cudjoe's, Knight, Vaca and Grassy Keys. On our return, which was along the northern shores of these islands, we stopped at Vaca, Bahia Honda, Hailer's Rock, Little Pine, Big Pine, Summerland, Cudjoe's, Sugar Loaf, West Cudjoe's, Riding, Snipe and Jewfish Keys. Most of the Keys are more or less covered with mangroves; others, such as Big and Little Pine, have large tracts of pine forest with an undergrowth of scattered palmettos. The latter grow several feet in height, and in combination with the pines present a beautiful contrast after the monotony of mangroves. All of the islands are low, rising but a few feet above the sea-level, and most all are furnished

with rather broad white sandy beaches. Some places along these beaches are studded with mangroves, affording excellent shelter, when overhanging, for many fishes. Along a number of the Keys were flat embankments covered with long grass, and in other places coconut groves, as that on Boca Chica Key. Many Keys were covered with more fertile areas in which various tropical plants, shrubs and trees were found in abundance, often studded here and there with cacti, and sometimes presenting an impenetrable barrier. Throughout the Keys we visited the water is comparatively shallow. In some places reefs are formed where the most beautiful of tropical marine animal life abounds in luxuriance. Most of these places, we were informed, are constantly though gradually shifting, so that new charts are needed from time to time to show the changes in depth and topography. Some of the shallows are left entirely dry by the tides, and others are covered with large beds of sea-wrack. In such places many wading-birds find an abundant supply of food. We found a few pools on certain of the larger Keys, such as Big Pine, Summerland and Little Pine. They are of rather brackish-water, though I did not taste of all.

Hailer's Rock is a small flat or low island of sand-heaped rocks, with a growth here and there of a few low bushes. The southern end is of bare dry rocks running well out to sea and leaving numerous tide-pools. These pools vary in size and depth from some of a few inches in extent to others of several feet. Here such gaudy and tropical fishes as the Cock Eye Pilot, Sheep's Head, Rock Fish, and School-master were found. The Rock Fish, or Gobies and Blennies, are colored much like their surroundings, and trust in great part to this for concealment. Some are pale and others are dark. They dart swiftly from place to place when disturbed, much after the manner of our own Darters, or else hide in crevices. Though they were active, I secured a number by hand with a little trouble.

While off Key West we saw cetaceans, evidently a species of *Delphinus*. The Opossum and Raccoon were reported from Key West, and the latter also from Sugar Loaf, Big and Little Pine Keys. I saw a Rabbit on Big Pine Key and a Deer on Sugar Loaf. Deer were found formerly on Little Pine Key, but were now believed to be absent. Though I did not see the Wood Rat on Summerland Key, I was informed that they sometimes climb the trees to feed on fruits, such as the sapadilla.

FISHES.

GINGLYMOSTOMIDÆ.

1. *Ginglymostoma cirratum* (Gmelin). Shark.

Very abundant in all warm shallows about the Marquesas. At this season (June) they come in these places to copulate, and I was informed that they do not occur here, or at least were rarely seen, at other times for this purpose. I saw a male and female in coitus. On one occasion about four males were seen swimming close about a female, whose whitish belly could be seen quite a distance, as she was back down. She was also evidently awaiting their initiative. I approached in a small boat till almost directly above, when it was possible to prod them with an oar as they swam slowly about and but little agitated. A pair will remain fastened together some little time, and then suddenly part without much commotion. Their location may easily be determined in these places by a portion of the dorsal fin, and frequently also a part of the caudal, projecting above the surface. The term "cooting," employed by some fishermen for the act of copulation among these sharks, may possibly have been derived from the word courting.

Examples vary somewhat in color, some appearing pale cinnamon, though they are always distinguishable quite a distance, even when entirely under water. All I observed were large, nearly twelve or fourteen feet in length, and were not at all shy. Occasionally in shallow water, especially like that along the southern shores of Ballast Key, they were sometimes more or less exposed or with both caudal fins well out of the water when copulating.

ALOPIIDÆ.

2. *Alopias vulpes* (Gmelin). Fish Shark.

Reported to be rather numerous at times in and about the Keys. They were said to feed almost entirely on fish.

GALEIDÆ.

(*Galeus* Klein, in Walbaum, Pet. Arted. Gen. Pisc., III, 1792, p. 580. Type *Squalus galeus* Linnaeus = *Galeorhinus* Blainville, 1816-17.)

3. *Cynais canis* (Mitchill).

A small Shark was seen in the shallow water about Sugar Loaf Key.

4. *Galeocerdo tigrinus* Müller and Henle.

Reported as sometimes taken during summer.

5. *Carcharhinus lamia* (Rafinesque).

Large examples of some species of *Carcharhinus*, most likely this species, were reported under the name "Man Eater." I did not see any examples or hear any reports of *Scoliodon terræ-novæ* (Richardson), unless it was confounded with the present form.

CESTRACIONTIDÆ.

(*Cestracion* Klein, in Walbaum, Pet. Arted. Gen. Pisc., III, 1792, p. 580.

Type *Squalus zygæna* Linnæus = *Sphyrna* Rafinesque, 1810.)

6. *Cestracion tiburo* (Linnæus). Bonnet Head Shark.

Reported as rather abundant.

7. *Cestracion zygæna* (Linnæus). Hammer Head. Hammer Head Shark.

The large examples which occur about Bahia Honda Key are said to attain at least fifteen or more feet in length. *C. tiburo* is said to be small. Both species were reported as more abundant in summer.

RHINIDÆ.

(*Rhina* Klein, in Walbaum, Pet. Arted. Gen. Pisc., III, 1792, p. 580. Type

Squalus squatina Linnæus = *Squatina* Dumeril, 1806.)

8. *Rhina squatina* (Linnæus).

Occasionally taken in summer.

PRISTIDÆ.

9. *Pristis pectinatus* Latham. Saw Fish.

Reaches a considerable size. Young rather common in the shallows.

NARCACIONTIDÆ.

(*Narcacian* Klein, in Walbaum, Pet. Arted. Gen. Pisc., III, 1792, p. 580.

Type *Raja torpedo* Linnæus = *Narcabatus* Blainville, 1816.)

10. *Tetronarce occidentalis* (Storer). Electric Fish.

Found occasionally associated with species of *Dasybatus*.

DASYBATIDÆ.

(*Dasybatus* Klein, in Walbaum, Pet. Arted. Gen. Pisc., III, 1792, p. 581.

Type *Raja pastinaca* Linnæus = *Dasyatis* Rafinesque.)

11. *Dasybatus hastatus* (De Kay). Sting Ray.

Color in life pale hair-brown above, margin of disk paler or more or less narrowly whitish, and submarginally a slightly darker shade than general color of body. Tail blackish-brown, spine dark. Lower surface of body white. Iris brown.

This species was seen several times about the shallows of the Mar-

quesas. When swimming they appear to glide over the sand, from which they are distinguished with difficulty when quiet. They usually swim rapidly away upon the approach of a small boat, though we captured a single example with the harpoon. They were found in pairs, and seldom attained more than a couple of feet in width of disk.

PSALLISOSTOMIDÆ.

(*Psallisosotomus* Klein, in Walbaum, Pet. Arted. Gen. Pisc., III, 1792, p. 581. Type *Esox osseus* Linnæus.)

12. *Psallisosotomus ossens* (Linnæus). Common Gar.

Reported from about the Keys south of Cape Sable, but not seen by me.

ELOPIDÆ.

13. *Tarpon atlanticus* (Valenciennes). Tarpon.

This fish is reported to be used for food by the negroes at times. It is the custom of anglers to throw their bodies on the beach or shore, as it is said they attract the sharks if allowed to stay in the water, thus interfering with the fishing. The young were said to be not quite so common, though it is possible that they may have been overlooked.

14. *Elops saurus* Linnæus. Ten Pounder.

Said to be abundant at times.

ALBULIDÆ.

15. *Albula vulpes* (Linnæus). Bone Fish.

Mostly abundant.

DUSSUMIERIIDÆ.

16. *Jenkinsia stolifera* (Jordan and Gilbert). Fig. 1.

Head $3\frac{2}{3}$; depth 5; D. III, 8; A. I, 14; P. II, 11; V. I, 6; scales 30? (according to pockets) in a lateral series to base of caudal, and about 4 more on latter; about 8? series of scales transversely between origin of dorsal obliquely back behind origin of ventral; width of head about 2 in its length, and depth of head a trifle less; length of depressed dorsal $1\frac{1}{4}$; base of anal 2; length of caudal (damaged) $1\frac{1}{4}$; pectoral $1\frac{3}{4}$; ventral 2; least depth of caudal peduncle $3\frac{2}{3}$; mandible $2\frac{1}{8}$; snout $3\frac{1}{2}$; orbit 3; interorbital space 4; maxillary $2\frac{1}{3}$.

Body long, compressed, profiles similar and not trenchant. Greatest depth at origin of dorsal. Caudal peduncle compressed, and its length about equal to its depth.

Head large, deep, compressed, upper profile curved a little from tip of upper jaw and then straight after middle of orbit, and lower profile forming a broad angle below front of orbit. Snout short and rounded. Eye large, rounded, almost impinging on upper profile and anterior. Adipose eyelid covering greater part of orbit. Mouth terminal and a little superior, small, and mandible projecting a little in front. Maxillary well inclined, distally broadly expanded till about equal to $\frac{3}{4}$ of pupil, and its posterior edge not quite reaching opposite same. Teeth in jaws minute, and if present on roof of mouth and tongue very small or indistinct. Tongue small, a little elongate, and with free rounded tip. Each ramus of mandible well elevated inside mouth. Interorbital space rather narrow and flat. Nostrils close together, and about midway in length of snout. Preorbital rather

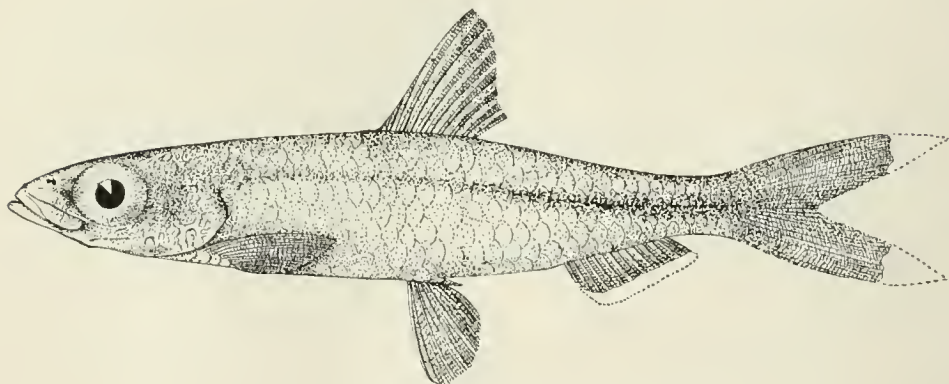


Fig. 1. *Jenkinsia stolifera* (Jordan and Gilbert).

narrow and together with infraorbital, preopercle and opercle furnished with rather large arborescent flutings, those on latter with more or less adipose substance above. Opercle with a gash in upper posterior margin. Articular surface of mandible below its articulation with a broad obtuse spine or denticle.

Gill-opening carried forward till about opposite front margin of orbit. Rakers fine, slender, longer than filaments. Filaments and pseudobranchiæ about equally well developed. Isthmus trenchant in front, and flattened rather broadly posteriorly.

Scales cycloid, caducous or but few remaining on alcoholic examples and those mostly comprising dorsal and anal sheaths, and on base of caudal. A patch of adipose tissue on shoulder behind opercle above.

Origin of dorsal nearly midway between tip of snout and base of caudal and first developed ray longest. Anal low, inserted a little behind tip of depressed dorsal or a little nearer origin of ventral than base of caudal. Caudal forked and lobes pointed. Pectoral low, inner rays of each fin approximating and reaching about half way to ventral. Ventral inserted a little behind origin of dorsal or a little nearer base of caudal than tip of snout and reaching about $\frac{2}{3}$ of distance to anal. Vent close in front of origin of anal.

Color in alcohol faded pale brownish, a little darker on back, and lower surface paler. Head more or less silvery, top brownish. Fins all pale or whitish, dorsal and caudal a little grayish. Median line of back with a dusky streak. Along course of what would be lateral line posteriorly a brownish streak. Iris silvery, a little slaty above.

Length $1\frac{3}{4}$ inches.

Hailer's Rock. Altogether 17 examples were taken associated with the large schools of Anchovies seen about the tide pools. In life they are colored transparent or translucent greenish similar to the Anchovies. One example contained a crustacean parasite within the gill-opening, the long spiral egg-cases well protruding.

CLUPEIDÆ.

17. *Harengula sardina* (Poey). Fig. 2.

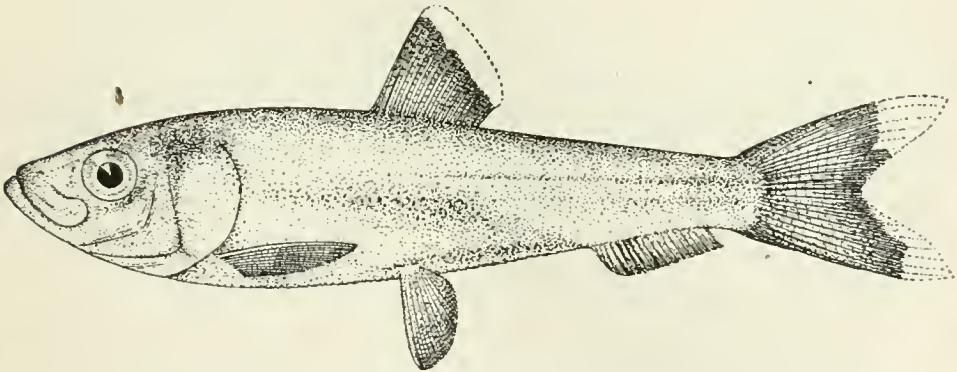


Fig. 2. *Harengula sardina* (Poey).

Two small examples taken at Hailer's Rock.

8. *Harengula humeralis* (Valenciennes). Shiner. Fig. 3.

Color in life bright or glistening silvery-white on sides and lower surface of body. Back bluish-green. Snout brownish. Eye silvery,

upper margin brownish blue-green. Dorsal and caudal gray-brown, other fins transparent whitish.

In the shallows of the Marquesas 30 examples were seined, associated with the Anchovies and other small fishes. In a tide-pool on

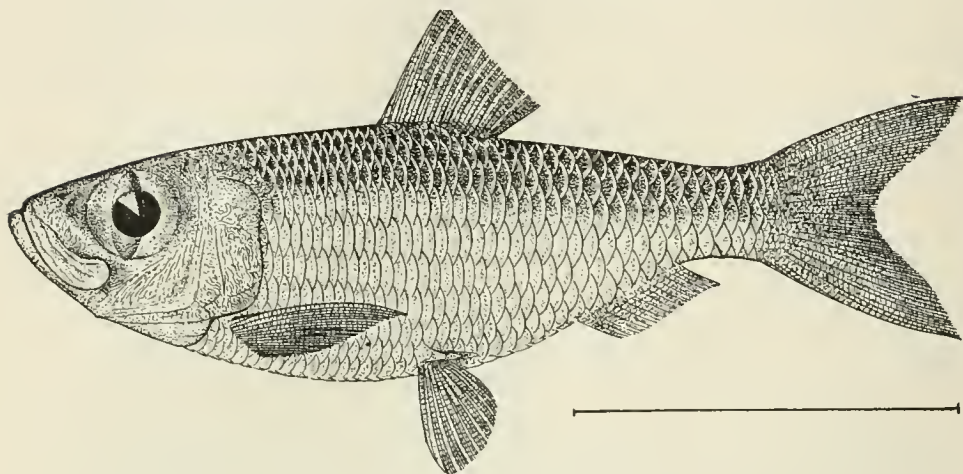


Fig. 3. *Harengula humeralis* (Valenciennes).

Hailer's Rock 2 were also taken. After being in alcohol some time most of the examples have the peritoneum showing plainly through the body-wall.

19. *Clupanodon oolina* (Linnaeus).¹ Thread Herring.

Occasional. No examples taken.

ENGRAULIDIDÆ.

20. *Anchovia brownii* (Gmelin). Sardine.

Color in life, above clear transparent hyaline-greenish washed with

¹ Drs. Jordan and Gilbert, in *Proc. U. S. Nat. Mus.*, V, 1882 (1883), p. 574, have restricted Lacépède's genus *Clupanodon* to *jussieu*. Later Drs. Jordan and Evermann, in *Bull. U. S. Nat. Mus.*, No. 47, I, 1896, p. 422, apparently consider *pilchardus* as typical. These precepts do not fall within the rule of elimination as the last name for which a generic name is proposed, so far as I can find, is *thrissa*. For this Dr. Gill proposed *Opisthonema*. At any rate *Sardinia* cannot be so considered as it is a synonym of *Thrissa* Rafinesque. Lacépède's species *thrissa* may be considered restricted to the American Thread Herring, as the Chinese fish included under Osbeck's reference is one of the *Dorosomatidæ*. *Opisthonema* Gill is thus to be superseded by *Clupanodon* Lacépède. The True Sardines, formerly placed under the latter name, will stand as species of *Thrissa* Rafinesque, with *Clupea pilchardus* Linnaeus as the type. Messrs. Jordan and Seal have pertinent remarks in *Proc. U. S. Nat. Mus.*, XXVIII, 1905 p. 771.

bright silvery, and sides and lower regions of the brightest silvery. Fins pale and more or less transparent. Iris silvery.

Reaches a length of 3 inches. Found throughout the Keys, the above notes from examples from Hailer's Rock. Very large schools were seen both in this locality and about the Marquesas. They swim in large shoals associated with the other small fishes, haunting the shallower as well as the deeper places along shore. They were unusually numerous about the broken rocky shores, where free ingress and egress could be had with the outer waters. Here the schools were seen more or less quiescent and with their heads all directed one way, so that upon any disturbance the whole mass would move more or less as if by one impulse. They appear mostly transparent in the water. I found them occasionally in the surf, where they were probably more abundant than I was able to determine. When taken from the water they soon die. I never observed them in any tide-pools which were cut off from the sea during low tide.

21. *Anchovia chærostoma cayorum* subsp. nov. Fig. 4.

Head $3\frac{3}{4}$; depth 5; D. III, 9; A. III, 25; P. I, 12; V. I, 6; scales 36 (squamation injured) in a lateral series to base of caudal with several

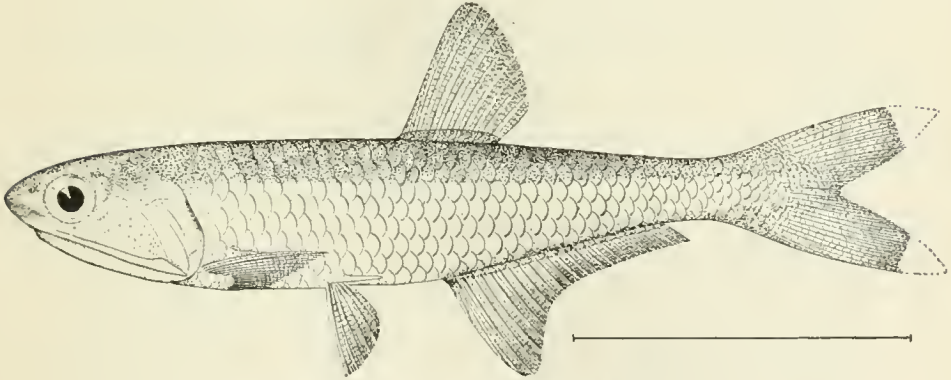


Fig. 4. *Anchovia chærostoma cayorum* Fowler.

more on latter; about 8 series of transverse scales from above origin of anal; width of head $2\frac{7}{8}$ in its length; depth of head $1\frac{1}{2}$; snout 5; eye $3\frac{1}{2}$; interorbital space $3\frac{2}{3}$; maxillary $1\frac{1}{6}$; length of depressed dorsal $1\frac{2}{3}$; caudal $1\frac{1}{2}$; pectoral $1\frac{1}{2}$; ventral $2\frac{2}{3}$; base of anal $3\frac{1}{4}$ in head and trunk.

Body strongly compressed, elongate in form, rather slender, and lower profile a little more convex than upper, edges not trenchant though rounded, and greatest depth about origin of dorsal. Caudal

peduncle strongly compressed, rather deep, and least depth about $\frac{3}{4}$ its length.

Head strongly compressed, rather deep, and profiles more or less similarly convex. Snout rather blunt, rounded, convex, and upper profile pronouncedly convex. Eye circular, rather large and well anterior. Adipose tissue developed. Mouth a little inclined and gape extending nearly $\frac{3}{4}$ length of head. Maxillary slender, long, and furnished with a single series of fine or minute teeth to its distal extremity which reaches almost to gill-opening in front of origin of pectoral. A similar series, though very minute, along margin of mandible. Vomerine teeth a little larger than those on palatines which are very small and uniserial. Also a still smaller series on each pterygoid. Symphysis of mandible reaching about opposite posterior nostril. Tongue small, little free, rounded, reaching forward till a little in front of anterior orbital rim and with a free asperous patch above. Nostrils close together, superior and a little nearer front rim of orbit than tip of snout. Interorbital space with a slightly elevated median ridge so that it is a little convex. Opercle and top of head posteriorly with varied shallow flutings. Cheek with shallow perforations, and some above eye posteriorly.

Gill-opening extending forward till opposite front rim of pupil. Rakers about $14+20?$, slender, long, and longest much longer than filaments. Pseudobranchiæ smaller than filaments. Isthmus rather broadly rounded though compressed above. Shoulder-girdle notched once on each side below for reception of interopercle, and above behind opercle an adipose-like tract.

Scales cycloid, large, and caducous. Dorsal and anal with scaly basal sheaths. Scales on base of caudal rather small. Pointed axillary flap at base of pectoral $\frac{3}{4}$ length of fin and inner rays of each fin approximated. A similar ventral flap.

Origin of dorsal nearer base of caudal than tip of snout and first branched ray longest. Anal inserted about opposite first fourth in length of depressed dorsal or much nearer origin of pectoral than base of caudal, and its anterior rays elevated. Caudal forked and lobes pointed. Pectoral low and reaching origin of ventral. Tip of depressed ventral reaching at least opposite origin of dorsal. Vent close in front of anal.

Color in alcohol pale brownish, paler or whitish below. Back with edge of each scale sprinkled with a series of brownish dots. A double series of brownish dots down middle of back. Top of head, snout, and opercle brownish with darker brownish dots. Upper posterior portion

of head with gill-opening showing through dark. Head otherwise bright silvery. Iris silvery. A broad brownish band overlaid with silvery and nearly as wide as pupil extends from above gill-opening to middle of base of caudal. It is broader in middle than at either end. A series of brownish spots along base of anal. Dorsal and caudal pale grayish marked with numerous pale brownish dots, other fins whitish.

Color in life with body more or less silvered and back above with a translucent appearance.

Length $2\frac{3}{4}$ inches.

Type No. 30,613. A. N. S. P. Hailer's Rock, Florida Keys. June, 1904. H. W. Fowler. Also Nos. 30,614 to 30,620. A. N. S. P., paratypes with same data.

Found only at the above locality in company with *A. brownii*. Only these few were secured among the multitudes of the latter. From *A. charostoma* (Goode), with which this form may prove identical, it appears at present to differ a little, upon comparison with Porto Rican material, in the more elongate form, larger eye and head, and more blunt or rounded snout. Young examples have a smaller eye, nearly 4 in head.

(*Cayo*, in Spanish meaning a ridge of small rocks or islands in the sea, like those off southern Florida.)

SYNODONTIDÆ.

22. *Synodus fætens* (Linnaeus). Lizard Fish.

Color in life clear pale brownish above with about 10 wampum-like blotches of darker brown. In some examples this produces a pepper and salt appearance. A slightly dark double series of blackish dots across each blotch on back. On side just below back a series of zig-zag W-shaped markings also of same darker color. Same color accents end of each blotch in form of a trifle darker speck. A somewhat diamond-like blotch or ring between each median lateral marking and somewhat connected. Another blotch alternately below each of these, and still lower more paler tints of diffuse markings. A deep brown blotch at base of tail and another of pale brown at base of each lobe. Head brownish above, and variegated with deeper spots and more or less olivaceous-golden on sides above. Jaws and mandible variegated with olivaceous-brown. Iris golden-olive, in some lights pure golden, pupil dark green. Region of isthmus dull citron. Tints of colors on sides all more or less golden. Dorsal and caudal variegated

with golden-brown tints, otherwise pale grayish. Other fins dull whitish. Length about 3 inches.

A number of small examples were taken in the sandy shallows of the Marquesas.

MURÆNIDÆ.

23. *Gymnothorax funebris* (Ranzani). Moray.

Large examples were seen about the reefs off Snipe Key, lurking in the crevices and holes of the coral rocks. They were deep olive in color.

SILURIDÆ.

24. *Galeichthys felis* (Linnaeus). Cat Fish. Salt Water Cat.

Very abundant and a very foul feeder, eating any refuse or filth thrown overboard. They were so ravenous that it was possible to catch them on any kind of bait even on a bent pin. At times great quantities were said to have been taken in seines, in which cases the fishermen would cut the leads and floats, leaving the whole mass to extricate themselves as best they may. Their spines are very much dreaded by the fishermen, who claim they are able to produce dangerous and ugly wounds. Most all the examples I observed were about Big Pine Key.

PÆCILIIDÆ.

25. *Fundulus similis* (Baird and Girard). Sac-à-Lait.

Color in life with a whitish lateral band from opercle above to base of caudal interrupting slaty vertical bars which were 9 in number. Lower surface of body white. Dorsal, anal and caudal grayish, former with a well-defined pale base. An olive shade on opercle. Iris silvery, a little brownish above and below, and latter also with a little pale orange. Jaws pale. Length $3\frac{3}{8}$ inches.

Only four examples obtained in the shallow pools on Boca Chica Key. The larger ones have as many as sixteen dark vertical bars. Found associated with this species were all of the following *Paciliidae*.

26. *Cyprinodon variegatus riverendi* (Poey).

Three examples from the Marquesas and Boca Chica Key.

27. *Cyprinodon mydrus* Goode and Bean. Puss Gut. Fig. 5 (male).

Color in life nearly milky-white, upper surface or back above slightly brownish. Lower surface or body milky-white and fins very pale brownish. After death some examples turned pale olive on back and top of head, and on dorsal and caudal. These fins, back and side

speckled with golden-brown or coppery in the males. Lines of a similar shade on side of head, one across chin, one on preorbital, another from corner of mouth to lower rim of eye, and two others below and parallel up over opercle. Iris golden-brownish. Side of body with indistinct traces of several pale slaty vertical streaks. Lower fins very pale brownish-golden. Ventral and anal with a more or less regular series of golden spots, less distinct on latter. Females

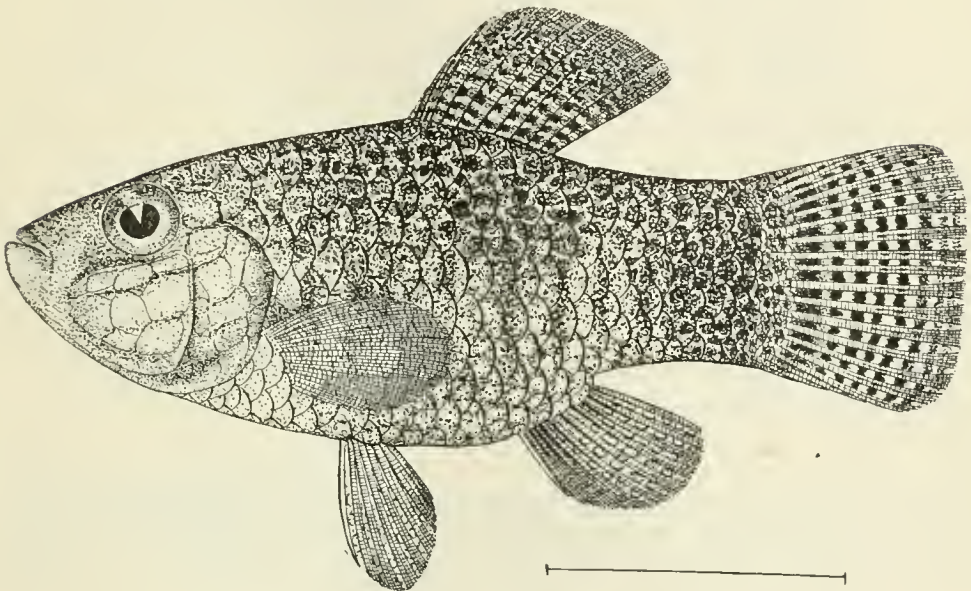


Fig. 5. *Cyprinodon mydrus* Goode and Bean.

were paler and had no spots on dorsal and caudal, and those on body more yellowish. In spirits young examples show large blotches of grayish on side and lack brilliant colors of the adults noted above. They were more or less milky-white in life.

This species is very abundant in pools and shallows of the Keys. They were met with in great numbers all about the Marquesas, and in the pools on Boca Chica Key. Young were abundant in the tide-pools on West Cudjoe's Key. Great numbers were also found about Big Pine Key.

Cyprinodon carpio Günther² may be identical, but the indefinite locality "America" admits a doubt. The figure given by Drs. Jordan

² *Cat. Fish. Brit. Mus.*, VI, 1866, p. 306.

and Evermann³ differs in that there are five rows of scales on the cheek.

28. *Mollienisia latipinna* Le Sueur. Mud Fish.

Color in life brown. Side of head with gray and same color on costal region. Iris brown. Lower surface of body white. Dorsal and caudal with grayish-brown spots and other markings of brown, blackish-brown and dull amber-color. Some examples with caudal dull amber in middle basally and a lower series of longitudinal lines of dots of pale amber. Ventral and anal white.

This species was found to be very abundant in the pools on Boca Chica Key, associated with other small fishes. Many are males with the dorsal fin enlarged and the edge of the caudal blackish.

MASTACCEMBELIDÆ.

29. *Tylosurus notatus* (Poey). Gar. Fig. 6.

Color in life clear hyaline-green overshot with silvery. Greenish about edge of opercle. Iris silvery. A narrow greenish line from origin of pectoral above to base of caudal. Vertical fins pale greenish-brown, tinted slightly with ruddy.

Boca Grande, Big Pine and Boca Chica Keys, also Hailer's Rock and the Marquesas.

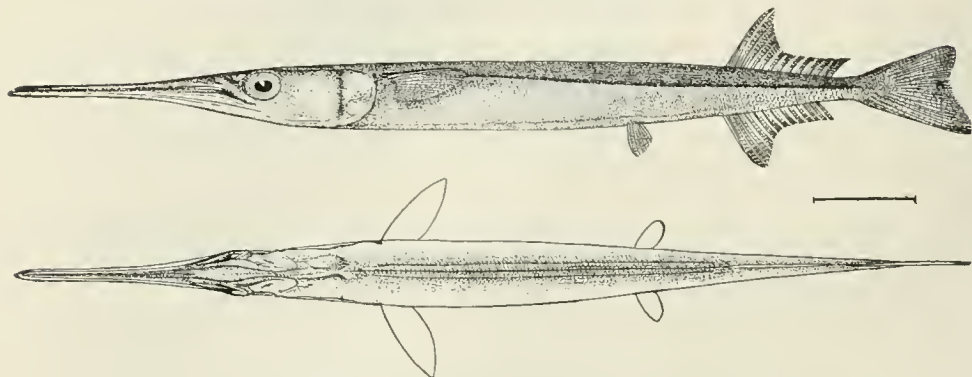


Fig. 6 *Tylosurus notatus* (Poey).

Found in small pools on some of the Keys. They usually associate in small schools in the shallows or near the shore. When in the water their bodies have a transparent appearance and in some lights are difficult to distinguish. They are also fond of lurking about overhanging mangroves.

³ Bull. U. S. Nat. Mus., No. 47, IV, 1900, Pl. 112, fig. 297.

HEMIRAMPHIDÆ.⁴30. *Chriodorus atherinoides* Goode and Bean. Hard Head.

Color in life bright silvery. A narrow bright silvery-white line from gill-opening to base of caudal. Upper surface of body and back pale translucent brownish, each scale with a small patch of dark dots forming longitudinal series and about three above lateral line. Down middle of back three narrow lines of same color, median one pale or less distinct than others, and all close together. Dorsal and caudal pale grayish-brown and other fins translucent whitish. Iris silvery-white. Length $4\frac{1}{2}$ inches. Alcoholic examples show lateral silvery band slaty.

Found associated with *Atherina laticeps* in the sandy shallows of the Marquesas and about Hailer's Rock.

31. *Hemiramphus brasiliensis* (Linnaeus). Balaó.

Reported as frequently seen.

ATHERINIDÆ.

32. *Atherina laticeps* Poey. Silver Sides.

Very abundant. Large schools were seen about the Marquesas, Boca Chica and Snipe Keys.

MUGILIDÆ.

33. *Mugil curema* Valenciennes. Mullet.

Abundant in the shallows near the shore where they associate in large schools. When disturbed they rush away, causing a loud noise in the water. Many were taken in cast-nets by fishermen, as many as a dozen at one time. They average several pounds each, and I found their flesh excellent eating. All examined appeared to be this species. They were most abundant in the Marquesas shallows.

34. *Mugil trichodon* Poey. Fig. 7.

Head $3\frac{1}{10}$; depth $3\frac{1}{4}$; D. IV-I, 8; A. III, 8; scales about 36 to base of caudal in a lateral series; about 12 series of scales between origin of spinous dorsal and middle of belly; 19 scales before spinous dorsal; snout $3\frac{3}{4}$ in head; eye 4; interorbital space $2\frac{1}{2}$; pectoral $1\frac{3}{7}$; ventral $1\frac{1}{5}$. Teeth large, conspicuous, uniserial, ciliform, and a little larger in upper jaw. Pectoral not quite reaching opposite origin of spinous dorsal.

Color in life with back bluish-slaty. Side and lower surface silvery-white. Base and axil of pectoral dark slaty. Dorsal, caudal and

⁴ A number of Flying Fish, *Exocoetidae*, were seen off Big Pine Key. They were all small.

anal pale brownish. Side of head with slight golden reflections. Iris brownish, a silver margin close to pupil.

Length of largest example $2\frac{1}{2}$ inches, and though only three were taken with other small fishes, many others were seen. They frequent the shallows like *M. curema*, but so far as I could observe never associate. Marquesas Keys.

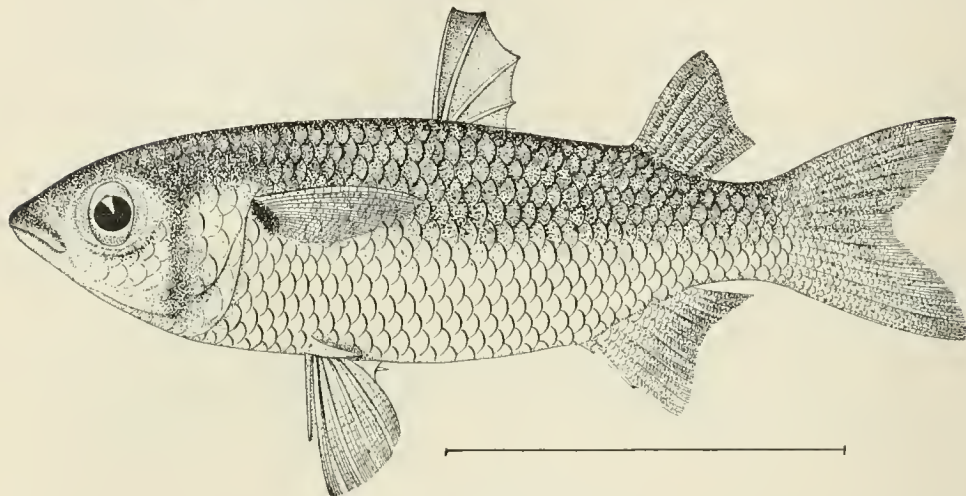


Fig. 7. *Mugil trichodon* Poey.

SPHYRÆNIDÆ.

35. *Sphyræna barracuda* (Walbaum). Barracuda.

Color in life more or less silvery. Above pale brownish with about six pairs of deep olivaceous double saddles meeting as many pairs of rounded blotches on side of body just above or over lateral line. A similar colored bar from end of snout to eye continued behind and across opercle. Iris pale olivaceous, slightly orange around pupil. Dorsals and caudal slightly grayish or a trifle dusky marginally, other fins pale whitish. These were all young examples. In the smallest, which are a little over an inch long, saddles of back are separated from lateral blotches by a pale or translucent brownish area. Dorsal and caudal but little darker than other fins. A brownish-olive spot at base of caudal in all stages of young.

Many examples obtained at the Marquesas and Boca Chica Key, largest about $3\frac{1}{2}$ inches. An adult, several feet long, was harpooned off Channel Key, and a number of large examples were noted off Bahia Honda Key.

SYNGNATHIDÆ.⁵36. *Syngnathus mackayi* (Swain and Meek). Pipe Fish. Fig. 8.

Color in alcohol brownish marked with small whitish dots or spots, each ring with a pale or whitish blotch on each keel, usually small and on side at intervals of four rings extending down in form of narrow bars. Back grayish with pale brown vermiculations medianly. On



Fig. 8. *Syngnathus mackayi* (Swain and Meek).

lower surface of tail small white spots producing a more or less confluent appearance. Head brownish, mottled grayish above, and snout and under surface with more or less whitish spots. Dorsal pale brownish-white mottled with pale brown. Caudal similar, only blotched and darker. Pectoral pale transparent brownish-white. Iris pale slaty.

Color in life resembling the following species. Back whitish, finely vermiculated or specked with lavender, brownish and olivaceous. Lower surface a little more green than sides which are marked with bluish-green. Snout slightly brownish. Iris pearl-colored with brownish. Length $6\frac{1}{4}$ inches.

Marquesas and Big Pine Key. This species is subject to color variation, some examples inclining more to green and others to brown than the one noted above.

37. *Syngnathus elucens* Poey. Pipe Fish. Fig. 9.

Color in alcohol brownish, each ring with a blotch of whitish posteriorly on each keel, those on sides of about every fifth ring producing about a dozen vertical lateral bands. Whitish blotches on lower surface of caudal becoming more or less confluent posteriorly. Head brownish, snout with a few white spots and under surface with a number of whitish blotches. Dorsal, caudal and pectoral whitish, former fins with brownish specks. Iris dull slaty.

Color in life with back whitish finely specked or dotted with lavender, brownish and olive medianly. Lower surface more clearly green than

⁵ I follow Profs. Jordan and Snyder in retaining *Syngnathus* for the species formerly called *Siphostoma*. Of the four species available by elimination, viz., *typhle*, *acus*, *pelagicus* and *ophidion*, the second (*acus*) remains and therefore must be regarded as the type. It is congeneric with *Siphostoma* Rafinesque. For *typhle* Rafinesque also proposed *Typhle*, and for *ophidion*, *Nerophis*. The latter name must therefore be used for the Ocean Pipe Fishes.

sides and each ring marked by a whitish or light vertical line. Some examples are darker, others have more white or brown, and still others are marked below with very pronounced white spots below, with general color of body pale greenish-brown and tail paler. Fins transparent, dorsal and caudal marked with brownish. Iris pearl-colored with brownish spots. Length $4\frac{1}{2}$ inches.

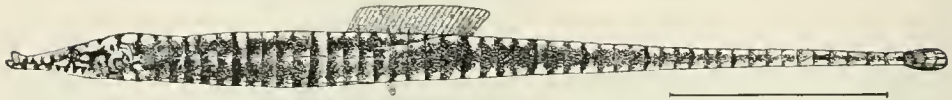


Fig. 9. *Syngnathus elucens* Poey.

A number of examples from the Marquesas, taken with many small fishes found in the sea-weed and marine vegetation of the shallows. One also from Big Pine Key.

38. *Syngnathus louisianæ* Günther. Pipe Fish. Fig. 10.

Color in alcohol rather pale brown, upper side of back dark brown and middle of back much paler. Several series of brown wavy longitudinal lines more or less irregular, but parallel, on middle of back and caudal above. Along side, just below each keel, a short brown horizontal line on each ring. In dark color of upper half of side several others appear on some rings. On lower half of side brown lines are sometimes more or less convex, and on caudal they assume various vermiculate patterns. Lower or under surface of both head and body dull or pale brownish-white without markings. Head brownish, pale above, and on side of snout a dark brownish streak through eye and back across opercle above, giving rise on side of body to hori-



Fig. 10. *Syngnathus louisianæ* Günther.

zontal dark line on each scute just below uppermost keel. Dorsal, caudal and pectoral pale brownish-white, caudal with some darker or brownish markings. Iris pale slaty, except brownish streak, and grayish below.

Color in life similar. Back grayish-white above or medianly with brown lines. Upper side olivaceous-brown. Lower surface pale whitish, lines on lower side brownish, and under surface of abdomen

pale greenish. Dorsal whitish with very pale lines, other fins more or less transparent. Iris shell-color with a brown horizontal cross-bar. Length $10\frac{3}{4}$ inches.

The Marquesas and Big Pine Key. This is the largest and strongest species met with. It was found associated with the others in the sea-weed. It varies in color when seen in life. One example now in alcohol is dark blackish-brown on upper half of side. A young example taken later at Hailer's Rock has about sixteen dark annulations.

39. *Hippocampus punctulatus* Guichenot. Sea Horse.

Color in life deep dull olivaceous, tubercles or joints pale at bases and ruddy at tips. Body everywhere more or less variegated with narrow whitish vermiculating lines, and those about eye radiating from pupil, which is blackish. Pectoral and dorsal pale grayish, latter finely spotted at base with small dusky or olive specks.

Sea-weed of the Marquesas.

40. *Hippocampus zosterae* Jordan and Gilbert. Sea Horse.

One living example was pale brownish-white, side speckled with pale yellowish. A submarginal dorsal line of blackish. Marginal portion of belly dusky-olive. Rings white. Pupil blackish.

Another was a little more brownish. Dorsal margined with pale orange, and a submarginal black band. Brown lines radiating from eye and on side of head slightly variegated with pale olive.

Another was a little more highly colored and more of a golden hue. Rings at intervals more grayish-white. Coronet with a dusky filament.

One had a whitish snout. General color more brownish. Brownish lines, edged with white, radiate from eye. Tubercles on trunk and caudal rings at intervals more whitish.

An example was similar to pale brownish-white one, but with minute specks. A pale brownish line from eye to end of snout. Whitish caudal rings at intervals, and like most of preceding with a more or less evident submarginal dusky line on dorsal, fins otherwise plain and pale-colored.

One with pronounced tubercles all more or less pure white, interspaces on rings pale olive, those on ventral surface darker, and all more or less variegated with whitish dots. Whitish lines radiate from eye. Dorsal with a submarginal brownish band, fins otherwise pale whitish. Rings on caudal white and pronounced at intervals. Brown band from eye to tip of snout crossed by several whitish fasciæ.

Another less tuberculate, more brownish, and variegated with white and pale brown.

Darker examples were almost blackish, without vermiculating lines. Side somewhat brownish. Snout whitish. Dorsal and caudal plain-colored. Other examples were more variable.

Many others were noted, some olivaceous, brownish, coral-white, or almost entirely white, and others pale lavender.

From the above notes it is easily seen that this species is subject to great color variation in life. Some examples are much more brilliant than others. There is also variation in the tubercles. All my examples collected in the sea-weed (*Zostera*) of the Marquesas shallows.

SCOMBRIDÆ.

41. *Scomberomorus cavalla* (Cuvier). King Fish.
Abundant.

TRICHIURIDÆ.

42. *Trichiurus lepturus* Linnæus.
Sometimes taken.

ISTIOPHORIDÆ.

43. *Istiophorus nigricaus* (Lacépède). Sail Fish.
Almost every season a large example is reported from these Keys.

CARANGIDÆ.

44. *Trachinotus falcatus* (Linnæus). Pampano.
Color of young in life, dusky-lavender. A diffuse vertical patch of brownish dots on side from middle of dorsal to anal. Dorsal and anal more or less sprinkled blackish, former otherwise with whitish and latter with pale orange adjoining blackish of anal. Margin of anal and entire caudal white. Caudal peduncle white. Spinous anal red, spotted with black. Breast rosy, with brownish specks. Top of head brown. Jaws and lower surface of head whitish. Cheek specked with brown. Iris red, with brownish margin. One $1\frac{3}{16}$ inches long, from the Marquesas.

SERRANIDÆ.

45. *Petrometopon cruentatus* (Lacépède). Red Hind.
No examples were seen, but it is reported from the Marquesas and other places.
46. *Epinephelus striatus* (Bloch). Nassau Grouper.
Marquesas Islands. Seen in the fish-pots.

47. *Epinephelus maculosus* (Valenciennes).

Reported.

48. *Epinephelus drummond-hayi* Goode and Bean. Speckled Hind.

Reported from about the Marquesas.

49. *Epinephelus morio* (Valenciennes). Red Grouper.

Color in life olivaceous-brown, branchiostegal region and cavities of jaws salmon-color. A brown streak opposite upper margin of maxillary in preorbital depression. Inside of pharynx vermilion, and inside of mouth fleshy-pink. Fins, except pectoral, dusky or blackish, especially submarginally. Narrow margins of rayed vertical fins whitish. Pectoral golden-brown, most noticeable marginally. Base of ventral pale whitish. Trunk marked with pale diffuse or indistinct scattered pale spots. A few dots about size of pin-head on preorbital. A salmon-pink line on base of anal. Iris golden or brassy-brown. Two examples from Bahia Honda Key.

About the Marquesas I saw a number of these fishes in fish-pots and in live-boxes. At Snipe Key they were frequently seen about the reefs.

50. *Promicrops guttatus* (Linnaeus). Jew Fish.

One taken in a pool on Boea Chica Key, and a large one off West Cudjoe's Key. They were reported as not at all uncommon about the other Keys. Several were also seen in the reef near Snipe Key.

LUTIANIDÆ.

51. *Lutianus griseus* (Linnaeus). Mangrove Snapper.

Marquesas and Boea Grande Key. Found about the roots and usually under overhanging mangroves, from which places they dart or swim quickly out to the open water when disturbed. They associate with the other snappers, and in some places are very abundant. Some attain quite a large size.

52. *Lutianus apodus* (Walbaum). Schoolmaster.

A very young example in alcohol which I take to be this species has the body dark brownish with about six pairs of dark transverse bands, the paler spaces between each much narrower alternately. Vertical fins more or less pale or whitish, spinous portions blackish basally. Pectoral and ventral dusky. A brownish streak from tip of snout to eye and then continued posteriorly along upper side of head to gill-opening above. Iris slaty. Eye about three in head. Preopercle with a short spine at lower posterior corner. Length one inch. Marquesas Islands.

Other examples were found at Big Pine Key.

53. *Lutianus aya* (Bloch). Red Snapper.

Reported from the Marquesas, but no examples taken.

54. *Lutianus synagris* (Linnaeus).

Marquesas Islands.

55. *Ocyurus chrysurus* (Bloch). Yellow Tail.

Color in life purplish-brown above, side rosy-purplish, becoming more purplish below. Jaws rosy. Iris brassy-white, and a red bar behind pupil. A gilt-green streak from tip of snout to caudal, broadening behind and including upper half of caudal peduncle and finally including all of tail. Edge of tail narrowly dull red-orange. A number of large gilt-green blotches above lateral streak. Narrow pale longitudinal gilt lines, lower ones very pale, below lateral band. Dorsal gilt-green. Margin of soft dorsal and base of spinous fin dull diffuse plumbeous. Anal pale milky, medianly pale greenish-yellow. Pectoral dilute pinkish. Ventral milky, first ray dull greenish-yellow. Lower surface of body white. Inside of mouth and gill-opening white. Length 8 inches. Hailer's Rock.

One of the most abundant food-fishes, large numbers being in the markets of Key West during all of our visit. It has been reported from all the Keys by fishermen. Most of our examples were taken in the deeper channels, like some off Bahia Honda Key.

HÆMULIDÆ.

56. *Hæmulon sciurus* (Shaw). Grunt. Yellow Grunt. Fig. 11 (young).

Color in life sky-blue above, inclining or fading to plumbeous below. Lines on snout and upper back in front more or less violaceous. Inside of mouth bright scarlet. Iris silvery. Dorsal plumbeous gray-brown, rayed fin and caudal with slightly more plumbeous and latter becoming pale brownish marginally. Margins of dorsal dull amber, also same shade at base of spinous fin and about seven dull amber blotches basally on radii of second dorsal. Pectoral brownish-amber. Ventral and anal golden-amber, and streaks on side same. Axil of pectoral pale.

The figure represents a young example from the Marquesas.

Jew Fish and Bahia Honda Keys, and found very abundant throughout our trip.

57. *Hæmulon plumieri* (Lacépède). Grunt. Boar Grunt.

Color in life of young, all olivaceous above, more or less golden or gilded, especially laterally. Head with bright blue lines, on trunk

immediately becoming plumbeous and fading. Fins all more or less pale olive-brown, margin of spinous dorsal somewhat pinkish. Base of caudal with a blackish spot. Inside of lower jaw pale orange.

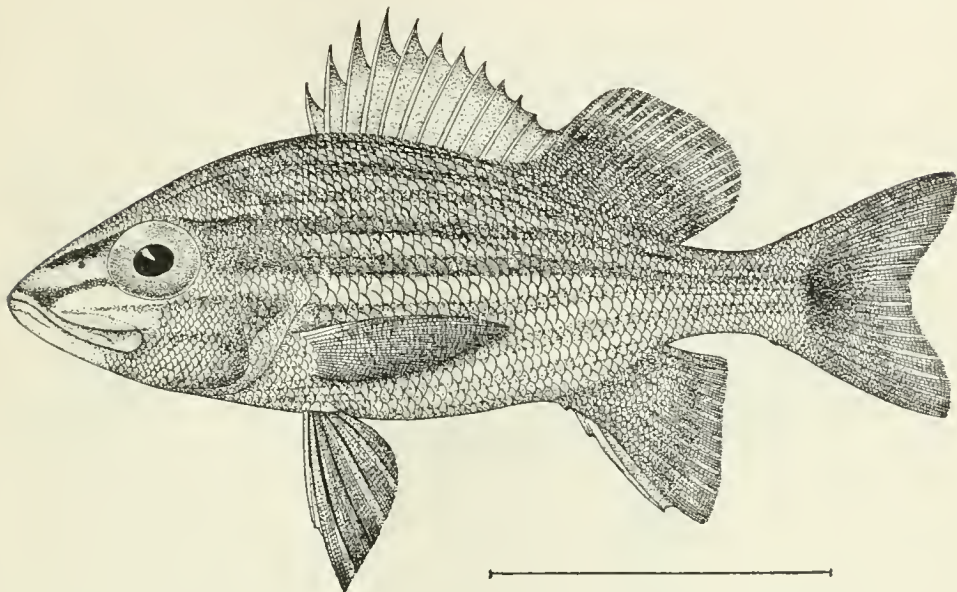


Fig. 11. *Hamulon sciurus* (Shaw).

Iris silvery tinted with pale orange above. Length $2\frac{3}{4}$ inches. Another was similar except gilt bands were a little broader, upper surface of body a little more olivaceous, ventral and anal more golden, and mandible white.

Very abundant about the Marquesas where many were seined.

58. *Bathystoma rimator* (Jordan and Swain). Young Grunt.

Grassy Key, Hailer's Rock and the Marquesas. Very abundant in these localities, also about the reefs near Snipe Key, where large schools were seen swimming about in the quiet or still waters.

SPARIDÆ

59. *Calamus penna* (Valenciennes). Speckled Porgy. Fig. 12 (young).

Color in life brownish, pale purple above on back, and side and lower surface silvery. About six golden-olive vertical bands with edges of

each scale within more or less dusky. Markings extending on fins which are very pale brownish. Iris golden. Length $3\frac{7}{16}$ inches.

The Marquesas and Boca Chica Key.

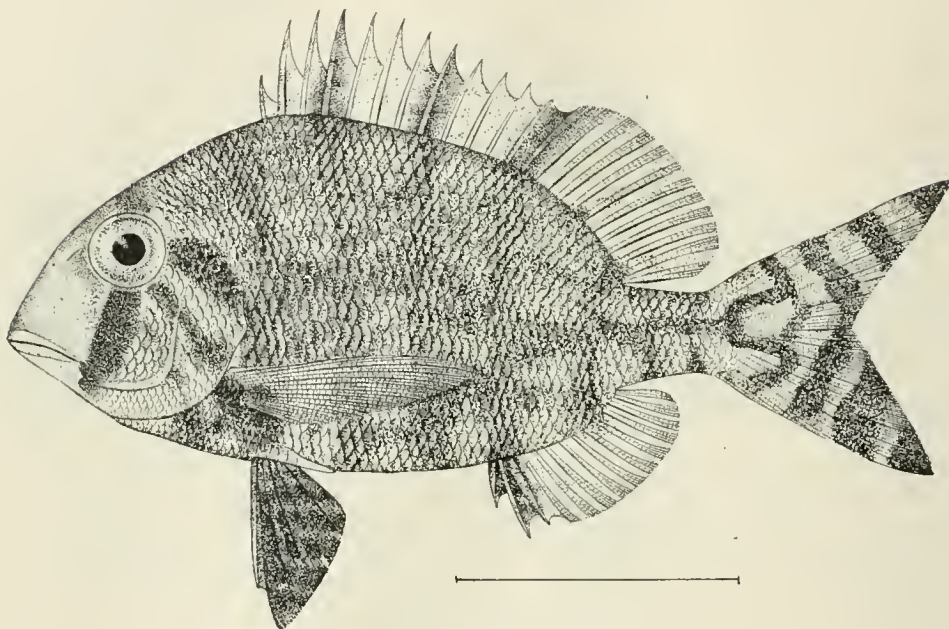


Fig. 12. *Calamus penna* (Valenciennes)

60. *Lagodon rhomboides* (Linnaeus). Bream.

Color in life pale bluish-olive above, below silvery white. Gilt lines above parallel with lateral line, and below horizontal. Vertical lines dusky slate-color, and forming a black blotch at beginning of lateral line. Dorsal spines gilded silvery slate-color. A median broad gilt band entire length of dorsal and anal. Edge of spinous dorsal gilt. Caudal brownish with golden tint. Pectoral and ventral whitish, latter with a gilt line in middle of its length. Inside of gill-opening silvery. Iris silvery with golden and brown. Length $3\frac{5}{8}$ inches.

Marquesas, Grassy and Big Pine Keys, and Hailer's Rock.

GERRIDÆ.

61. *Eucinostomus gula* (Valenciennes). Shad.

Color in life bright silvery, back tinted with very pale gray-blue. About four indistinct grayish vertical bands on side of back, most

distinct in young examples. Dorsal and caudal grayish, other fins paler and translucent. Iris brownish with a brownish vertical bar.

The Marquesas, Boca Chica, West Cudjoe's and Grassy Keys, and Hailer's Rock.

POMACENTRIDÆ.

62. *Pomacentrus leucostictus* Müller and Troschel. Cock Eye Pilot.

Color in life with upper half of body anteriorly brilliant violet, this color changing insensibly into yellow, and becoming intense orange-yellow posteriorly as on caudal and on caudal peduncle. Spinous dorsal like back in front. Rayed dorsal yellowish like back posteriorly. A black blue-edged ocellus at junction of dorsals basally. Lower margin of anal olivaceous-yellow, rest of fin like abdomen. Pectoral and ventral orange. Three brilliant, or light, blue lines from eyes and snout to occiput. Iris brown.

Two small examples, a little less than an inch in length, were taken in the tide-pools off Hailer's Rock. When in the water they are very conspicuous on account of their brilliant coloration. They are not especially active swimmers though shy, the smaller ones usually escaping capture on account of their size. Found associated with *Blennius cristatus*, *Cyprinodon mydrus* and *Glyphisodon mauritii*.

63. *Glyphisodon mauritii* (Bloch). Sheepshead.

Color in life, back shaded with lemon-yellow. Five distinct vertical bars of deep plumbeous, edges of scales within each dusky-plumbeous. Lower surface of body chalky-white. Fins brownish and transverse bars extending on them. Scales on base of anal specked with dusky, otherwise plumbeous-white. Base of pectoral above, blackish. Each ray and spine of ventral pale dusky, axillary scale white. Head above plumbeous with a deep golden shade. Side of head plumbeous. Iris brown, front rim yellow. One example $4\frac{1}{2}$ inches long from the Marquesas shallows.

A young example from Hailer's Rock was more greenish-yellow above in life. Below slaty-plumbeous, becoming more or less silvery on ventral region. Vertical bars dusky. Greenish-yellow and dark bars on spinous dorsal, other vertical fins pale-grayish. Pectoral and ventral whitish. Iris brown. Length $1\frac{1}{4}$ inches.

SCARIDÆ.

64. *Cryptotomus beryllinus* Jordan and Swain. Parrot Fish.

Color in life brown, edges of some scales darker, those on lower surface of a light chestnut tint. Dorsal and anal slightly brownish, with

a ruddy tint and mottled with slightly darker spots. Caudal brownish with slightly brownish cross-bars. Pectoral and ventral pale brownish-white with slight cross-markings of a chestnut tint on latter. Eye silvery. Marquesas.

Another, from same locality, had ventral and anal more rosy-red. Small ones were speckled with dusky and tinted orange-purple on anal below. Spots on belly pale purple.

65. *Sparisoma flavescens* (Schneider). Parrot Fish.

Marquesas, Big Pine and Boca Chica Keys.

66. *Pseudoscarus guacamaia* (Cuvier). Parrot Fish. Green Parrot Fish

I saw a large example of this species swimming about the reef near Snipe Key. In the water it appeared to be entirely dark green.

CHÆTODONTIDÆ.

67. *Chætodon capistratus* Linnaeus. Butterfly Fish.

One example seen in the reef about Snipe Key. It was very evidently this species and measured about 5 inches in length, as far as I could judge.

68. *Pomacanthus arcuatus* (Linnaeus). Black Angel.

Color in life blackish. Bars bright lemon-yellow. Each scale on side with a black spot. Iris deep blackish-brown, marginally blackish. Length $4\frac{5}{16}$ inches.

Only one example was taken about the roots of a red mangrove in the Marquesas shallows. It was also reported by several fishermen as rather common about the roots of overhanging mangroves of several Keys.

69. *Angelichthys ciliaris* (Linnaeus). Yellow Angel. Golden Angel. Blue Angel.

Several of these beautiful fishes were seen about the reefs near Snipe Key. They like the protection of large rocks and are exceedingly brilliant among their equally showy surroundings.

MONACANTHIDÆ.

70. *Stephanolepis hispidus* (Linnaeus). File Fish. Leather Fish.

Color in life green mottled with whitish and brown. Iris pale yellowish. Some examples with fine dusky dots and others with pubic flap edged with pale orange. Subject to great color variation, especially with respect to pattern.

Very abundant in the sea-wrack about the Marquesas. Also taken about Hailer's Rock.

OSTRACIONTIDÆ.

71. *Lactophrys trigonus* (Linnaeus). Trunk Fish. Shell Fish.

Color in life pale olive with blue spots or dots. Blotch of blackish on side. Fins pale yellowish-brown, caudal more brownish. Base of dorsal blackish. Iris pale yellowish. Length $6\frac{1}{2}$ inches.

Marquesas Islands.

72. *Acanthostracion tricornis* (Linnaeus). Horned Trunk Fish.

Color in life with belly pale sulphury. Spots on body blackish-brown. Fins pale brownish, caudal with a few spots. Chin whitish. Iris yellowish-white with brown spots. Length $3\frac{1}{4}$ inches.

Marquesas Islands.

TETRODONTIDÆ.

73. *Spheroides nephelus* Goode and Bean. Puffer. Swelling Fish.

Color in life with side of body citron-yellow. Back variegated with pale vermiculating blue lines of dots and marked with black spots. Blue lines also forming ocelli of black lateral blotches. Fins dilute brownish. Iris dilute yellowish. Length $2\frac{1}{8}$ inches.

Marquesas Islands.

74. *Spheroides plumieri* (Schneider). Puffer. Swelling Fish.

Color in life brownish above tinted with pale olive and marbled with blackish-brown. Tentacles on back whitish. A dark expanded triangular blotch between eyes. Side of body olive, blotches blackish. Fins pale or dilute brownish. Caudal whitish, and basally and submarginally with a broad transverse blackish-brown bar. Lower surface of body chalky-white. Iris pale orange-yellow. Length $3\frac{1}{2}$ inches.

Marquesas Islands' and a number from Boca Chica Key.

DIODONTIDÆ.

75. *Diodon hystrix* Linnaeus. Porcupine Fish.

This, and sometimes the following, are taken and dried as curios. Nothing further than that both species occur was gathered from the fishermen.

76. *Diodon holocanthus* Linnaeus. Porcupine Fish.

77. *Lyosphæra gibbosa* Evermann and Kendall. Marble Fish.

Color in life pale olivaceous above. Black below forming reticulating lines with bright orange spots. Black lines reticulating above in olivaceous. Jaws pale brownish. Fins whitish. Iris pale golden. Length $\frac{11}{16}$ inches.

This species was reported not at all uncommon in the shallows of the Marquesas about the *Zostera*, though I only found one example. It is a very curious and interesting little animal and I watched it inflate and collapse several times before death. The inflation was slight, much less than that of *Spheroides*. This specimen agrees best with the larger figure given by Drs. Evermann and Kendall,⁶ though the dark reticulating lines are more distinct. Those on top of the head are narrow, or fine, and others are broken a little. Those all over abdomen are broader and darker.

SCORPÆNIDÆ.

78. *Scorpena grandicornis* Cuvier. Sculpin.

Color in life brownish variegated with darker and whitish. A broad brownish band from eye down over cheek. Eye brownish. Fins blackish-brown and whitish. Body marked most everywhere with small whitish spots. Length $2\frac{9}{16}$ inches.

Two examples were seined in the sea-wrack of the Marquesas shallows.

GOBIIDÆ.

79. *Mapo soporator* (Valenciennes).

Color in life mottled brownish above, sides with darker brownish spots. Back also with dusky and olivaceous markings. Lower surface white. Margin of anal narrowly whitish. Ventral white. Other fins more or less grayish and transparent. Iris brownish. Length $2\frac{7}{16}$ inches. Hailer's Rock, in a tide-pool. After being in alcohol there is an evident small bluish shoulder-spot.

Another example was brownish in life with a dull bluish tint, spots more dull or pale bluish. Markings on back brownish. Fins brownish, spots pale bluish. Outer portions of dorsal pale yellowish, basally spotted with pale bluish, and brownish between. Caudal same. Anal paler bluish than on dorsal, becoming somewhat dilute brownish-yellow distally with a submarginal brownish line, and tip of each ray whitish. Pupil greenish, edged narrowly with golden. One example 4 inches long from the sea-wrack of the Marquesas shallows.

PLEURONECTIDÆ.

80. *Platophrys ocellatus* (Agassiz). Flounder.

Color in life pale sandy-brown, mottled with white, deep brown and gray, white forming distinct spots. Fins also spotted with same

⁶ Bull. U. S. Fish. Comm., XVII, 1897 (1898), p. 131, Pl. 9, figs. 11 and 12. Rappahannock River, near the mouth of Windmill Creek, Virginia. (W. C. Kendall. Type No. 48,794. U. S. Nat. Mus.)

colors, dark brownish spots at regular intervals and showing through on dextral side, which is whitish. Iris pinkish.

A single small example from the Marquesas.

BLENNIIDÆ.

CLININÆ.

CONGRAMMUS gen. nov.

Type *Congrammus moorei* sp. nov.

Body elongate and tapering from head. Head deep, large and broadened posteriorly. Snout short. Eyes small, on top of head, directed upwards, close together, and near tip of snout. Mouth superior and much inclined. Lips with a series of large eutaneous flaps or cirri. Teeth in jaws in fine bands. No teeth on vomer or palatines. Interorbital space very narrow. No gill-rakers. No small upturned hook on shoulder-girdle. Scales rather large and cycloid. Lateral line continuous and arched till over pectoral. Dorsal not divided, radii similar or no apparent spines, and about 40 in number. Anal extending well forward on abdomen. Caudal free and rounded. Pectoral with tips of lower rays, and those of other fins, with exception of caudal, free. Color pale or brownish-white.

Small Blennies found in tropical waters or in shallows with sandy bottoms, and with something of the appearance of the Star Gazers or *Uranoscopidae*.

(Κόγγρος, or Γόγγρος, *Congrus*, the ancient name of the Conger Eel; ἄμμος, sand.)

81. *Congrammus moorei* sp. nov. Sand Conger. Fig. 13.

Head $3\frac{5}{8}$; depth of trunk at tip of pectoral 6; least depth of body 7; D. 41; A. III, 33; P. 14; V. I, 3; scales 46 in lateral line to base of

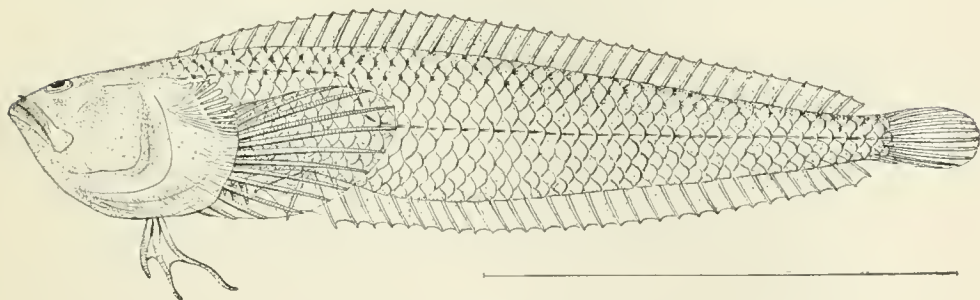


Fig. 13. *Congrammus moorei* Fowler.

caudal, and 1 more on latter; 5 scales obliquely between dorsal and lateral line at tip of pectoral, and 4 scales obliquely back and

down from same point to anal; width of head $1\frac{9}{10}$ in its length; depth of head $1\frac{1}{2}$; mandible $2\frac{2}{5}$; caudal $2\frac{1}{5}$; pectoral $1\frac{2}{5}$; third ray of anal $3\frac{1}{5}$; snout about 8 in head from tip of upper jaw; eye about $7\frac{1}{2}$; inter-orbital space about half of eye.

Body elongate, swollen about branchial region in width but depth at this point less than farther back, and rest of trunk or long tail tapering. Upper profile convex, especially above pectoral posteriorly. Caudal peduncle compressed, and its depth nearly a fifth of length of head.

Head large, compressed anteriorly and swollen laterally posteriorly, and its greatest depth greater than that of trunk. Upper profile nearly straight, and but little inclined. Lower profile well inclined. Snout very short and a little broad. Eyes superior, directed upwards, close together near tip of snout and longer than broad. Mouth small, superior, and with jaws protruding. Mandible produced beyond upper jaw. Teeth in jaws, only apparent when mouth is open, fine and in bands. Apparently no teeth on vomer or on tongue. Each lip with a fringe of long cutaneous flaps of even length at regular intervals and conspicuous at all times. Tongue thick, rounded, a little posterior in mouth, and free in front. Nostrils directly in front of eye, separated, and anterior with a small cutaneous rim or in a short tube. Interorbital space very narrow and a little concave. Opercle with radiate striae above, each of which is produced beyond posterior margin as a slender cutaneous process over gill-flap and beyond.

Gill-opening large, extending forward about midway in length of head. Rakers absent. Filaments small, about equal to orbital diameter. Isthmus compressed, and surmounted with broadened surface which is concave medianly.

Scales only on trunk, except several on base of caudal, where they are large. Scales cycloid, large, except on nuchal region anteriorly, and in parallel series. Lateral line of large simple tubes and continuous, at first high or after fourteenth scale of its course midway in depth of body.

Dorsal of simple flexible rays, none apparently evident as spines, tips of each free anteriorly, but becoming gradually more restricted by membranes posteriorly where it is free from caudal. Origin of dorsal beginning a trifle before posterior margin of preopercle. Anal with three rather pungent short spines, anteriorly separated from rest of fin, and nearly opposite origin of pectoral. Rest of anal, except first few elongated rays which are more or less erect with first two inclined forward and with well-developed membranes, similar to dorsal.

Caudal rounded and small, free from dorsal and anal. Pectoral large, broad, tips of lower rays free, and median rays longest. Ventrals jugular, each with three graduated rays with more or less free tips.

Color in alcohol pale brownish, whitish below, and a trifle darker on top of head. Lateral, and back, with many minute pale brown specks or dots. Fins all transparent or brownish-white. Iris whitish, pupil slaty.

Color in life white, below brighter, above more translucent and marked on back alternately with pale brown and white. Fins transparent whitish, dorsal and caudal hardly darker. Iris pale greenish-white, becoming silvery marginally, and pupil black.

Length 2 inches.

Type No. 30,621, A. N. S. P. Hailer's Rock, Florida Keys. June 23, 1904. H. W. Fowler.

Only a single example, the type, was taken in very shallow water on the sandy shore of Hailer's Rock.

(Named for Mr. Clarence B. Moore, of Philadelphia, well known for his valuable researches in Archæology, and through whose interest in Zoology the expedition to the Florida Keys was realized.)

BLENNIINÆ.

82. *Blennius cristatus* Linnaeus. Rock Fish.

Color in life olive-brown above, saddles darker than ground-color. Body speckled or minutely spotted with deeper brown and whitish, markings becoming pale plumbeous below. Lines of dorsal brown. Edge of fins whitish. Caudal tinted a little with pale green. Abdomen dilute greenish-white and translucent. Fins all very pale transparent brownish, and pale markings dusky or whitish. Lower surface of head pale dusky. Eye brown. Crest on head dull deep red with dusky spots.

A larger example with dilute carmine tints to margins of dorsals and upper edge of caudal, posterior margin of latter and tips of dorsal radii whitish. A whitish-plumbeous spot at base of each anal ray and also at tip of each, submarginally dusky. Spots and lines on body dilute plumbeous or pearly-blue. Bars on caudal dusky. Occipital filaments reddish. Axil of pectoral dusky. Brownish bars on lower half of pectoral. Iris brown.

Small examples have brownish lines on dorsal more pale brownish.

Found very abundant in all the tide-pools on Hailer's Rock and West Cudjoe's Key. In such places they are often found completely entrapped, darting quickly about when disturbed, however, soon find-

ing shelter in the crevices. They are colored much in keeping with their surroundings, so that it is difficult to make out their presence when quiet.

83. *Auohenopterus marmoratus* (Steindachner). Rock Fish.

Color in life brown, darker markings dark brown. A pale spot on side of head tinted greenish-white. Pale markings on body whitish or pale brown. Caudal whitish. Blotches on dorsals and anals blackish-brown. Iris reddish. One small example from the sea-wrack in the Marquesas shallows.

BROTULIDÆ.

84. *Ogilhia cayorum* Evermann and Kendall.

Color in life nearly uniform or pale isabella-color, finely dusted with minute darker specks or dots. Eye slaty.

Four examples from West Cudjoe's Key were taken in the tide-pools. They all show a distinct opercular spine and have very inconspicuous or imbedded scales, not arranged transversely or otherwise in indistinct series, the fish having the appearance of being naked when alive.

BATRACHIDÆ.

85. *Opsanus tau* (Linnaeus).

Color in life brownish, below whitish. Dorsal and caudal pale brown, markings darker. Paler markings creamy. Iris brownish. One $3\frac{3}{4}$ inches from the Marquesas.

Another, $1\frac{1}{2}$ inches long, from West Cudjoe's Key has no ventral sucking-disk. Color-pattern suggesting that of certain Cottidæ. Blotches on body and vertical fins posteriorly very large and confluent, so that contrast between light and pale markings is pronounced. Belly and abdomen immaculate whitish.

OGCOCEPHALIDÆ.

86. *Ogcocephalus radiatus* (Mitchill). Toad. Plate I!!.

Color in life deep slaty-brown, without any distinct markings. Dorsal, caudal, anal and pectorals same color above and basally below, and marked with a beautiful network of whitish lines forming more or less distinct ocelli. Sides of trunk similarly colored. Lower distal portion of pectoral, ventral, anal and caudal tinged with golden. Under surface of body otherwise pale or soiled whitish. Iris brownish with pale radiating line. Length $7\frac{7}{8}$ inches.

Big Pine and Ballast Keys, about the shallows. They do not move fast and are easily captured in the hand or in a small dip-net. They

lurk about the rocks or sea-wrack, and their protective colors make it difficult to distinguish them when quiet or not moving about.

AMPHIBIANS.

BUFONIDÆ.

87. *Bufo quericus* Holbrook.

In life plumbeous-gray, markings dusky slate-color. Lower surface of body translucent whitish. Soles of feet and toes brownish. Iris with yellowish next to pupil.

Abundant in the open grass-land on Big Pine Key. They progress by a series of short jumps.

HYLIDÆ.

88. *Hyla squirella* Daudin.

In life plumbeous above speckled with dull brownish. A blackish-brown line from tip of snout along side of head and including eye in its course. Lower surface of body pale brownish-white. Legs pale translucent brown, whitish below and posterior feet dusky. Iris brown.

This species was found on the ground about shady hammock-land on Boca Chica Key. I also saw one on a Gumbo Limbo tree on Vaca Key.

89. *Hyla carolineensis* (Pennant).

A small green frog, evidently this species, was seen on Key West and Boca Chica Key.

REPTILES.

COLUBRIDÆ.

90. *Natrix fasciata* (Linnaeus). Moccasin.

One example was taken in the mangroves of Boca Grande Key. Here they live in the pools among the roots and short sprouts, and are thus difficult to see on account of the seclusion afforded. I did not meet with it in any other locality, though it doubtless occurs as it was reported from No Name Key. The vernacular is "Moccasin," as distinguished from the "Cotton Mouth Moccasin" (*Agkistrodon contortrix*).

91. *Bascanion constrictor* (Linnaeus). Black Snake.

Reported from No Name Key. Seen on Knight and Summerland Keys.

92. *Lampropeltis doliiatus* (Linnaeus). Red Snake.

An example, reddish or coppery-red in color, was found on Boca Chica Key. Others were reported from No Name, Summerland and Cudjoe's Keys.

CROTALIDÆ.**93. *Crotalus adamantens* Beauvois. Rattler. Rattle Snake. Diamond Rattle Snake.**

Reported from Boca Chica, Big Pine and No Name Keys. I observed it on Summerland and Sugar Loaf Keys, and on the latter one was secured.

SCINCIDÆ.**94. *Eumeces fasciatus* (Linnaeus). Lion.**

General color in life waxy-black. Lines on head and neck deep brick-orange, becoming rather more orange on trunk, and finally fading into deep ultramarine-violet tail, though latter at first azure. Line along side of head paler or more ochraceous. Lower surface of head pale or translucent, mandible somewhat dilute purplish and throat greenish. A tinge of pale brick-color on lower side of head. Iris brownish. Lower surface of trunk dusky with brassy reflections. Feet and legs black.

This beautiful little lizard was first noticed in the hammock-land on the east end of Boca Chica Key. They were also rather plentiful on Vaca Key, where a rather large one was secured.

TEIDÆ.**95. *Cnemidophorus sexlineatus* (Linnaeus). Lagarto. Lion.**

In life upper surface brownish, and from above hind legs to tip of tail grayish-brown. Lower surface entirely chalky or livid dilute lavender-blue, inclining more to bluish laterally. A median pale streak from occiput along upper surface of tail to become joined with its fellows. They unite with a slightly ochraceous one on each side, though becoming pale gray on tail, and extending parallel from occiput. A bright yellow line similar in shape and course from above posterior margin of eye and extending back along side of tail where it also becomes gray. From lower eyelid below another of pale lemon to hip and fading out on femur. Still another, and paler, fading out on ribs in front. It is indistinctly defined. Eyelid pale yellowish. Iris brown. Lower side of head pale bluish. Top of head pale brown. Inside of mouth flesh-colored. Upper surfaces of fore legs grayish-brown. In sutures of squamation on posterior costal region, hind

legs, and front of tail, brick-colored patches. Lines fade out on tail which is almost entirely gray a short distance from its base. A brownish-gray line on posterior side of hind leg, leaving a white one between it and color above. It extends along lower side of tail where it is blue-green, and though continued a good distance back is not well defined. Toes and soles of feet pale brownish flesh-color.

Key West, Boca Chica, Big Pine, Knight, Vaca and Grassy Keys. The above notes are from an example from the former locality. They were abundant on most Keys, where they were seen running swiftly through the grass. They soon hide in holes or among rocks. About the lagoon on Key West I found them most common under low grassy vegetation where numerous insects, such as small grasshoppers, were seen.

IGUANIDÆ.

96. *Anolis principalis* (Linnaeus). Lion.

Key West, Boca Chica, Marquesas, Big Pine, No Name, Vaca, Grassy and Summerland Keys. Many bright green examples were seen on Key West among grasses and other green vegetation, from which they are distinguished with difficulty. Those on the ground, or on brown sticks, etc., were brown in color. I never saw the animal change to the negative of its surroundings. They are quick, though more easily captured than the other species.

CROCODILIDÆ.

97. *Alligator mississippiensis* (Daudin). Alligator.

Reported from several pools we saw on Little Pine Key, though I did not see any example during our stay. They were also reported from pools on Summerland Key, and were said to occasionally reach six feet in length.

DERMOCHELYDIDÆ.

98. *Dermochelys coriacea* (Vandelli). Trunk Back.

Frequently taken about the Keys. Several shells were seen about Key West.

CHELONIIDÆ.

99. *Thalassochelys caretta* (Linnaeus). Logger Head Turtle. Logger Head.

Reported as abundant in the past and still frequently taken. It, like both of the following species, is much sought after, and bids fair to become exterminated in a short time if the ruthless depredations of the turtle-fisher are not speedily checked. These animals, all of which

breed in suitable places in the Keys, are thus subjected to additional danger as their eggs are also held in demand. These are eagerly gathered when found and used as food.

100. *Eretmochelys imbricata* (Linnaeus). Hawk's Bill Turtle.

Shells of this animal were seen in Key West. It was reported as of frequent occurrence in past times.

101. *Chelonia mydas* (Linnaeus). Green Turtle. Turtle.

Hunted for food and the most familiar of the family. Several times newly laid eggs, most likely of this species, were found on the sandy beaches of the different Keys.

EMYDIDÆ.

102. *Malaclemmys littoralis rhizophorarum* subsp. nov. Terrapin. Diamond Back Terrapin. Plate IV.

Head large, heavy, flattened somewhat above, and below, and a little swollen laterally behind each eye. Eye large. Snout short, and rather obtuse. Jaws each with a broad horny covering. Mouth large, and its profile together with mandible convex. Legs and feet strong; furnished with stout claws, five on each anterior limb and four on each posterior. Claws on fore feet rather broad, and those on hind feet narrow and longer. Scales on limbs well developed superiorly. Tail short, conic, and rather weak.

Carapace slightly ovoid when viewed from above, with its greatest width opposite posterior portion of fourth vertebral plate. Anterior carapace a little emarginate. Carapace deepest when viewed laterally about middle of its length, or tops of crests of second and third vertebral plates highest with profile sloping down gradually in front and behind. Lower margin of carapace sloping gently down to a point above suture of seventh and eighth marginal plates, then turns upward and outward a little to descend again behind. Vertical and horizontal measurements of marginal plates forming bridge with plastron, or fifth, sixth and seventh, about equal. Edges of marginal plates from sixth backwards sharp and becoming more revolute to most posterior. Axillary and inguinal plates well developed. Each vertebral plate, except posterior which is evenly convex, with a median keel surmounted by a more or less well developed osseous tubercle posteriorly, and best developed proceeding to last. Each plate of carapace with conspicuous concentric rings. Plastron a trifle ovoid, and its greatest width would fall a trifle in advance of its middle or about middle of bridge. Front of plastron nearly truncate or its anterior edge only very slightly emarginate. Behind bridge sides of plastron nearly parallel to posterior margin of femoral plate where there is a prominent notch, and then more convergent to ends of anal

plates which are furnished with a deep notch on median line. Epidermal plates of plastron smooth.

Color in life. Carapace deep dusky, with perhaps faint or obscure darker mottlings. Inferior portion of marginal plates of carapace of the same shade of pale yellowish-brown as the plastron, though at each suture a broad blackish blotch. These blotches are most distinct and conspicuous on the bridge, those of posterior plates very narrow. Plastron dull or pale yellowish-brown, and articulation of each plate with a broad irregular blackish margin, at least anteriorly. Head, legs, feet and tail pale-slaty or plumbeous, and former speckled or spotted with a dark or dusky-slaty. On legs this is evident as each scale has a dark or slaty center. Jaws whitish or of a whitish horn-color. Top of head pale or light. Eye grayish. Claws horn-color, dark or brownish above.

Length of carapace $7\frac{1}{8}$ inches.

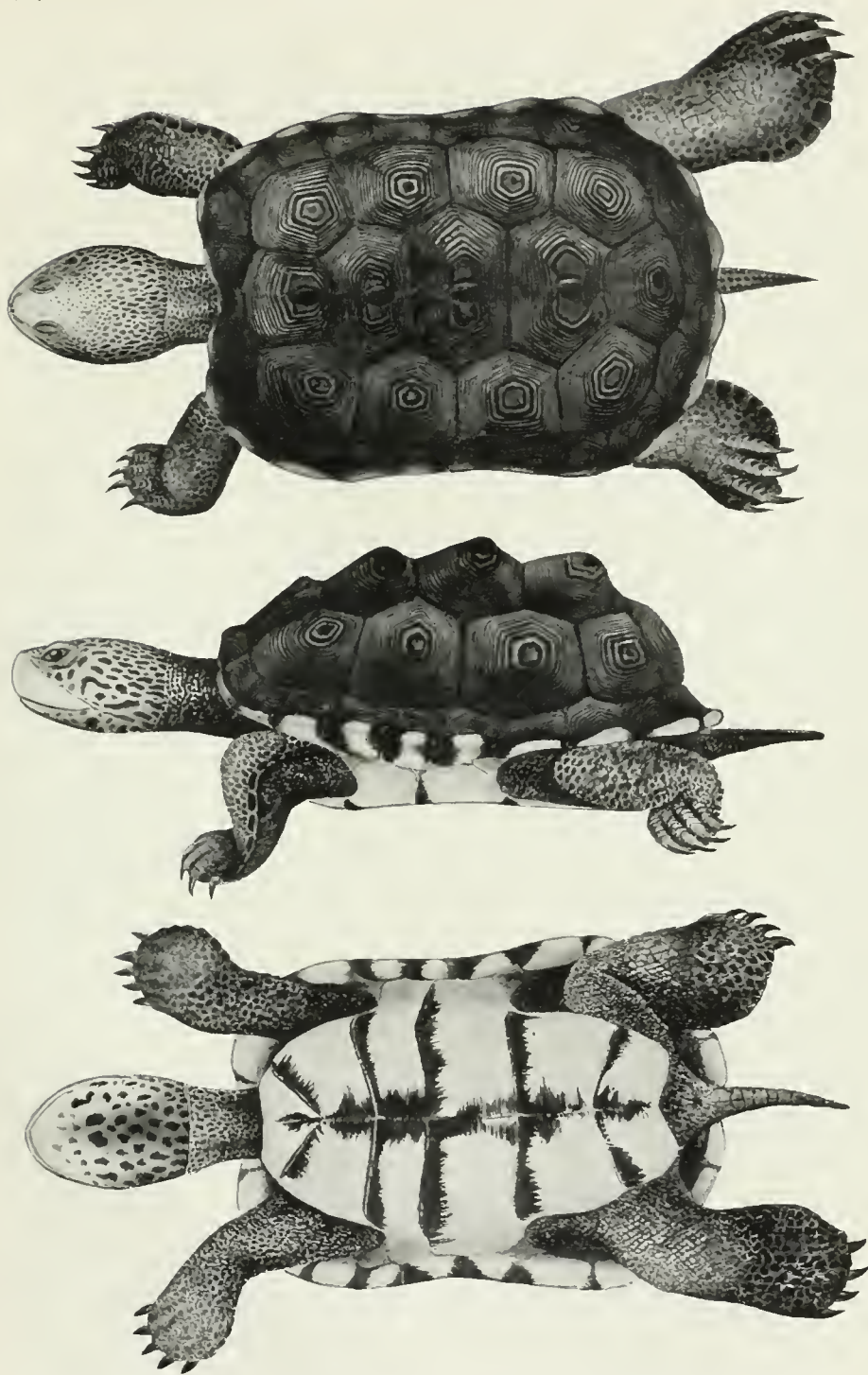
Type, No. 16,570, A. N. S. P. Boca Grande Key, Florida. June 18, 1904. H. W. Fowler. Clarence B. Moore Collection.

This form is known to me only from the above described example, which was collected in a pool among the mangroves of Boca Grande Key together with *Natrix*. It did not appear to me to be especially abundant on the islands we visited, whether for seclusive habits or other reasons, I could not tell. It was reported from other islands within the limits of our trip, however. As it is highly valued as food it is much sought after. Provisionally, as a form of *Malaclemmys littoralis* of Prof. Hay,⁷ from the Texas coasts, it may be recognized as a distinct subspecies. Although he had a very large series of individuals, the sutures of the marginal plates of the carapace are not described as black, which is the case in the example before me. His figures do not show this, and certainly the colored one of the adult is different. I have recently had the opportunity of examining a large series of several hundred living examples of *Malaclemmys centrata* (Latreille), through Dr. Samuel G. Dixon, in the markets of Philadelphia. Most of these were said to have been procured near Savannah, Georgia. Great variations in color were noticed, some individuals approaching the above described example very closely, while others had perfectly uniform plastrons, etc. Most of the variations, like those figured under *Emys concentrica* by Sowerby and Lear,⁸ were found.

(*Rhizophora*, Mangrove.)

⁷ Bull. Bureau of Fish., XXIV, 1905, p. 18.

⁸ Tort. Terrap. Turt., 1872. Four figures referable to Pls. 33-55, and 36, are not numbered in the copy before me.



MALACLEMmys LITTORALIS RHIZOPHORARUM FOWLER.