

Article II.—THE FISHES OF THE MOTAGUA RIVER, GUATEMALA.¹

BY NEWTON MILLER.

During January, February, and March of 1905, I collected fishes in the Rio Motagua basin of Guatemala from an elevation of 60 to 900 feet. I was the only member of a party of botanists and zoölogists exclusively engaged in collecting fishes but received assistance from Mr. E. B. Williamson, Mr. C. C. Dean, and Prof. J. Hines, three members of our party. I am much indebted to the authorities of the Ferrocarril del Norte de Guatemala and the Ferrocarril Central de Guatemala for kindness and valuable assistance. I am no less indebted to Dr. C. H. Eigenmann under whose direction I made this collection and prepared this paper.

In a recent paper (Fresh-water Fishes of Mexico) Meek has shown that the North and South American faunas overlap in Mexico. The prime object of my work in Guatemala was to determine to what extent the fauna of the Motagua basin contains representatives of the North and South American faunas, respectively, and what is autochthonous.

The Motagua basin has a general east-west trend from the Gulf of Honduras to within about 50 miles of the Pacific coast. Collections were made in the following localities: Tenedores, Los Amates, Algeria, Gualan, Zacapa, and El Rancho. Other collections were made at Puerto Barrios and Santa Lucia not in the Motagua basin.

CHARACTER OF COLLECTING STATIONS.

1. *Stream at Edge of Puerto Barrios.*—At the edge of Puerto Barrios a small stream empties directly into the Gulf of Honduras. The water of this stream is dark, sluggish, and contains much dirt. The banks are low, overgrown with low elbowed bushes which extend out over the water. I collected only in the mouth of this stream where the bottom is composed of sand and mud.

Altitude 0.

2. *Swamps West of Puerto Barrios.*—The region west of Puerto Barrios for about 50 miles contains many swamps. The water is very dark and full of decaying vegetable matter. About the edges of the swamps is a dense growth of bushes and trees and in some cases the marginal water is full of water plants. The swamps examined are 2 to 3 miles west of Puerto Barrios and when examined were about 4½ feet deep. Seining

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was almost impossible on account of logs and brush. Dynamite was used with very little success.

Altitude 60 to 80 feet.

3. *Sulphur River*.—Sulphur River is a short stream emptying into the Bay of Honduras. Collections were made $3\frac{1}{2}$ and $5\frac{1}{2}$ miles west of Puerto Barrios near the railroad. In the upper part of the stream, $5\frac{1}{2}$ miles west of Puerto Barrios at an elevation of 80 feet, the water is very warm, 32.2° C., and strongly charged with sulphur. The stream here has numerous small falls, the bottom being rocky and gravelly.

Three and a half miles from Puerto Barrios, with an altitude of 40 feet, the water is much cooler and not so clear. The bottom here is sandy or solid rock with occasional large boulders.

4. *Rio Machaca*,¹ four miles east of Tenedores.—This stream, a tributary of the Motagua, is about 45 feet wide, deep, swift, and with steep banks. Its bottom for the most part is sandy. Very little brush and but few logs are lodged in it. Its course is through a growth of vegetation, so dense that we had to cut our way through it to the stream.

Altitude 64 feet; temperature 26° C.

5. *Rio Negro near Tenedores*.—Rio Negro is a small, sluggish, swamp stream tributary to the Motagua. The abundance of vegetable matter makes its water a dirty brown. It is deeply shaded for the most part by overhanging boughs and vines that trail over them.

I was not able to seine this stream at all on account of the brush in it, but I secured a few specimens with dynamite.

Altitude 68 feet.

6. *Rio Tenedores at Tenedores*.—Collections were made in this stream for a quarter of a mile from where it empties into the Motagua. Its water was clear enough to show the bottom at a depth of about two feet. The river is not swift at this point. Above it is much more rapid. The bottom is sandy and for the most part free from brush. Seining would be easy but for the steep banks. Trees and shrubs are here few. The average width of the stream is about 40 feet and its depth in places 7 or 8 feet. Cichlids were taken in abundance, especially *Cichlasoma spilurum*.

Altitude 85 feet; temperature 27° C.

7. *Rio Kilagua at Los Amates*.—The water of this tributary of the Motagua is ordinarily clear, but becomes very muddy for a short time after a rain. The bottom is sandy. The banks are steep, with dense vegetation up to their edges. Vines overrun the trees and hang down into the water in places. These vines often catch brush and form a drift in the stream about which some species of Cichlid are more abundant

¹ Machaca is the name given by the natives to the largest of the fresh-water fishes, *Brycon dentex*, and on account of its abundance in this stream, the stream has been called Machaca.

than elsewhere. Collections were made by setting a seine across the river below one of the drifts and then dynamiting the place. The water is swift enough to wash the dead and stunned fishes into the net. *Astyanax aeneus* was the only species taken in abundance from this river.

Altitude 260 feet; temperature 26.5° C.

8. *Pond North of Los Amates.*—A large pond was discovered about half a mile northeast of Los Amates. Its water contains vegetable matter in abundance. All about the pond are palms and large trees. Weeds and water plants grow out into the pond to a depth of about four feet, leaving only about 60 feet of the central portion of the pond free from plants. Seining here was a difficult matter. We succeeded in getting a few specimens of *Xiphophorus helleri* and *Belonesox belizanus*.

Altitude 260 feet; temperature 27° C.

9. *Rio Managua at Algeria.*—This river is swift with now and then deep holes that can be seined. The bottom is either gravelly or sandy. Landing places are good. In some places there is so much drifting sand that it fills the seine; in other places are large boulders. Algeria is near the mountains and the stream is here practically a mountain torrent.

Altitude 280 feet; temperature 26.5° C.

10. *Rio Gualan at Gualan.*—This river, a tributary of the Motagua, is a mountain torrent, with few pools that are waist deep. Its water is clear and swift, so swift indeed that a forty-foot seine can scarcely be stretched across it. No mud bottom was found in the river proper. The bottom is covered with pebbles or small boulders, about the size of a man's fist. No brush was found in this stream at all. Fishes are few in this river both in species and individuals.

More species were taken from a small fork of the Rio Gualan whose water was clear and sluggish than from the river proper. This stream flows through a field, is about 15 feet wide and has deep pools and sandy bottom. *Heterandria lutzi* and *Pacilia spheonops*, abundant.

Altitude 430 feet; temperature 26.5° C.

11. *Rio Motagua at Gualan.*—The Rio Motagua is a mountain stream from here to its source. Its water is not very clear. The bottom consists of sharp jagged rocks in places, or is sandy or sandy with large boulders. The water was so swift and deep that we were able to seine only in eddies. Vegetation about the river is not dense. This region is in an arid condition during the dry season.

Altitude 430 feet; temperature 26° C.

12. *Rio Motagua at Zacapa.*—The Motagua here is rather clear, swift and deep. Its bottom is rocky in some places and sandy in others. The river is so swift and deep that we were able to take specimens only.

from a branch of the river where it flows past an island. Surroundings similar to those at Gualan.

Altitude 600 feet; temperature 26.5° C.

13. *Rio Motagua at El Rancho*.—The river at this point is very swift and full of sand that is washed about continually. Its width averages about 60 feet. A satisfactory haul of the seine was impossible on account of the sand suspended in the water. Dynamite was used to little advantage. The region is almost a desert from January first to June first.

Altitude 900 feet; temperature 25.5° C.

14. *Spring at Santa Lucia*.—This town is on the western slope along the Southern railroad. A few specimens were taken from a small spring that had almost dried up.

Altitude 1045 feet.

THE SOURCES OF THE MOTAGUA RIVER FISH FAUNA.

The chief object in making this collection was to determine to what extent the fauna of the Motagua River is related to that of North and South America. Meek has shown that the North American fauna has forced its way southward at least as far as the Isthmus of Tehuantepec. Thus the river Papaloapam, emptying into the Gulf of Mexico from the Isthmus of Tehuantepec, harbors 37 species, four of which represent North American types. Of the 27 species taken from the Motagua system none represent the North American fauna; South America is represented by three genera of Characins each with a very wide distribution in Central and South America, a Gymnonotid universally distributed in the lower levels of tropical America from the Motagua to the La Plata; *Symbranchus marmoratus* which has even a wider distribution; a catfish, *Rhamdia godmani*, of a genus with a universal distribution in tropical America; eleven Cichlids whose centre of distribution is the Orinoco River. The Cichlids have undergone numerous local adaptations in Central America where the genera *Cichlasoma*, *Thorichthys*, and *Heros* have their principal location.

The remaining species are either derivatives from the sea direct or belong to the Middle American types of Gobiidæ and Pœciliidæ. I have given the distribution of each genus occurring in the Motagua basin to show the relation of the Motagua region to the general fauna.

I have included in this paper 5 species not taken from the Motagua system. These are: *Cichlasoma globosum* and *Gambusia nicaraguensis* from the brackish water about Puerto Barrios; *Cichlasoma nebuliferum* and *Heros salvini* from Sulphur River near Puerto Barrios; *Heterandria pleurospilus* from a spring at Santa Lucia on the western slope.

Table showing Localities at which the species were taken.

	Brackish water, Pto. Barrios.	Swamps 2 to 3 ml. west of Pto. Barrios.	Sulphur River $3\frac{1}{2}$ ml. from Pto. Barrios.	Sulphur River $5\frac{1}{2}$ ml. west Pto. Barrios.	Machaca River, Tenedores.	Rio Negro, Tenedores.	Rio Tenedores, Tenedores.	Rio Kilagua, Los Amates.	Ponds & swamps, Los Amates.	Brooks, Los Amates.	Rio Managua, Algeria.	Rio Gualan, Gualan.	Rio Motagua, Gualan.	Rio Motagua, Zacapa.	Rio Motagua, El Rancho.	Spring, Santa Lucia.
1. <i>Rhamdia godmani</i>		×					×	×	×	×	×					
2. <i>Hemigrammus compressus</i>				×	×		×	×	×	×	×					
3. <i>Astyanax æneus</i>			×	×	×	×	×	×	×	×	×	×				
4. <i>Brycon dentex</i>			×				×	×								
5. <i>Gymnotus carapo</i>			×						×	×						
6. <i>Rivulus elegans</i>									×	×						
7. <i>Pseudoxiphophorus bimaculatus</i>			×						×	×						
8. <i>Gambusia nicaraguensis</i>	×															
9. <i>Belonesox belizanus</i>		×				×	×		×		×					
10. <i>Heterandria pleurospilus</i>																×
11. <i>Heterandria lutzi</i>																
12. <i>Poecilia sphenops</i>	×	×					×		×		×	×	×		×	×
13. <i>Poecilia amates</i>										×						
14. <i>Xiphophorus helleri</i>			×	×				×	×	×	×	×				
15. <i>Agonostomus monticola</i>							×	×								
16. <i>Thyrina meeki</i>							×	×								
17. <i>Philypnus dormitor</i>				×			×					×	×			
18. <i>Awaous taiasica</i>				×				×			×	×	×			
19. <i>Cichlasoma spilurum</i>		×	×				×	×			×		×			
20. <i>Cichlasoma hedricki</i>		×				×		×		×						
21. <i>Cichlasoma globosum</i>	×															
22. <i>Cichlasoma mañana</i>							×	×			×					
23. <i>Cichlasoma acutum</i>							×	×				×				
24. <i>Cichlasoma nebuliferum</i>			×	×												
25. <i>Heros friederichsthalii</i>							×	×	×		×	×	×			
26. <i>Heros salvini</i>			×	×												
27. <i>Heros microphthalmus</i>							×	×			×		×	×	×	
28. <i>Thorichthys helleri</i>			×			×					×		×			
29. <i>Thorichthys ellioti</i>							×					×	×			
30. <i>Centropomus mexicanus</i>					×											
31. <i>Pomadasys templei</i>		×			×											
32. <i>Symbranchus marmoratus</i>									×							

FISHES RECORDED FROM THE MOTAGUA BASIN NOT IN MY COLLECTION.

a. *Heros oblongus* (non Casteln.); Günther, Trans. Zool. Soc., VI, 1869, p. 464; Jordan & Evermann, Fishes of North and Middle America, 1535, 1898.

Cichlasoma güntheri Pellegrin, Mem. Soc. Zool. France, XVI, 1903, 215 (1894); Regan, Ann. and Mag. Nat. Hist. (7), XVI, 233, Aug. 1905, (Rio Motagua).

b. *Rhamdia motaguensis* Günther.

As nothing is known of the variability of the tropical fishes I have in most cases made extensive tables of measurements which are summarized under the respective species.

SILURIDÆ.

This family is represented by about 25 species in the fresh waters of North America and by over 200 species in tropical America. Those of North America belong to a different subfamily from those of South America.

***Rhamdia* Bleeker.**

Geographical distribution: streams south of Vera Cruz, Rio Motagua system, rivers of Panama, and southward to western Peru and the Rio de la Plata.

1. ***Rhamdia godmani* (Günther).**

Pimelodus cinerascens KNER & STEINDACHNER, Abh. Bay. Ak., X, 49 (not of Günther).

Pimelodus godmani GÜNTHER, Cat. Fish. Brit. Mus., V, 1864, 124 (Lower Vera Paz; Rio Motagua; Mexico).

Rhamdia godmani JORDAN & EVERMANN, Fishes of North and Middle America, I, 152, 1896.

Pimelodus wagneri GÜNTHER, Fishes Cent. America, 393 and 494, 1866 (Pacific and Atlantic rivers of Panama); STEINDACHNER, Flussfische Südamerikas, I, 14, 1879 (Mamoni river near Chepo).

Rhamdia wagneri EIGENMANN & EIGENMANN, Proc. Cal. Acad., 2d Ser., I, 128, 1888 (Gorgona; Rio Chagres; Rio Obispo; Turbo; Atlantic Coast Cent. Am.; JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 1896, 150; EVERMANN & GOLDSBOROUGH, Bull. U. S. Fish Comm., 1902, 146 (Teapa and Frontera, Tabasco); MEEK, Fishes Mexico, 1904, 22 (Teapa and Frontera, Tabasco).

Rhamdia bransfordii GILL, Proc. Acad. Nat. Sci. Phila., 1876, 337 (Panama).

D. 7 to 9; A. 9 to 11; head 3.2 to 4.1; depth 4.7 to 5.5; eye 4.5 to 6.7 in the head. 1.8 to 4.3 in the interorbital; snout 2.1 to 3.1 in the head; distance from tip of snout to dorsal 2.5 to 2.9 in the body; base of adipose 2.5 to 3.2 in the body; maxillary barbel 1.3 to 2.1; mental barbels 3.1 to 6.

Numerous specimens; maximum length 28.9 cm. Specimens taken from a deeply shaded brook at Los Amates are of a much lighter color than those taken from the rivers of the same locality and the swamps a few miles from Puerto Barrios. This species was taken from swamps and eddies of streams. It was taken only from places where the bottoms are muddy.

The northernmost record of this species is Teapa and Frontera, Mexico, and the southernmost Chepo, Panama. Thus it apparently is strictly a Central American fish and is found on both the eastern and western slopes.

My specimens were taken from Rio Motagua, Algeria; Rio Kilagua, Los Amates; brooks and swamps, Los Amates; Rio Tenedores, Tenedores; swamps and streams two miles west of Puerto Barrios.

CHARACINIDÆ.

The Characinidæ are confined to Africa and South and Central America; a few species, belonging to five genera, have entered Middle America, one of them reaching the United States. They range southward to the Rio Negro, Patagonia, on the east and Puerto Mont, southern Chile, on the west.

Hemigrammus Gill.

Geographical distribution: Paraguay basin, Rio Grande do Sul, Rio San Francisco basin, Amazon, Orinoco, rivers of Trinidad, Rio Motagua basin and basin of Papaloapam.

2. Hemigrammus compressus Meek.

Hemigrammus compressus MEEK, Freshwater Fishes of Mexico, 87, 1904 (El Hule, Oaxaca, in the basin of the Papaloapam).

D. 9 to 11; A. 26 to 27; head 3.3 to 3.5; depth 2.5 to 2.7; snout 3.6 to 4.5 in head; eye 3 to 3.9 in head, .9 to 1 in interorbital; longest dorsal ray 1.1 to 1.3 in head; length of caudal peduncle 2.8 to 3.2 in head.

This species has been taken only at El Hule and Oaxaca in the Papaloapam basin by Meek, and at Los Amates in the Motagua basin by myself. My specimens were taken from swamps near Los Amates. The largest specimen is 3.9 cm. long. One taken Jan. 17, contains eggs.

Astyanax Baird & Girard.

Geographical distribution: all streams of the eastern slope of South

America north of Patagonia; Pacific slope from Peru to the Rio Motagua system and Mexico.

3. *Astyanax æneus* (Günther).

Tetragonopterus æneus GÜNTHER, Proc. Zool. Soc., 1860, p. 319; GÜNTHER, Cat. Fishes Brit. Mus., V, 326, 1864 (Oaxaca).

D. 10 to 11; A. 26 to 28; scales 7 to 8-35 to 37-6 to 8; head 3.8 to 4.1; depth 2.5 to 2.9; eye 3.1 to 4 in head; length of caudal peduncle 8.4 in body.

Numerous specimens; maximum length 11.6 cm. This species was taken in water varying from swift clear streams to swamps full of decaying matter. It is the most abundant of the species taken in Guatemala. Wherever other fish were found, except in brackish water, it was found. Of the specimens opened none contained mature eggs; the spawning season of this species is later than March, probably during the early part of the rainy season.

Specimens were taken from: Rio Motagua, El Rancho, Zacapa, Gualan; Rio Managua, Algeria; Rio Gualan, Gualan; Rio Kilagua, Los Amates; Rio Tenedores, Tenedores; swamps, Los Amates; Sulphur River, Puerto Barrios.

Brycon Müller & Troschel.

Geographical distribution: La Plata to the Rio Motagua basin, inclusive, in all streams. Western Peru, Ecuador, and Panama.

4. *Brycon dentex* Günther.

Brycon dentex GÜNTHER, Proc. Zool. Soc. Lond., 240, 1860 (Esmeraldas); E. & E., Proc. U. S. Nat. Mus., XIV, 1891, 55; EIGENMANN, Proc. U. S. Nat. Mus., XVI, 56, 1893; JORDAN & EVERMANN, Fishes of North and Middle America, I, 337, 1896; BOULENGER, Boll. Mus. Torino, XIII, 3, 1898 (Rio Peripo).

Chalcinopsis dentex GÜNTHER, Cat. Fish. Brit. Mus., V, 337, 1864 (Esmeraldas; Rio Motagua; Rio Usumacinto; Yzabal); GILL, Proc. Phila. Acad. Sci., 188, 1877 (Lake Nicaragua).

D. 10 to 12; A. 28 to 37; scales 10-52 to 62-7 to 8; head 3.7 to 4.5; depth 2.9 to 3.9; eye, with adipose lid, 2.2 to 3.9 in the head, .9 to 1.7 in the interorbital; snout 3 to 4.5 in the head. The wide range of these measurements is due to the difference in the ages of specimens examined.

Specimens abundant; maximum length 42.4 cm. This species was not taken in swamps nor very sluggish streams. It seems to prefer rather swift, deep, clear water. Specimens taken March 3 had mature eggs. These are the largest strictly fresh-water fishes taken from the Motagua system. They go in schools similar to our suckers and in dynamiting

the rivers I was successful with only a few shots in getting any. With one charge I got a school of twenty or more three- to four-pound Machacas.

Localities: Rio Motagua, El Rancho, Zacapa, Gualan; Rio Gualan, Gualan; Rio Managua, Algeria; Rio Kilagua, Los Amates; Rio Tenedores, Tenedores; Rio Machaca near Tenedores; Sulphur River near Puerto Barrios; Brook near Los Amates.

GYMNOTIDÆ.

This family, consisting of about thirty species, is confined to the freshwaters of tropical America. Only one species ranges into Middle America.

Gymnotus Linnæus.

Gymnotus LINNÆUS, Syst. Nat., ed. X, 246, 1858 (carapo).

Carapus CUVIER, Règne Animal, ed. I, 237, 1817 (in part); MÜLLER & TROSCHEL, Horæ Ichthyol., III, 13, 1845 (restricted to *fasciatus*) [not *Carapus*, Rafinesque].

Giton KAUP, in Duméril, Analyt. Ichth., 201, 1856 (*fasciatus*).

Type: *Gymnotus carapo* Linnæus.

Geographical distribution; Rio Motagua south to the Rio de la Plata.

5. *Gymnotus carapo* Linnæus.¹

Carapo MARCGR., Hist. Pisc., 170; WILLOUGHBY, Hist. Pisc., 115, tab. G7, fig. 4.

Gymnotus SEBA, Thesaur., III, tab. 32, fig. 1.

Gymnotus carapo LINNÆUS, Syst. Nat., ed. X, 246, 1858; ed. XII, 427, 1766; BLOCH, V, 59, tab. 157, fig. 2.

Gymnotus fasciatus PALLAS, Spicil. Zoöl., VII, 35; SCHOMBURGK, Fishes of Guiana, 184, pl. 19, 1843 (Guiana).

Carapus fasciatus CUVIER, Règne Animal, ed. I, 237, 1817; MÜLLER & TROSCHEL, Horæ Ichthyol., III, 13, 1849; CASTELNAU, Anim. Amer. Sud, 85, 1855 (Amazon); KAUP, Apod., 139; STEINDACHNER, Die Gymnotidæ, 13, 1863 (Caicara; Cuyaba; Marabitanos; Surinam; Matto Grosso); GÜNTHER, Cat., VIII, 9, 1870 (Capin; Bahia; Surinam; British Guiana; Essequibo; Berbice; Trinidad; Is. Grenada; Rio Motagua); HENSEL, Wieg. Archiv, 89, 1870 (Guahyba; Porto Alegre); COPE, Proc. Am. Philos. Soc., 1870, 570 (Pebas); COPE, Proc. Acad. Nat. Sci. Phila., 1871 (1872), 257, (Ambyiacu); LÜTKEN, Velhas Flodens Fiske, 247 and xix, 1875 (Rio das Velhas; Lagoa Santa and Rio San Francisco); COPE, Proc. Am. Philos. Soc., 1878, 682 (Peruvian Amazon); BOULENGER, Proc. Zool. Soc., 1887, 282 (Canelos); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., XIV, 1891, 62; PERUGIA, Ann. Mus. Civico Storia Nat. Genova, 2nd Ser., X, 56, 1891 (Central Chaco); EIGENMANN, Ann. N. Y. Acad. Sci., VII, 1894, 626 (Braret); EIGENMANN, l. c., 635 (Rio Grande do Sul); COPE, Proc. Am. Philos. Soc., 1894, 93 (Rio Grande do Sul); BOULENGER, Boll. Torino, X, 3, 1895 (Colonia Risso and Villa Rica, Paraguay); BOULENGER, Ann. Mus. Civico Genoa, 1898, 127 (Puerto, 14 de Mayo).

¹This is not the *Sternopygus carapus* of Günther and other recent authors but their *Giton fasciatus*. The *carapus* of Günther et al. is the *Gymnotus macrurus* Bloch & Schneider.

Giton fasciatus KAUP in Duméril, *Analyt. Ichthyol.*, 201, 1856; JORDAN & EVERMANN, *Fishes North and Mid. Amer.*, 340, 1896 (Guatemala to Rio de la Plata); EIGENMANN & KENNEDY, *Proc. Acad. Nat. Sci. Phila.*, 1893, 530 (Estancia, La Armonia; Campo Grande; Arroya Trementina); EIGENMANN & WARD, *Proc. Wash. Acad. Sci.*, 177, 1905, pl. x, fig. 15.

Gymnotus albus PALLAS, *Spicil. Zool.*, VII, 36 (Surinam); BLOCH & SCHNEIDER, 523, 1801.

Carapus albus KAUP, *Apod.*, 140, 1856.

Gymnotus brachyurus BLOCH, *Taf.* 157, fig. I, 1787.

Gymnotus putaol LACÉPÈDE, *Hist. Nat. Poiss.*, II, 176, 1800.

Gymnotus carapo BLOCH & SCHNEIDER, 521, 1801.

Carapus brachyurus CUVIER, *Règne Animal*, I, 237, 1817.

Carapus inæquilabiatus VALENCIENNES, in d'Orb. *Voy. Am. Merid.*, *Poiss.*, II, pl. xiv, 1847 (La Plata).

Body much elongate, its length 8.1 to 9.8 times its depth; head 8.2 to 10 in body; snout 2.8 to 8 in head; interorbital 2 to 2.7 in head; pectoral 2 to 2.7 in head.

Many specimens; females, taken about Feb. 20, with eggs; largest specimen 20 cm. I found them abundant in a deep pool in a small, very shady stream. The pool was well supplied with vegetable matter.

Localities: swamps and a small sluggish stream near Los Amates; swamps 2 to 4 miles west of Puerto Barrios.

PŒCILIDÆ.

A large family of fresh and brackish-water fishes of southern Europe, Africa, Asia, and America where they are especially abundant in the West Indies and Middle America. They range north to Cape Cod and south to the La Plata.

Rivulus Poey.

Geographical distribution: Cuba; United States; Central America and South America to Paraguay.

6. *Rivulus elegans* Steindachner.

Rivulus elegans STEINDACHNER, *Denk. A.K. Wien*, XLII, 85, extr. p. 33, pl. vi, fig. 6, 1880; JORDAN, *Proc. U. S. Nat. Mus.*, IX, 564, 1887; EIGENMANN, *Proc. U. S. Nat. Mus.*, XIV, 64, 1891; GARMAN, *The Cyprinodonts*, 138, 1895.

D. 8; A. 12 to 13; scales 10–36 to 38; head 3.8 to 4.4 in body; depth 4.3 to 5.7; snout 3.2 to 7 in head; eye 2.8 to 4.6 in head, 1.5 to 2.2 in interorbital; least depth of caudal peduncle 1.4 to 2.2 in head; pectoral 1 to 1.5.

All my specimens were taken from brooks about Los Amates. Maximum length 5.3 cm.

Pseudoxiphophorus Bleeker.

Geographical distribution: Eastern slopes of Mexico from Jalapa to the Isthmus of Tehuantepec up to an altitude of 600 feet; Guatemala.

7. *Pseudoxiphophorus bimaculatus* (Heckel).

Xiphophorus bimaculatus HECKEL, SB. Akad. Wiss. Wien, 196, 1848 (Mexico).

Pseudoxiphophorus bimaculatus GÜNTHER, Cat., VI, 332, 1866; GARMAN, Mem. Mus. Comp. Zool., XIX, 1895, 81, pl. iii, fig. 6 (teeth), pl. viii, fig. 9 (male), (Mexico); WOOLMAN, Bull. U. S. Fish. Comm., 1894, 65 (Rio Blanca, Orizaba); JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 1898, 541 (Mirador); MEEK, Field Col. Mus. Pub. 65, 1902, 98 (Jalapa); MEEK, Fishes of Mexico, 127, 1904 (Jalapa, Xico, Cordoba, Otopa, Matzorongo, El Hule, Sanborn).

Pecilioides bimaculatus STEINDACHNER, SB. Akad. Wiss. Wien, 1863, 176.

Pseudoxiphophorus reticulatus TROSCHEL, Müller's Reise Mexico, III, App. 638, 1865 (no locality); GÜNTHER, Cat., VI, 333, 1866; JORDAN & GILBERT, Synopsis, 344, 1883.

D. 10 to 17; A. 9 to 11; scales 9 or 10–28 to 30; head 3.2 to 4.1; snout 3 to 3.8 in head; eye 2.8 to 4.7 in head, 1.4 to 2.5 in interorbital; length of caudal peduncle 1.4 to 2.1 in head; depth 3.1 to 4.5 in body; anal ♂ 2 to 2.3 in body. Color varies from a light to a dark brown.

Many specimens; maximum length 8.8 cm. One female 8.8 cm., taken Feb. 7, contained 52 young .9 cm. long. All of my specimens were taken either from swamps or sluggish streams. Meek found it in swift streams.

Localities: irrigating ditch west of Gualan; swamps and their outlets 1 to 2 miles west of Puerto Barrios; brook and swamps near Los Amates.

Gambusia Poey.

Geographical distribution: Cuba; Guatemala north to the southern United States.

8. *Gambusia nicaraguensis* Günther.

Gambusia nicaraguensis GÜNTHER, Cat., VI, 336, 1866 (Lakes of Nicaragua); JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus. I, 682, 1898 (Lakes of Nicaragua).

D. 7 to 8; A. 10 to 11; scales 9–27 to 30; head 3.4 to 3.8; depth 3.8 to 3.6; snout 3 to 4 in the head; eye 2.7 to 3.5 in head, 1.3 to 2 in interorbital; least depth of caudal peduncle 1.4 to 1.7 in head; pectoral 1 to 1.1 in head; anal of males 3 to 3.3 in body. Color olivaceous; caudal dusky with or without bands of dots. The dots are usually in two vertical rows.

Number of specimens 25; maximum length 4.6 cm. Females taken Feb. 19, contain eggs which show no sign of young. My specimens were all taken from brackish water near Puerto Barrios.

Belonesox Kner.

Geographical distribution: Southern Mexico, Honduras, Lake Peten and rivers of Guatemala.

9. *Belonesox belizanus* Kner.

Belonesox belizanus KNER, SB. Akad. Wiss. Wien, 1860, 419 (Belize); GÜNTHER, Cat., VI, 33, 1866 (Mexico, Lago de Peten); JORDAN & GILBERT, Synopsis, 345, 1883; GARMAN, Mem. Mus. Comp. Zool., XIX 1895, 80 (Mexico); JORDAN & EVERMANN, Bull. 47, U. S. Nat., 1886, 684 (southern Mexico, Honduras and Guatemala); MEEK, Fishes of Mexico, 1904 (Boca del Rio, Otopa, El Hule, Obispo, Perez).

D. 9 to 11; A. 10 to 11; scales 15 to 17-40 to 52; head 2.7 to 3; depth 4.4 to 6.6; snout 1.3 to 2.1 in head; eye 4.8 to 6.6 in head, 1.2 to 1.6 in interorbital; upper surface of premaxillary 3 to 3.6 in head.

This species swims near the surface of the water. If disturbed, it dives down to come up a few feet away. It swims so close to the surface that in dynamiting I was able to stun only one sufficiently to procure it. As soon as the water is quiet after a charge, these fishes gather around to feed on the small fishes killed. When swimming near the surface, their eyes show like pearls against the dark water. The eyes are always first to attract the attention and sometimes they are seen distinctly when the rest of the fish is scarcely visible.

One female contained young 1.5 cm. long. Maximum length of female 15.4 cm.; male 11.5 cm. About 30 specimens. This species prefers swamps and the eddies of streams.

Localities: swamps east of Los Amates; swamps 2 miles west of Puerto Barrios; Rio Tenedores, Tenedores: Rio Managua, Algeria; Rio Negro, Tenedores.

Heterandria Agassiz.

Geographical distribution: Cuba and Mexico to the Amazon.

10. *Heterandria pleurospilus* (Günther).

Girardinus pleurospilus GÜNTHER, Cat., VI, 355, 1866 (Lago de Duenas); GÜNTHER, Fishes of Central America, 486, pl. lxxvii, fig. 1, 1869 (Lago de Duenas, Guatemala).

Heterandria pleurospilus JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 688, 1886 (Guatemala); MEEK, Fishes of Mexico, 148, 1904 (San Geronimo).

D. 7 to 8; A. 8 to 9; scales 7 to 8-28 to 29; head 4 to 4.3; depth 3.6 to 4.3; snout 3.5 to 4 in head; eye 3 to 4 in head, 1.4 to 2 in interorbital; depth of caudal peduncle 1.4 to 2 in head, 1.8 to 2.2 in its own length.

I found this species in a spring on the western slope at Santa Lucia.

11. *Heterandria lutzi* Meek.

Heterandria lutzi MEEK, Field. Col. Mus. Pub. 65, 1902, 106 (Oaxaca; Cuicatlan; Venta Salada); MEEK, Fishes of Mexico, 148, 1904, fig. 47 (Matzorongo; Otopa; El Hule; Perez; Tehuantepec).

D. 7 to 8; A. 8 to 9; scales $8\frac{1}{2}$ to $9\frac{1}{2}$ -25 to 30; head 4 to 4.7, depth 3.1 to 3.7; snout 2.2 to 4.8 in head; eye 2.8 to 4.3 in head, 1.4 to 2 in interorbital; greatest depth of caudal peduncle 1.1 to 1.4 in the head; pectoral 1 to 1.2 in head; abdomen turns black in preserved specimens; 9 to 13 spots on sides; males about half the length of females.

These little fish were taken in abundance in sluggish streams and eddies. Females taken Jan. 13, have young almost ready to be born. Numerous specimens; maximum length 8.7 cm.

This species was taken from the Rio Motagua, Gualan; Rio Gualan, Gualan; Rio Managua, Algeria.

Poecilia Bloch & Schneider.

Geographical distribution: West Indies, Mexico to Ecuador and Montevideo.

12. *Poecilia sphenops* CUVIER & VALENCIENNES.

Poecilia sphenops CUVIER & VALENCIENNES, Hist. Nat. Poiss., XVIII, 130, 1836 (Vera Cruz); GARMAN, Mem. Mus. Comp. Zool., 1895, 59, pl. iv, fig. 13 (Mexico and Central America); JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus. 694, 1896; MEEK, Fishes of Mexico, 153, fig. 49, 1904 (San Juan river, Monterey).

Molienesia fasciata MÜLLER & TROSCHER, MB. Akad. Wiss. Berlin, 36, 1844 (Mexico).

Gambusia modesta TROSCHER in Müller, Reise in Mexico, III, 639, 1865 (Mexico).

Gambusia plumbea TROSCHER, *ibid.*, III, 640, 1865 (Mexico).

Poecilia mexicana STEINDACHNER, SB. Akad. Wiss. Wien, 1863, 178 (southern Mexico); JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 1896, 692; BEAN, Proc. U. S. Nat. Mus., 1898 (Santa Maria, Vera Cruz).

Poecilia limantouri JORDAN & SCHNEIDER, Bull. U. S. Fish Comm., 1900, 129, fig. 10 (Rio Tamesin, Tampico); JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 1900, 3153; MEEK, Field Col. Mus. Pub. 65, 1902, 106 (Puente de Ixtla; Balsas; La Antigua); FOWLER, Proc. Acad. Nat. Sci. Phila., 1903, 320 (Victoria, Tamaulipas).

D. 8 to 10; A. 8 to 9; scales 9 to 11-26 to 29; head 3.5 to 4.4; depth 2.8 to 3.4; snout 2.2 to 4.5 in head; eye 3.2 to 4.2 in head, 1.4 to 2.2 in interorbital; least depth of caudal peduncle 1.1 to 1.6 in head; pectoral 1 to 1.2 in head; anal of males 1.2 to 1.4 in head. Color dusky brown with cream colored under parts; these colors are uniform in about one-third of my specimens, in the remainder there is a dark or sometimes a golden spot on the base of each scale. These spots occur on the scales

from the dorsal down to the 5th or 7th row; some specimens have a dark caudal spot, others a profusely blotched caudal and others have their caudal plain or evenly dusky.

Many specimens; maximum length 11.4 cm. These fishes while taken from almost all of the streams were most abundant in the sluggish, mud-bottom streams. Females taken Feb. 10, have well developed young, 9 mm. long.

Localities: Rio Motagua, Zacapa, Gualan, El Rancho; Rio Gualan, Gualan; Rio Managua, Algeria; Rio Tenedores, Tenedores; spring, Santa Lucia, Brackish water and swamps two to five miles west of Puerto Barrios.

13. *Pæcilia amates* sp. nov.

(Fig. 1.)

Type no. 11375, I. U. Mus.; female; length 5 cm.; Los Amates.

Cotype; no. 11375a I. U. Mus.; male; length 3.6 cm.; Los Amates.

D. 8 to 9; A. 8 to 9; scales 8 to 10–26 to 28; head 3.1 to 3.9; depth 2.5 to 3.3; snout 3.4 to 4.5 in the head; eye 2.3 to 3.3 in the head, 1.1 to 2 in the interorbital;

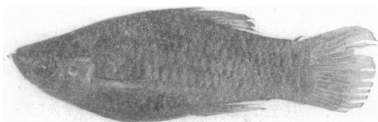


Fig 1. *Pæcilia amates* sp. nov., nat. size.

least depth of caudal peduncle 1.1 to 1.8 in the head; pectoral 1 to 1.3 in the head; anal of males 2 to 2.2 in the body; body compressed and rather deep, more elongate in young; color obivaceous or dusky brown, lighter below; some specimens, especially the males have as many as 9 vertical lines on sides; vertical lines on females indistinct or none.

Description of a 3.5 cm. female; length of body 2.6 cm.; D. 8; A. 9; scales 9–27; head 2.2; depth 2.9; snout 4 in head; eye 2.7 in head, 1.3 in interorbital; least depth of caudal peduncle 1.6 in head; pectoral 1.1 in head. Body compressed and rather deep; profile to insertion of dorsal almost straight, very slightly raised just back of nape; from origin of dorsal to base of caudal concave; from anal to base of caudal very nearly straight; from tip of lower jaw to below middle of pectoral a uniform curve; head flat, wedge-shaped; snout square; premaxillary very protractile; lower jaw vertical, weak and projecting; maxillary not nearly to vertical from eye. Caudal peduncle long, its length 1.4 times its depth; eye rather large, nearer snout than to edge of opercle; pupil on level with tip of snout. Dorsal inserted midway between ventral and anal, its base short, 2 in the head, its rays 1.4 in head; caudal large, broad and rounded, its depth equal to its length; anal acute, inserted under middle of dorsal, its longest rays 1.4 in the head. Ventrals inserted under middle of pectorals, acute, their tips to base of anal. Pectorals almost to vertical from anal, slender and pointed; scales large; base of caudal scaled.

Color olivaceous; opercle reddish-brown; cheeks considerably pigmented; eye black; black spot above vent in most females. (Of a different species Jordan & Evermann say that this spot is a sign of pregnancy.) Dorsal black margined; pectorals plain; dorsal, caudal and anal somewhat dusky; black line from nape to dorsal, a similar line on lower edge of caudal peduncle.

The males are similar to the females with the following exceptions; the anal is modified into an intromittant organ equal to about half length of body; body of adult males deeper; caudal peduncle deeper and more compressed. General coloring the same; most males with from 3 to 9 vertical lines on sides.

Numerous specimens, all taken from a pond and its outlet at Los Amates. So abundant were these fishes at a little waterfall by a pond on Feb. 27, that I could scoop them up with my hands. Females with eggs, but of those examined the young had not begun to develop. My specimens were taken Jan. 17.

Xiphophorus Heckel.

Geographical distribution: Atlantic slope of Mexico and Guatemala.

14. *Xiphophorus helleri Heckel.*

Xiphophorus helleri HECKEL, SB. Akad. Wiss. Wien, 1898, 163 (Rio Chisoy; Cordoba); GÜNTHER, Fishes Cent. Amer., 485, pl. 87, figs. 2-6 1869 (Rio Chisoy); GARMAN Memoirs Mus. Comp. Zool., 1895, 63, pl. iv, figs. 14, teeth, pl. viii, fig. 4, male (Mexico and Central America); JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 1896, 701; MEEK, Fishes of Mexico, 157, 1904.

Xiphophorus helleri Var. GÜNTHER, Cat., VI, 350, 1866 (Rio Chisoy, Guatemala).

Xiphophorus güntheri JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus. 1896, 702.

D. 12 to 15; A., in females, 8 to 10; scales 8 or 9-25 to 29; head 3.4 to 4.1; depth 2.5 to 3.7; snout 2.7 to 3.7 in head; eye 3.1 to 4 in the head, 1.2 to 2.7 in interorbital; least depth of caudal peduncle 4.3 to 6.2 in body.

Many specimens; maximum length, 11.5 cm.; maximum length of body of male 7.3 cm.; female 9.2 cm. Two females taken about March 1, contained well developed young. This species is found most abundantly in ponds, swamps and dark sluggish streams. Some were taken from eddies of swift streams.

Localities: irrigating ditch west of Gualan; Rio Managua, Algeria; brook and swamps near Los Amates; Rio Kilagua, Los Amates; Sulphur river, 3½ miles west of Puerto Barrios; Swamps 2 to 4 miles west of Puerto Barrios.

MUGILIDÆ.

Agonostomus Bennett.

Geographical distribution: freshwaters of the West Indies, eastern Mexico, Guatemala, and New Zealand.

15. **Agonostomus monticola** (Bancroft).

Mugil monticola BANCROFT in Griffith's edition of Cuvier's Animal Kingdom, Fishes, 367, pl. 36, 1836.

Mugil irretitus GOSSE, Nat. Sojourn Jamaica, 84, 1851 (Jamaica).

Agonostomus monticola GÜNTHER, Cat., III, 464, 1861 (West Indies and Mexico; Barbadoes).

Dajous monticola CUV. & VAL., XI, 164, pl. 316.

D. IV-I, 8; A. II-III, 9; scales 11 to 12-39 to 40; head 3.5 to 3.7; depth 3.8 to 4.1; snout 3.1 to 3.7 in head; eye 3.5 to 4.3 in head, 1 to 1.6 in interorbital.

Maximum length 12 cm. My 5 specimens were taken from swift water where the bottom is sandy.

Localities: Rio Motagua, El Rancho, Zacapa; Rio Tenedores, Tenedores; Rio Kilagua, Los Amates.

ATHERINIDÆ.

Thyrina JORDAN & CULVER.

Geographical distribution of the two known species: Pacific slope of Mexico and the Motagua system.

16. **Thyrina meeki** sp. nov.

(Fig. 2.)

Type: No. 11214 I. U. Mus.; length 11.5 cm.; Rio Motagua, Gualan.

D. IV-I, 9 to 11; A. I, 21 to 25; scales $9\frac{1}{2}$ or $10\frac{1}{2}$ -39 to 43; head 3.9 to 4.9;

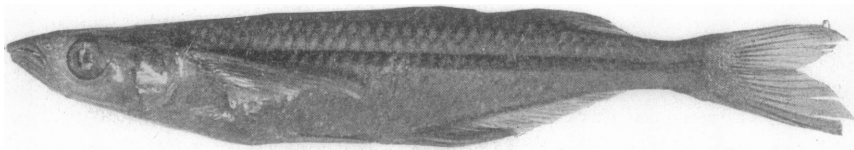


Fig. 2. *Thyrina meeki* sp. nov., about nat. size.

depth 5.1 to 6.6; snout 2.9 to 3.7; eye 3.1 to 4.6 in the head 1 to 1.6 in the interorbital; base of anal 3.2 to 3.7 in the body.

Description of a 10-cm. specimen. Body 8.4 cm. long; D. IV-I, 9; A. I, 23; scales $10\frac{1}{2}$ -42; head 4.7; depth 6.6; snout 3 in head; eye 3.6 in head, 1 in interorbital; anal 3.6 in body. Body very slender, compressed; top of head flat; back little higher than head; sides above anal strongly compressed; sides of belly converging uniformly; breast compressed to an edge; caudal peduncle long, its least depth 2.4 in its length; sides of head compressed; chin steep; mouth rather large; jaws

decurved; recurved canine-like teeth in each jaw; teeth in more than one series; teeth on maxillary; premaxillary protractile; eye large, nearer tip of snout than to edge of opercle; pectoral inserted high, its base long, 3.5 in its length, pointed, its tip reaching verticle from vent; ventrals midway between tip of snout and insertion of rayed dorsal, short and subtruncate, reaching but little past vent. Anal inserted before verticle from intersertion of spinous dorsal, its margin falcate and its longest rays 1.5 in the head; caudal deeply forked, the lower lobe the larger (which is usually the case in this species); rayed dorsal over last half of anal; spinous dorsal weak, its longest spine about 3 in the head, its origin equidistant between edge of opercle and base of anal; base of anal scaled.

Color translucent greenish; edges of scales granular pigmented; pigmented streak at base of anal; dark lateral line about the width of the pupil; top of head darker than body; iris plumbeous; pectorals and ventrals pale; anal margined with dusky; both rayed and spinous dorsals clouded; caudal a little dusky.

Rivers, especially where the water is swift, and the bottom either sandy or rocky. Abundant in the Motagua river. Maximum length 11.4 cm.; females with eggs. Many specimens.

This species is named in honor of Dr. S. E. Meek of the Field Columbian Museum, for his work on the fishes of Mexico.

Localities: Rio Motagua, El Rancho, Zacapa, Gualan; Rio Managua, Algeria, Rio Kilagua, Los Amates; Rio Tenedores, Tenedores; Rio Gualan, Gualan.

GOBIIDÆ.

Philypnus Cuvier & Valenciennes.

Geographical distribution: Both slopes of Middle America.

17. *Philypnus dormitor* (Lacépède).

Gobiomorus dormitor LACÉPÈDE, Hist. Nat. Poiss., II, 599, 1789; Martinique.

Philypnus dormitor GIRARD, Mex. Bound. Surv., 29, pl. xii, fig. 13, 1859 (mouth of the Rio Grande); GILL, Proc. Acad. Nat. Sci. Phila., 1860, 122 (mouth of the Rio Grande); JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 1898, 2194; JORDAN & SYNDER, Bull. U. S. Fish Comm., 1900, 147 (lagoons near Tampico); MEEK, Field Col. Mus. Pub. 65, 1902, 120 (La Antigua); MEEK, Fishes of Mexico, 226, 1904 (Mexico).

Philypnus lateralis GILL, Proc. Acad. Nat. Sci. Phila., 1860, 123 (Cape San Lucas); JORDAN, Proc. Cal. Acad. Sci., 1895, 493 (Rio Presidio and Astillero); RUTTER, Proc. Cal. Acad. Sci., 1896, 264 (fresh waters at San Jose del Cabo, Lower California); JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 1898, 2195 (Rio Presidio, near Mazatlan, Mexico).

Eleotris dormitatrix GÜNTHER, Cat., III, 119, 1861 (Mexico).

Gobiomorus dormitor BEAN, Proc. U. S. Nat. Mus., 1898, 542 (Dominica and Santa Maria, Vera Cruz).

Two specimens; maximum length 40 cm.

Locality: Rio Tenedores, Tenedores; Sulphur River, Puerto Barrios.

Awaous Steindachner.

Geographical distribution: both slopes of Middle America south to the Rio Dulce and Ecuador.

18. ***Awaous taiasica* (Lichtenstein).**

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

Gobius taiasica LICHTENSTEIN, Berl. Abhandl., 273, 1822 (Brazil), not *Tajasica* Marcgrave.

Chronophorus taiasica JORDAN & EIGENMANN, Proc. U. S. Nat. Mus., 1886, 500; MEEK, Fishes of Mexico, 233, 1904 (Cuantla; Valles; San Francisco; Perez).

Awaous taiasica JORDAN, Proc. Cal. Acad. Sci., 1895, 494 (Rio Presidio, Mazatlan; San José del Cabo, Lower California); JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 1898, 2236; RUTTER, Proc. Cal. Acad. Sci., 1896, 265 (Rio San José, San José del Cabo, Lower California); JORDAN & SYNDER, Bull. U. S. Fish Comm., 1900, 147 (Rio Ixtla, Puente de Ixtla); MEEK, Field Col. Mus. Pub. 65, 1902, 121 (La Antigua; Balsas; Puente de Ixtla).

Gobius banana CUVIER & VALENCIENNES, Hist. Nat. Poiss., XII, 103, 1837 (San Domingo); GÜNTHER, Cat., III, 59, 1861.

Gobius martinicus CUVIER & VALENCIENNES, Hist. Nat. Poiss., XII, 105, 1837 (Martinique).

Chronophorus bucculentus POEY, Memorias de Cuba, II, 275, 1861 (Cuba).

Rhinogobius contractus POEY, Memorias de Cuba, II, 424, 1861 (Cuba); POEY, Enumeratio, 125, 1875.

Gobius dolichocephalus COPE, Trans. Amer. Philos. Soc., 1869, 403 (near Orizaba, Mexico).

Euctenagobius latus O'SHAUGHNESSY, Ann. Mag. Nat. Hist., Ser. 4, XV, 1875, 146 (Bahia, Coll. Dr. Wucherer).

Many specimens; maximum length 19 cm.

Localities: Rio Gualan, Gualan; Rio Motagua Gualan; Rio Managua, Algeria; Rio Kilagua, Los Amates, Sulphur River, Puerto Barrios.

CICHLIDÆ.

Tropical American waters harbor about 25 genera with about 250 species. The genera *Heros* and *Cichlasoma*, by some considered a single genus, have reached a great development in Central America. *Heros* has reached Cuba where a number of incipient species are found.

***Cichlasoma* Swainson.**

This genus contains those species allied to *Astronotus*, which have 4

to 11 spines in the anal fin, the dorsal and anal not closely scaled and the lower lip interrupted mesially to form a frenum. Species very numerous.

Geographical distribution: Mexico to the La Plata, on both slopes of Central America. Species few in South America.

19. *Cichlasoma spilurum* Günther.

(Fig 3.)

Heros spilurus GÜNTHER, Cat., IV, 289, 1862 (Guatemala); GÜNTHER, *Fishes of Central America*, 451, pl. lxxiii, fig. 1, 1868 (Rio Motagua, Yzabal).

Cichlasoma spilurum JORDAN & EVERMANN, *Fishes of Middle and North America*, II, 1520, 1898 (Rio Motagua, Guatemala); PELLEGRIN, *Étude Cichlides*, 186, 1904 (L. Mullins, Guatemala).

D. XVII or XVIII, 9 to 11; A. VIII or IX, 7 to 9. Scales 5 to 6-27 to 30-12 to 13; head 2.8 to 3.2, depth 1.7 to 2.6; snout 2.2 to 3 in head; eye 2.4 to 4 in head, 1 to 1.9 in interorbital; greatest depth of caudal peduncle 1.7 to 2.4 in head; pectoral 1 to 1.3 in head. Color of mature specimens dark, ashy gray, with 7 more or less distinct vertical bars; young lighter, with more distinct vertical bars.

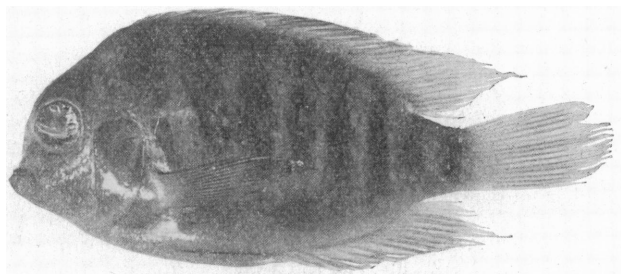


Fig. 3. *Cichlasoma spilurum* Günther, nat. size.

The fins of this species are very fragile and the dorsal and anal filaments are often broken off. Some specimens have the dorsal filament produced in a mere thread to tip of caudal.

Numerous specimens; maximum length 11.6 cm. Abundant in Sulphur and Tenedores Rivers.

Localities: Rio Motagua, Rio Gualan, and irrigating ditch, near Gualan; Rio Managua, Algeria; Rio Kilagua, Los Amates; Rio Tenedores, Tenedores; swamp stream 2 miles west of Puerto Barrios; Sulphur River 3½ miles west of Puerto Barrios.

The following is a description of a unique specimen taken from the Rio Tenedores, Tenedores, Feb. 9. It is a new genus if it is not a deformed *Cichlasoma spilurum*.

Total length 7.9 cm. length of body 6 cm. D. XVII, 10; A. VIII, 8; scales 6-29-13; head 3; depth 1.9; snout 2.9 in the head; eye 3.3 in the head; 1.3 in the interorbital; least depth of caudal peduncle 2.5 in the head, 1.3 in its own depth; pectoral 1 in the head. First dorsal spine 3.3 in the last, last 2 in the head; 1st anal spine 2.2 in the last, the last 2.2 in the head. Body compressed; profile from the interorbital to insertion of dorsal very slightly concave; back not strongly arched; forehead almost vertical; interorbital almost flat; ventral outline convex to end of anal; peduncle thin, its edges converging; length of head about equal to its depth; eye large, situated above and anterior to centre of head, much above horizontal from tip of snout; mouth small, upper jaw weak; maxillary to vertical from eye; mandible projecting. Teeth in bands in both jaws, the outer brown and enlarged; lips thin, the lower with a frenum. Dorsal inserted anterior to gill-openings, its spine rather high; its longest rays slightly filamentous and reaching to near middle of caudal; caudal rather long, little rounded; anal inserted under 12th dorsal spine, its spines long, its longest rays to first third of caudal; ventrals inserted posterior to base of pectoral, 2nd ray produced to base of 4th anal spine; pectorals long and narrow reaching to tips of ventrals.

Color olivaceous with 7 dark vertical bands and a dark caudal spot; opercle somewhat brownish; iris black; fins except the pectorals a little dusky.

20. *Cichlasoma hedricki* Meek.

Cichlasoma hedricki MEEK, Fresh-water Fishes of Mexico, 208, 1904, fig. 66 (rivers of Mexico, south of Vera Cruz).

D. XVIII to XX, 9 to 10; A. VIII to X, 7 to 9; scales 5 to 6-27 to 32-12 to 14; head 2.6 to 3; depth 2.2 to 2.5; snout 3.1 to 4 in the head; eye 3.2 to 5.7 in the head; 1 to 1.9 in the interorbital; greatest depth of caudal peduncle 2.1 to 2.5 in the head. Color varies from a dark bluish tinged brown to a light olive in which the bands and bars of darker color show distinctly.

Some of my specimens have dark specks on opercles and cheeks, while two have bluish dots scattered over head and body above lateral line to tip of pectoral.

Twenty-two specimens; maximum length 13.8 cm. Taken from swamps or sluggish streams and the Kilagua River.

Localities: Rio Kilagua, and brook near Los Amates; Rio Negro, Tenedores; swamps and swamp streams 2 to 3 miles west of Puerto Barrios.

21. *Cichlasoma globosum* sp. nov.

(Fig. 4.)

Type: No. 11382 I. U. Mus.; length 22 cm.; brackish water, Puerto Barrios.

D. XVI to XVII, 13; A. VI, 9 or 10; scales 6 or 7-32 or 33-13 or 14; head 2.8 to 3; depth 1.8 to 1.9; snout 2.1 to 2.3 in head; eye 4.2 to 5 in head, 1.8 to 2.1 in interorbital; greatest depth of caudal peduncle 1.6 to 2.4 in head; pectoral 1.1 to 1.3; color varies from a dark slaty-blue to a smoky brown.

Description of a 22 cm. specimen; length of body 16.2 cm.; D. XVI, 13; A. VI,

9; scales 7-32-13; head 2.8; depth 1.8; snout 2.3 in head; eye 4.8 in head, 2.1 in interorbital; greatest depth of caudal peduncle 1.8 in head; pectoral 1.2; profile to nape slightly concave and steep; a depression in the interorbital; nape to end of dorsal gently arched; belly straight; body deep, not much elongate, compressed; peduncle short and deep, its length 2 in its depth, much compressed; head higher than long; interorbital convex with a slight depression; snout rather long, acute; lips fleshy, the lower with a frenum; premaxillary protractile; maxillary almost entirely hidden under the preorbital; teeth in bands in both jaws, the outer enlarged,

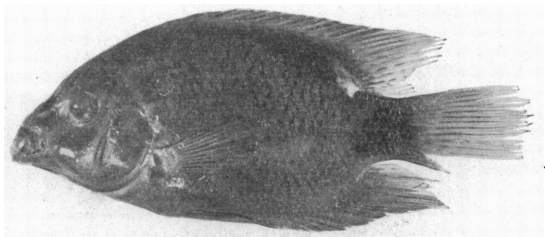


Fig. 4. *Cichlasoma globosum* sp. nov., about $\frac{1}{2}$ nat. size.

conical and brown-tipped; mouth horizontal; maxillary not nearly to vertical from eye; preorbital equal to distance from eye to upper edge of opercle; lower edge of orbit above centre of head; eye rather large, 1.3 times length of maxillary; nares much closer to tip of snout than to eyes; origin of dorsal anterior to base of pectoral, first spine 5 in last, last spine 1.8 in head; rayed dorsal high, produced past middle of caudal, the longest rays a little longer than head; caudal long, strong, broad and slightly rounded; origin of anal under origin of rayed dorsal; anal spine very strong, first 3.5 in the last, last 1.8 in head; rayed anal acute, produced past middle of caudal, its longest ray slightly less than head, ventral insertion posterior to base of pectoral, 1st ray produced into a filament to 4th anal spine; pectoral long, obtuse, its tip to vertical from base of first anal spine.

Scales large and ctenoid; base of anal, caudal and dorsal scaled; 6 rows on cheeks; 5 on opercle.

Color deep slaty-blue over entire body except breast and under parts of head which are a little lighter; large black caudal spot; pectoral pale; dorsal, anal and ventral deep slaty-blue; caudal lighter, with a fleshy tinge; dark spots on rayed dorsal and caudal, those on rayed dorsal more or less in bands.

Locality: mouth of small stream at edge of Puerto Barrios.

22. *Cichlasoma mañana* sp. nov.

(Fig. 5.)

Cichlasoma maculicauda REGAN, Ann. and Mag. Nat. Hist. (7), XVI, 227, 1905.

Type No. 11385 I. U. Mus. length 20 cm.; Tenedores River, Tenedores.

D. XVI or XVII, 12 to 14; A. VI, 9 to 10; Scales 6 or 7-21 to 33-13 or 14; head 2.8 to 3 in body; depth 1.8 to 2.1; snout 2.1 to 3.1 in head; eye 3.4 to 5 in head

1.2 to 2.2 in interorbital; greatest depth of caudal peduncle 1.6 to 2.4 in head; pectoral 1.1 to 1.3 in head; color dark slaty; ventral parts not much lighter; five indistinct vertical bars can be made out on some specimens while on others only one bar at tip of pectoral; large black caudal spot.

Description of a 20 cm. specimen; length of body 15.2 cm. D. XVII, 13; A. VI, 10; scales 7-32-13; head 3; depth 2.1; snout 2.4 in head; eye 5 in head, 2.1 in interorbital; greatest depth of peduncle 1.8 in head; pectoral 1.3 in head; body

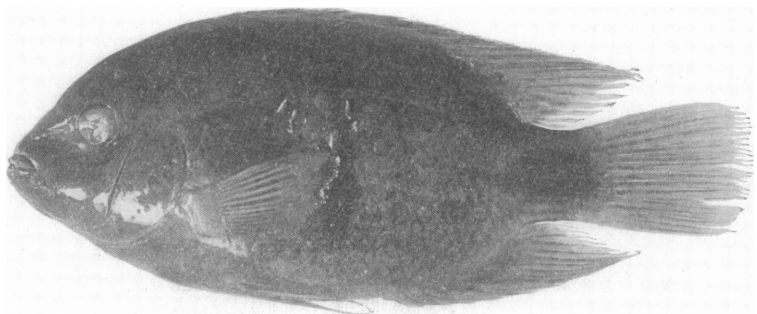


Fig. 5. *Cichlasoma mañana* sp. nov., about $\frac{1}{4}$ nat. size.

rather deep, compressed; belly as much below head as back is above; caudal peduncle deep and strong, its depth equal to its length; head little longer than high; profile to nape steep, from nape to end of dorsal a uniform curve; belly straight; snout blunt; mouth horizontal and terminal; lips rather fleshy, the lower with a frenum; teeth in bands, the outer enlarged, brown-tipped and [slightly recurved; maxillary not near to vertical from anterior margin of orbit; eye moderate, above centre of head; dorsal inserted over insertion of pectoral; rayed dorsal a little past fourth of caudal, first spine 6.5 in last, last 2 in head; anal inserted under 14th dorsal spine; first anal spine 3.4 in last, last 1.9 in head; rayed anal to middle of caudal; ventral produced in a filament past vent, almost to anal; pectoral rather broad and obtuse, its tip past vertical from tip of ventral spine; caudal large, strong and almost truncate or slightly rounded; scales ctenoid, large, 5 rows on cheeks; small scales on bases of dorsal, caudal and anal.

Color a blackish-slate, with four faint, darker vertical bars, the bar at tip of pectoral much more distinct than the rest; a large black area behind and below tip of pectoral; large black caudal blotch; no lateral streak; pectoral pale; rest of fins dusky; dark spots on dorsal, anal and caudal arranged in more or less irregular rows.

Specimens 13; maximum length 22 cm. These fishes readily jump the seine. When not disturbed they seem simply to loiter about the banks at a depth of about 2 feet. For this lazy swimming habit I have given them the name Mañana.

Localities: Rio Managua, Algeria; Rio Kilagua, Los Amates; Rio Tenedores, Tenedores.

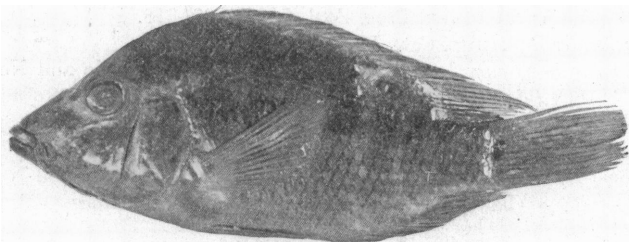
23. *Cichlasoma acutum* sp. nov.

(Fig. 6.)

Type: No. 11186 I. U. Mus.; length 16.5 cm.; Rio Tenedores, Tenedores.

D. XV or XVI, 11 to 13; A. VI or VII, 8 to 10; Scales 5 to 7–29 to 33–12 to 14; head 2.4 to 2.7 in body, depth 2 to 2.3 in body; snout 2 to 2.9 in head; eye 3.3 to 5 in head, 1 to 1.7 in interorbital; greatest depth of caudal peduncle 2.1 to 2.5 in head; pectoral 1 to 1.3 in head.

Description of a 12.6 cm. specimen; length of body 9.7 cm.; D. XVI, 11; A. VI, 9; scales 6–30–13; head 2.2; depth 2.1; snout 2.1 in head; eye 4.2 in head, 1.7 in interorbital; greatest depth of caudal peduncle 2.1 in head; pectoral 1.1 in

Fig. 6. *Cichlasoma acutum* sp. nov., about $\frac{2}{3}$ nat. size.

head; body elongate, compressed; back high; profile to nape straight, thence but little arched; ventral outline, including ventrals when folded, a uniform curve from tip of snout to caudal peduncle; peduncle strong and deep, its length 1.8 in its depth; head longer than high; snout pointed; mouth terminal slightly oblique, moderate in size, lower jaw strong; lip with frenum; maxillary not to eye; hid beneath the preorbital, its length equals the distance from its tip to eye; teeth in series, the outer enlarged and canine-like; premaxillary protractile; lips fleshy; nares equidistant between tip of snout and eyes; cheeks slightly compressed with 4 rows of scales; eye rather large, high and nearer edge of opercle than to tip of snout, inserted anterior to vertical from base of pectoral; first spine of dorsal 2.7 in last, the last 2.3 in head; rayed dorsal produced almost to middle of caudal; caudal long, broad, strong, subtruncate; origin of anal under 13th dorsal spine; rayed portion to first third of caudal; first anal spine 1.9 in last, last 2.2 in head; tip of ventral reaching 2nd anal spine; origin of ventral posterior to base of pectoral; pectoral large, long and sub-acute, its tip to vertical from 3rd anal spine.

Color a dark olive-brown with eight slightly darker vertical bars; a large black blotch at end of pectoral which is one of the series on the vertical bars from opercle to end of dorsal; snout and interorbital bluish; an indistinct dark band between the eyes, another on snout connecting the eyes; iris plumbeous, a small black caudal blotch; black dots on opercles and cheeks; opercle very dusky with a brownish tinge; a small black spot on base of pectoral, otherwise pale; small dark spots on caudal fin, those on dorsal arranged in at least seven vertical rows across the rays and posterior part of spinous portion; ventrals and anal dusky as are all the fins except the pectorals.

About 40 specimens, the largest 16.5 cm. long. This species seems to prefer rather swift and clear water where there are plenty of rocks and sandy bottom. The clean cut features of this fish are of interest; its sharply acute fins, the large and strong caudal, its sharp triangular head and the general outlines of dorsal and ventral parts gives it the appearance of a game fish.

Females with immature eggs.

Localities: Rio Motagua, Algeria; Rio Kilagua, and brook, Los Amates; Rio Tenedores, Tenedores.

24. *Cichlasoma nebuliferum* (Günther).

Chromis nebulifer GÜNTHER, Proc. Zool. Soc., 1860, 318.

Heros nebulifer GÜNTHER, Cat., IV, 297, 1862 (Mexico).

Cichlasoma nebuliferum JORDAN & EVERMANN, Fishes Middle and North America, II, 1524, 1898 (Mexico); PELLEGRIN, Étude Cichlides, 180, 1898 (Mexico).

Heros intermedius GÜNTHER, Cat., IV, 298, 1862 (Guatemala); GÜNTHER, Fishes Cent. Am., 468, pl. lxxviii, fig. 1, 1868 (Lake Peten).

Cichlasoma intermedium JORDAN & EVERMANN, Fishes Middle and North America, II, 1517, 1898 (Lake Peten); PELLEGRIN, Étude Cichlides, 173, 1904 (Rio Polachic, Guatemala).

Heros angulifer GÜNTHER, Cat., IV, 298, 1862 (Guatemala); GÜNTHER, Fishes of Central America, 469, pl. lxxxv, fig. 1, 1868 (Yzabal).

Cichlasoma anguliferum JORDAN & EVERMANN, Fishes of Middle and North America, II, 1517, 1898 (Guatemala).

Acara rectangularis STEINDACHNER, Chromiden Majicos und Cent. Amerikas, Tab. 1, fig. 1, 1864 (Mexico).

Cichlasoma rectangulare JORDAN & EVERMANN, Fishes Middle and North America, II, 1515, 1898 (Mexico); MEEK, Fishes Mexico, 216, 1904 (Mexico); PELLEGRIN, Étude Cichlides, 169, 1904 (Mexico).

Cichlasoma intermedium, *nebuliferum* and *rectangulare* differ from all other species of this genus in their peculiar coloration, which consists of a dark band from the gill-opening to below the posterior part of the spinous dorsal where it turns up at or nearly at a right angle to the dorsal where the spinous and rayed portions meet.

Steindachner described a specimen of *Acara* (*Acara* = *Cichlasoma*) *rectangularis* 7½ inches long from Mexico without naming definitely the locality. It was not found by Meek in his extensive expeditions in Mexico. Günther described *Heros intermedius* from three specimens, 5 to 6 inches long, taken from Lake Peten, and his *Heros angulifer* from 2 specimens 4 inches long taken from Lake Yzabal. No additional specimens have been recorded.

The data for these specimens are as follows: *rectangulare*, D. XVI, 13; A. IV, II; scales 4-33-13; *intermedium*, D. XVII to XVIII, II; A. V or VI,

8 to 10; scales 5-32-13. My specimens D. XVI to XVIII, 12 to 15; A. V, 9 to 11; scales 5-31 to 35-12 or 13. Pellegrin, on examining Günther's specimens without additional material, considered his two species identical.

I have 16 specimens, ranging from 6.5 cm. to 20. cm. All of these were taken from Sulphur River, the only place where I found this species. I have no doubt that these specimens represent Günther's species. The small number of anal spines is the only character so far noted that in any way distinguishes *rectangulare* as a distinct species and this does not seem to be sufficient.

D. XVI to XVII, 12 to 15; A. V, 9 to 11; scales 5 to 6-31 to 35-12 to 13; head 2.6 to 3; depth 2.1 to 2.5; snout 2.3 to 3.4 in head; eye 3.1 to 5.2 in head, 1 to 2 in interorbital; greatest depth of caudal peduncle 2.1 to 2.3 in the head.

Color varies from a dull brown (in young) with pale ventral parts to a dark brown more or less tinged with blue; in specimens 18 cm. long the ventral region is as dark as the back; specimens of this size have considerable blue, especially about the gills ventrally; a dark lateral band extending almost to the black caudal spot; large, black humeral blotch; one large black band or as many as three smaller ones from the lateral band up to and on the basal parts of the rayed and spinous dorsal; these bands in 18 cm.-specimens also extend down to the anal. Some specimens under 9 cm. do not have the black humeral spot, only the broad lateral band.

Taken only from Sulphur River, 3½ miles west of Puerto Barrios. These fishes swim leisurely among the rocks and about trash until disturbed, when they dart off to deep water or places of concealment. Females taken March 2, have fully developed eggs. Length of largest specimen 18.7 cm.

Heros Heckel.

Geographical distribution: Cuba, Mexico, both slopes of Central America, and south to the La Plata basin. Species few in South America.

25. *Heros friedrichsthalii* Heckel.

Heros friedrichsthalii GÜNTHER, Cat., IV, 294, 1862 (Lake Peten); JORDAN & EVERMANN, Fishes Middle and North America II, 1528, 1898 (Lake Peten and Lake Nicaragua with its outlet Rio San Juan); GÜNTHER, Fishes of Central America, 459, 1868 (Lake Peten).

Heros motaguensis GÜNTHER, Fishes of Central America, 462, pl. lxxvii, fig. 2, 1868 (Guatemala); JORDAN & EVERMANN, Fishes of Middle and North America, II, 1534, 1898 (Rio Motagua and Lake Nicaragua); PELLEGRIN, Étude Cichlides, 198, 1904.

Heros managuensis GÜNTHER, Fishes of Central America 463, pl. lxxvii, fig. 3, 1868 (Lake Managua); JORDAN & EVERMANN, Fishes of Middle and North America, II, 1533, 1898 (Lake Managua, Nicaragua).

D. XVII to XIX, 10 to 12; Anal VI to VIII, 8 to 9; scales 5 or 6-30 to 33-11 to 12; head 2.4 to 2.7; depth 2.4 to 2.9; snout 2.4 to 3.6 in head; eye 3.8 to 5.8 in

head, 1 to 1.8 in interorbital; greatest depth of caudal peduncle 2.1 to 2.7 in head; pectoral 1.5 to 1.7 in head.

Color variable, the darker specimens slaty-blue and the lighter ones dusky-brown; ten vertical bars and a dark caudal spot. In one specimen the color is a light brown with the vertical bars jet black. Some specimens have dark spots on vertical fins arranged more or less in rows.

Of the specimens examined the females are the darker, thicker, and apparently stouter in body proportions than the males. The females have been described as the species *Heros managuensis*, and the males as *Heros motaguensis*.

Twenty specimens; maximum length 32 cm. This species has the appearance of a game fish and they take the hook readily. One female taken Feb. 10, has well developed eggs.

Localities: Rio Motagua and Rio Gualan; Rio Managua, Algeria; Rio Kilagua, Los Amates; pond near Los Amates; Rio Tenedores, Tenedores.

26. *Heros salvini* Günther.

Heros salvini GÜNTHER, Cat., IV, 294, 1862 (Rio de Santa Isabel, Lake Peten); GÜNTHER, Fishes Cent. Amer., 460, pl. lxxiii, fig. 3, 1869; JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 1898, 1528.

Cichlasoma salvini MEEK, Fresh-water Fishes of Mexico, 207, 1904 (southern Mexico and Guatemala, Motzorango; Refugio; El Hule; Perez; Obispo).

D. XVI to XVII, 10 to 12; A. VI to IX, 8 to 9; scales 5 to 7-26 to 31-10 to 11; head 2.4 to 2.6; depth 2.3 to 2.5; snout 2.8 to 3.4; eye 3.4 to 4.6 in head, .9 to 1.4 in interorbital; greatest depth of caudal peduncle 2.2 to 2.7 in head.

Seventeen specimens, Sulphur River; the largest 12.4 cm.; females taken March 4, contained eggs. Sulphur river is fed by a hot spring and some of the specimens were taken where the water was 90° F. and so strongly sulphurous that it can be detected more than a hundred yards away.

27. *Heros microphthalmus* Günther.

Heros microphthalmus GÜNTHER, Cat., IV, 295, 1862 (Guatemala); GÜNTHER, Fishes of Central America, 464, 1868 (Rio Motagua); JORDAN & EVERMANN, Fishes Middle and North America, II, 1536, 1898 (Rio Motagua and Nicaragua); PELLEGRIN Étude Cichlides, 196, 1904 (Rio Motagua).

D. XVII to XVIII, 12 to 14; A. V to VII, 8 to 11; scales 5 to 6-27 to 36-12 to 15; head 2.9 to 3.2; depth 2.1 to 2.6; snout 2 to 2.4 in head; eye 3.8 to 5.3 in head, 1.4 to 2.2 in interorbital; greatest depth of caudal peduncle 1.8 to 2.2 in head; pectoral 1.2 to 2.1 in head.

Color varies from a dusky-brown in young to a slaty-blue in adults. Some specimens have as many as 6 vertical bars and a black caudal spot. These markings are not usually so prominent in specimens over 12 cm.

Thirty specimens; the largest 21 cm. long. A female taken Jan. 14, has well developed eggs. Taken for the most part in swift, clear water where the bottom was sandy and rocky.

Localities: Rio Motagua, El Rancho, Zacapa, Gualan; Rio Managua, Algeria; Rio Kilagua, Los Amates; Rio Tenedores, Tenedores.

Thorichthys Meek.

Geographical distribution: Eastern slope of Mexico and Central America.

28. *Thorichthys helleri* (Steindachner).

Heros helleri STEINDACHNER, Chromiden Mexico, 1864, 8 (Rio Teapa, Tabasco, Mexico).

Cichlasoma helleri JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus., 1896, 1521.

Thorichthys helleri MEEK, Fresh-water Fishes of Mexico, 223, 1905 (lowland streams of Mexico which empty into the Gulf south of the City of Vera Cruz; Otopa; El Hule; Obispo; Perez; San Juan Evangelista).

Heros maculipinnis STEINDACHNER, Chromiden Mexico, 1864, 13 (Rio Zanopa, Mexico); BEAN, Proc. U. S. Nat. Mus., 1892, 541 (Santa Maria, Vera Cruz); JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus. 1898, 1529.

D. XVI, 10; A. VII to VIII, 7 to 9; scales 6 to 7-29 to 31-14; head 2.8 to 2.9; depth 2 to 2.1; snout 2.4 to 2.8 in head; eye 3.1 to 3.4 in head, 1 in interorbital; greatest depth of caudal peduncle 2 to 2.1 in head; pectoral 2.8 to 3 in body.

Three specimens; maximum length 15.4 cm. One specimen from Rio Negro, a dirty swamp stream at Tenedores, the other two from 3½ miles west of Puerto Barrios in Sulphur River, a clear, swift stream.

29. *Thorichthys ellioti* Meek.

Thorichthys ellioti MEEK, Fresh-water Fishes of Mexico, 223, 1905, fig. 72.

D. XV to XVI, 9 to 12; A. VII to VIII, 7 to 9; scales 6 to 7-29 to 33-13 to 14; head 2.8 to 2.2 in body; depth 2 to 2.4 in body; snout 2.2 to 3 in head; eye 3 to 3.8 in head, 1 in interorbital; greatest depth of caudal peduncle 1 to 2.1 in head.

Color dark olive above axis of body, much lighter below; dark spots on head.

Taken only in swift water with either sandy or rocky bottom. Maximum length 16.6 cm.; females with eggs.

Localities: Rio Motagua, Zacapa, Gualan; Rio Managua, Algeria; Rio Kilagua, Los Amates; Rio Tenedores, Tenedores; Rio Gualan, Gualan.

CENTROPOMIDÆ.

Species all American, marine, entering streams. One species found in the rivers of southeastern Mexico far above tidewater. My specimens of this family were taken some 14 miles from the coast.

Centropomus Lacépède.**30. Centropomus mexicanus Bocourt.**

Centropomus mexicanus BOCOURT, Ann. Sci. Nat. Paris, 90, 1868 (Gulf of Mexico); VAILLANT & BOCOURT, Miss. Sci. Mex., 23, 1875, with pl. i, fig. 2; JORDAN & EVERMANN, Bull. 47, U. S. Nat. Mus. 1121, 1896 (coast of Mexico and State of Oaxaca. Recorded by Steindachner from Bahia).

D. VIII-I, 10; A. III, 6; scales 11-67 to 69-15 to 17; head, measured to end of opercular flap, 2.6; depth 3.5 to 3.7; snout 3.4 to 4 in the head; eye 4.7 to 6.2 in head, 6 to .9 in interorbital; 2nd anal spine 1.4 to 1.7 in head; 3rd dorsal spine 2.1 to 2.2 in head.

This is a salt-water fish sometimes entering the streams for quite a distance. Taken in abundance and of large size off the eastern coast of Guatemala. My specimens were killed with dynamite in Machaca river, 13 miles from the coast 4 miles east of Tenedores. This means that these fishes had traveled at least 20 miles up stream. Largest specimen taken in fresh water is 41 cm. long.

HÆMULIDÆ.**Pomadasys Lacépède.****31. Pomadasys templei Meek.**

Pomadasys templei MEEK, Fresh-Water Fishes of Mexico, 201, 1904 (Valles and Perez).

D. XIII, 12 to 13; A. III, 7; scales 8 to 9-55 to 56-16; head 2.8 to 2.9 in body; depth 3.2 to 3.3 in body; eye 2.9 to 3 in head. .8 to 1 in interorbital; 2nd anal spine 1.5 in head; 4th dorsal spine 2.3 to 2.5 in head.

Three specimens, maximum length of those taken from fresh water 25.5 cm. This is an oceanic fish that ascends the rivers.

Localities: Sulphur River $3\frac{1}{2}$ miles west of Puerto Barrios; Rio Machaca 13 miles west of Puerto Barrios.

SYMBRANCHIDÆ.**Symbranchus Bloch.**

Geographical distribution: India, Tropical America, southern Mexico and St. Lucia south to the La Plata.

32. Symbranchus marmoratus Bloch.

Symbranchus marmoratus BLOCH, Ichthyologia, IX, 87, pl. 418, 1795; GÜNTHER, Cat., VIII, 15, 1870; JORDAN & EVERMANN, Fishes Middle and North America, Bull. 47, U. S. Nat. Mus. I, 342, 1898; MEEK, Fresh-water Fishes of Mexico, 89, 1904.

Symbranchus immaculatus BLOCH, *l. c.*, pl. 419, fig. 1.

Symbranchus transversalis BLOCH & SCHNEIDER, 524, 1801 (Guiana, after Gronow).

Unibranchapertura grisea, *marmorata*, *immaculata*, and *lineata*, LACÉPÈDE, Hist. Nat. Poiss., V, 658, 1803 (Surinam).

Symbranchus fuliginosus RANZANI, Nov. Comm. Ac. Sci. Inst. Bonan., IV, 75, pl. ii, fig. 1, 1840 (Brazil).

Muraena lumbricus GRONOW, Cat. Fishes, 18, 1854 (Sea of Guiana).

Symbranchus vittatus CASTELNAU, Anim. Amér. Sud, 84, pl. 44, fig. 3, 1855 (Rio de Janeiro).

Recorded from Vera Cruz, Trinidad, St. Lucia, Lake Peten, Huamuchal, Rio Chisoy.

My two specimens were taken from a pond at edge of Los Amates. Maximum length 11.3 cm.

