

A REVIEW OF THE GOBIIDÆ OF NORTH AMERICA.

By DAVID S. JORDAN and CARL H. EIGENMANN.

In the present paper we have attempted to give the synonymy of each of the genera and species of Gobies found in the waters of America north of Surinam and Panama. The specimens examined belong to the U. S. National Museum and to the museum of the Indiana University, most of the latter having been collected by Professor Jordan.

The group offers considerable difficulty, as most of the species are of small size, and many of them are but scantily represented in collections.

The determination of the proper limits of the genera has been especially difficult, as the characters used as generic by Bleeker, Gill, and others are, in themselves, of small value, and subject to many intergradations. Among the *Eleotridinæ* we find the skeletal differences well marked, easily defining the genera, at least, if only American species are taken into consideration. Among the American *Gobiinæ*, however, the skeletons of *Gillichthys* and *Typhlogobius* only show any well-marked peculiarities, so far as we have seen, and no characters of importance can be drawn from this source. We have ventured to detach from *Gobius*, on characters of minor importance, the genera *Lophogobius*, *Chonophorus*, *Lepidogobius*, and *Microgobius*, but the characters of none of these groups have any high importance, and it is not unlikely that Dr. Günther is right in uniting all with *Gobius*.

The genera of Gobiidæ recognized by us may be defined as follows :

ANALYSIS OF GENERA OF NORTH AMERICAN GOBIIDÆ.

- a. Ventral fins separate; body scaly.
- b. Ventral rays I, 4. (*Oxymetopontina*).
- c. Forehead bluntly rounded, without sharp keel; tongue very slender, sharp; body elongate, compressed, covered with very small scales, some cycloid, some etenoid; head short, compressed, rather broad above; mouth oblique, the lower jaw projecting; teeth in few series, some of them canine-like; isthmus narrow. Dorsals separate, the first of six slender spines; soft dorsal and anal elongate; caudal lanceolate IOGLOSSUS, 1.
- bb. Ventral rays 1.5; (*Eleotridinæ*).
- d. Vomer with a broad patch of villiform teeth; gill-openings extending forward to below posterior angle of mouth, the isthmus thus very narrow; teeth villiform, the outer scarcely enlarged; vertebræ 12 + 13 (*dormitor*);

skull above with conspicuous elevated ridges, one of these bounding the orbit above, the orbital ridges connected posteriorly above by a strong cross-ridge; a sharp longitudinal ridge on each side of the occipital, the two nearly parallel, the post-temporals being attached to the posterior ends. Insertions of post-temporals widely separated, the distance between them greater than the rather narrow interorbital width; the post-temporal bones little divergent; top of head depressed, both before and behind the cross-ridge between eyes; a flattish triangular area between this and the little elevated supraoccipital region; preopercle without spines; lower pharyngeals with slender depressible teeth, and without lamelliform appendages; scales of moderate size, ctenoid GOBIOMORUS, 2.

dd. Vomer without teeth; isthmus broad; gill-openings scarcely extending forward below to posterior angle of preopercle; skull without crests.

e. Body anteriorly entirely scaly.

f. Lower pharyngeal teeth setaceous, the bones with an outer series of broad flexible lamelliform appendages or teeth; body short and elevated, cyprinodontiform; teeth slender, those in the outer row scarcely larger, and movable; top of head without raised crests, flattish, its surface uneven; post-temporal bones rather strongly diverging, the distance between their insertions about half the broad flattish interorbital space; no spine on preopercle or branchiostegals; scales large, ctenoid. Species herbivorous.

DORMITATOR, 3.

ff. Lower pharyngeals normal, subtriangular, the teeth stiff, villiform, none of them lamelliform; scales of moderate or small size; body oblong or elongate.

y. Body moderately robust, the depth 4-5½ times in the length to base of caudal; cranium without distinct median keel; a small supraoccipital crest.

h. Post-temporal bones little divergent, not inserted close together, the distance between their insertions greater than the moderate interorbital space, or 3½ in length of head; top of skull little gibbous; interorbital region somewhat concave or channeled;

lower pharyngeals narrower than in *Eleotris*; preopercle without spine; scales very small, ctenoid, about 100 in a longitudinal series. Vertebrae, 11+13; teeth moderate, the outer series enlarged..... GUAVIKA, 4.

hh. Post-temporal bones very strongly divergent, their insertions close together, the distance between them about $\frac{2}{3}$ the narrow interorbital space, and less than $\frac{1}{4}$ length of head; top of skull somewhat elevated and declivous; interorbital area slightly convex transversely; lower pharyngeals rather broad, the teeth bluntish; preopercle with partly concealed spine directed downward and forward at its angle; scales moderate, ctenoid, 45 to 60 in a longitudinal series; vertebrae (*pisonis*) 11 + 15; teeth small.*

ELEOTRIS, 5.

gg. Body very slender, elongate, the depth nine times in length to base of caudal; post-temporal bones short, strongly divergent, the distance between their insertions about equal to the narrow interorbital space, or about $\frac{1}{6}$ length of head; top of head with a strong median keel, which is highest on the occipital region; no supraoccipital crest; preopercle without spine; mouth very oblique; the teeth small; scales very small, cycloid.

EROTELIS, 6.

ee. Body naked on the anterior part; head naked; lower jaw with four larger recurved teeth GYMNELEOTRIS, 7.

aa. Ventral fins united.

i. Dorsal fins separate free from caudal. (*Gobiinae*.)

j. Ventral disk short, adnate to the belly; body subcylindrical, covered with ctenoid scales; lips very thick; upper teeth mostly small and movable, lower fixed; dorsal spines 6.

k. Teeth simple SICYDIUM, 8.

kk. Teeth trifid (or bifid) SICYOPTERUS, 9.

jj. Ventral disk free from the belly.

l. Dorsal spines four to eight; eyes well developed.

m. Teeth emarginate, uniserial, those of the lower jaw nearly horizontal; dorsal spines 6; scales large, ctenoid; gill-openings moderate.

EVORRHODUS, 10.

mm. Teeth simple.

n. Maxillary normal not prolonged behind the rictus; skull of the usual gobioid form, comparatively short and abruptly broadened behind the orbits (at least in typical species).

* These characters of the skeleton are taken from *Eleotris pisonis* and have not been verified on other species.

- o.* Body scaly, more or less.
- p.* Dorsal spines 6; scales evidently ctenoid.
- q.* Interorbital area anteriorly elevated, with a large foramen-like depression in front of eye; body short, compressed, formed much as in *Dormitator*; nape with a fleshy crest; scales large. Vertebrae 11+15 LOPHOGOBIUS, 11.
- qq.* Interorbital area not elevated in front, higher than the occipital region; body more elongate; no fleshy nuchal crest; isthmus broad.
- r.* Inner edge of shoulder-girdle without fleshy cirri or papillæ; cranium anteriorly short; interorbital space narrower, grooved, with a low median ridge or none: median crest on cranium low. Vertebrae 12+16 (*niger*); 10+15 (*oceanicus*) GOBIUS, 12.
- rr.* Inner edge of shoulder-girdle with two or three conspicuous dermal flaps; preorbital region very long; premaxillary and maxillary strong; interorbital groove with a conspicuous median crest. CHONOPHORUS, 13.
- pp.* Dorsal spines 7 or 8; scales very small, cycloid or weakly ctenoid.
- s.* Inner edge of shoulder-girdle with two or three dermal flaps or processes; interorbital groove with the median ridge little developed (*lepidus*). Body little compressed LEPIDOGOBIUS, 14.
- ss.* Inner edge of shoulder-girdle without fleshy processes; body more or less compressed; mouth very oblique; teeth strong; interorbital groove with or without a median ridge. Vertebrae 11+15 or 16 MICROGOBIUS, 15.
- oo.* Body entirely naked; body not strongly compressed. GOBIOSOMA, 16.
- nn.* Maxillary much produced backward, extending beyond the gill-opening in the adult; skull comparatively long, gradually (not abruptly) broadened behind orbits; median crest of cranium well-developed; a cross-ridge across posterior part of interorbital space; scales small, cycloid; dorsal spines 6; no fleshy processes on shoulder-girdle: isthmus broad. Vertebrae 14+16 (*mirabilis*). GILLICHTHYS, 17.
- ll.* Dorsal spines two (or one); body wholly naked; eyes reduced to small rudiments; interorbital area forming a sharp median ridge; skull rather abruptly widened behind

orbits; anterior portion of skull unusually long; no flaps on shoulder-girdle; skull highest at nape, depressed above the eyes

TYPHLOGOBIUS, 18.

- ii. Dorsal fin continuous, the second and the anal joined to base of caudal; eyes minute; body elongate; scales minute or wanting; mouth very oblique, the lower jaw projecting; gill openings moderate; (*Gobioidinæ*).

u. Dorsal rays vi-16 to 23; anal rays 17 to 23.

v. Teeth, small in a single series; scales present

TYNPLASTES, 19.
rv. Teeth in a band, those of the outer series being very strong; scales present.

GOBIOIDES, 20.

1. IOGLOSSUS.

IOGLOSSUS (Bean MSS), Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, 297, (*calliurus*.)

Type *Ioglossus calliurus* Bean.

This singular form is quite unlike all the other American gobies, although apparently closely related to the *Orthostomus* of Kner. But one species is known.

ANALYSIS OF THE SPECIES OF IOGLOSSUS.

- a. Body elongate, compressed; its depth 7 in length, its width $2\frac{1}{2}$ in head, which is 5 in length. Head compressed, higher than wide, rounded above. Eye large, $3\frac{2}{3}$ in head, longer than snout, equal to the interorbital area which is broad and rounded. Mouth small, very oblique, almost vertical; maxillary extending to below anterior edge of pupil, $2\frac{1}{2}$ in head. Teeth in the lower jaw unequal, irregularly placed, in a very narrow band, some of them canine-like; those of the upper jaw in two series; the outer series long and stout, the inner minute; behind these in front are two fang-like canines. All the teeth fixed. Tongue very narrow, lying in a groove in bottom of the mouth. Scales all small, the anterior ones imbedded and cycloid, those of the caudal peduncle imbricated, ctenoid; head and nape naked. Dorsal spines weak, graduated from the first to the fifth which is highest, $1\frac{1}{2}$ in head. Dorsal rays high, the last extending past base of caudal. Caudal long, pointed, $1\frac{5}{8}$ in body. Pectorals very short, the longest ray $\frac{2}{3}$ of head; ventrals contiguous, very narrow and long, $4\frac{1}{2}$ in length. Light olive, everywhere densely punctate with microscopic points. Dorsals edged with black; caudal with a median reddish stripe and two bluish bands. Dorsal VI-23; anal 22, ventral I, 4.

CALLIURUS, 1.

1. *Ioglossus calliurus*.

Ioglossus calliurus (Bean, MSS.), Jordan & Gilbert Proc. U. S. Nat. Mus., 1882, 297 (Pensacola, Fla.); Bean, Proc. U. S. Nat. Mus., 1882, 419 (Pensacola, Fla.); Jordan & Gilbert, Syn. Fish., North America, 949, 1883 (Pensacola); Jordan, Proc. U. S. Nat. Mus., 1884, 437 (Pensacola); Jordan, Catalogue Fish., North America, 106, 1885 (name only).

Habitat.—West Indian fauna; Pensacola.

Proc. N. M. 86—31

November 26, 1886.

The numerous specimens of this species have all been taken from the stomachs of the Red Snapper, *Lutjanus aya*, at Pensacola. All of the known specimens have been obtained by Mr. Silas Stearns.

2. GOBIOMORUS.*

GOBIOMORUS Lacépède, Hist. Nat. Poiss., ii, 699, 1798 (*dormitor*, etc).

PHILYPNUS Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 255, 1837 (*dormitator*).

LEMBUS Günther, Cat. Fish. Brit. Mus., i, 505, 1859 (*maculatus*).

GOBIOMORUS Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 571 (restricted to *dormitor*).

Type *Gobiomorus dormitor* Lacépède.

2. *Gobiomorus lateralis*.

Philypus lateralis Gill, Proc. Acad. Nat. Sci. Phila., 1860, 123 (Cape San Lucas).

Habitat.—Pacific coast of America, from San José to Panama.

3. *Gobiomorus dormitor*.

Gobiomorus dormitor Lacépède, Hist. Nat. Poiss., ii, 599, 1798 (from a drawing by Plumier).

Batrachus guarina Bloch & Schneider, Syst. Ichth., 44, 1801 (based on *Guarina* of Parra).

Platycephalus dormitator Bloch & Schneider, Syst. Ichth., 1801, 60 (Martinique).

Habitat.—Rio Grande to Martinique, in fresh waters.

4. *Gobiomorus longiceps*.

Eleotris longiceps Günther, Proc. Zool. Soc., Lond., 1864, 151 (Nicaragua).

Habitat.—Lake Nicaragua.

3. DORMITATOR.

Prochilus Cuvier, Règne Animal, ed. i, 1817 (*mulgoides*), (preoccupied).

Dormitator Gill, Proc. Acad. Nat. Sci., Phila., 1862, 240 (*gundlachi*=*maculatus*).

Type *Eleotris gundlachi* Poey = *Sciæna maculata* Bloch.

5. *Dormitator maculatus*.

Sciæna maculata Bloch, Ichth., tab. 299, f. 2, 1790 (West Indies).

Eleotris mulgoides Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 226, 1837 (Martinique, Surinam).

Eleotris sima Cuv. & Val., xii, 232, 1837 (Vera Cruz).

Eleotris somnolentus Girard, Proc. Acad. Nat. Sci. Phila., 1858, 169 (Rio Grande).

Eleotris omocyanus Poey, Memorias, ii, 269, 1860 (Havana).

Dormitator gundlachi Poey, Syn. Pisc. Cub., 396, 1868 (Cuba).

Dormitator lineatus Gill, Proc. Acad. Nat. Sci. Phila., 1863, 271 (Savannah).

* The *Eleotridinae* have been made the subject of a special paper (A Review of the American Eleotridinae, in Proc. Ac. Nat. Sci., Phil., 1885, 66-80) by Eigenmann and Fordice. For the synonymy and characters of the species of *Gobiomorus*, *Dormitator*, *Guarina*, *Eleotris*, *Erotelis*, and *Gymneleotris* the reader is referred to the paper in question. Only the outlines of the synonymy are here presented.

Habitat.—East coast of America; South Carolina, Texas, Louisiana, south to Surinam; chiefly in fresh water.

6. *Dormitator latifrons*.

Eleotris latifrons Richards, "Voy. Sulph. Fish., 57, plate 35, fig. 4-5," 1837 (Pacific coast, Central America).

Dormitator microphthalmus Gill, Proc. Acad. Nat. Sci. Phila., 1863, 170 (Panama).

Habitat.—Pacific coast of Central America, from Cape San Lucas southward to Panama.

4. **GUAVINA.**

GUAVINA Bleeker, Esquisse d'un Syst. Nat. Gobioid., 302, 1874 (*guavina*).

Type *Eleotris guavina* Cuv. & Val.

7. *Guavina guavina*.

Eleotris guavina Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 223, 1837 (Martinique).

Habitat.—East coast of tropical America, West Indies, south to Surinam, in fresh waters.

5. **ELEOTRIS.**

ELEOTRIS Gronow, Zooph., 83, 1763.

ELEOTRIS Bloch & Schneider, Syst. Ichth., 65, 1801 (*pisonis*).

CULIUS Bleeker, Esquisse d'un Syst. Nat. des Gobioid., 303, 1874 (*fuscus*).

? OXYELEOTRIS Bleeker, Esquisse, 303, 1874 (*marmorata*).

? GOBIOMORPHUS (Gill) Bleeker, Esquisse, 303, 1874 (*gobioides*).

8. *Eleotris amblyopsis*.

Eleotris amblyopsis Cope, Proc. Am. Phil. Soc., 1870, 473 (Surinam).

Habitat.—Atlantic coast of America, from Charleston to Surinam.

9. *Eleotris pisonis*.

Gobius pisonis Gmelin, Syst. Nat., 1206, 1788 (based on *Eleotris* of Gronow).

Gobius amorea Walbaum, Artedi Pisc., iii, 205, 1792 (based on *Eleotris* of Gronow).

Eleotris gyrinus Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 220, 1837, plate 356 (Martinique, San Domingo, Surinam).

Eleotris picta Kner & Steindachner, Abhandl. bayer. Ak. Wiss., 1864, 18, plate iii, fig. 1 (Rio Bayano, near Panama).

Culius perniger Cope, Trans. Am. Phil. Soc., 1870, 473 (St. Martin's).

Habitat.—Both coasts of Central America, north to Cuba and Texas, chiefly in fresh waters.

10. *Eleotris æquidens*.

Culius æquidens Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 461 (Mazatlan).

Habitat.—Streams about the Gulf of California, south to Colima.

11. *Eleotris belizana*.

Eleotris (Culius) belizana Sauvage, "Bull. Soc. Philom. Paris, 1879, 16 (reprint)" (Belize).

Habitat.—Belize.

6. EROTELIS.

EROTELIS Poey, Memorias de Cuba, ii, 273, 1861 (*valenciennesi* = *smaragdus*).

12. *Erotelis smaragdus*.

Erotelis smaragdus Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 231, 1837 (Cuba).

Erotelis valenciennesi Poey, Mem. de Cuba, ii, 273, 1861 (Cuba).

Habitat.—Florida Keys to Cuba; strictly marine, not ascending rivers.

7. GYMNELEOTRIS.

GYMNELEOTRIS Bleeker, Esquisse d'un Syst. Nat. des Gobioïd., 304, 1874, (*seminuda*)

13. *Gymneleotris seminuda*.

Eleotris seminuda Günther, Proc. Zool. Soc. London, 1864, 24, "plate iv, fig. 2, 2a" (Pacific coast of Panama).

Habitat.—Pacific coast of Panama.

8. SICYDIUM.

SICYDIUM Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 168, 1837 (*plumieri*).

Type *Gobius plumieri* Bloch.

This genus, as here restricted, contains probably but a single species, widely diffused in the fresh waters of the West Indies.

ANALYSIS OF THE SPECIES OF SICYDIUM.

- a. [Front teeth of lower jaw not larger than those behind; a single row of inconspicuous papillæ on the gum beneath the upper lip; a large median papilla above the maxillary suture; a median cleft in the upper lip; head, 4 to 4½ in length (without caudal); depth, 4½ in length; scales small, reduced on neck and belly; diameter of eye contained 6 or 7 times in head, 2 to 3 times in interorbital space; pectorals longer than head; third, fourth, and fifth dorsal spines produced into long ribands; the fourth, which is longest, 2 to 3 times height of body; color uniform, olive or violet-brown; dorsals with irregular dark markings; anal with a dark marginal band, sometimes edged with white.] (*Grant.*)

PLUMIERI, 14.

14. *Sicydium plumieri*.

Gobius plumierii Bloch, Ichthyologia 125, taf. 178, fig. 3. (Martinique; on a drawing by Plumier) Bloch & Schneider, Syst. Ichth., 69, 1801 (copied); Lacépède ii, 537, 562, plate 15, fig. 2 (copied), 1798.

Sicydium plumierii Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 168, 1837 (Porto Rico); Gill, Proc. Acad. Nat. Sci. Phila., 1860, 101; Günther, Cat. Fish. Brit. Mus., iii, 92, 1861 (Barbadoes, West Indies); Poey, Fauna Puerto-Riqueña, 338, 1881 (Porto Rico); Grant, Proc. Zool. Soc. London, 1834, 156; plate xi, fig. 1 (West Indies).

Sicydium siragus Poey, Memorias de Cuba, ii, 278, 1876 (Santiago de Cuba).

? *Sicydium antillarum* Grant, Proc. Zool. Soc. London, 1884, 157, plate xii, fig. 3 (Barbadoes).

Habitat.—Fresh waters of the West Indies.

We have at present no specimens of this species. The *Sicydium antillarum* of Mr. Ogilvie-Grant, seems to differ only in the greater prominence of the teeth, a matter subject to variations, perhaps according to the age, sex, or condition of the specimen.

9. SICYOPTERUS.

SICYOPTERUS Gill, Proc. Acad. Nat. Sci. Phila., 1860, 101 (*stimpsoni*).

COTYLOPUS Guichenot, in Maillard Notes sur l'Isle de la Réunion, ii, Addenda 9, 1864 (*acutipinnis*).

SICYDIOPS Bleeker, Esquisse d'un Système Naturel des Gobioides, 314, 1874 (*xanthurus*).

†MICROSICYDIUM Bleeker, l. c., 314, 1874 (*gymnauchen*).

Type *Sicyopterus stimpsoni*.

As here restricted, this group would include all the species of *Sicydium*, in which the teeth are trifid, bifid, or (by wearing of the tips) clavate. Having had no opportunity to study the species of this group, we do not know whether this division is a natural one or not.

ANALYSIS OF THE SPECIES OF SICYOPTERUS.

a. Head 4 to 5 in length (to base of caudal); width of head, $\frac{2}{3}$ its length; depth of body, $5\frac{1}{2}$ to $6\frac{1}{4}$ in length; scales ctenoid; teeth in upper jaw curved, tricuspid, trident-shaped, the middle cusp terminal, very short, soon worn away; dorsal VI-I, 10. Anal I-10. Caudal rounded; dorsal spines produced in filaments.

b. [Neck and belly naked; a double or treble row of small papillæ on the gum beneath the upper lip, without a larger median papilla; third dorsal spine twice height of body; second dorsal higher than the body; scales 60 to 64; color violet-brown, yellowish in young specimens, shaded with indistinct transverse bands of darker; an irregular brown spot on the axis of the pectoral and a broad dark band from the base of the pectoral to the root of the caudal; fins violet, clouded with darker; 60 to 64 scales in a longitudinal series.] (*Grant*) GYMNOGASTER, 15.

bb. [Neck and belly covered with small scales; gum beneath the upper lip smooth; a median papillose tubercle above the maxillary suture; second and third dorsal spines one and a half times the height of body; second dorsal not as high as body; scales 78; color olive-brown; anal yellow, with a black and white band along the margin; membrane of the second dorsal clear, spotted with brown; caudal with a dark and yellow band round the extremity; 78 scales in a median series.] (*Grant*) SALVINI, 16.

15. *Sicyopterus gymnogaster*.

Sicydium gymnogaster Grant, Proc. Zool. Soc. London, 1884, 158, plate xi, fig. 2, and xii, fig. 6 (Mazatlan).

Habitat.—Fresh waters of the Pacific slope of Mexico.

We know this species only from the description and figure given by Mr. Ogilvie Grant.

16. *Sicyopterus salvini*.

Sicydium salvini Grant, Proc. Zool. Soc. London, 1884, 159, plate xii, fig. 2 (Panama).

Habitat.—Streams of the Pacific slope of the Isthmus of Panama.

This species is known to us only from the description and figure given by Mr. Ogilvie-Grant.

10. EVORTHODUS.

EVORTHODUS Gill, Proc. Acad. Nat. Sci. Phila., 1859, 195 (*breviceps*).

Type *Evorthodus breviceps* Gill.

We know nothing of this genus beyond the account given by Dr. Gill. Its dentition more resembles that of the *Sicydium* group than the true Gobies, though it (inferentially) agrees with the latter in the development of its ventral fins.

ANALYSIS OF THE SPECIES OF EVORTHODUS.

- a. [Teeth emarginate, uniserial; those of the lower jaw nearly horizontal; some of the dorsal rays filamentous; profile blunt, evenly decurved; head about as deep as wide, $4\frac{1}{2}$ in length; depth $4\frac{1}{2}$; eye 3 in head. Caudal rounded, 3 in body; dorsal VI-I, 10; anal I-11. Color light-brown, with irregular blackish blotches along the sides; two black spots at base of caudal fin, one above the other alternating with one anterior on the peduncle; first dorsal with two bands parallel with its upper margin, second dorsal with three narrow longitudinal bands.] (*Gill*) BREVICEPS, 17.

17. *Evorthodus breviceps*.

Evorthodus breviceps Gill, Proc. Acad. Nat. Sci. Phila., 1859, 195 (Trinidad); Günther, Cat. Fish. Brit. Mus., III, 85, 1861 (Trinidad; Surinam).

Habitat.—Fresh waters of Trinidad and Surinam.

We know this species only from the description of Dr. Gill.

11. LOPHOGOBIUS.

LOPHOGOBIUS Gill, Proc. Acad. Nat. Sci. Phila., 1862, 240; (*crista-galli*=*cyprinoides*.)

Type *Gobius crista-galli* Cuv. & Val.

The single species which forms this group differs considerably in form from our other gobies. The study of its skeleton shows no distinction of much importance, unless the peculiar form of its interorbital area be regarded as such.

ANALYSIS OF THE SPECIES OF LOPHOGOBIUS.

- a. Body short and deep, little compressed, cyprinodontiform; greatest height $3\frac{2}{3}$ in length; greatest width $5\frac{1}{2}$; length of head $3\frac{2}{3}$; head naked; a prominent naked dermal crest extending from above middle of eyes to near front of spinous dorsal; diameter of eye $3\frac{1}{3}$ to 4 times in head, little greater than interorbital area; profile convex; snout stout, bluntish, about as long as eye; mouth very oblique, the gape slightly curved; upper lip on level of lower border of eye; lower jaw somewhat projecting; teeth in both jaws in bands, the outer series somewhat enlarged and erect; those of the inner series small, depressible backwards; scales large, reduced on breast and nape; a few scales on the upper edge of the opercle; median line before dorsal naked; dorsal spines produced in short filaments; last rays of soft dorsal reaching caudal; caudal rounded; pectorals lanceolate, reaching beyond insertion of anal, its upper rays not silk-like; dorsal VI or VII-11; anal 10; scales 26 to 30; color blackish-green, some green streaks about eye CYPRINOIDES, 18.

18. *Lophogobius cyprinoides*.

Gobius cyprinoides Pallas, "Spicilegia, Zool. viii, 17, tab. 1, fig. 5, 1770;"

("Amboina") Cuvier & Valenciennes, Hist. Nat. Poiss. xii, 129, 1837 (copied); Günther, Cat. Brit. Mus. iii, 8, 1861 (San Domingo, Jamaica).

Lophogobius cyprinoides Poey, "Repertorio i, 335, 1867; Poey, Syn. Pisc. Cub., 393, 1863 (Cuba); Poey, Enumeratio Pisc. Cub., 125, 1876 (Cuba); Jordan, Proc. U. S. Nat. Mus., 1886, 49 (Havana, Cuba).

Gobius cristagalli Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 130, 1837 (Havana); Guichenot "Poiss. in Ramon de la Sagra, Hist. Cuba, 128, plate 3, fig. 3" (Cuba).

Habitat.—West Indian Fauna.

This remarkable little fish is rather common in the markets of Havana, in which locality our specimens were taken. We have also seen specimens from Aspinwall. Günther is doubtless correct in identifying the *cristagalli* of Cuvier & Valenciennes with the *cyprinoides* of Pallas.

12. GOBIUS.

GOBIUS Artedi, Genera 28, 1738 (*Gobius ex nigricante varius*, etc., = *niger*).

GOBIUS Linnæus, Syst. Nat., Ed. x, 1758 (*niger*, etc.), and of authors generally.

GOBILEPTES Swainson, Nat. Hist. Classi. Fishes, ii, 1839, 183 (no type mentioned; *laucelotus* doubtless intended).

GOBIONELLUS Girard, Proc. Acad. Nat. Sci. Phila., 1858, 168 (*hastatus* = *oceanicus*).

CTENOGOBIUS Gill, Fish., Trinidad, 374, 1858 (*fasciatus*).

EUCTENOGOBIUS Gill, Annals Lye. Nat. Hist. New York, 1859, 45 (*badius*).

SMARAGDUS Poey, Memorias de Cuba, ii, 279, 1861 (*smaragdus*).

? POMATOSCHISTUS Gill, Proc. Acad. Nat. Sci., 1863, 263, foot-note (*minutus*).

CORYPHOPTERUS Gill, Proc. Acad. Nat. Sci. Phila., 1863, 263 (*glaucofrænum*).

? DELTENTOSTEUS Gill, Proc. Acad. Nat. Sci. Phila., 1863, 263, foot-note (*quadrimaculatus*).

? GOBIICHTHYS Klunzinger, Fisch. Rothen Meeres, 479, 1871 (*petersii*).

MESOGOBIUS Bleeker, Esquisse d'un Syst. Nat. Gobioid., 317, 1874 (*guavina*).

STENOGOBIUS Bleeker, l. c. 317 (*gymnopomus*).

OLIGOLEPIS Bleeker, l. c. 318 (*melanostigma*).

GNATHOLEPIS Bleeker, l. c. 318 (*anjerenensis*).

CALLOGOBIUS Bleeker, l. c. 318 (*hasselti*).

HYPOGYMNOGOBIUS Bleeker, l. c. 318 (*xanthozona*).

? HEMIGOBIUS Bleeker, l. c. 318 (*melanurus*).

? CEPHALOGOBIUS Bleeker, l. c. 320 (*sublitus*).

? ACENTROGOBIUS Bleeker, l. c. 321 (*chlorostigma*).

? POROGOBIUS Bleeker, l. c. 321 (*schlegeli*).

? AMBLYGOBIUS Bleeker, l. c. 322 (*sphinx*).

ZONOGOBIUS Bleeker, l. c. 323 (*semifasciatus*).

? ODONTOGOBIUS Bleeker, l. c. 323 (*bynoënsis*).

STIGMATOGOBIUS Bleeker, l. c. 323 (*plurostigma*).

? OXYURICHTHYS Bleeker, l. c. 324 (*belosso*).

Type *Gobius niger* Linnæus.

The genus *Gobius*, as here understood, comprises a very large number of species more or less closely related to the European type of the genus, *Gobius niger*, and its American relative, *Gobius saporator*. An examination of skulls or skeletons of numerous European and American species shows a remarkable uniformity in most respects. The general form and

structure of the cranium is the same in all, the only differences being very minor ones in the height of certain crests. *Gobius oceanicus* is the most aberrant of these species, but that agrees wholly with the common gobies in the structure of the skull, and the greater elongation of the body is due to the elongation of individual vertebræ, not to any increase in their number. Of the European species examined, certainly *ophiocephalus*, *jozo*, *paganellus*, *quadrifasciatus*, and *mertensi* ought not to be generically separated from *Gobius niger*. *Gobius (Pomatoschistus) minutus* differs notably in the narrowness of its isthmus, and its very small scales are scarcely ctenoid. It is however evidently very closely related to *Gobius (Deltentosteus) quadrifasciatus*, which, in turn, approaches *Gobius paganellus* and the true gobies. The American forms mostly have a somewhat less depressed form of the head than the European ones, and in many of them the scales do not extend so far forward behind the eyes. No generic distinction can however be made out by us, and as before stated, an almost unbroken series leads from *G. soporator*, the species most like the European ones, to *G. oceanicus*, the most aberrant.

We have placed in the synonymy above a considerable number of the generic names of Dr. Bleeker. In most cases the types of these nominal genera have not been examined by us, but the characters assigned by Bleeker are mostly of specific value only. We feel reasonably certain that the natural boundaries of the genus *Gobius* are broader than given in this paper, rather than narrower. No serious violence would be done in merging *Lophogobius*, *Chonophorus*, *Lepidogobius*, and *Microgobius* also in *Gobius*, and the relations of *Gobiosoma* with the same group are very close.

ANALYSIS OF NORTH AMERICAN SPECIES OF GOBIUS.*

- a. Anterior half of trunk scaled; head naked.
- b. Upper rays of pectoral fin silk-like; *i. e.*, short and very slender and flexible, free for nearly their whole length.
- c. Body robust, compressed posteriorly; depth 5 to 5½ in length; head broad, low, rounded in profile, its length 3⅔ in body. Eye 4 to 5 in head; mouth large, little oblique; lips thick; teeth in both jaws in bands, the outer series a little enlarged; scales large, strongly ctenoid, smaller on nape and belly; dorsal spines short, none filamentous; color olivaceous, light or dark, varying from sand-color to greenish black, everywhere mottled and marbled with dark and paler; fins speckled; a faint dusky spot behind eye. Dorsal VI-10. Anal 8 or 9. Scales 36 to 41. SOPORATOR, 19.
- bb. Upper rays of pectoral normal, not silk-like.
 - d. Scales large (25 to 42).
 - e. Scales 25 to 35.

**Gobius fasciatus* (No. 25) is omitted from the following analysis, the published descriptions being insufficient to separate it from *Gobius boleosoma*.

f. Dorsal soft rays 14; vertex and nape with a slight median fold of skin.
g. [Body stout, compressed, its depth 5 in length; head $3\frac{3}{4}$; eye equal to snout, 4 in head; vertex and nape with a slight median fold of skin; maxillary reaching front of pupil; lower jaw slightly produced; teeth in bands, the outer slightly enlarged. Olivaceous; spinous dorsal black at tip; second dorsal and anal spotted; scales each with a broad dusky margin. D. VI-14. A. 12. Scales 26-10.] (*Bean.*)

NICHOLSI, 20.

ff. Dorsal soft rays 10-12; no median fold of skin on vertex and nape.
h. [Caudal with two spots at its base; jaws unequal, the lower slightly produced; body robust, compressed behind, the depth 5 in total length; head $4\frac{1}{2}$; eye longer than snout, $3\frac{1}{2}$ in head; maxillary reaching pupil; teeth in a band, the outer enlarged and distant, the inner enlarged and bent backwards; brownish; a faint blue spot on each scale; six spots along middle of back; similar spots on scapular region and middle of sides; two spots on base of caudal; a dark spot above opercle; blue dots on head; a straight blue line crossing cheek above and continued on opercle; dorsals faintly spotted. D. VI-10. A. 10. Scales 25-7.] (*Gill.*)

GLAUCOPRÆNUM, 21.

hh. Caudal with a single spot at its base or plain.

i. Dorsal spines low, the highest little longer than head.

j. Region from nape to dorsal entirely scaled. Body subfusiform, little compressed; depth $4\frac{1}{2}$ in length; head blunt, 4 in length, rounded in profile. Eye equal to snout, 4 in head. Mouth small, horizontal, the lower jaw included; maxillary 3 in head, reaching to below eye. Teeth small, in bands in both jaws, the outer enlarged, those of the upper jaw very slender. Scales large, ctenoid, those of nape and belly little reduced. Longest dorsal spine shorter than head. Caudal scarcely pointed, about as long as head. Color whitish gray, middle of sides with four or five dark blotches, from each of which a narrow dark bar extends downwards and forwards; a large black blotch above pectorals, obsolete in female; a small black spot at base of caudal; a dark mark below eye; vertical fins barred. D. VI-12. A. 11 or 12. Scales 33. STIGMATURUS, 22.

jj. Region between nape and dorsal with a narrow naked median strip. Body moderately elongate, subfusiform, the depth $5\frac{1}{2}$ in length. Head large, not so blunt as in *G. boleosoma*, its length $3\frac{2}{3}$ to $3\frac{3}{8}$ in length; anterior profile gently decurved; snout $3\frac{1}{2}$ to $3\frac{1}{2}$ in head; eye 4; mouth large, slightly oblique; maxillary extending to front of pupil, $2\frac{3}{8}$ in head. Teeth small, slender and curved, in moderate bands; scales moderate, ctenoid, those in front much reduced in size. Breast naked. Longest dorsal spine $1\frac{1}{2}$ in head. Caudal as long as head,

somewhat pointed. Olivaceous, mottled with gray; about five rounded dark blotches along middle of sides, the last forming a spot at base of caudal; no dark spot on side of nape; some dark marks on head; vertical fins barred. D. VI-12. A. 13. Scales 33 to 35.....SHUFELDTI, 23.

ijj. Region between nape and dorsal entirely naked.

k. Highest rays of second dorsal little more than half head, none of them reaching base of caudal.

l. Profile much decurved, skull rounded behind, without distinct median ridge; mouth horizontal. Body elongate, deepest below front of dorsal, tapering regularly backwards, the greatest depth $5\frac{1}{2}$ in length. Head short, blunt, profile anteriorly abruptly decurved, cheek somewhat swollen. Length of head $3\frac{1}{2}$ in body. Snout about equal eye, $3\frac{2}{3}$ in head. Mouth horizontal, maxillary reaching to below pupil (in male); lower jaw included. Teeth in both jaws in a band, the outer row of the upper jaw large, recurved. Scales large, ctenoid, somewhat reduced anteriorly. Nape, breast, and belly naked. Dorsal spines about $\frac{2}{3}$ of head. Caudal pointed, $2\frac{2}{3}$ to $3\frac{1}{2}$ in body. Color olivaceous, with numerous dark reticulations on the back; five black spots along the sides, the last forming a spot on base of caudal, sometimes with V-shaped dark bars extending from them to dorsal. Breasts and sides of belly with numerous dark specks in male; a dark line between eyes; a dark line from eye to middle of premaxillary, some dark spots below eye, sometimes forming bars, sometimes a stripe. A large oblique spot above pectorals, continued on opercle; a black spot at base of pectoral. Dorsals and caudal barred, anal uniform dusky, ventrals and pectorals black in male, white in female. Dorsal VI-11. Anal 10-12. Scales 25-30.....BOLEOSOMA, 24.

ll. Profile little decurved, skull flattish behind, much broader than in *boleosoma*, with an evident median ridge; mouth very oblique, much larger than in *boleosoma*; lower jaw thin and flat. Back slightly arched. Body a little deeper and rather less compressed than in *G. encaomus*, the depth 5 to 6 in length. Head 4. Anterior profile moderately decurved. Eye $3\frac{1}{3}$ in head. Mouth large, oblique; maxillary reaching to below pupil in both sexes. Teeth above uniserial, some of them enlarged and recurved; lower teeth in a narrow band, males with the hindermost of the outer series sometimes a strong, exerted, recurved canine; belly naked. Longest dorsal spine $\frac{2}{3}$ head; caudal $3\frac{1}{2}$ in body. Color light greenish, sides of male with 5 or 6 narrow, straight, rather sharply defined whitish or yellowish cross-bars, regularly placed; four dark bars, three below eye and one on opercle; a small

dark spot behind and above opercle. Vertical fins barred; female with a row of irregular dark spots connected by a dusky streak, and with the pale cross-bars obsolete. D. VI-12; A. 13. Scales 27.

STIGMATICUS, 26.

kk. Highest rays of second dorsal as long as head, the last reaching base of caudal. Body elongate, the back not arched; depth 6 in length; head 4, not compressed, the cheeks tumid. Profile abruptly decurved, the snout $3\frac{1}{2}$ in head. Mouth large, nearly horizontal, the maxillary reaching posterior edge of eye in males, middle of eye in females. Teeth in narrow bands in both jaws, the outer somewhat enlarged, the outer in some (males?) much enlarged above and recurved, the enlarged teeth fixed, the others movable. Scales large, ctenoid, reduced anteriorly, belly naked. Dorsal spines little filamentous, the longest about equal to head; caudal $2\frac{1}{2}$ to 3 in body. Males dark olive, with 4 oblong dark blotches along middle of sides; a dark caudal spot; a black blotch larger than eye on each side of shoulder; dorsal spotted. Caudal reddish above, dusky below. Females with 5 oblong dark blotches on sides, the last on base of caudal; from each of the middle blotches a V-shaped bar runs to the back; a black shoulder blotch; a dark bar from eye to mouth; ventrals pale, with two dark streaks. D. VI-11. A. 12. Scales 30 (27 to 33.)

ENCEOMUS, 27.

ii. Dorsal spines high, the highest reaching past middle of second dorsal. Nape scaly. Body elongate, moderately compressed, the depth $4\frac{2}{3}$ in length, the head $4\frac{1}{3}$. Profile very obtuse anteriorly; eye small, $4\frac{1}{2}$ in head. Mouth nearly horizontal, the maxillary extending beyond pupil, $2\frac{2}{3}$ in head. Teeth strong, uniserial; four shortish canines in lower jaw behind the other teeth; upper teeth largest. Some of the dorsal spines filamentous, reaching (δ) past middle of second dorsal. Caudal $\frac{1}{4}$ longer than head. Scales large ctenoid, those on nape and belly much reduced in size. Dark olive, with 4 or 5 irregular, confluent, blackish cross-bands, besides irregular, dark blotches. Head marked with darker, fins mostly dusky; caudal dark blue with two red longitudinal stripes. D. VI-11. A. 10. Scales 27..... LYRICUS, 28.

ee. Scales moderate, 39 to 42.

m. Dorsal rays VI-11. A. 11. Body moderately elongate, compressed; depth $5\frac{1}{4}$; head 4. Head not compressed, the cheeks tumid, the snout short, abruptly decurved; mouth large, little oblique, the jaws equal, the maxillary $2\frac{3}{8}$ in head, reaching to below pupil; eye 5 in head; teeth above large, unequal, uniserial, some of them fixed, those below small, in a band. Scales anteriorly, cycloid, be-

coming larger posteriorly, and ctenoid; dorsal spines scarcely filamentous, none of them as high as body; caudal $2\frac{1}{2}$ in body, light olive,* with dark olive blotches; body and head with many conspicuous round spots of cream-color, each surrounded by a dusky ring, these most distinct on the head, all smaller than pupil; snout with dusky streaks; dorsals and caudal sharply barred; anal and ventrals dusky (♂). A small round dark spot at base of caudal. D. VI-11. A. 11. Scales 39 to 42 SMARAGDUS, 29.

mm. [Dorsal rays VI-9; A. 9. Depth $6\frac{1}{2}$ in total length; head broad, flattish: snout short, decurved; eye $4\frac{1}{2}$ in head, $1\frac{1}{2}$ in interorbital area, longer than snout. Maxillary extending to below middle of eye. Some of the dorsal spines produced in filaments, the third $1\frac{1}{2}$ times depth of body. Caudal short, rounded. Two rows of ill-defined blotches on upper half of body; two rows of brownish spots on second dorsal, the upper strongly marked. Scales 40.] (*Steindachner.*) POEYI, 30.

dd. Scales rather small, 53-92.

n. [Scales comparatively small (53). Body elongate, compressed behind; head a little compressed; head $3\frac{3}{4}$ in length; depth 5. Eye $3\frac{3}{4}$ in head, shorter than the rounded snout; maxillary reaching to below middle of eye; teeth small, the outer a little enlarged; dorsal spines all shorter than head, not filamentous. Nape scaly, its scales much reduced in size; scales ctenoid; two violet stripes from eye to mouth; 8 or 9 violet bars on sides; 3 or 4 bars on caudal; second dorsal spotted; D. VI-12. A. 11 or 12. Scales 53-13.] (*Steindachner.*)

KRAUSSI, 31.

nn. [Scales moderate (55 to 60). Caudal fin about half longer than head; body elongate, the depth $6\frac{1}{2}$ in length; head $4\frac{3}{4}$. Eye longer than snout, 4 in head, mouth slightly oblique, the jaws equal, the maxillary not reaching centre of eye; teeth in a narrow band, the outer much enlarged and separated from the others by a narrow interspace. Second dorsal spine not equal to depth of body. Caudal $3\frac{1}{2}$ in body. Scales on nape and axil very small, those on posterior part of body much larger. Light olive green; a series of brown spots along middle of tail; sides of head with dusky blotches, vertical fins dotted with black. D. VI-13. A. 14. Scales 58-20.] SAGITTULA, 32.

nnn. Scales very small (60 to 90); caudal more than twice as long as head. Body compressed, extremely elongate, the depth 6 to $7\frac{2}{3}$ in length; head higher than wide, short, compressed, $4\frac{1}{2}$ to 5 in length, mouth

* This is the coloration of the male. The female we have not seen, unless a plain olivaceous example from Charleston, agreeing in all essential respects except in coloration, represents the latter.

wide, oblique; maxillary in adult reaching to below posterior border of eye. Lower jaw very thin and flat; teeth in both jaws small, subequal; those in the upper jaw in a single series, those of the lower in a narrow band; outer teeth somewhat movable. Scales anteriorly small, cycloid, imbedded, those behind larger and ctenoid; a few scales on upper anterior corner of opercle; dorsal fins high, some of the spines filamentous, longer than head. Caudal very long, filamentous, 2 to $2\frac{2}{3}$ in body. Light olive, fins dusky in male; a round black spot on sides, a little larger than eye, below spinous dorsal; first dorsal spine with two or three black spots; a small dusky spot at base of caudal. Emerald spot on tongue conspicuous, fading in spirits. D. VI-14. A 14 or 15. Scales, 70 (60 to 90).....OCEANICUS, 33.

aa. Region before dorsal and anal fins entirely naked.

o. Scales large, 14 series developed. Depth $5\frac{3}{4}$ in total length; head $4\frac{1}{2}$, nearly as broad as high. Eyes equal to the rounded snout; mouth slightly oblique, the jaws equal, the maxillary extending to below middle of eye; teeth in villiform bands; two curved canines on each side of lower jaw. First dorsal spine elongate, sometimes reaching base of caudal; caudal rounded, shorter than head; blackish, fins mostly black; dorsal filament whitish (σ ?). D. VI-11. A. 9. Scales, 14.....PARADOXUS, 34.

oo. Scales exceedingly minute. Head 4 in total length; depth, 6. Head broader than high; snout obtuse, as long as eye; jaws equal, maxillary extending to below middle of eye; teeth in villiform bands, the anterior in upper jaw slightly enlarged; two small, curved canines on each side of lower jaw. Dorsal fins low, the anterior not elevated; caudal rounded, blackish; fins and sides of head dotted. D. VI-15. A. 10.....SEMINUDUS, 35.

19. *Gobius soporator*.

Gobius soporator Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 56, 1837 (Martinique); Guichenot, "Poiss. in Ramon de la Sagra, Hist. Cuba, 127," 1855 (Cuba); Günther, Cat. Fish. Brit. Mus., iii, 26, 549, 1861 (Jamaica, Mexico; Panama; Sicily (?); Caribbean Sea); Cope, Ichth. Lesser Antilles, 473, 1871 (St. Martin's; New Providence); Goode, Bull. U. S. Nat. Mus., v, 75, 1876 (Bermudas); Poey, Enumeratio Pisc. Cub., 124, 1876 (Cuba); Goode & Bean, Proc. U. S. Nat. Mus., 1879, 127 (Pensacola, Fla.); Bean, Proc. U. S. Nat. Mus., 1880, 83 (Bermuda); Jordan & Gilbert, Bull. U. S. Fish. Com., 1882, 108 (Mazatlan); Jordan & Gilbert, Bull. U. S. Fish. Com. 1882, 111 (Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 296 (Pensacola); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 368 (Cape San Lucas); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 377 (Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 626 (Panama); Jordan & Gilbert, Syn. Fish. North America, 634, 1883; Jordan, Proc. U. S. Nat. Mus., 1884, 37 (Pensacola, Fla.); Jordan, Proc. U. S. Nat. Mus. 1884, 140 (Key West); Jordan, Proc. U. S. Nat. Mus., 1884, 260 (Guaymas, Mexico); Jordan, Catalogue Fish. North America, 105, 1885 (name only); Jordan, Proc. U. S. Nat. Mus., 1886, 49 (Havana, Cuba).

- Gobius catulus* Girard, Proc. Acad. Nat. Sci. Phila., 1858, 169 (St. Joseph's Island); Girard, U. S. & Mex. Bound. Survey, 26, plate xii, fig. 9-10, 1859 (copied).
- Evorthodus catulus* Jordan & Gilbert, Syn. Fish. North America, 632, 1883 (copied).
- Gobius nipo* Poey, Memorias de Cuba ii, 277, 1861 (Cuba); Poey, Syn. Pisc. Cuv., 292, 1868 (Coast of Cuba).
- Gobius lacertus* Poey, Memorias de Cuba, ii, 278, 1861 (Cuba); Poey, Syn. Pisc. Cub., 392, 1868 (Cuba); Poey, Enumeratio Pisc. Cub., 125, 1876 (Cuba).
- Gobius carolinensis* Gill, Proc. Acad. Nat. Sci. Phila., 1863, 268 (Charleston, S. C.); Gill, Cat. Fish. East coast North America, 21, 1873 (name only); Goode, Proc. U. S. Nat. Mus., 1879, 110 (Arlington, Florida); Jordan & Gilbert, Syn. Fish. North America, 634, 1883.

Habitat.—Shore fauna of Tropical America, on both coasts, Charleston to Surinam, Guaymas and Panama.

This species is the commonest of all shore-fishes in Tropical America, abounding everywhere in tide-pools and cavities among the reefs. Among our species, it seems to be the one most nearly related to the European *Gobius niger*, and it may therefore be held to represent the subgenus *Gobius*, if our other species be placed in different subgenera.

This is certainly the *Gobius catulus* of Girard, the *Gobius nipo* of Poey, and the *Gobius carolinensis* of Gill. The *Gobius lacertus* of Poey seems to be the same species, probably based on paler specimens than usual. The coloration in life varies much with the surroundings.

The specimens before us are from Key West, Panama, and Cuba.

20. *Gobius nicholsi*.

- Gobius nicholsii* Bean, Proc. U. S. Nat. Mus., 1881, 469 (Departure Bay, British Columbia); Jordan & Gilbert, Syn. Fish. North America, 946, 1883 (copied); Jordan, Catalogue Fish. North America, 105, 1885 (name only).

Habitat.—Coast of British Columbia.

This species is known to us only from the account given by Dr. Bean.

2. *Gobius glaucofrænum*.

- Coryphopterus glaucofrænum* Gill, Proc. Acad. Nat. Sci. Phila., 1863, 263 (Washington Territory).
- Gobius glaucofrænum* Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 53 (name only); Jordan & Gilbert, Syn. Fish. North America, 635, 1883 (copied); Jordan, Cat. Fish. North America, 105, 1885 (name only).

Habitat.—Coast of Washington Territory.

This species is known only from the description of Dr. Gill. The types are now lost, and the explorations of Professors Jordan and Gilbert have failed to recover the species. It may be possible that it is the young of *Gobius nicholsi*, but the difference in Dr. Gill's count of the fin rays and scales, from the formula of the latter species, makes this seem unlikely. The so-called genus *Coryphopterus* has no evident excuse, being apparently fully identical with *Otenogobius*, itself not tangibly distinct from the typical *Gobius*.

22. *Gobius stigmaturus*.

Gobius stigmaturus Goode & Bean, Proc. U. S. Nat. Mus., 1882, 418 (Florida); Jordan & Gilbert, Syn. Fish. North America, 946, 1883 (West coast Florida); Jordan, Proc. U. S. Nat. Mus., 1884, 140 (Key West); Jordan, Cat. Fish. North America, 105, 1885.

Habitat.—Florida Keys.

This species is known to us from the original type, and from a number of specimens collected by Dr. Jordan at Key West. It is very close to *Gobius boleosoma*, but thus far it may be readily distinguished by its pale coloration and by its scaly nape.

23. *Gobius shufeldti* (nom. sp. nov.).

?? *Gobius würdemanni* Girard, Proc. Acad. Nat. Sci. Phila., 1853, 169 (Brazos Santiago, Tex.); Girard, U. S. & Mexico Bound. Survey, 25, 1859 (copied); Jordan & Gilbert, Syn. Fish. North America, 634, 1883 (copied).

Gobius würdemanni Jordan, Proc. U. S. Nat. Mus., 1884, 321 (New Orleans); Jordan, Cat. Fish. North America, 105, 1885 (name only, probably not of Girard).

Habitat.—Gulf coast of United States; vicinity of New Orleans.

This species is known to us only from numerous specimens collected by Dr. R. W. Shufeldt in the vicinity of New Orleans. The original description given by Girard of his *Gobius würdemanni* is very scanty and insufficient for the determination of the species. He may have possibly intended the present species, but it seems unlikely, and the statement that the third dorsal spine is filamentous comes nearer *G. lyricus*. In any case, the present species is distinct from the others known to Girard, and is closely related to *G. boleosoma*. It seems better to give it a new name, in honor of its distinguished discoverer rather than to retain for it a name to which it is probably not entitled.

The types of *Gobius shufeldti* are Nos. 35202, U. S. Nat. Mus.

24. *Gobius boleosoma*.

Gobius boleosoma Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 295 (Pensacola); Jordan & Gilbert, Syn. Fish. North America, 946, 1883 (West coast Florida); Jordan, Proc. U. S. Nat. Mus., 1884, 140 (Key West); Jordan, Cat. Fish. North America, 105, 1885.

Habitat.—Gulf of Mexico.

The numerous specimens of this species before us are from the shores about Pensacola, where it is very abundant. A few are also in our collection from Key West. The species may be identical with Gill's *Otenogobius fasciatus*, but our knowledge of the latter is not sufficient to justify an identification.

25. *Gobius fasciatus*.

Otenogobius fasciatus Gill, Syn. Fish., Trinidad, 376, 1858 (Trinidad).

Gobius fasciatus Günther, Cat. Fish. Brit. Mus., iii, 34, 1861 (copied).

Habitat.—Trinidad.

The following is the substance of Dr. Gill's description of this species. It seems to be closely related to *G. boleosoma*.

Body oblong, the depth 7 in total length; head flattish above, 5 in total; snout equal to eye, more than 4 in head; teeth in both jaws in a band, the outer row recurved, the last tooth on each side in the lower jaw somewhat enlarged in the male. Brownish yellow; four linear dark spots in a line on the sides, a dark spot and numerous black dots at base of caudal; ventral fins barred. Dorsal VI-11, Anal 10. Scales large.

26. *Gobius stigmaticus*.

Smaragdus stigmaticus Poey, *Memorias de Cuba*, ii, 281, 1861 (Cuba).

Gobionellus stigmaticus Poey, *Syn. Pisc. Cub.*, 394, 1868 (Cuba); Poey, *Enumeratio Pisc. Cub.*, 126, 1876, (Cuba); Jordan & Gilbert, *Syn. Fish. North America*, 947, 1883 (copied); Jordan, *Cat. Fish. North America*, 106, 1885 (specimen referred to from Florida Keys).

Gobius stigmaticus Jordan, *Proc. U. S. Nat. Mus.*, 1886, 49 (Havana, Cuba).

Habitat.—West Indian fauna; Cuba, Florida Keys.

We have numerous specimens of this species from Havana, where it is not rare. Specimens from the Florida Keys, in the U. S. Nat. Mus., have been identified with it by Dr. Bean. The difference between the sexes in form and color, is in this species considerable. With this species begins the transition from the more typical gobies to the elongate forms called *Gobileptes* or *Gobionellus*.

27. *Gobius encæomus*.

Gobius encæomus Jordan & Gilbert, *Proc. U. S. Nat. Mus.*, 1882, 611 (Charleston, S. C.); Jordan & Gilbert, *Syn. Fish. North America*, 945, 1883 (Charleston, S. C.); Jordan, *Proc. U. S. Nat. Mus.*, 1884, 141 (Key West); Jordan, *Cat. Fish. North America*, 105, 1885 (no locality); Jenkins, *Johns Hopkins Univ. Circular* 43, 11, 1885 (Beaufort, N. C.).

Gobionellus encæomus Jordan, *Proc. U. S. Nat. Mus.*, 1886, 28 (Beaufort, N. C.).

Habitat.—South Atlantic coast of United States.

This abundant species is very close to *G. stigmaticus*, of which it is probably a northern variety. Only the difference in color, and some slight differences in proportions seem to distinguish it. As in *G. stigmaticus*, the sexual differences are marked. The specimens before us are from Beaufort, N. C.

28. *Gobius lyricus*.

Gobius lyricus Girard, *Proc. Acad. Nat. Sci. Phila.*, 1858, 169 (Brazos Santiago, Tex.); Girard, *U. S. & Mex. Bound. Survey*, 25, plate xii, fig. 4 and 5, 1859 (Brazos Santiago, Tex.); Günther, *Cat. Fish. Brit. Mus.*, iii, 550, 1861 (copied); Jordan & Gilbert, *Proc. U. S. Nat. Mus.*, 1882, 294 (Galveston, Tex.); Jordan, *Cat. Fish. North America*, 105, 1885 (name only).

Euctenogobius lyricus Jordan & Gilbert, *Syn. Fish. North America*, 633, 1883.

? *Gobius würdemannii* Girard, *Proc. Acad. Nat. Sci. Phila.*, 1858, 169 (Brazos Santiago, Tex.); Girard, *U. S. & Mex. Bound. Survey*, 23, 1859 (copied); Jordan & Gilbert, *Syn. Fish. North America*, 105, 1883 (copied).

Smaragdus costalesi Poey, *Memorias de Cuba*, ii, 280, 1861 (Rio Almendares); Poey, *Syn. Pisc. Cub.*, 394, 1868 (Cuba); Poey, *Enumeratio Pisc. Cub.*, 126, 1876 (Cuba).

Habitat.—Gulf of Mexico; Texas, Cuba.

This species is best known from a male specimen, obtained by Dr. Jordan at Galveston. With this specimen corresponds very closely Poey's account of his *Gobionellus costalesi*. The original account of *Gobius würdemanni* may have been drawn from a female of the same species.

29. *Gobius smaragdus*.

Gobius smaragdus Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 120, 1837 (Cuba); Jordan, Proc. U. S. Nat. Mus., 1886, 49 (Havana, Cuba).

Gobionellus smaragdus Poey, Syn. Pisc. Cub., 394, 1868 (Cuba); Poey, Enumeratio Pisc. Cub., 126, 1876 (Cuba); Hay, Proc. U. S. Nat. Mus., 1885, 552 (Saint Augustine, Fla.).

Smaragdus valenciennesi Poey, Memorias de Cuba, ii, 280, 1861 (Cuba).

Habitat.—West Indian fauna; Cuba, Florida.

We have examined two specimens of this species, one from Havana, the other collected at Saint Augustine, by Prof. O. P. Hay. Both these have the pale spots very sharply defined, but they may perhaps not be present in the female. The green spot above the base of the tongue is conspicuous in life.

30. *Gobius poeyi*.

Gobius poeyi Steindachner, Ichthyol. Notizen, vi, 44, 1867 (Barbadoes).

Habitat.—West Indian fauna; Barbadoes.

This species we know only from Dr. Steindachner's description.

31. *Gobius kraussi*.

Gobius kraussi Steindachner, Ichth. Beiträge, viii, 16, 1879 (Surinam).

Habitat.—Coast of Surinam.

This species is known only from Dr. Steindachner's description.

32. *Gobius sagittula*.

Euctenogobius sagittula Günther, Proc. Zool. Soc. London, 1861, 3 (west coast Central America); Günther, Fish. Centr. Amer., 389, 1869 (Panama); Günther, Cat. Fish. Brit. Mus., iii, 555 (west coast Central America).

Gobius sagittula Jordan & Gilbert, Bull. U. S. Fish. Com., 1882, 108 (Mazatlau); Jordan & Gilbert, Bull. U. S. Fish. Com., 1882, 111 (Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 380 (San José); Jordan, Cat. Fish. North America, 105 (name only).

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

This species is common on the west coast of Mexico, where numerous specimens were obtained by Professor Gilbert. We have no specimens at hand, and, therefore, are obliged to make use of the published accounts of this species.

33. *Gobius oceanicus*.

Gobius cauda longissima acuminata "Gronow, Zooph., 82, no. 277, plate 4. fig. 4."

Gobius oceanicus, "Pallas, Spicilegia, viii, 4, 1769 (after Gronow);" Jordan, Proc. U. S. Nat. Mus., 1886, 49 (Havana, Cuba).

Gobionellus oceanicus Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 613 (Charleston, S. C.); Jordan & Gilbert, Syn. Fish. North America, 636, 1883; Jordan, Cat. Fish. North America, 106, 1885 (name only).

Gobius lanceolatus Bloch, Fische Deutschlands, ii, 8., taf. 38, fig. 1, 1783 (Antilles); Bloch & Schneider, Syst. Ichth., 69, 1801 (Antilles): Lacépède "ii, 545, plate XV, fig. 1, 1801"; Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 114, 1837 (Havana); Günther, Cat. Fish. Brit. Mus., iii, 50 (Brazil, West Indies); Poey, Syn. Pisc. Cub., 393., 1868 (Cuba); Poey, Enumeratio Pisc. Cub., 126, 1876 (Cuba); Poey, Fauna Puerta-Riqueña, 338, 1881 (Porto Rico).

Gobius bacalaus Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 119, 1837 (Suri-nam); Poey, "Repertorio I, 334"; Poey, Syn. Pisc. Cub., 394, 1868 (Cuba); Poey, Enumeratio Pisc. Cub., 126, 1876 (Cuba).

Gobionellus hastatus Girard, Proc. Acad. Nat. Sci. Phil., 1858 (St. Joseph's Island, Tex.) 163; Girard, U. S. & Mex. Bound. Survey, 25, plate XII, fig. 7-8 (copied).

Habitat.—West Indian fauna; North to South Carolina and Texas.

This species is generally common in the West Indies. The specimens before us are all from Havana, except one, a large example from St. Joseph's Bay, Florida.

This species differs considerably from the typical species of *Gobius*, but a series of intermediate forms renders it impossible to define it as a distinct genus, or even subgenus. Different specimens show considerable variations in the size of the scales, but there is not much doubt that all the names included in the foregoing synonymy belong to one species, for which the earliest name is that of Pallas.

34. *Gobius paradoxus*.

Gobius paradoxus Günther, Proc. Zool. Soc., London, 1861, 3 (west coast Central America); Günther, Cat. Fish. Brit. Mus., iii, 549, 1861 (west coast Central America); Jordan & Gilbert, Bull. U. S. Fish Com., 1882, iii (Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 626 (Panama).

Habitat.—Pacific coast of Tropical America; Panama.

This species is not rare at Panama where specimens were obtained by Professor Gilbert. As these are not now at hand, we are compelled to fall back on Dr. Günther's description. This species is a very peculiar one in regard to its squamation and the development of its spines, and it may be perhaps properly the type of a distinct genus.

35. *Gobius seminudus*.

Gobius seminudus Günther, Proc. Zool. Soc., London, 1861, 3 (west coast Central America); Günther, Cat. Fish. Brit. Mus., iii, 554, 1861 (west coast Central America); Jordan & Gilbert, Bull. U. S. Fish Com., 1882, iii (Panama); Jordan, Proc. U. S. Nat. Mus., 1885 (Panama).

Habitat.—Pacific coast of Central America.

This species was obtained by Professor Gilbert at Panama. As his specimens have been unfortunately destroyed, we here use the description of Dr. Günther.

It is remarkable that in the Panama fauna are four gobies, not especially related to each other, each of which has the anterior half of the body naked, this region in all our other gobies being scaled. These are *Gymnelcotris seminuda*, *Gobius paradoxus*, *Gobius seminudus*, and *Microgobius emblematicus*. Can there be any physical cause for this?

*Doubtful species of Gobius.***Gobius** ———.

Gobius lineatus Poey, Memorias de Cuba, ii, 424, 1861 (Havana); Poey, Synopsis 1868, 393; Poey, Enumeratio, 125, 1875 (name preoccupied; not *Gobius lineatus* of Jenyns).

This species, which must, if valid, receive a new name is characterized as follows:

Body elongate, subcylindrical; depth of body 6 in length, head $3\frac{1}{2}$; eye in head 6 times; maxillary extending almost to below middle of eye; pectorals rounded; dorsals high, yellowish green; the body with 20 vertical yellow bands; a red band extending from snout to point of opercle; fins yellowish. Dorsal VII, 12.

Gobius ———.

Gobius brunneus Poey, Synopsis Pisc. Cubens., 393, 1868 (Havana); Poey, Enumeratio 125, 1876 (name preoccupied; not *Gobius brunneus* of Schlegel).

This species, which, if valid, must receive a new name, is thus characterized:

Color dark-gray with brighter spots; pectoral, dorsals, and caudal spotted with black; outer series of teeth notably stouter and somewhat separated; profile more oblique and longer than in *Gobius lacertus* (*soporator*); maxillary extending to below middle of eye which is contained $4\frac{1}{2}$ times in head; interorbital space $\frac{1}{3}$ of eye, snout $1\frac{1}{2}$. Dorsal inserted in the middle point between snout and end of second third of caudal.

13. CHONOPHORUS.

? RHINOGOBIUS Gill, Proc. Acad. Nat. Sci. Phila., 1859, 145 (*similis*).

CHONOPHORUS Poey, Memorias de Cuba, ii, 274, 1861 (*bucculentus* = *taiasica*).

? AWAOUS Bleeker, Esquisse d'un Système Naturel des Gobioïdes, 320 (*ocellaris*; name from "les Awaous" of Valenciennes).

Type: *Chonophorus bucculentus* Poey = *Gobius taiasica* Lichtenstein.

We cannot feel certain that Bleeker and Gill are right in considering *Chonophorus* as identical with *Rhinogobius*, as the description of *Rhinogobius similis* is not sufficiently full to permit a proper comparison of the two groups.

The name "*Awaous*" cannot be adopted from Valenciennes for this group, as this name, as used by him, was evidently not in any sense a subgeneric name, but a French plural noun, "*Awaou*" being the vernacular name of one of the species in the Sandwich Islands.

The American species are closely related and form a well-marked group, but their relation to the East Indian and Asiatic forms called *Awaous* and *Rhinogobius* is, as above stated, yet to be proven.

ANALYSIS OF THE SPECIES OF CHONOPHORUS.

- a. Scales about 53; little crowded anteriorly, 21 before dorsal on nape; depth, $5\frac{2}{3}$ in length, head, 4; eyes placed high, interorbital area equal to diameter of eye; mouth, horizontal; maxillary extending to middle of eye, $2\frac{1}{2}$ in head, lower jaw more flat than in *taiasica*: teeth small, in narrow bands, those of the outer row above enlarged, some large teeth in band of lower jaw. D. VI-1, 12, A. 1, 10. Uniform yellowish in spirits FLAVUS, 36.

aa. Scales 60 to 70, crowded anteriorly, about 30 scales before the dorsal on nape; 21 scales between second dorsal and anal; head broader than high; body compressed posteriorly, rather depressed anteriorly; greatest depth $5\frac{1}{2}$ in length; head, $3\frac{1}{2}$ in length; eye small, less than interorbital (in adult), 3 times in snout (twice in young), and about 7 times in length of head; distance from eye to mouth $3\frac{1}{2}$ in head, the preorbital being much enlarged; mouth large, horizontal; maxillary extending to below anterior part of orbit; lower jaw included; teeth of the upper jaw in two series, those in anterior series much enlarged, recurved; those of lower jaw in a narrow band, outer series scarcely enlarged; inner edge of shoulder-girdle with 2 or 3 rather long papillæ. Body covered with ctenoid scales, much reduced in size anteriorly; nape closely scaled, breast scaly, head naked; dorsal fins less than height of body; dorsal spines scarcely filamentous, not as high as the soft rays; caudal rounded, shorter than head; ventrals very broad and short, $1\frac{1}{2}$ to $1\frac{2}{3}$ in head; the rays very much branched. Olivaceous, a series of irregular, roundish blotches along middle of sides; narrow dark streaks radiating from eye; a blackish streak running across upper margin of opercle and extending obliquely across base of upper pectoral rays; belly white; dorsal and caudal more or less distinctly barred with wavy blackish lines. D. VI, 11, A. 11. Scales, about 65.

TAIASICA, 37.

aaa. [Scales 76 to 82; 24 scales between second dorsal and anal; head as broad as high; depth of body $6\frac{3}{8}$ in length; head 4; head flat above, snout elongate, upper profile oblique; eye, $\frac{1}{8}$ of head, equals interorbital area (in adult); mouth horizontal; lower jaw included; maxillary reaching to below anterior margin of eye; teeth of the outer series enlarged; canine teeth, none; scales ctenoid, those on nape and anterior part of body very small; head naked; dorsal fins lower than body, none of the spines produced; caudal rounded, 7 in length of body. Yellowish-olive; back and sides reticulated with blackish; head, dorsal, caudal, and pectoral fins dotted with blackish, the spots forming streaks on second dorsal; six cross series of dots on the caudal; an irregular small blackish spot on the upper part of the root of pectoral. Dorsal, VI-11. Anal, 11. Scales about 80.] (*Günther*).....MEXICANUS, 38.

36. *Chonophorus flavus*.

Gobius flavus Cuv. & Val., Hist. Nat. Poiss. xii, 60, 1837 (Surinam); *Günther*, Cat. Fish. Brit. Mus. viii, 13 (copied).

Habitat.—Surinam.

An examination of the type of *Gobius flavus* Cuv. & Val. has proven it to be a *Chonophorus*, having the dermal flaps on the shoulder girdle as in *Ch. taiasica*, to which it is closely related.

37. *Chonophorus taiasica*.

Amore guacu Maregrave, Hist. Brasil., 1648, 166 (Brazil).

Gobius taiasica Lichtenstein, "Berl. Abhandl. 1822, 273" (not *Tajasica* Marcgrave).

Chonophorus taiasica Jordan, Proc. U. S. Nat. Mus. 1886, 49 (Havana, Cuba).

Gobius banana Cuvier & Valenciennes, Hist. Nat. Poiss., xii, 103, 1837 (St. Domingo); *Günther*, Cat. Fish. Brit. Mus. iii, 59, 1861 (Caribbean Sea; Antilles; West Indies); Steindachner, Ichth. Not. vi, 45, 1877 (Surinam); Cope, Ichthyology Lesser Antilles, 473, 1871 (St. Domingo); Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 368 (Cape San Lucas); Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 379 (San José); Jordan, Catalogue Fish. North America, 105, 1885 (name only).

Gobius martinicus Cuvier & Valenciennes, Hist. Nat. Poiss. xii, 105, 1837 (Martinique); Castelnau, "Anim. nouv. ou rares de l'Améri. du Sud, Poiss. 26."

Chonophorus bucculentus Poey, Memorias de Cuba, ii, 275, 1861 (Cuba).

Rhinogobius bucculentus Poey, Syn. Pisc. Cub. 394, 1868 (Cuba); Poey, Enumeratio Pisc. Cub., 125, 1876 (Cuba).

Rhinogobius contractus Poey, Memorias de Cuba, ii, 424, 1861 (Cuba); Poey, "Annals Lyc. Nat. Hist. New York, ix, 322;" Poey, Enumeratio Pisc.

Cub. 125, 1875, Poey, La Fauna Puerto-Riqueña, 338, 1881 (Porto Rico).

Gobius dolichocephalus Cope, Trans. Amer. Phil. Soc. Philad. 1869, 403 (near Orizaba, Vera Cruz).

Habitat.—Fresh waters of the West Indies and of both coasts of Mexico.

The specimens of this species before us are from the Rio Almendares, near Havana, and from near Cape San Lucas. We are unable to detect any specific differences between these examples. The former corresponds to the *Rhinogobius bucculentus*. There are considerable (sexual) differences in the size of the mouth corresponding to the distinctions between *banana* and *martinicus*, and to those between *bucculentus* and *contractus*. *Gobius dolichocephalus* Cope has the scales slightly smaller than the average in *G. banana*, but in this respect the species is subject to considerable variation.

It seems to us that there is little room for doubt that this is the species to which Lichtenstein, in his commentary on Maregrave, has given the name *Gobius taiasica*. We have not seen the original paper of Lichtenstein. According to Cuvier & Valenciennes, this *Gobius taiasica* is "a goby of Brazil, 6 or 7 inches in length, with rounded tail, of a dirty gray color, covered with small brown specks; of which the head forms one-fifth the total length. The fin rays are D. VI-12. A. 12. C. 15. P. 16. V. 1-5."

Among the known species this can only be *Chonophorus banana*, *Gobius soporator*, or *Gobius oceanicus*, as no other West Indian species reaches a length of 3 inches. Of these, only the first corresponds at all to the above account. We therefore adopt the name of *Chonophorus taiasica*. The "Amore Guacu" of Maregrave seems to be this species.

38. *Chonophorus mexicanus*.

Gobius mexicanus Günther, Cat. Fish. Brit. Mus., iii, 61, 1861 (Mexico).

Habitat.—Fresh waters of the eastern slope of Mexico.

This species is known to us only from Dr. Günther's description. It is evidently a near ally of *Chonophorus taiasica*.

14. LEPIDOGOBIUS.

LEPIDOGOBIUS Gill, Annals Lyc. Nat. Hist. N. Y. 1859, 14 (*lepidus*).

EUCYCLÓGOBIUS Gill, Proc. Acad. Nat. Sci. Phila. 1862, 279 (*newberrii*).

CYCLOGOBIUS "Steindachner."

Type *Gobius gracilis* Girard = *Gobius lepidus* Girard.

We retain the name *Lepidogobius* for two species, apparently allied to each other, and differing from the typical Gobies in the small, cycloid scales, in the presence of 7 or 8 dorsal species, and in the presence of fleshy processes on the shoulder girdle.

The two species have been made types of distinct genera by Dr. Gill, but the differences between them, although considerable, seem to us of less than generic importance.

ANALYSIS OF THE SPECIES OF LEPIDOGOBIUS.

a. Head scaled; body elongate (*Lepidogobius*).

b. Body elongate, subfusiform, little compressed, depth about 7 in length. Head regularly conical, $4\frac{1}{2}$ in length. Eye twice as long as high; its longitudinal diameter equals snout, 4 in head. Snout not obtuse in profile. Interorbital area narrow, about equal the diameter of pupil. Mouth large; maxillary reaching to below posterior edge of pupil, $2\frac{1}{2}$ in head. Teeth small, all similar, those of the upper jaw in two or three series, those of the lower jaw close set, in a broad band. Body covered with small cycloid scales, which are very much reduced anteriorly, especially on nape; cheeks, sides of head and upper posterior part of opercle covered with small scales. Top of head scaly to eye. Breast scaled. Dorsal spines weak; the highest one half head. Soft dorsal low, none of the rays reaching caudal. Caudal long, somewhat pointed. Dorsal, vii, 16-18. Anal, 15. Scales about 86.LEPIDUS, 39.

aa. Head naked; body short, chubby (*Encyclogobius*).

c. Body short, little compressed, its depth $4\frac{1}{2}$ in length. Head large, $3\frac{1}{2}$ in length, rounded above; snout broad. Mouth large, somewhat oblique, the lower jaw somewhat projecting; maxillary extending more or less beyond orbits. Eye small, 5 in head, shorter than snout. Teeth rather strong, in narrow bands, the outer row larger; outer teeth of lower jaw somewhat movable. Scales very small, cycloid; head and nape naked. Dorsal spines very slender, not filamentous, lower than the soft rays; caudal truncate, about as long as pectorals and considerably shorter than head. Ventrals inserted under lower anterior edge of pectorals. Olivaceous, mottled with darker; head with some dusky markings; second dorsal and caudal checkered; a faint spot at base of caudal. Dorsal, vii to viii—12. Anal 11 or 12. Scales 60 to 70.NEWBERRYI, 40.

39. *Lepidogobius lepidus*.

Gobius gracilis Girard, "Proc. Acad. Nat. Sci. Phil., 1854, 134" (preoccupied by *Gobius gracilis* Jenyns.)

Lepidogobius gracilis Gill, Annals Lyc. Nat. Hist. New York, 1859, 14; Gill, Proc. Acad. Nat. Sci. Phil., 1863, 279 (California); Gill, Proc. Acad. Nat. Sci. Phil., 1863, 266 (no locality); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 455 (Puget Sound; San Francisco); Jordan & Jouy, Proc. U. S. Nat. Mus., 1881, 9 (San Francisco); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 53 (San Francisco; Victoria); Jordan & Gilbert, Syn. Fish. North America, 637, 1883.

Gobius lepidus Girard, Pacific Railroad Survey, 127, plate xxv a, fig. 5 & 6, 1859 (San Francisco); Günther, Cat. Fish. Brit. Mus., iii, 78, 1861 (San Francisco).

Lepidogobius lepidus Jordan, Catalogue Fish. North America, 106, 1885 (name only).

Habitat.—Pacific coast of United States, San Francisco, northward.

This species is common in rather deep water outside the bay of San Francisco; from this locality our specimens were obtained.

40. *Lepidogobius newberrii*.

Gobius newberrii Girard, "Proc. Acad. Nat. Sci. Phil., 1856, 136"; Girard, "Boston Journal Nat. Hist., 1857, 530, plate xxv, fig. 5-8"; Girard, Pacific Railroad Survey, 1859, 128 (Tomales Bay, Cal.); Gill, "Annals Lye. Nat. Hist. New York, 1859, 16"; Günther, Cat. Fish. Brit. Mus., iii, 77, 1861 (copied); Steindachner, Ichth. Beiträge, viii, 17, 1879 (Santa Monica, California; Artesian well).

Lepidogobius newberryi Gill, "Ann. Lye. Nat. Hist. N. Y., 1859, 14"; Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 455 (California); Jordan & Gilbert, Syn. Fish. North America, 637, 1883; Jordan, Catalogue Fish. North America, 106, 1885 (name only).

Eucyclogobius newberryi Gill, Proc. Acad. Nat. Sci. Phil., 1862, 330 (name only); Gill, Proc. Acad. Nat. Sci. Phil., 1863, 265 (name only); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 53 (name only).

Habitat.—Coast of California.

This species is rather rare on the California coast. While agreeing closely with *L. lepidus* in many respects, it differs considerably in the naked head and less elongate form. Both species have the fleshy papillæ on the shoulder girdle, found also in *Chonophorus*.

15. MICROGOBIUS.

MICROGOBIUS Poey. Enumeratio Pisc. Cubens., 1875, 127 (*signatus*).

Type *Microgobius signatus* Poey.

We retain the genus *Microgobius* for four small, brightly-colored Gobies, which differ considerably in form and appearance from the species of related genera. The technical characters of *Microgobius* do not seem to have much importance, but for the present we regard it as worthy of retention.

ANALYSIS OF THE SPECIES OF MICROGOBIUS.

a. Body entirely scaled, except the nape, belly, and breast, which are naked, like the head.

b. Scales about 42. Body elongate, moderately compressed, the depth 4 to 5 in length: head long and large, rather sharp in profile, 3 to 3½ in body; eye longer than snout, 4 in head; mouth large, very oblique, the lower jaw strongly projecting; maxillary 1½ to 2½ in head, extending to opposite middle of eye, or much beyond the orbit; teeth in few series, the outer very long and slender, curved, the lower longest, none canine-like; scales small, some of them with short, thick teeth, those of anterior part of body not well developed; dorsal spines more or less filamentous, the 3d and 4th or 4th and 5th sometimes with long filaments; caudal pointed, about as long as head. Grayish-olive, with rather sharply-defined markings of darker brown overlaid with orange in life; head with a pale bluish or gilt stripe from maxillary backward across suborbital region to upper edge of gill-opening; another pale gilt streak from snout along lower part of eye, another from angle of mouth upward and backwards; rest of head dark; opercle with an oblique blackish bar; top of head and nape with dark marblings surrounded by paler reticulations; back with a series of black cross-blotches mostly separated on the median line; two narrower dark vertical bars behind pectoral; middle line of side posteriorly with longitudinally oblong black blotches; besides these, numerous other blotches not regularly arranged; first dorsal with two or three oblique black bands; second dorsal pale, with about four series of black dots; caudal spotted with black; pectoral yellowish; ventral black, its center yellowish (♂); anal pale. Dorsal VII-15. Anal 16 or 17GULOSUS, 41.

bb. Scales 65 or more.

c. Caudal fin more than one-third ($\frac{2}{3}$) length of body. Scales very small, cycloid, deciduous. Body elongate, much compressed, highest in front of ventrals, tapering regularly to the very narrow, short caudal peduncle. Greatest depth $4\frac{3}{4}$ in length, head $3\frac{1}{2}$. Head compressed, much higher than wide; snout very short, acute, preorbital not as wide as pupil; mouth terminal, very wide and oblique; jaws equal; maxillary reaching vertical from middle of orbit, 2 in head. Outer series of teeth enlarged. Eye 3 in head. Dorsals closely contiguous; spines very slender, the fifth slightly produced and filamentous; pectorals as long as head. Head and body translucent, overlaid by brilliant green luster, formed by minute, close-set green points; three conspicuous translucent bars wider than the interspaces, crossing body close behind head; head with two brilliant narrow blue and green lines running obliquely across cheeks below eye. Dorsal whitish, with two or three lengthwise series of large reddish-brown spots; spinous dorsal blackish at base. Upper caudal rays marked with red, the lower portion of caudal and most of the anal fin blackish, anal whitish at base, the anterior rays tipped with white. In spirits, body dusted with dark points; two light cross-bars towards head; lower part of caudal and anal black. Dorsal VII-16. Anal 15..... THALASSINUS, 42.

cc. Caudal fin less than one-third length of body. Scales small, cycloid, imbedded. Body very much compressed, more or less elongate, greatest depth at ventrals 4 (♀) to $6\frac{1}{2}$ (♂) in length; head $3\frac{1}{2}$ to 4. Head much compressed, much deeper than wide. Snout very short, acute, the anterior profile not decurved, not steep; preorbital not as wide as pupil; mouth very large, very oblique or almost vertical; maxillary extending to below pupil 2, in head (in ♂, $2\frac{1}{2}$ in ♀). Lower jaw projecting, the teeth of the outer series enlarged, recurved. Eye $3\frac{1}{2}$ to 4 in head. Dorsals contiguous, spines very fine, produced in filaments, the 3d highest, a little longer than head. Second dorsal and anal high. Head and nape naked. In female the depth is greater, mouth less oblique, smaller; profile from spinous dorsal oblique. First dorsal spine highest, $3\frac{1}{2}$ in length. Ventrals much shorter than in males. Dark gray; female with a short bright blue bar bordered by blackish above pectorals. A blotch of sky-blue and orange below eye; fins dusky, the ventrals pale in female, dusky in males. Males with the body plain bluish gray. Dorsal VII-17 to 20; anal 18 to 21. Scales 68 to 70.

SIGNATUS, 43.

aa. Anterior part of body naked. Teeth of upper jaw in one series. Body elongate compressed, heaviest forwards; depth 5 in length; head $3\frac{3}{4}$; snout short, rather broad, acute in profile; mouth terminal very oblique; gape wide, its length nearly half head; maxillary reaching to opposite middle of pupil; lower jaw projecting. Teeth in lower jaw partly in two series in front, forming a single row laterally; anterior teeth in both jaws strong, incurved. Eyes very large, about $\frac{1}{2}$ of head; snout less than orbit. Scales extremely small, cycloid, scarcely increasing in size toward caudal peduncle; head and anterior part of body to front of dorsal fin naked; a narrow naked strip along base of anterior half of spinous dorsal. Dorsal spines very slender and weak, some of the middle ones usually prolonged, sometimes reaching nearly to the base of caudal, sometimes little elevated. Second dorsal and anal similar to each other, the rays high, the last when depressed nearly reaching to the base of caudal. Caudal pointed, a little longer than head. Light olivaceous; above thickly punctate with pale dots; sides very thickly covered with golden-green specks; back with six pairs of golden-green spots on each side of the dorsal fin, each nearly as large as pupil. Sides of head and anterior half of body with wide streaks

and bars alternately of purplish-blue and golden bronze; those on cheeks longitudinal; those on opercle extending obliquely upwards and backwards, those on body vertical. First dorsal dusky, second dorsal with about 3 series of light-blue spots. Anal pale. Caudal yellowish-green below, dusky above, a very conspicuous narrow bright red streak from the lower end of the base to the tip of the 5th or 6th ray from the bottom, thus crossing the rays obliquely; ventrals bluish. In spirits plain light olive, with a silvery cross-bar behind pectorals. Head $3\frac{2}{3}$ in length; depth 5. Dorsal VII-16. Anal 17. About 65 scales in a median series.

EMBLEMATICUS, 44.

41. *Microgobius gulosus*.

Gobius gulosus Girard, Proc. Acad. Nat. Sci. Phila., 1858, 169 (Indianola, Tex.); Girard, U. S. & Mex. Bound. Survey, 26, 1859 (Indianola, Tex.); Jordan & Gilbert, Syn. Fish. North America, 634, 1883 (copied).

Lepidogobius gulosus Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 294 (Pensacola, Fla.); Jordan & Gilbert, Syn. Fish. North America, 945, 1883; Jordan, Proc. U. S. Nat. Mus., 1884, 324 (Indian River, Fla.); Jordan, Catalogue Fish. North America, 106, 1885.

Habitat.—Gulf of Mexico.

This strongly marked species has no near relative among our Gobies. The many specimens before us are all from Pensacola, where it is a common inhabitant of the grassy bays.

42. *Microgobius thalassinus*.

Gobius thalassinus Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 612 (Charleston, S. C.).

Lepidogobius thalassinus Jordan & Gilbert, Syn. Fish. North America, 947, 1883 (Charleston Harbor); Jordan, Catalogue Fish. North America, 106, 1885 (name only).

Habitat.—South Atlantic Coast of United States; Charleston.

This species is known, as yet, only from the original types taken by Professor Gilbert in Charleston Harbor.

43. *Microgobius signatus*.

Microgobius signatus Poey, Enumeratio Pisc. Cub., 127 Lám. v, fig. 3, 1875; (Cuba) Jordan, Proc. U. S. Nat. Mus., 1886, 49 (Havana, Cuba).

Habitat.—West Indian fauna; Cuba.

The numerous specimens of this species examined by us were obtained by Dr. Jordan in the Havana market. The sexual differences are in this species very strongly marked, as the foregoing analysis of the species shows.

44. *Microgobius emblematicus*.

Gobius emblematicus Jordan & Gilbert, Bull. U. S. Fish. Com., 1881, 330 (Bay of Panama).

Lepidogobius emblematicus Jordan & Gilbert, Bull. U. S. Fish. Com., 1882, 111 (Panama).

Habitat.—Pacific coast of Tropical America; Panama.

This singular species is thus far known only from the original types taken by Professor Gilbert at Panama.

16. GOBIOSOMA.

GOBIOSOMA Girard, Proc. Acad. Nat. Sci. Phila., 1858, 169. (*Alepidotum=bosci.*)

Type *Gobius alepidotus* Bloch & Schneider=*Gobius bosci* Lacépède.

The typical species of this genus scarcely differ from the species of *Gobius*, except in the absence of scales. Two or three little-known species are, however, in some respects decidedly aberrant, and are perhaps not allied to the others. Of the numerous American species of this genus only one is as yet well represented in collections.

ANALYSIS OF SPECIES OF GOBIOSOMA.

- a. Second dorsal short, its rays 10 to 14 in number; anal rays 10 to 12; mouth not very large, the maxillary not extending beyond orbit, not half length of head.
- b. Dorsal spines seven.
- c. Chin with a fringe of short barbels (shriveled and invisible in alcoholic specimen). Body slender, the depth nearly 7 times in length; head $3\frac{3}{4}$ times; head narrow and slender, depressed above. Eyes close together, 4 in head; snout not blunt; mouth terminal, oblique, the maxillary reaching to below eye, 3 in head. Vertical fins high, no rays filamentous. Upper half of head and body brown, finely speckled; four oblong colorless areas along base of dorsals and a smaller one on back of caudal peduncle; lower parts abruptly pale; back with 5 or 6 blackish cross-bars to middle of sides, below which they extend as 5 or 6 short V-shaped projections; a brownish streak below eye; a small brown bar on base of pectoral; a jet-black bar at base of caudal. D. VII-10. A. 10. CEUTHÆCUM, 45.
- cc. Chin without barbels.
- d. Maxillary extending to below front of orbit; color blackish, with sharply defined cross-bars of whitish. Body rather short, the depth $5\frac{1}{2}$ in length; head $3\frac{1}{4}$. Snout low, little obtuse; mouth large, rather oblique, the maxillary $2\frac{3}{8}$ in head; teeth small, in few series above, in a band below, the outer enlarged. Fins low. Caudal $1\frac{1}{2}$ in head. Cross-bands on body as wide as eye, not quite meeting below; a dark blotch on base of pectoral, a fainter one on base of caudal; fins nearly plain. D. VII-13. A. 12. HISTRIO, 46.
- dd. Maxillary extending to below posterior part of orbit; coloration not sharply defined.
- e. Body rather short, chubby, the depth about 4 in length; head about $3\frac{3}{8}$; head rounded above. Teeth in several series, slender, the outer ones somewhat elongate, none of the inner ones specially enlarged. Color olivaceous, with dark points; sides with narrow, alternating light and dark bars; a row of small linear dark spots along middle of sides; first dorsal with three oblique dark bars, second dorsal, caudal, and pectorals finely barred, base and edge of anal light, middle dark. Breast with many well-defined spots. A dark line running forward and downward from eye to angle of mouth, another extending straight down; a black bar on edge of preopercle, a black spot on upper edge of opercle. D. VII-13. A. 10. (Otherwise essentially as in *G. bosci*.)
MOLESTUM, 47.
- ee. Body more elongate, its depth 5 to 6 in body. Head very broad, flattish above, with tumid cheeks, its length $3\frac{1}{2}$ in body. Eye small, longer than snout, 5 in head. Mouth large, little oblique, the jaws subequal.

the maxillary extending to below posterior part of orbit (at least in male), $2\frac{1}{2}$ in head. Teeth in few series, the outer considerably enlarged; two teeth on each side of inner series of lower jaw especially large canines. Dorsal spines slender, none filamentous; caudal rounded. Olivaceous, with darker cross-shades of rounded spots; vertical fins dusky, faintly barred. Teeth of the female similar to those of the male but smaller, head narrower, more slender. D. VII-14. A. 10.....BOSCI, 48.

bb. [Dorsal spines six; anterior dorsal rays not produced in filaments. Head and body compressed; greatest depth $5\frac{3}{8}$ times in total length, head about 4 times. Angle of mouth little behind the center of the eye. Eye 4 in head. Teeth pointed, in several series, those of the outer series a little enlarged. Caudal rounded. Head light yellow; a carmine-red bar extending along the upper edge of head, from the upper corner of gill-opening to the snout, where it joins its fellow, ending behind over the pectoral in a small indigo-blue spot; body with 16-17 light green, well-defined cross-bars separated by narrow white stripes. Fins chiefly greenish. Dorsal VI-11. Anal 10.] (*Steindachner*.)

MULTIFASCIATUM, 49.

bbb. Dorsal spines four, the anterior filamentous. Body long, slender, depth $6\frac{3}{8}$ in length; head long, slender, $3\frac{1}{2}$ in length; mouth large, the lower jaw projecting; maxillary extending slightly beyond posterior edge of orbit. Eye longer than snout $3\frac{3}{8}$ in head; snout rather pointed; interorbital space less than pupil. Teeth small in villiform bands, the outer series in the upper jaw slightly enlarged. Spinous dorsal high, the spines slender, the anterior filamentous; considerably more than greatest depth of body. Caudal short, $1\frac{3}{8}$ in head. Olivaceous, vaguely barred, everywhere closely punctate with darker; lower parts of head thickly punctate with dark dots like the sides; sides of body and head with some faint pale spots; caudal with two distinct black lengthwise bands; its upper and lower edges white, the middle part colored like the body; dorsal and anal largely black, with pale edges. Dorsal IV-12. Anal 12.....ZOSTERURUM, 50.

aa. Second dorsal long—of 15 to 17 rays; anal rays 12 to 17; mouth very large, the maxillary extending considerably beyond the orbit, its length more than half head.

f. [Body moderately slender, its depth 5 to $5\frac{1}{2}$ in body; head $3\frac{1}{2}$; snout slightly decurved in profile, $3\frac{1}{2}$ in head. Mouth a little oblique, the jaws equal. Maxillary extending beyond middle of head, to a distance behind eye, equal to an eye's diameter. Teeth in both jaws beserial laterally, in 3 series in front; those of the outer series somewhat enlarged; fins low, the longest dorsal spine half head; caudal shorter than head. Color brownish yellow; upper parts of head and body with small, irregularly placed brown spots and streaks; dorsals and caudal barred. D. IV to VI-16 or 17. A. 16 or 17.] (*Steindachner*).....LONGIPINNE, 51.

ff. Body very long and slender, the depth $6\frac{3}{8}$ in length; head $4\frac{1}{6}$, long and low, rather pointed anteriorly. Mouth very large, oblique, the lower jaw slightly projecting; maxillary extending to middle of cheek, its length more than half head. Teeth in bands, slender, the outer somewhat enlarged. Eye $4\frac{1}{2}$ in head. Dorsal spines very slender and flexible. Caudal short. Light olivaceous; back, sides and upper fins speckled with dark olive; caudal with 3 or 4 dark cross-bars. D. VI-15. A. 12.....IOS, 52.

45. *Gobiosoma ceuthœcum*.

Gobiosoma ceuthœcum Jordan & Gilbert, Proc. U. S. Nat. Mus., 1884, 29 (Key West); Jordan, Proc. U. S. Nat. Mus., 1884, 141 (Key West); Jordan, Catalogue Fish. North America, 106, 1885 (name only).

Habitat.—West Indian fauna; Key West.

The single known specimen of this species was taken by Dr. Jordan from the cavity of a sponge at Key West. It has no intimate relation to the other species of the genus.

46. *Gobiosoma histrio*.

Gobiosoma histrio Jordan, Proc. U. S. Nat. Mus., 1884, 260 (Guaymas, Mexico); Jordan, Catalogue Fishes North America, 106, 1885 (name only).

Habitat.—Gulf of California.

The single known specimen of this species was sent to the U. S. National Museum from Guaymas, by Mr. H. V. Emeric. The species is closely related to the *Gobiosoma molestum* of the Gulf coast, differing chiefly in the more pronounced coloration.

47. *Gobiosoma molestum*.

Gobiosoma molestum Girard, Proc. Acad. Nat. Sci. Phila., 1858, 169 (Indianola, Tex.); Girard, U. S. & Mex. Bound. Survey, 27, plate 12, fig. 14, 1859, (Indianola, Tex.); Günther, Cat. Fish. Brit. Mus., iii, 556, 1861 (copied); Putnam, Amer. Nat. (Ohio R., near Louisville); Jordan, Man. Vert., Ed. 1, 1876, 246, Ed. 2-4, p. 257 (copied); Jordan & Gilbert, Syn. Fish. North America, 638, 1883 (copied).

Gobiosoma alepidotum Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 297 (Laguna Grande, at Pensacola).

Gobiosoma bosci Jordan, Proc. U. S. Nat. Mus., 1884, 141 (Key West).

Habitat.—Gulf coast of United States.

This species seems to differ from *G. bosci* only in the less elongate form. A full series of specimens will doubtless show intergradations in this respect, and at the most *G. molestum* is probably only a southern representative or variety of *Gobiosoma bosci*. It is common in shallow waters along the coast from Key West to Texas. Professor Putnam's statement of its occurrence in the Ohio River is probably an error.

48. *Gobiosoma bosci*.

Gobius bosci Lacépède, Poissons, ii, 555, 1793, plate 16, fig. 1 (Charleston).

Gobiosoma bosci Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 613 (Charleston, S. C.); Jordan, Proc. U. S. Nat. Mus., 1884, 324 (Indian River, Fla.); Jordan, Catalogue Fish. North America, 106, 1885 (name only); Jenkins, Johns Hopkins Univ. Circular No. 43, 1885, 11 (Beaufort, N. C.); Jordan, Proc. U. S. Nat. Mus., 1886, 28 (Beaufort, N. C.).

Gobius alepidotus Bloch & Schneider, Syst. Ichth., 547, 1801 (after Lacépède); DeKay, Nat. Hist., New York, 160, plate xxiii, fig. 70, 1842 (New York); Uhler & Lugger, Fishes of Maryland, 84, 1876 (Sinepuxent Bay).

Gobiosoma alepidotum Gill, Cat. Fish. East Coast North America, 44, 1861; Gill, Proc. Acad. Nat. Sci. Phil., 1863, 269 (no specimen); Günther, Cat. Fish. Brit. Mus., iii, 85, 1861 (copied); Gill, Cat. Fish. East Coast North America, 21, 1873 (no specimen); Goodé, Proc. U. S. Nat. Mus., 1879, 110 (east coast Florida); Jordan, Proc. U. S. Nat. Mus., 1880, 22 (St. John's River, Fla.); Jordan & Gilbert, Syn. Fish. North America, 638, 1883.

Gobius viridipallidus Mitchell, Trans. Lit. and Phil. Soc., New York, i, 379, plate i, fig. 8, 1814 (New York).

Habitat.—East coast of United States. Cape Cod to Florida.

This little fish is generally common on our Atlantic coast, especially southward in shallow grassy bays. The name *bosci*, first given it by Lacépède, has priority over the commonly used *alepidotum* of Bloch & Schneider.

49. *Gobiosoma multifasciatum*.

Gobiosoma multifasciatum Steindachner, Ichth. Beiträge, v. 183, 1870 (Lesser Antilles).

Habitat.—West Indian fauna; Lesser Antilles.

We know this species only from the description of Dr. Steindachner, who found it not uncommon about the Lesser Antilles.

50. *Gobiosoma zosterurum*.

Gobiosoma zosterurum Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 361 (Mazatlan); Jordan & Gilbert, Bull. U. S. Fish Com., 1882, 108 (Mazatlan); Jordan, Catalogue Fish. North America, 106, 1885 (name only).

Habitat.—Gulf of California; Mazatlan.

This species is known only from the type taken by Professor Gilbert at Mazatlan. The name *zosterurum* (belted tail) is intended to refer to the dark stripe on the caudal fin.

51. *Gobiosoma longipinne*.

Gobiosoma longipinne Steindachner, Ichth. Beiträge, viii, 27, 1879 (Las Animas, Gulf of California).

Habitat.—Gulf of California.

This species is known to us only from Dr. Steindachner's description. It differs widely from the foregoing species of the genus, and is probably an ally of the aberrant *G. ios*.

52. *Gobiosoma ios*.

Gobiosoma ios Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 437 (Vancouver's Island); Jordan & Gilbert, Syn. Fish. North America, 948, 1883 (Puget Sound); Jordan, Cat. Fish. North America, 106, 1885 (name only).

Habitat.—Waters about Puget Sound.

The types of this species, two in number, were taken by Professors Jordan and Gilbert in Saanich Arm, Vancouver's Island. They were found in the stomach of a specimen of *Hexagrammus asper*, taken in water of some depth.

The species has evidently very little affinity with the type of *Gobiosoma*, and when its skull is examined it may prove to be the type of a distinct genus, perhaps allied to *Gillichthys*.

17. GILLICHTHYS.

GILLICHTHYS Cooper, Proc. Cal. Acad. Nat. Sci., 1863, 109 (*mirabilis*).

GILLIA Günther, Zoological Record, 1865 (name preoccupied), (*mirabilis*).

SACCOSTOMA (Guichenot MSS.), Sauvage, Bull. Sci. Philom. Paris, 1882, 171 (name preoccupied), (*gulosum*).

Type *Gillichthys mirabilis* Cooper.

This genus is distinguished not only by the prolongation of the maxillary, as in *Opisthognathus* and *Neoclinus*, but also by the form of the skull. Besides the single American species, the Asiatic *Gobius mystacinus* C. & V., and *Saccostoma gulosum* Guichenot, will probably be found to belong to it.

The clumsy name selected for this genus by Dr. Cooper can hardly be set aside on account of its barbarous construction, as Dr. Günther has suggested. Besides, the more euphonic substitute, *Gillia*, is pre-occupied, as is also the still later *Saccostoma*.

ANALYSIS OF THE SPECIES OF GILlichTHYS.

a. Body stout, somewhat compressed behind, broad and depressed anteriorly, its greatest depth 5 times in length. Head $3\frac{1}{2}$ in length, broader than high, its width $1\frac{1}{2}$; its depth 2 or more in its length. Eyes small, 6 to 7 in head; snout longer than eye, low, little decurved; interorbital area greater than eye. Maxillary variable, extending to base of pectoral in adults, broadened behind. Fold of lower lip extending its full length. Mouth very large, its angle extending to below posterior angle of orbit. Teeth all alike, small, fixed, in bands; the band of the lower jaw broader than that of upper. Scales small, cycloid, irregularly placed; largest from front of second dorsal backwards; decreasing in size forward. Head, breast, belly, and half of nape naked. Dorsal spines not filamentous, not as high as the soft rays, which are little more than half height of body. Caudal broad, short, rounded. Pectorals broad and rounded; their length half head, longer than ventrals. Dull olive, very finely marbled with darker; sides of head and maxillary finely punctate; fins olive; belly and ventrals yellowish. Dorsal, VI-12; anal, 12..... MIRABILIS, 51.

53. *Gillichthys mirabilis*.

Gillichthys mirabilis Cooper, Proc. Cal. Acad. Nat. Sci., 1863, 109; Steindachner, Ichth. Beiträge v. 147, 1876 (Oakland, Cal.); Lockington, Am. Naturalist, 1877, 474 (San Francisco, "Gulf of California"); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 455 ("Puget Sound," San Francisco; Santa Barbara; San Pedro; San Diego); Rosa Smith, Fishes of San Diego Cal., 1880 (San Diego, Cal.); Jordan & Jouy, Proc. U. S. Nat., Mus. 1881, 9 (San Diego); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 53 (California, south of San Francisco); Jordan & Gilbert, Syn. Fish. North America, 636, 1883; Jordan, Catalogue Fish. North America, 106, 1885 (name only); Rosa Smith, West. American Scientist, 1885, 46 (San Diego, Cal.).

Habitat. Coast of California from San Francisco to San Diego.

This singular species is very abundant in the mud flats in shallow water along the coast of California. It burrows holes in the mud like a cray-fish, and it readily takes the hook baited with flesh or worm, when it is dropped into the mouth of the burrow. The locality, "Puget Sound," given in the above synonymy is based on error, and the locality "Gulf of California," given by Mr. Lockington, needs verification.

18. TYPHLOGOBIUS.

TYPHLOGOBIUS Steindachner, Ichth. Beitr., viii, 24, 1879 (*californiensis*).
OTHIONOPS Rosa Smith, Proc. U. S. Nat. Mus., 1881, 19 (*cos=californiensis*).

Type, *Typhlogobius californiensis* Steindachner.

This singular group consists of blind gobies, living like slugs under rocks between tide marks. But one species is known.

ANALYSIS OF THE SPECIES OF TYPHLOGOBIUS.

- a. Body subcylindrical, the males more compressed behind; greatest depth 6 times in length to base of caudal. Head very broad behind, its greatest width $\frac{2}{3}$ its length, which is $3\frac{1}{2}$ in body. Eye concealed, very small; distance from snout to anterior border of eye 5 in head. Interorbital space a mere ridge. Skin about mouth and eye very loose; a small papilla in front of nasal opening. Lower lip developed as a fold; another fold of skin behind it, bordered with fine cilia; behind this fold is a row of short, thick papillæ. Teeth in both jaws long, close set; those of the upper jaw in a broad band; the edge of the jaw rounded. Spinous dorsal remote from soft dorsal in male, connected with it by a low membrane; in female without any connection; soft dorsal much higher than spines; caudal broad, rounded; anal very short, inserted under sixth dorsal ray, coterminous with dorsal; pectorals little longer than ventrals, half head. Body naked; male with small tubercular plates irregularly placed. Dorsal II—12; anal 12; color uniform light pink CALIFORNIENSIS, 54.

54. *Typhlogobius californiensis*.

Typhlogobius californiensis Steindachner, Ichth. Beiträge, viii, 24, 1879 (False Bay, San Diego, Cal.); Jordan & Gilbert, Syn. Fish. North America, 639, 1883 (San Diego, Cal.); Rosa Smith, Proc. U. S. Nat. Mus., 1883, 234 (Todos Santos Bay, Lower Cal.); Jordan, Catalogue Fish. North America, 106, 1885 (name only); Rosa Smith, West. American Scientist, 1885, 46 (San Diego, Cal.).

Othonops eos Rosa Smith, Proc. U. S. Nat. Mus., 1881, 19 (Point Loma, Cal.); Jordan and Gilbert, Proc. U. S. Nat. Mus., 1881, 53 (Point Loma, Cal.).

Habitat.—Coast of Southern California; vicinity of San Diego, and southward.

This little fish is very abundant under rocks at low-tide about Point Loma, near San Diego. Nearly all of the known specimens have been collected by Miss Rosa Smith. The specimens before us are from Point Loma and Todos Santos.

19. TYNTLASTES.

TYNTLASTES Günther, Proc. Zool. Soc. London, 1862, 193 (Sagitta).

Type, *Amblyopus sagitta* Günther.

This genus consists of two species, both unknown to us.

ANALYSIS OF THE SPECIES OF TYNTLASTES.

- a. [Dorsal, VI-15; anal, 15; depth, 8 in length to base of caudal; head, $4\frac{1}{2}$; eyes minute; jaws with a series of longish, wide set teeth; caudal fin black.] (*Günther*)..... BREVIS, 55.
- aa. [Dorsal, VI-21; anal, 21. Body and head elongate, compressed. Depth of body $9\frac{3}{8}$ in length, head, $5\frac{3}{8}$. Maxillary reaching to behind eye; teeth sub-horizontal, very small; scales becoming larger posteriorly. Caudal arrow-shaped, about one-fourth length of body; pectoral as long as ventral, half as long as head. Grayish, sides and below silvery; an ovate gray spot before each dorsal ray; caudal gray.] (*Günther*)..... SAGITTA, 56.

55. Tynntlastes brevis.

Amblyopus brevis Günther, Proc. Zool. Soc., 1864, 151 (Pacific coast, Panama).
Günther, Fish. Central America, 441, 1869 (copied).

Habitat.—Panama fauna.

This species is known to us only from the description of Dr. Günther.

56. Tynntlastes sagitta.

Amblyopus sagitta Günther, Proc. Zool. Soc., London, 1862, 193 (California).
Tynntlastes sagitta Jordan & Gilbert, Syn. Fish. North America, 639, 1883
(copied); Jordan, Catalogue Fish. North America, 106, 1885 (name only).

Habitat.—(Lower?) California.

This species is known only from the description of Dr. Günther.

20. GOBIOIDES.

GOBIOIDES Lacépède, ii, 280, 1798 (*broussoneti*).

OGNICHODES Swainson, Nat. Hist., Class'n Anim., ii, 1839, 183 and 278 (*broussoneti*).

Type, *Gobioides broussoneti* Lacépède.

This genus seems to be represented within the region covered by this paper, by a single species, widely distributed in the tropical rivers. A second species, *Gobioides peruanus* Steindachner, occurs in Peru.

From *Tenioides* (= *Amblyopus*) the genus *Gobioides* seems to be distinguished by much smaller number of rays in its vertical fins.

ANALYSIS OF THE SPECIES OF GOBIOIDES.

- a. Body elongate, head $5\frac{1}{2}$ to 7 in length; caudal $3\frac{1}{2}$ to 5 in length. Mouth oblique, maxillary extending beyond eye. Teeth in bands; the outer series enlarged, shorter and closer set than in *Gobioides peruanus*. Eye small, 7 to 10 times in head (half as large as in specimens of *Gobioides peruanus* of same size); inter-orbital area 1 to $1\frac{1}{2}$ diameter of eye. Scales twice as large as in *peruanus*, those of the anterior part of body not imbricated, much smaller than those of posterior part. Violet bars extending downward and forward on the upper half of body; sometimes a violet spot with a lighter or darker dot at the end of the bars. Head marbled or spotted with dark violet or brown. Dorsals united, vii, 16. Anal i, 16. BROUSSONETI, 57.

57. Gobioides broussoneti.

Gobioides broussoneti Lacépède, ii, 280, 1798 (probably from Surinam); Cuvier, "Règne Anim. Ill., Poiss., plate 80, f. 3, 1818" (not of Cuv. & Val. nor of Günther, whose species is the Pacific coast *G. peruanus*).

Amblyopus broussoneti Steindachner, Fisch-Arten um Guayaquil, 43, 1879 (Cuba, Amazon, Rio Janeiro).

? *Gobius brasiliensis* Bloch & Schneider, Syst. Ichth., 1801, 69 (on a drawing by Prince Maurice).

Gobius brasiliensis Cuv. & Val., Hist. Nat. Poiss., xii, 121, 1837 (Martinique).

Gobius oblongus Bloch & Schneider, Syst. Ichth., 548, 1801 (based on Lacépède).

Gobioides barreto Poey, Memorias de Cuba, 282, 1861 (Cuba); Poey, Synopsis Pisc. Cub., 394, 1868 (Cuba); Poey, Enum. Pisc. Cub., 125, 1876 (Cuba).

? *Amblyopus mexicanus* O'Shaughnessy, "Ann. Mag. of Nat. Hist., ser. iv, vol. xv, 1875, 147 (Mexico)."

Habitat.—Fresh waters of the West Indies, Eastern Mexico and South America.

We have had no opportunity to study this species, and have drawn our knowledge of it chiefly from Steindachner. The original type of the species, belonging to a collection "given by Holland to France," probably came from Surinam, and, therefore, probably belongs to this species, rather than to *G. peruanus*. The *Gobioides barreto* is doubtless the same, as Steindachner has shown. The description of *Amblyopus mexicanus* we have not seen, and we take the reference to it from Steindachner. The type of *Gobius brasiliensis* Cuvier & Valenciennes, examined by Dr. Jordan in Paris, apparently belongs to *Gobioides broussoneti*. It is probable that the *Gobius brasiliensis* of Bloch & Schneider is the same, although they give the fin rays of their specimen as D. XVIII-21, A. 19.

NOTES ON SKELETONS.

Lophogobius cyprinoides.

Skull very broad and short; distance from posterior edge of orbit to occiput $1\frac{2}{3}$ in its width; an angle formed at the occiput. A low, median crest, highest behind. Double crests of temporal region joining at the upper posterior angles of the eyes and forming a bridge over the interorbital area. The crests end abruptly above the anterior part of the orbit, forming a decided angle. The bridged interorbital leaves a large foramen in front of this angle. A slight ridge along the middle of the interorbital.

Vertebræ, 11 + 15.

Teeth in the upper jaw in a band, those of the outer series large, all of the same size, the inner series minute; those of the lower jaw in a band, the outer series somewhat enlarged, the innermost teeth strongly recurved, remote, somewhat enlarged; other teeth minute.

Gobius soporator.

Skull posteriorly much as in *L. cyprinoides*, but the median crest reduced to a slight ridge. The lateral crests very high and closely approximated, rising obliquely outwards; the inner crests meet behind the eye, the outer ones form a very high border about the orbit. Interorbital very narrow and deep, with a median ridge.

Vertebræ, 11 + 16.

Teeth of the upper jaw in a broad band, those of the outer series much enlarged, the inner ones minute, brush-like. Teeth of the lower jaw in a band, the inner and outer series equally enlarged, the median ones minute. A few of the teeth of the inner series near the angle of the mouth specially enlarged, those of the outer series in the same region smaller or absent.

Gobius boleosoma.

Skull rounded behind, no ridges nor crests. The crests at the side minute. Interorbital very narrow.

Gobius oceanicus.

Skull behind eye broad and short, its length $1\frac{1}{2}$ in width, no decided ridges nor crests; lateral crests large and stout behind, minute forward. Interorbital area narrow, deeply grooved, with a median ridge.

Vertebræ, 11 + 15.

Chonophorus taiasica.

Skull rounded behind, with a very short crest in its middle; lateral crests high and thin, converging into one opposite the insertion of the suprascapula. The inner crests do not meet behind the eye; the outer ones extend around the orbit. A low, blunt ridge between the posterior corners of the orbit, becoming much higher forward, continued as the ethmoid and ending abruptly some distance in advance of the orbit.

Teeth in the upper jaw in a few series, those of the outer series many times larger than the others, which are minute; those of the lower jaw all alike small, in a band.

Microgobius gulosus.

Skull flattened behind, with a median ridge extending from the eyes back to end of skull. Double crests border the skull in front and on sides. The inner ones meet in front of median crest. Interorbital very narrow and deeply grooved, with a median ridge. Frontal bones very thin and fragile.

Vertebræ, 11 + 15.

Teeth on both jaws in narrow bands, all alike.

Microgobius signatus.

Skull rounded, very fragile. A median crest which is highest between the eyes. Lateral crests developed; the inner ones meeting above the posterior part of the eye. Interorbital comparatively broad, the median crest ending above the anterior part of the orbit.

Vertebræ, 14 + 15.

Teeth in both jaws, in two or three series, the outer series of the upper jaw enlarged and recurved, the inner ones minute. The outer series of the lower jaw smaller than those of the upper jaw, the one nearest angle of mouth an enlarged canine.

Gobiosoma molestum.

Skull flattish, with a slight median keel. Lateral crests developed, lower and stronger than in *Gobius*. Interorbital very narrow, bounded by two minute crests. Bones of the skull very weak and fragile.

Vertebræ, 12 + 15.

Teeth in both jaws recurved, in two or three series.

Gillichthys mirabilis.

Skull not abruptly widened behind eye, as in *Gobius*, being triangular posteriorly. No lateral ridges; a strong median keel; a short trans-

verse crest behind orbit. Interorbital not deeply grooved, with a blunt median ridge. Orbit not bordered by any prominent ridges.

Vertebrae 15 + 17.

Teeth in both jaws, close set, in bands, all alike.

Typhlogobius californiensis.

Skull highest at its posterior end, depressed forward; the bones all thick and strong. No lateral crests; a median keel which is lowest behind. Orbit not bounded by any ridges. Interorbital a mere ridge. Two keels diverge from the posterior end of the median keel to the insertion of the suprascapula. Premaxillaries and mandible very long.

Vertebrae 17 + 13.

Teeth of the upper jaw all alike, in a broad band, those of the lower jaw in a narrow band, the inner ones apparently larger.

List of nominal species of North American Gobies, with identifications.

[Tenable specific names are in italics.]

Nominal species.	Date.	Identification.
<i>Gobius oceanicus</i> Pallas.....	1769	<i>Gobius oceanicus.</i>
<i>Gobius cyprinoides</i> Pallas.....	1770	<i>Lophogobius cyprinoides.</i>
<i>Gobius lanceolatus</i> Bloch.....	1783	<i>Gobius oceanicus.</i>
<i>Gobius plumieri</i> Bloch.....	1786	<i>Sicydium plumieri.</i>
<i>Gobius pisonis</i> Gmelin.....	1788	<i>Eleotris pisonis.</i>
<i>Sciæna maculata</i> Bloch.....	1792	<i>Dormitator maculatus.</i>
<i>Gobius amorea</i> Walbaum.....	1792	<i>Eleotris pisonis.</i>
<i>Gobius bosci</i> Lacépède.....	1798	<i>Gobiosoma bosci.</i>
<i>Gobioides broussoneti</i> Lacépède.....	1798	<i>Gobioides broussoneti.</i>
<i>Gobiomorus dormitor</i> Lacépède.....	1798	<i>Gobiomorus dormitor.</i>
<i>Gobius brasiliensis</i> Bloch & Schneider.....	1801	<i>?Gobioides broussoneti.</i>
<i>Batrachus gnævina</i> Bloch & Schneider.....	1801	<i>Gobiomorus dormitor.</i>
<i>Platycephalus dormitator</i> Bloch & Schneider.....	1801	<i>Gobiomorus dormitor.</i>
<i>Gobius alepidotus</i> Bloch & Schneider.....	1801	<i>Gobiosoma bosci.</i>
<i>Gobius oblongus</i> Bloch & Schneider.....	1801	<i>Gobioides broussoneti.</i>
<i>Gobius viridipallidus</i> Mitchell.....	1814	<i>Gobiosoma bosci.</i>
<i>Gobius taiasica</i> Lichtenstein.....	1822	<i>Chonophorus taiasica.</i>
<i>Eleotris latifrons</i> Richardson.....	1837	<i>Dormitator latifrons.</i>
<i>Gobius saporator</i> Cuvier & Valenciennes.....	1837	<i>Gobius saporator.</i>
<i>Gobius flavus</i> Cuvier & Valenciennes.....	1837	<i>Chonophorus flavus.</i>
<i>Gobius banana</i> Cuvier & Valenciennes.....	1837	<i>Chonophorus taiasica.</i>
<i>Gobius martinicus</i> Cuvier & Valenciennes.....	1837	<i>Chonophorus taiasica.</i>
<i>Gobius bacalaus</i> Cuvier & Valenciennes.....	1837	<i>Gobius oceanicus.</i>
<i>Gobius smaragdus</i> Cuvier & Valenciennes.....	1837	<i>Gobius smaragdus.</i>
<i>Gobius brasiliensis</i> Cuvier & Valenciennes.....	1837	<i>Gobioides broussoneti.</i>
<i>Gobius cristagalli</i> Cuvier & Valenciennes.....	1837	<i>Lophogobius cyprinoides.</i>
<i>Eleotris gyrinus</i> Cuvier & Valenciennes.....	1837	<i>Eleotris pisonis.</i>
<i>Eleotris guævina</i> Cuvier & Valenciennes.....	1837	<i>Guævina gnævina.</i>
<i>Eleotris mugiloides</i> Cuvier & Valenciennes.....	1837	<i>Dormitator maculatus.</i>
<i>Eleotris smaragdus</i> Cuvier & Valenciennes.....	1837	<i>Eleotris smaragdus.</i>
<i>Eleotris sina</i> Cuvier & Valenciennes.....	1837	<i>Dormitator maculatus.</i>
<i>Gobius gracilis</i> Girard.....	1854	<i>Lepidogobius lepidus.</i>
<i>Gobius newberryi</i> Girard.....	1856	<i>Lepidogobius newberryi.</i>
<i>Ctenogobius fasciatus</i> Gill.....	1858	<i>Gobius fasciatus.</i>
<i>Gobionellus hastatus</i> Girard.....	1858	<i>Gobius oceanicus.</i>
<i>Gobius lyricus</i> Girard.....	1858	<i>Gobius lyricus.</i>
<i>Gobius würdemanni</i> Girard.....	1858	<i>?Gobius lyricus.</i>
<i>Gobius catulus</i> Girard.....	1858	<i>Gobius saporator.</i>
<i>Gobius gulosus</i> Girard.....	1858	<i>Microgobius gulosus.</i>
<i>Gobiosoma molestum</i> Girard.....	1858	<i>Gobiosoma molestum.</i>
<i>Eleotris somnolentus</i> Girard.....	1859	<i>Eleotris pisonis.</i>
<i>Evorthodus breviceps</i> Gill.....	1859	<i>Evorthodus breviceps.</i>
<i>Gobius lepidus</i> Girard.....	1859	<i>Lepidogobius lepidus.</i>
<i>Philypnus lateralis</i> Gill.....	1860	<i>Gobiomorus lateralis.</i>
<i>Gobius mexicanus</i> Günther.....	1861	<i>Chonophorus mexicanus.</i>
<i>Gobius paradoxus</i> Günther.....	1861	<i>Gobius paradoxus.</i>
<i>Gobius seminudus</i> Günther.....	1861	<i>Gobius seminudus.</i>
<i>Gobius sagittula</i> Günther.....	1861	<i>Gobius sagittula.</i>
<i>Eleotris omocæneus</i> Poey.....	1861	<i>Dormitator maculatus.</i>
<i>Eleotris gundlachi</i> Poey.....	1861	<i>Dormitator maculatus.</i>
<i>Erotelis valenciennesi</i> Poey.....	1861	<i>Erotelis smaragdus.</i>
<i>Chonophorus bucculentus</i> Poey.....	1861	<i>Chonophorus taiasica.</i>
<i>Gobius mapo</i> Poey.....	1861	<i>Gobius saporator.</i>

List of nominal species of North American Gobies, with identifications—Continued.

Nominal species.	Date.	Identification.
<i>Gobius lacertus</i> Poey	1861	<i>Gobius saporator</i> .
<i>Sicydium siragns</i> Poey	1861	<i>Sicydium plumieri</i> .
<i>Smaragdus valenciennesi</i> Poey	1861	<i>Gobius smaragdus</i> .
<i>Smaragdus costalesi</i> Poey	1861	<i>Gobius lyricus</i> .
<i>Smaragdus stigmaticus</i> Poey	1861	<i>Gobius stigmaticus</i> .
<i>Gobioides barreto</i> Poey	1861	<i>Gobioides broussoneti</i> .
<i>Gobius lineatus</i> Poey	1861	<i>Gobius</i> sp.
<i>Rhinogobius contractus</i> Poey	1861	<i>Chonophorus taiasica</i> .
<i>Amblyopus sagitta</i> Günther	1862	<i>Tyntlastes sagitta</i> .
<i>Dormitator micropthalmus</i> Gill	1863	<i>Dormitator latifrons</i> .
<i>Coryphopterus glaucofrænum</i> Gill	1863	<i>Gobius glaucofrænum</i> .
<i>Gobius carolinensis</i> Gill	1863	<i>Gobius saporator</i> .
<i>Dormitator lineatus</i> Gill	1863	<i>Dormitator latifrons</i> .
<i>Gillichthys mirabilis</i> Cooper	1863	<i>Gillichthys mirabilis</i> .
<i>Eleotris picta</i> Kner & Steindachner	1864	<i>Eleotris pisonis</i> .
<i>Eleotris seminuda</i> Günther	1864	<i>Gymneleotris seminuda</i> .
<i>Eleotris longiceps</i> Günther	1864	<i>Gobiomorus longiceps</i> .
<i>Amblyopus brevis</i> Günther	1864	<i>Tyntlastes brevis</i> .
<i>Gobius poeyi</i> Steindachner	1867	<i>Gobius poeyi</i> .
<i>Gobius brunneus</i> Poey	1868	<i>Gobius</i> sp.
<i>Gobius dolichocephalus</i> Cope	1869	<i>Chonophorus taiasica</i> .
<i>Gobiosoma multifasciatum</i> Steindachner	1869	<i>Gobiosoma multifasciatum</i> .
<i>Eleotris amblyopsis</i> Cope	1870	<i>Eleotris amblyopsis</i> .
<i>Culius perniger</i> Cope	1870	<i>Eleotris pisonis</i> .
<i>Amblyopus mexicanus</i> O'Shaughnessy	1875	<i>Gobioides broussoneti</i> .
<i>Microgobius signatus</i> Poey	1875	<i>Microgobius signatus</i> .
<i>Gobius kraussi</i> Steindachner	1879	<i>Gobius kraussi</i> .
<i>Typhlogobius californiensis</i> Steindachner	1879	<i>Typhlogobius californiensis</i> .
<i>Gobiosoma longipinne</i> Steindachner	1879	<i>Gobiosoma longipinne</i> .
<i>Culius belizanus</i> Sauvage	1879	<i>Eleotris belizana</i> .
<i>Othonops eos</i> Rosa Smith	1881	<i>Typhlogobius californiensis</i> .
<i>Gobiosoma zosterurum</i> Jordan & Gilbert	1881	<i>Gobiosoma zosterurum</i> .
<i>Culius æquidens</i> Jordan & Gilbert	1881	<i>Eleotris æquidens</i> .
<i>Gobius nicholsi</i> Bean	1881	<i>Gobius nicholsi</i> .
<i>Gobius emblematicus</i> Jordan & Gilbert	1881	<i>Microgobius emblematicus</i> .
<i>Gobius boleosoma</i> Jordan & Gilbert	1882	<i>Gobius boleosoma</i> .
<i>Ioglossus calliurus</i> Bean	1882	<i>Ioglossus calliurus</i> .
<i>Gobius stigmaturus</i> Goode & Bean	1882	<i>Gobius stigmaturus</i> .
<i>Gobiosoma ios</i> Jordan & Gilbert	1882	<i>Gobiosoma ios</i> .
<i>Gobius encæomus</i> Jordan & Gilbert	1882	<i>Gobius encæomus</i> .
<i>Gobius thalassinus</i> Jordan & Gilbert	1882	<i>Microgobius thalassinus</i> .
<i>Gobiosoma euthecum</i> Jordan & Gilbert	1884	<i>Gobiosoma thalassinus</i> .
<i>Gobiosoma histrio</i> Jordan & Gilbert	1884	<i>Gobiosoma histrio</i> .
<i>Sicydium antillarum</i> Grant	1884	<i>Sicydium plumieri</i> .
<i>Sicydium gymnogaster</i> Grant	1884	<i>Sicyopterus gymnogaster</i> .
<i>Sicydium salvini</i> Grant	1884	<i>Sicyopterus salvini</i> .
<i>Gobius shufeldti</i> Jordan & Eigenmann	1886	<i>Gobius shufeldti</i> .

RECAPITULATION.

(U, Atlantic coasts of United States; C, California fauna; W, West Indian fauna; P, Panama fauna.)

1. IOGLOSSUS Bean.
 1. *Ioglossus calliurus* Bean. U.
2. GOBIOMORUS Lacépède.
 2. *Gobiomorus lateralis* Gill. P.
 3. *Gobiomorus dormitor* Lacépède. W, U.
 4. *Gobiomorus longiceps* Günther. W.
3. DORMITATOR Gill.
 5. *Dormitator maculatus* Bloch. W, U.
 6. *Dormitator latifrons* Richardson. P.
4. GUAVINA Bleeker.
 7. *Guavina guavina* Cnv. & Val. W.
5. ELEOTRIS Gronow.
 8. *Eleotris amblyopsis* Cope. W, U.
 9. *Eleotris pisonis* Gmelin. W, U.
 10. *Eleotris æquidens* Jordan & Gilbert. P.
 11. *Eleotris belizana* Sauvage. W.

6. EROTELIS Poey.
 12. *Erotelis smaragdus* Cuv. & Val. W, U.
7. GYMNELEOTRIS Bleeker. (Doubtful genus, imperfectly known.)
 13. *Gymneleotris seminuda* Günther. P.
8. SICYDIUM Cuvier & Valenciennes.
 14. *Sicydium plumieri* Bloch. W. (Perhaps includes two species.)
9. SICYOPTERUS Gill. (Genus not clearly defined.)
 15. *Sicyopterus gymnogaster* Grant. P.
 16. *Sicyopterus salvini* Grant. P.
10. EVORTHODUS Gill.
 17. *Evorthodus breviceps* Gill. W.
11. LOPHOGOBIUS Gill.
 18. *Lophogobius cyprinoides* Pallas. W.
12. GOBIUS (Artedi) Linnæus.
 19. *Gobius saporator* Cuv. & Val. W, U, P.
 20. *Gobius nicholsi* Bean. C. (Perhaps adult of the next.)
 21. *Gobius glaucofrænum* Gill. C.
 22. *Gobius stigmaturus* Goode & Bean. U.
 23. *Gobius shufeldti* Jordan & Eigenmann. U.
 24. *Gobius boleosoma* Jordan & Gilbert. U.
 25. *Gobius fasciatus* Gill. W. (Species imperfectly known.)
 26. *Gobius stigmaticus* Poey. W, U.
 27. *Gobius encæomus* Jordan & Gilbert. U.
 28. *Gobius lyricus* Girard. W, U.
 29. *Gobius smaragdus* Cuv. & Val. W, U.
 30. *Gobius poeyi* Steindachner. W.
 31. *Gobius kraussi* Steindachner. W.
 32. *Gobius sagittula* Günther. P.
 33. *Gobius oceanicus* Pallas. W, U.
 34. *Gobius paradoxus* Günther. P.
 35. *Gobius seminudus* Günther. P.
13. CHONOPHORUS Poey. (Perhaps identical with the Asiatic *Rhinogobius*.)
 36. *Chonophorus flavus* C. & V. W.
 37. *Chonophorus taiasica* Lichtenstein. W, P.
 38. *Chonophorus mexicanus* Günther. W.
14. LEPIDOGOBIUS Gill.
 § *Lepidogobius*.
 39. *Lepidogobius lepidus* Girard. C.
 § *Eucyclogobius* Gill.
 40. *Lepidogobius newberrii* Girard. C.
15. MICROGOBIUS Poey.
 41. *Microgobius gulosus* Girard. U.
 42. *Microgobius thalassinus* Jordan & Gilbert. U.
 43. *Microgobius signatus* Poey. W.
 44. *Microgobius emblematicus* Jordan & Gilbert. P.
16. GOBIOSOMA Girard.
 45. *Gobiosoma ceuthæcum* Jordan & Gilbert. U.
 46. *Gobiosoma histrio* Jordan. P.
 47. *Gobiosoma molestum* Girard. U. (Probably a variety of the next.)
 48. *Gobiosoma bosci* Lacépède. U.
 49. *Gobiosoma multifasciatum* Steindachner. W.
 50. *Gobiosoma zosterurum* Jordan & Gilbert. P.
 51. *Gobiosoma longipinne* Steindachner. P.
 52. *Gobiosoma ios* Jordan & Gilbert. C.

17. GILLICHTHYS Cooper.
53. *Gillichthys mirabilis* Cooper. C.
18. TYPHLOGOBIUS Steindachner.
54. *Typhlogobius californiensis* Steindachner. C.
19. TYNTLASTES Günther.
55. *Tyntlastes brevis* Günther. P.
56. *Tyntlastes sagitta* Günther. P.
20. GOBIOIDES Lacépède.
57. *Gobioides broussoneti* Lacépède. W.

INDIANA UNIVERSITY, *September 17, 1886.*