

10.—A REPORT UPON THE RIVERS OF CENTRAL FLORIDA TRIBUTARY TO THE GULF OF MEXICO, WITH LISTS OF FISHES INHABITING THEM.

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INTRODUCTION.

During December, 1890, and January, 1891, the writer, accompanied by Prof. Louis J. Rettger, of Huntingburg, Indiana, made an examination of several of the larger rivers which empty into the Gulf of Mexico on the west side of Florida. The work was conducted under the direction of the U. S. Commissioner of Fish and Fisheries. It began in the vicinity of Punta Gorda, on Charlotte Harbor (the most southern point that could conveniently be reached), and was carried northward through the central part of the State to the tributaries of the Suwanee, in Bradford County. The fishes collected were subsequently studied at the University of Indiana, Bloomington, Indiana; annotated lists of them follow the description of each stream or river basin. The streams examined were as follows:

1. Alligator River: The main river and the ponds and ditches near Punta Gorda.
2. Peace River: Joshua Creek, Charlie Apopka, Oak Creek, and Alligator Creek.
3. Hillsboro River: Pemberton Creek, Galliger Drain, and Mill Creek.
4. Withlacooche River: Little Withlacooche River and Pond Creek.
5. Sante Fe River: The main river, Sampson Creek, and New River.

ALLIGATOR RIVER.

Emptying into Charlotte Harbor, about 5 miles below Punta Gorda, is a small stream called Alligator River. Its proportions, however, would not entitle it to be regarded as more than a creek, except, perhaps, near its mouth, where for a mile or more small boats may ascend it without being impeded by sandbars or overhanging vegetation. The stream was visited about 5 miles from its mouth, where it was shallow enough to permit seining. Here it has cut a narrow, deep channel with very steep banks, mostly through the sand, but in places through a loose limestone. The banks are composed of fine white sand, mixed to a greater or less extent with the debris of mollusk shells. The bottom of the stream, in most places, is smooth and sandy, and quite suitable for seining. At intervals, however, there are deep basins in which the accumulated deposits of organic matter, together with a few inches of a fine black mud, combine to form a treacherous bottom for the collector. The steep banks are lined with a subtropical vegetation which overhangs the stream and makes access to it almost impossible. The average width of the stream where visited was about 15 feet,

and the average depth 4 or 5 feet. Its proximity to the harbor makes it subject to the rise and fall of the tide, which daily changes the depth of water by about 2 feet. Several species of algae were found growing in great abundance. The predominating trees on the banks are palmettos, small live oaks, and small yellow pines. The surface of the surrounding country is level, and is dotted with small lakes and ponds. The stream flows mostly through a light woodland of yellow pines. Few species of fish were taken, the predominant forms belonging to the *Cyprinodontida* and the *Centrarchida*.

A number of ponds and large ditches in the neighborhood of Punta Gorda were also visited. They generally swarm with cyprinodonts.

In the following list the Alligator River is designated by the letter R, while the ponds and ditches near Punta Gorda are denoted by the letter P. All measurements are in millimeters unless otherwise stated.

FISHES OF THE ALLIGATOR RIVER.

1. *Notropis roseus* Jordan. (R, P.) Common. The specimens taken are smaller than the original types, and smaller than specimens obtained by Mr. Bollman at Way Cross, Georgia, in 1889; pharyngeal bones very heavy; teeth, 2, 4-4, 2; scales in lateral line, 38.
2. *Notemigonus chrysoleucus bosci* (Cuv. & Val.). (R, P.) Common. Only young specimens were secured; dark above; fins tinged with red; silver scales on sides extending to within two rows of scales of the dorsal.
3. *Opsopœodus bollmani* Gilbert. (R.) Very common. Agreeing with the original description,* except in the general color, which is somewhat darker. There is a bright, carmine-red, U-shaped mark on the snout, the arms of which reach just beyond the nostrils, the curved part just touching the premaxillary; a short line of the same color on either side of the black caudal spot; fins and sides of many of the specimens washed with red; without black edging on dorsal and anal, and without black spot on the first rays of the dorsal. The lengths of six specimens ranged from 35 to 41; scales in the lateral line, 36, 34, 35, 38, 36, 34.
4. *Lucania goodei* Jordan. (R.) Common. This is a very handsome little fish, about an inch long. The species was described by Dr. David S. Jordan in 1879, and has not since been taken until the present research. The specimens obtained at this time agree with the original description.† (See Plate LIII, Fig. 2.)
5. *Gambusia patruelis* (Baird and Girard). (R, P.) Very abundant. Found in the small brooks, lakes, and ditches, wherever there were a few inches of water. Some specimens have a dark blotch below the eye, while others are without it.
6. *Jordanella floridæ* Goode and Bean. (R, P.) Not common; only two small specimens obtained.
7. *Achirus fasciatus* Lacépède. (R, P.) Abundant. The specimens taken do not exceed 2½ inches in length, and are exceedingly variable in color.
8. *Labidesthes sicculus* Cope. *Brook silverside*. (R, P.) Common. Color, dark green; lateral stripe bright, with upper edge very dark.
9. *Chænobryttus gulosus* (Cuv. & Val.). *War-mouth*. (R, P.) Common, especially in ponds and lakes. Specimens small and very dark.
10. *Lepomis punctatus* (Cuv. & Val.). (R, P.) Not common.
11. *Gerres gula* (Cuv. & Val.). (R.) Not common. Only young specimens taken. It probably follows the tide as it ascends the river.
12. *Etheostoma quiescens* Jordan. (R.) Common. Lateral line, 48, 53, 53 or 52; scales with pores, 22, 26, 25 or 26. (See Plate LIII, Fig. 3.)

* Bull. U. S. Fish Comm., VIII, 1888, 226.

† Proc. U. S. Nat. Mus., 1879, 240.

PEACE RIVER.

Peace River, one of the largest rivers of southern Florida, rises in Polk County, where it drains a number of lakes of considerable size; thence flowing in a southerly direction for 75 miles, it empties into Charlotte Harbor. During the rainy season the water is deep and the river navigable for its entire length, but in May and June the water becomes low, and the river is fordable at many places. In December there was too much water in the channel for successful seining, and although several localities were visited, no spot was found where the net could be hauled to good advantage. The banks are low everywhere, and there is but little vegetation in the stream, except near its mouth, where it spreads out to form a large swampy tract, filled with rushes, sedges, and wild grasses. Examinations were made at Zolfo Springs, December 25, and at Wauchula and Bartow. At the first-mentioned place the river flows through a broad, low valley; its banks are precipitous and the water deep. The temperature was 63° F. Much phosphate rock occurs in that locality.

Joshua Creek is a small eastern tributary of Peace River, 12 or 15 miles long, and with an average width of 25 feet at the crossing of the South Florida Railroad, where it was examined. As in many of the Florida streams, the water appears dark-colored, owing to the decaying vegetation in the bottom of the stream, which forms a thin layer of very black sediment over the sandy bottom. The average depth of the water is, perhaps, 4 feet, although at short intervals there are "holes" which far exceed this depth. The sandy bottom is swept clean in the swifter parts of the channel, but in the more sluggish places the vegetable débris has collected to a thickness of several feet, forming a miry bottom, remarkable for the amount of marsh gas given off whenever it is disturbed. There are few ripples, but the collections of drift make it impossible for boats to ascend the stream. The banks are lined with a subtropical vegetation, and jungles of palmettos and live oaks make access to the stream especially difficult; while, owing to the steepness of the banks and the absence of sandbars, good landing-places for the seine are not numerous. Outcrops of phosphate occur in some places in the bed of the stream. This deposit seems to underlie much of the surrounding country, and is extensively mined, and shipped away for fertilizing purposes. The material resembles somewhat small water-worn pebbles of flint, but it is readily distinguished by its softness and lightness. Shark teeth and bones of other vertebrates are abundant in the phosphate rock. *Spirogyra* and other forms of algæ are common. The creek was examined at the crossing of the South Florida Railroad, about 3 miles from its mouth and near Nocatee, December 24, 1890. Temperature of water, 60° F.

Charlie Apopka is one of the largest eastern tributaries of Peace River. It rises near the northern boundary of De Soto County, and flows southwesterly a distance of 25 miles. The stream has cut its channel through the sandy soil, which in places approaches a sandstone in consistency, to a depth of from 12 to 20 feet, piling up large banks of clean white sand at every curve in its course. The current is quite swift, and the depth of water ranges from 3 to 6 feet. The bottom of the stream is composed of sand, together with coarse gravel of very soft, dark sandstone and some phosphate. No algæ were observed. Fishes were very scarce, *Fundulus seminolis* being the only abundant species. The examinations were made at Charlie Apopka Station.

Oak Creek is a small eastern tributary of Charlie Apopka, only a few miles in length, and having about the same characteristics as the main stream. *Fundulus seminolis* and black bass were the most common fishes. The collections were made near Charlie Apopka Station, December 25, 1890.

Alligator Creek empties into Peace River, and is the outlet of a small meadow lake. It is peculiar in having, for the most part, the characteristics of a prairie stream, there being no vegetation along its banks except a coarse, wild grass. The bottom is of sand, blackened by the usual vegetable mold. Its average width is about 15 feet, and its depth from 1 to 5 feet. The stream is small, but swarms with fishes, and is a good one in which to make collections. It was examined 1 mile south of Zolfo Springs, December 26, 1890; temperature of the water, 65° F.

In the accompanying list the different places visited are designated by letters as follows: Joshua Creek, J; Charlie Apopka, C; Oak Creek, O; Peace River at Zolfo Springs, P; Alligator Branch, A; Peace River at Wauchula, W; at Bartow, B.

FISHES OF PEACE RIVER.

1. *Ameiurus nebulosus* (Le Sueur). *Bullhead*. (J, A.) Not common. Very dark; almost black above; sides marbled with white.
2. *Erimyzon sucetta* (Lacépède). (J, P.) Not common. Very dark or black above, with a dark lateral band, two scales in width; somewhat lighter below, with a rose tint on breast; head, 4½ in length; depth, 3½; eye small, nearly 5 in head; dorsal rays, 12, the longest nearly as long as base of fin; number of scales, 39.
3. *Notropis roseus* (Jordan). (J, C, O, P, W, B.) Specimens very dark, with a light line above the plumbeous lateral band, and a pale line below; no vertebral line; base of caudal dark. The measurements of five specimens were as follows: Length, 59, 55, 55, 54, 54 millimeters; head, 11½, 11, 11, 10½, 10¼ millimeters; depth, 11, 9, 9, 8½, 8¼ millimeters; lateral line, 38, 38, 38, 37, or 38.
4. *Notemigonus chrysoleucus bosci* (Cuv. & Val.). (J, C, A, W, B.) Very common in Joshua and Alligator creeks. Specimens very large and fine; fins washed with red; anal edged with black; silver band very broad; scales in lateral line, 46 to 50; scales before dorsal, 25; anal rays, 16.
5. *Opsopœodus bollmani* Gilbert. (J, P, A.) Common only in Joshua Creek. Specimens taken from this stream were all large, the largest measuring as follows: Length, 60; head, 11; depth, 10+; scales in lateral line, 36; no dark spot on dorsal; body washed with red above the plumbeous lateral band; lower lip dark, almost black.
6. *Gambusia patruelis* (Baird and Girard). (J, C, O, P, A, W, B.) Common at every station. The three largest specimens measured respectively 40, 45, and 46 millimeters in total length.
7. *Mollienesia latipinna* Le Sueur. (C, O, P, A.) Not common. Only a very few specimens were taken in this river basin.
8. *Jordanella floridae* (Goode and Bean). (J, P, A.) Not common. Two specimens were taken in Joshua Creek and three in Peace River, at Zolfo Springs. The largest measured: Length, 33; head, 8; depth, 10½. (See Plate LII, Fig. 4.)
9. *Zygonectes chrysotus* (Günther). (J, P, A, W, B.) Quite common. Specimens with or without pearly spots; dark spots on dorsal and caudal of a few specimens; cheeks iridescent; one specimen had sides marked with small black dots; scales before dorsal, 22; measurements as follows: Length, 53, 53, 46, 37, 37, 37 millimeters; head, 12, 12+, 11, 9, 9, 9; depth, 10½, 10½, 9, 7, 7, 7; eye, 3½, 3½, 3, 2½, 2½, 2½; lateral line, 35, 35, 38, 35, 35, 35. (See Plate LIII, Fig. 1.)
10. *Lucania goodei* Jordan. (W.) Only one specimen was taken; length, 31.

11. *Fundulus seminolis* Girard. (J, C, O, A, P.) Common, especially in Charlie Apopka and Oak creeks. Somewhat variable in color, and differing otherwise from the original and other descriptions.* (See Plate LII, Fig. 3.)

Body slender, not compressed; back not elevated; caudal peduncle deep; depth the same as the height of dorsal, and also equal to the distance from the end of the snout to middle of pupil; head long and pointed, somewhat pyramidal, $4\frac{1}{2}$ to $4\frac{1}{3}$ in total length; depth of body $5\frac{1}{2}$ to $6\frac{1}{2}$ in length, or equal to the distance from end of snout to the hinder margin of the proopercle; eye medium size, about 4 in head or two-thirds the interorbital space; dorsal fin longer than anal, the rays growing gradually shorter from the fifth to the last, giving the top of the fin a gentle convex curve; origin of dorsal above the termination of the ventrals; anal short, length of longest rays, $1\frac{1}{5}$ that of base of fin, the fourth ray longest, growing rapidly shorter to the last; posterior margin below posterior margin of the dorsal; ventrals small and short, not reaching vent; pectorals broad, barely reaching ventrals.

Ground color, olive green in the larger specimens, brighter in the males, or of a somewhat yellowish brown, caused by the scales having dark edges. Some specimens have several longitudinal stripes resulting from dark spots in the center of the scales, but the majority of the specimens taken have no such marking. All of the young, and the older females, are crossed by 12 or 14 faint dark bars. The fins are generally plain, but in a few specimens the dorsal and caudal have darker spots, which in some instances are arranged on bars. The teeth are arranged in two rows, those of the outer row in the lower jaw much enlarged; all are pointed, movable, and curve inward. Dorsal, 17; anal, 13.

Following are given the measurements and other details of a few specimens taken in different localities: Three specimens from Joshua Creek, Noctee: Length, 108, 100, 94 millimeters; head, 22, 22—, 21 millimeters; depth, 16, 16, $15\frac{1}{2}$ millimeters; scales in lateral line 54, 50, 52; some specimens with faint crossbars. Charlie Apopka: Very common; color light; fins without markings; lines produced by the dots at the intersection of the scales very faint. Alligator Branch: Common; color very dark; length, 112, 104; head, 27, 25; depth, 20, 19; distance from end of snout to origin of dorsal fin, 48, from origin of dorsal to end of caudal fin, 39; three bars across the dorsal; lateral line, 54.

12. *Achirus fasciatus* (Lacépède). (J, C, O, A, W.) Common, except in Alligator Creek. Color very variable.
13. *Labidesthes sicculus* Cope. Common at every station.
14. *Chænobryttus gulosus* (Cuv. & Val.). *War-mouth*. (J, C, O, A, W, B.) Common. Very dark; many specimens with the body below the lateral line decorated with copper-colored dots.
15. *Lepomis punctatus* (Cuv. & Val.). (J, C, O.) Not common. Specimens almost black; scales in lateral line, 39 to 41.
16. *Lepomis pallidus* (Mitchill). (J, P, A, W, B.) Not common. Opercle ornamented with a red spot on the posterior margin; 13 dark crossbars across the body; lateral line, 42.
17. *Lepomis holbrooki* (Cuv. & Val.). (J, C, O, P, A.) Common. Much more abundant than *L. pallidus*.
18. *Lepomis megalotis* (Rafinesque). *Long-eared sunfish*. (C, P, W, B.) Abundant wherever found.
19. *Micropterus salmoides* (Lacépède). *Large-mouthed black bass*. Taken at every station. Common in the lakes and ponds, where it is reported to grow to a great size.
20. *Etheostoma quiescens* Jordan. (J, A.) This species is described in the Proceedings of the U. S. National Museum, 1884, 479. Color, dark brown, with very dark green between the darker spots on the body. Length, $34\frac{1}{2}$, $34\frac{1}{2}$, 48, 52, 46, and 47 millimeters; head, 9, 9, 10, $10\frac{1}{2}$, $9\frac{1}{2}$, $9\frac{1}{2}$ millimeters; depth, $6\frac{1}{2}$, $6\frac{1}{2}$, $7\frac{1}{2}$, $7\frac{1}{2}$, $7\frac{1}{2}$, 7— millimeters; lateral line, 52, 49, 49, 50, 52, 50; scales with pores, 27, 21, 24, 27, 26, 22; dorsal, IX-9, IX-11, X-12, IX-10, IX-11, IX-11; anal, II-7; the spines about equal in length. (See Plate LIII, Fig. 3.)

* Proc. Acad. Nat. Sci. Phila. 1859, p. 59. Günther, vol. vi, p. 325. Syn. N. A. Fishes, p. 334. Proc. U. S. Nat. Mus., 1884, p. 322.

HILLSBORO RIVER.

The *Hillsboro River*, one of the larger rivers of the western slope of Florida, rises in the western part of Polk County, in a low watershed that separates the rivers flowing into Lake Okeechobee from those which empty into the Gulf. It is about 45 miles long and very sluggish, but of sufficient depth to be navigable for small boats to a distance of several miles above its mouth. The country which it drains is low except about its headwaters, where it is more or less rolling. Only three places were visited on this river and its tributaries, as follows: Pemberton Creek, Galliger Drain near Seffner, and Mill Creek at Kathleen.

Pemberton Creek is a small tributary of the Little Hillsboro River, draining several small lakes and flowing for the most part through an open country. Its banks are low, the bottom is covered with a few inches of mud, and in some places with a heavy growth of algae. Fishes were scarce, the few taken being found among the algae and other vegetation growing in the stream. The examination was made at Seffner, December 27, 1890; water temperature, 56° F.

Galliger Drain is a large ditch-like stream, which drains several lakes and marshy prairies, and empties into Pemberton Creek. Its banks are steep and low, and the stream is narrow and deep, looking very much like an artificial waterway. It is filled in places with algae, grass, and other vegetation. Fishes were not abundant. The Drain was examined at Seffner, December 27, 1890; water temperature, 55° F.

Mill Creek, a tributary of Hillsboro River, is a small stream, only 12 or 15 feet wide, and 2 to 4 feet deep. It was seined one-half mile southeast of Kathleen, at the "Old Mill," December 29, 1890. The stream contained much vegetation and an abundance of fishes. The water temperature was 52° F.

In the following list P denotes Pemberton Creek; G, Galliger Drain; and M, Mill Creek:

FISHES OF HILLSBORO RIVER.

1. *Lepisosteus platystomus* Rafinesque. *Gar-pike*. (M.) One large specimen was taken. Color dark brown above, decorated with darker spots, from 4 to 10 millimeters in diameter, scattered irregularly over the body and head; lighter below, but with the same black spots; opercles with a very heavy silvery pigment showing at intervals.
2. *Erimyzon sucetta* Lacépède. (M.) Rare. Black lateral band very distinct; specimens large.
3. *Ameiurus natalis* (Le Sueur). (P.) Rare. Color very light for a specimen coming from these waters.
4. *Notropis roseus* Jordan. Not common. Specimens all young.
5. *Gambusia patruelis* (Baird and Girard). (P, G, M.) Abundant. Total length of largest specimens, 50, 49, 45, 44, 44 millimeters.
6. *Jordanella floridae* Goode and Bean. (P.) Very rare. Length, 35; depth, 11; lateral line, 27.
7. *Labidesthes sicculus* Cope. *Brook silverside*. (P, G.) Very abundant.
8. *Chenobryttus gulosus* (Cuv. & Val.). *War-mouth*. (P, G, M.) Not common. Several small specimens were taken in Mill Creek.
9. *Lepomis pallidus* (Mitchill). *Blue sunfish*. (P, G, M.) Common. Several very large specimens were obtained; the specimens from Mill Creek show eight well-defined crossbars, four scales in width.
10. *Lepomis holbrooki* (Cuv. & Val.). (M.) Rare.
11. *Lepomis megalotis* (Rafinesque). *Long-eared sunfish*. (P, G, M.) Common.
12. *Micropterus salmoides* (Lacépède). *Large-mouthed black bass*. (P, G.) Quite common.

13. *Elassoma evergladei* Jordan. (P, M.) Two very fine specimens were taken in Pemberton Creek, which differ in several particulars from the types of this species.* Total length of specimens, 25 and 27; length to caudal fin, 22½, 23; greatest height of body, 6, 7; depth of caudal peduncle, 3—, 3; length of head 6+, 7; interorbital area, 2—, 2—; eye, 2, 2; distance from tip of snout to front of dorsal, 10—, 10; number of dorsal spines and rays, III-8, III-8; length of base of dorsal, 7—, 7; longest dorsal spine, 3—, 3; longest dorsal ray, 5—, 5; anal, IV-5, IV-5; ventrals reaching to anal; number of scales, 28, 28. Ground color, very dark brown, nearly black, with three crossbars behind dorsal, between which there is a dark metallic blue; spot on opercle of a dull carmine color; two small spots of the same color at base of caudal; spots of blue on other parts of the body, notably along the lateral line; fins dark; upper half of dorsal, black; two lighter spots on the last rays of dorsal. (See Plate LIII, Fig. 4.)

Several specimens were obtained in Mill Creek which correspond more closely with the originals. The measurements of three of these are as follows: Length, 25, 25, 23; length to base of caudal, 21, 21, 19; greatest depth, 6, 7, 5; depth of caudal peduncle, 3, 3, 3—; length of head, 6, 6+, 6—; eye, 1½, 1½, 1½; distance from end of snout to origin of dorsal, 9, 9½, 8; dorsal rays, IV-8, IV-9, IV-9; anal rays, III-5, III-5, III-5; number of scales, 27, 28, 27. Ground color dark brown, thickly covered with darker spots having no definite arrangement; a few deep lustrous blue scales on body; dorsal dark, showing in some specimens a double row of dark-red spots, forming two stripes parallel with the edge of the fin. There seems to be some variation in the size of the eye and the width of the interorbital space.

14. *Etheostoma quiescens* Jordan. (P, M.) Common only in Mill Creek. These specimens were much lighter than specimens of the same species taken in other localities. Eight cross-bars pass over the back from the lateral line on one side to that on the other; a row of irregular spots below the lateral line; light spot on cheek, with irregular black spots around it; lower lip with a narrow black line on edge. Length, 47, 47, 47, 43, 43, 42, 57 millimeters; head, 9, 9, 9, 8, 8—, 11; depth, 11, 11, 11, 10—, 10—, 10, 10½; lateral line, 52, 52, 51, 52, 50, 52, 52; pores, 28, 24, 27, 25, 24, 22, 22; head full-scaled, with small rough scales. (See Plate LIII, Fig. 3.)

WITHLACOCHEE RIVER.

The *Withlacoochee River* drains a large number of lakes and low prairies in Lake County and the eastern part of Polk County. It flows in a general northwesterly direction a distance of 75 or 80 miles, and empties into the Gulf of Mexico about 20 miles south of Cedar Keys. Its headwaters were examined in three places. Three miles east of Richland the river turns nearly at right angles, changing its course from a southwest to a northwest direction; here it is about 10 yards in width, with steep banks and a swift current. The water is clear, although appearing somewhat dark, and flows over a sandy bottom. The stream at this place is almost devoid of vegetation; no crustaceans or mollusks were taken, and but few fishes. The stream was seined December 31, 1890, the water temperature being 50° F.

The *Little Withlacoochee River* was fished January 1, 1891, about 2 miles north of the station of Withlacoochee, at the crossing of the Florida Central and Peninsula Railroad. The stream at this place flows in several channels through a dense cypress swamp. The main channel is 20 feet wide, and too deep for seining. The stream was full of cypress trees and cypress knees; several species of algae were noticed, and clinging to the logs and roots were large, brown, gelatinous-appearing masses. The surface of the country is somewhat rolling, and large ledges of coral limestone were jutting from the surface, the remains of an old coral reef. Water temperature, 48° F.

* Proc. U. S. Nat. Mus., 1884, 323.

Pond Creek is a small prairie or meadow creek, flowing through open country. The banks are low and mossy, the water clear and shallow, and the bottom of fine mud. The stream swarms with small fishes, several species of cyprinodonts being especially abundant. The examination was made at Dragem Junction, January 2, 1891; water temperature, 52° F.

In the following list species taken in the Withlacoochee River are marked W; those from the Little Withlacoochee, L; and those from Pond Creek, P:

FISHES OF THE WITHLACOOCHEE RIVER.

1. *Ameiurus natalis* (Le Sueur). (W, L.) Not common. Several young specimens were taken in both streams.
2. *Erimyzon sucetta* Lacépède. (L.) Common. Jet black above; fins all black.
3. *Notropis roseus* Jordan. (W, L.) Not common. Six specimens were obtained.
4. *Notropis metallicus* Jordan and Meek. Four specimens were taken, two adult and two young. The adults measure as follows: Length, 39, 40; head, 10—, 10; depth, 9—, 9; anal rays, 11, 11; scales in lateral line, 35, 34. For a full description see Proc. U. S. National Museum, 1884, p. 475. These specimens differ from the description in being somewhat darker in color; in having two very small red spots at the base of the caudal fin, one on the upper and one on the lower edge of the termination of the broad lateral band; in having the pectoral and ventral fins very dark; and in the absence of a distinct black caudal spot. (See Plate LI, Fig. 1.)
5. *Opsopæodus bollmani* Gilbert. (L.) One very large specimen taken; color very light, about the same as specimens of this species obtained in Kentucky. Length, 50; head, 10½; depth, 11; eye, 3; lateral line, 34; lateral band not distinct; no markings on fins.
6. *Gambusia patruelis* (Baird and Girard). (W, L, P.) Common everywhere.
7. *Zygonectes chrysotus* (Günther). (W, L, P.) Common. Variable in color; largest specimen from Little Withlacoochee River measured, length, 66; head, 18; depth, 15; scales in lateral line, 33, without pores. Several specimens from Withlacoochee and Pond Creek measured as follows: Length, 62, 58, 56, 54, 49; head, 16, 14, 13½, 12, 11; depth, 13, 13, 12, 11½, 9; lateral line, 33, 31, 31, 33, 32. Color plain, no bars or pearly dots except on cheeks. Pearly markings oblong; many scales in lateral line with pores; cheeks iridescent; eleven distinct crossbars on body; showing crossbars; color plain; two rows of pearly dots on sides. (See Plate LIII, Fig. 1.)
8. *Mollienesia latipinna* Le Sueur. (W, L, P.) Common. Dorsal rays as long as head.
9. *Jordanella floridae* Goode and Bean. (W, L, P.) Common. These specimens agree with the original description,* especially in regard to the generic characters. Many specimens have more than a trace of a lateral line; in the row of scales along the axis of the body a few of the scales are provided with pores; the first and second row above have a greater number, and in some cases almost all the scales in those rows have pores. Length, 50, 49, 49, 46, 43; head, 13, 12, 12, 12—, 10; depth, 18½, 19, 19, 19, 17; dorsal, I-14, I-15, I-15, I-15, I-15; lateral line, 26, 24, 26, 26, 25. (See Plate LI, Fig. 4.)
10. *Lucania goodei* Jordan. Very abundant.
11. *Fundulus ocellaris* Jordan and Gilbert. Not common. General color dark olive; body crossed by 14 dark crossbars, not as wide as the interspaces; sides above middle line covered with small spots, below dusted with minute spots. The largest specimen measured, length, 38; head, 16; depth, 11; scales, 36, of which many from the dorsal fin to the caudal are pored.† (See Plate LI, Fig. 2.)
12. *Chænobryttus gulosus* (Cuv. & Val.). *War-mouth*. (W, L, P.) Common.
13. *Elassoma evergladei* Jordan. Several specimens taken; very variable.
14. *Lepomis pallidus* (Mitchill). *Blue sunfish*. (W.) Not common.
15. *Lepomis holbrooki* (Cuv. & Val.). (P.) Common. The specimens obtained were all young.
16. *Etheostoma quiescens* Jordan. (W, L, P.) Common in the Little Withlacoochee.

* Proc. U. S. Nat. Mus., 11, 1879, p. 117.

† Proc. U. S. Nat. Mus., 1882, 254.

SANTA FÉ RIVER.

The Santa Fé River is an eastern, and one of the largest, tributaries of the Suwanee River. Collections were made at three places on this river and its tributaries, in Bradford County.

The Santa Fé River is the outlet of a lake having the same name, situated in the southeastern part of Bradford County. This lake is about 11 miles long, 5 miles wide, and very deep. Three miles southwest of Hampton, a station at the crossing of the Georgia and Southern Florida and the Florida Central and Peninsula Railroad, the river is only about 20 feet wide, with an average depth of about 4 feet. Here the river flows through woodland, and is full of cypress trees, coarse grass, and algae. A red alga, *Batrachospermum*, was found in such abundance at this place as to hinder the use of the seine. The examination was made January 3, 1891; water temperature, 51° F.

Sampson Creek is a small northern tributary of the Santa Fé, and is very shallow. It afforded very few fishes. It was examined at Sampson, January 5, 1891; water temperature, 49° F.

New River is a large northern tributary of the Santa Fé, and at the place where it was visited, New River Station, was of about the same size and character as the Santa Fé, but the water was more shallow. The bottom is sandy and black, the banks are low, and vegetation extends down to and into the water. Fishes were not abundant. Examined January 5, 1891; water temperature, 50° F.

In the following list, the Santa Fé River is designated "SF," Sampson Creek, by the letter S, and New River by the letter N.

FISHES OF THE SANTA FÉ RIVER.

1. *Ameiurus natalis* (Le Sueur). (SF, S.) Not common. Largest specimen only 3½ inches long.
2. *Noturus gyrinus* (Mitchill). *Stone cat.* (SF, S.) Rare.
3. *Noturus leptacanthus* Jordan. (N.) Three small specimens were taken, the largest measuring length, 62; head, 13; width of head, 10; depth, 10; upper jaw, projecting; color, a uniform dark brown above, lighter on belly.
4. *Erimyzon sucetta* Lacépède. (SF, S, N.) Young specimens quite common in the Santa Fé.
5. *Notropis roseus* Jordan. (SF.) Rare, and becoming less abundant farther north.
6. *Gambusia patruelis* (Baird and Girard). (SF, S, N.) Common. Most of the specimens have a spot below the eye.
7. *Zygonectes chrysotus* (Günther). (SF, S, N.) Common. Specimens large, with body barred; young with pearly dots.
8. *Zygonectes notti* Agassiz. (SF, S, N.) Common. Not found farther south. Males with twelve, vertical bars; longitudinal rope-like stripes very bright. Length, 55; head, 12; depth, 7; scales in lateral line, 35.

9. *Heterandria ommata* Jordan. (SF, S, N.) Not common. The original description of this species was published in the Proceedings of the U. S. National Museum, 1884, p. 323. The females only have the black ocellus on the upper part of the base of caudal, the males being crossed by from 5 to 7 dark bars. The mouth varies; the teeth are movable. Five specimens, two males and three females, gave the following measurements (in millimeters):

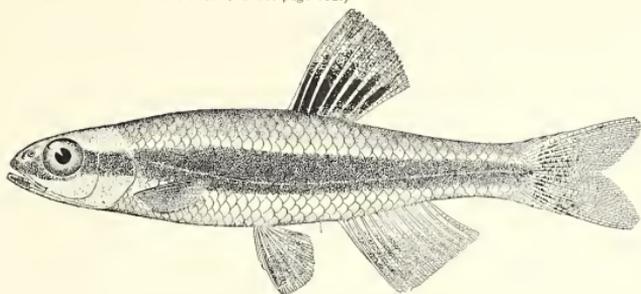
Sex.	Total length.	Length to caudal fin.	Head.	Depth.	Dorsal.	Anal.	Scales.
Males.....	{ 23.5	20	6	4	6	10	28
	{ 23.5	19.5	6	4-	6	9	26
Females.....	{ 25	22	6+	4+	7	10	27
	{ 23	20	6	4	6	10	27
	{ 22	20	5.5	4-	6	9	28

The generic characteristics of this genus are not well established, as it has affinities with both *Heterandria* (see Proc. U. S. Nat. Mus., 1884, 233; Günther, vol. vi, 351; Proc. Acad. Nat. Sci. Phila. 1859, 62), and *Rivulus* (see Günther, vol. vi, 227). The specimens I have examined have more in common with *Heterandria*, but have not the anal fin modified into an intromittent organ.

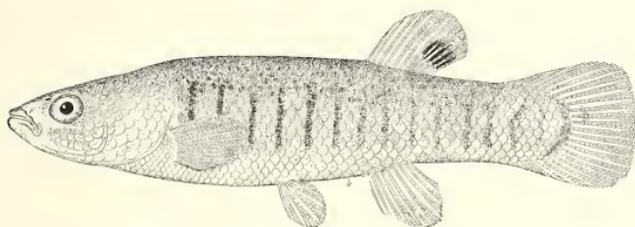
10. *Aphredoderus sayanus* (Gilliams). (SF.) One specimen taken; length, 50; head, 18; depth, 16½; number of scales, 48; dorsal, III-12; anal, II-8; vent below hinder margin of opercle.
11. *Chænobryttus gulosus* (Cuv. & Val.). (SF, S, N.) Common.
12. *Lepomis punctatus* (Cuv. & Val.). (SF, S, N.) Common. Specimens large; scales in lateral line, 43.
13. *Lepomis pallidus* (Mitchill). *Blue sunfish*. (S, N.) Rare. Only three specimens obtained.
14. *Lepomis megalotis* (Rafinesque). *Long-eared sunfish*. (N.) Not common.
16. *Etheostoma quiescens* Jordan. (SF, S, N.) Not abundant. Several specimens were obtained in each locality.
17. *Elassoma evergladei* Jordan. (SF, S, N.) The color of these little fishes is exceedingly variable. The ground may vary from a light olive to a dark brown, or they may be mottled, striped, or barred with reddish brown, a dark brown, or a very dark green. Dorsal and anal fins edged with black. Several specimens had the body crossed by from 5 to 8 reddish-brown bars, which extended to the upper edge of the dorsal. (See Plate LIII, Fig. 4.) Six specimens from the Santa Fé measure as follows:

Total length.	Length to caudal fin.	Head.	Depth.	Dorsal.	Anal.	No. of scales.
25	22	6.5	6.5	IV-12	IV-7	28
26	21.5	7	6	IV-11	III-5	27
24	20.5	6	6	IV-11	III-6	29
23	20	6.5	6	IV-11	III-6	28
23.5	20.5	6	6	IV-9	III-5	28
24	21	6	6	IV-10	III-5	27

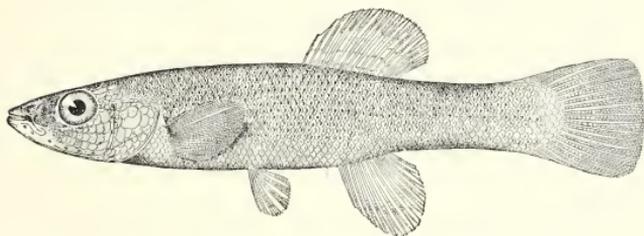
INDIANA UNIVERSITY, *Bloomington, Ind., June 6, 1891.*



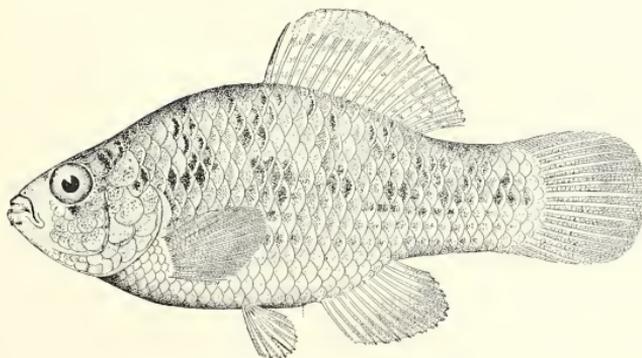
1. NOTROPIS METALLICUS Jordan and Meek.



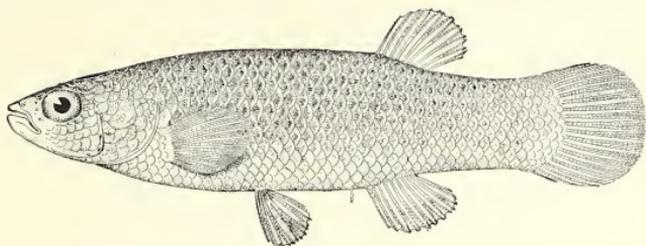
2. FUNDULUS OCELLARIS Jordan and Gilbert.



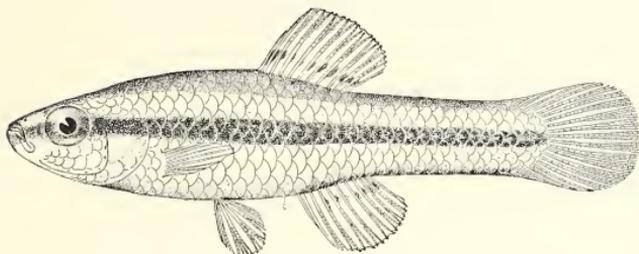
3. FUNDULUS SEMINOLIS Girard.



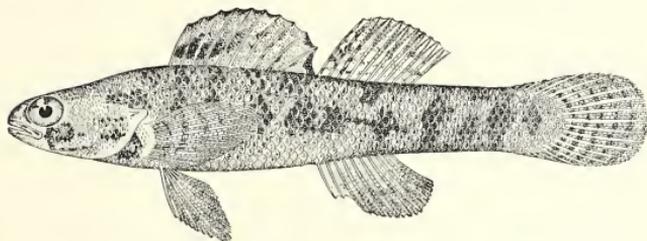
4. JORDANELLA FLORIDÆ Goode and Bean.



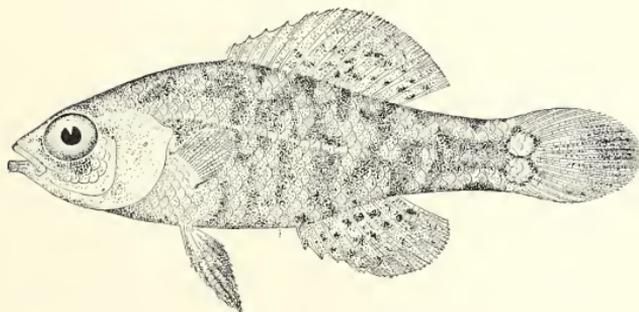
1. ZYGONECTES CHRYSOTUS (Günther).



2. LUCANIA GOODEI Jordan.



3. ETHEOSTOMA QUIESCENS Jordan.



4. ELASSOMA EVERGLADEI Jordan.