

rather short, oblique. Length of gill-rakers equals two-thirds the diameter of eye. Insertion of dorsal about midway between root of caudal fin and anterior border of eye. Caudal peduncle robust. Caudal fin deeply forked. Anal moderate, with basal sheath, the length of its base  $4\frac{3}{4}$  in head. Pectorals nearly 2 in head. Ventrals short,  $3\frac{3}{4}$  in head.

Color in spirits slightly olivaceous; side with a sharply defined silvery band, about as wide as eye, more distinct than in our other species. Snout yellowish; top of head dusky; sides of head lustrous silvery; caudal light, with many dark points; dorsal little dotted; anal and pectoral scarcely specked. Described from numerous specimens from Beaufort, N. C., and a specimen from the coast of Brazil. The specimens obtained by Professor Baird at Beesley's Point, New Jersey, belong to this species.

Günther's description of *Engraulis mitchilli* does not conform to *S. browni* in depth of body and in the number of anal rays; these characters probably indicate a confusion with *E. mitchilli* C. & V. *Engraulis hiuleus* Goode and Bean differs from *S. browni* in a body less deep and in having two more rays in the anal—differences which scarcely sustain the validity of the species.

### 3. *Stolephorus mitchilli* (C. & V.) J. & G.

*Engraulis mitchilli* C. & V. Hist. Nat. Poiss. xxi, 50, 1848 (New York; Lake Pontchartrain); Poey, Syn. Pisc. Cub. pp. 421 and 422, 1868 (Havana).

*Stolephorus mitchilli* J. & G. Proc. U. S. Nat. Mus. 1882.

*Engraulis vittata* Storer, Fishes of Mass. 341, 1867, pl. xxvii, fig. 3. (Description incomplete and erroneous; the figure good, and evidently referring to *S. mitchilli*. Provincetown, Mass.)

*Engraulis duodecim* Cope, Trans. Amer. Philos. Soc. 1866 (Beesley's Point, N. J. Description erroneous\* if intended for this species).

*Habitat*.—Cape Cod to Texas and Cuba; Provincetown; Wood's Holl; Pensacola; Lake Pontchartrain; Galveston; Havana.

For detailed description of *S. mitchilli*, see J. & G., Proc. U. S. Nat. Mus. 1882.

INDIANA UNIVERSITY, June 11, 1882.

## ON A COLLECTION OF FISHES FROM THE LOWER MISSISSIPPI VALLEY.

By O. P. HAY.

The fishes described in the following paper were collected mostly by the author during the summer of 1881. The first point visited was Memphis, Tenn. My collections there were made during the latter part of June, on the Arkansas side of the river. The seining was done there, as I was obliged for the most part to do it elsewhere, in the shallow

\*This species differs from *E. browni* in having the dorsal fin entirely anterior to the anterior ray of the long and deeply concave anal and in the serration of its belly. (Cope.)

ponds along the river, which had been filled during the period of high water. From Memphis I proceeded to Vicksburg, Miss., where I spent several days during the early part of July. The collecting was done on both the Mississippi and the Louisiana sides of the river. My next work was done along the Big Black River, near Edwards, where the railroad leading to Jackson crosses this stream.

At Jackson, Miss., a very thorough search was made of Pearl River and the ponds and small streams of the vicinity. A portion of the collection was made at this point about the middle of July, and another portion about the middle of August. In the latter month a day was spent along the Big Black at Vaughan's Station, along the New Orleans and Chicago Railroad, in Yazoo County. Another day was devoted to seining in the Yalabusha River, at Grenada, in Yalabusha County; and this ended my work in that region for the season.

I have included also a few species that were sent to me from Enterprise, Miss., on the Chickasawha River. One of them, *Labidesthes sicculus*, had not previously been obtained from that part of the State, while the other specimens enable me to give more complete descriptions than have yet been given of the species to which they belong.

In this paper I enumerate 64 species, 5 of which I describe as new to science. One new genus is established, belonging to the Cyprinidæ.

#### ETHEOSTOMATIDÆ.

##### 1. *Ammocrypta vivax*, sp. nov.

In form and general appearance closely resembling *A. pellucida* (Bd.) Jor. Body elongated and terete. Depth in the length, 7 times or more. Head contained in the length 4 times. Snout gradually decurved; intermaxillaries protractile. Mouth moderate, horizontal, the maxillaries reaching back to a vertical from the anterior border of the orbit. Teeth on the vomer, intermaxillaries, and mandibles rather weak. Eye equal to the snout, and contained in the length of the head  $3\frac{1}{2}$  times; interorbital space narrow. Cheeks densely covered with small scales. Opercles overlaid with a few rather large scales.

Body completely covered with small, usually strongly ctenoid scales, except the regions immediately in front of and behind the bases of the paired fins. There are 65 rows of scales running across the distinct lateral line. Of the horizontal rows of scales, 6 lie above the lateral line and 10 below it.

The rays of the fins are as follows: D XI, 10; A I, 9. The spinous and soft dorsals are separated by a space equal to one-half the length of the head. The two portions of this fin are about equal in height, the longest ray of each being contained twice in the length of the head. The base of the spinous dorsal is four-fifths the length of the head; that of the soft dorsal about one-half the same unit. The anal is short and high, its base less than one-half the head, while the longest ray is equal to three-fourths the head. As to position, the spinous dorsal begins at a point

three-eighths of the distance from the snout to the base of the caudal, the soft dorsal two-thirds of this distance, and the anal immediately under the first ray of the soft dorsal. The single spine of the anal is soft and weak.

The pectorals and the ventrals extend backward to about the same point, a little more than half-way from the base of the pectorals to the commencement of the anal. The caudal peduncle forms about one-fourth of the length exclusive of the caudal fin.

In color this fish, while living, resembles the other species of this genus, being indeed almost as pellucid as *A. beanii*; and at first it was supposed to be that species. The sides are ornamented with about 10 dusky blotches, most distinct posteriorly. Along the back there are about 14 similar blotches. The occiput is sprinkled with black specks, and a few of these are scattered over the snout. The belly, chest, and lower parts of the head are colorless. The fins appear to be marked in no way except with a few black dots.

Only a single specimen of this species was secured. Its length to the base of the caudal is  $1\frac{3}{8}$  inches, taken from the Pearl River at Jackson, Miss.

2. *Ammocrypta beanii* Jor.—*Bean's Darter*.

*Ammocrypta gelida*, HAY, Proc. U. S. Nat. Museum, iii, 1880, 490.

One specimen of this species was taken, along with the preceding, from the Pearl River at Jackson. It is but an inch and one-eighth long, and resembles those taken in Eastern Mississippi, and described, as cited above, under the name of *A. gelida*. I have no doubt now, however, that they ought to have been included under Professor Jordan's species.

3. *Ioa vigil*, sp. nov.

The following description is drawn from a single specimen, which has a length of 1 inch to the base of the caudal:

Body slender, head long, caudal peduncle compressed and comparatively deep. The fish, therefore, appears to have nearly the same depth everywhere.

Top of the head sloping gradually from the occiput to the snout. Length of the head in that of the body,  $3\frac{3}{4}$  times; therefore long and pointed. Upper jaw projectile, the furrow separating the skin of the premaxillaries from that of the forehead being evident. Mouth large, terminal, slightly oblique; the jaws equal. The maxillaries extend back to a vertical from the anterior edge of the pupil. The jaws both straight, the tip of the lower not being curved downward, as in *A. pellucida*. Upper and lower jaws armed with recurved teeth. Vomer apparently with teeth.

Opercular spine well developed. Opercles and cheeks apparently devoid of scales. Eye large, its diameter in the length of the head 3 times, exceeding the length of the snout. Interorbital space very narrow.

Depth of the body in its length 6 times. Caudal peduncle in length of the body 4 times. Its depth in its length twice.

Dorsal fin-rays X, 12; the spinous and soft portions well separated. The spinous dorsal beginning at a point one-third of the distance from the snout to the caudal fin. Its length four-fifths and its height one-half the length of the head. Soft dorsal with the same dimensions as the spinous dorsal. The distance between the last spinous ray and the first soft ray equal to two-thirds the length of either portion of the dorsal. Anal fin II, 10. Its length equal to two-thirds the length of the head, and its height one-half the head. This fin begins immediately opposite the first soft dorsal ray. The hard rays are slender and about one-half as long as the longest soft rays.

The posterior portion of the body is densely scaled. There appear also to have been some scales on the anterior portion of the body above the lateral line, but in the single specimen known they are now missing. There are apparently no scales on the interior half of the body below the lateral line. There would probably be about sixty transverse rows of scales. The lateral line is deficient on five or six of the last scales of the caudal peduncle.

The color of this little fish is pale straw, or in life, perhaps, pellucid. It is marked with some blotches and specks of olive, about 10 square spots along the back, and about as many along the lateral line. The spots are most distinct on the hinder portion of the body. Along the sides the last 4 or 5 are considerably the largest. There are a few specks of olive between the lateral and dorsal rows of spots. The top of the head is dusky, and there is a small but very distinct black spot at the base of the caudal. There are no distinct markings below or in front of the eye.

From the Pearl River at Jackson, Miss.

4. *Percina caprodes* (Raf.) Grd.—*Hogfish*.

Specimens of this species were captured at Vicksburg and at Jackson, Miss.

5. *Alvordius aspro* Cope & Jor.—*Black-sided Darter*.

One specimen was secured while seining in the Yalabusha River at Grenada. It thus appears to have a very wide geographical distribution.

6. *Hadropterus spillmani* Hay.—*Spillman's Darter*.

I have another specimen of this fish from the Chickasawha River, at Enterprise, Miss., but I obtained none in other parts of the State. It is not unlikely that this will prove to be a variety of *H. migrofasciatus*. However, there appear to be some differences between the two that, so far as we yet know, are constant.

7. *Boleosoma olmstedti* (Stor.) Ag.—*Johnny Darter*.

A very few specimens of this Darter were obtained in the Big Black River, near Edwards, and again in the Yalabusha at Grenada. As it

appears to be quite certain that the forms called *B. olmstedii* and *B. maculatum* belong to the same species, the older name, given above, must take precedence.

8. *Pœcilichthys butlerianus*,\* sp. nov.

Body elongated, compressed; back somewhat arched.

Head rather large, contained in the length 4 times. Snout gradually decurved. Mouth of medium size, very slightly oblique. Lower jaw equal to the upper. Maxillary reaching back to a vertical from the anterior edge of the pupil. Upper jaw not projectile. Eye in the head  $3\frac{1}{2}$  times. Length of the snout three-fourths the diameter of the eye. Depth of the body in the whole length to the caudal  $5\frac{5}{8}$  times; caudal peduncle in the length  $3\frac{1}{2}$  times; its depth one-third its length.

There are 44 transverse rows of scales, 3 longitudinal rows above the lateral line and about 12 below it, counting to the middle line of the belly. The lateral line is incomplete, there being pores in about 18 scales. It extends back to the last ray of the spinous dorsal. As indicated by the small number of rows of scales above it, it runs high up on the body.

The structure of the fins is shown by the formula D. IX, 11; A. II, 6. The spinous dorsal is as long as the head; its longest spine is contained  $1\frac{2}{3}$  times in the length of the head. The soft is in length four-sevenths and in height three-fifths the length of the head. Anal in length five-sevenths and in height one-third the head. Pectorals and ventrals reaching back nearly to the vent. Both these fins are narrow and pointed. The caudal is rounded. The spinous dorsal begins at a point one-third of the distance from the snout to the base of the caudal. The anal begins at a point one-half the distance from the posterior edge of the preopercle and the base of the caudal.

The opercles have a row of enlarged scales along their lower edge. The cheeks are densely covered with small scales. Chest naked. Opercular spine well developed.

As regards color, this fish is pale below, almost white, from the snout to the caudal fin. On the chest and abdomen this white area extends upwards on each side as high as the upper edge of the base of the pectorals. On the caudal peduncle it is very narrow. The sides are ornamented with irregular blotches of olive. On the caudal peduncle these blotches are confluent into somewhat indistinct zigzag markings. Along the back are about ten square blotches of the same olive color. The center of the operculum has a triangular blotch. The occipital region is dusky. There is a dark spot behind the eye, a dark streak across the snout from eye to eye, a spot just above each eye, and a streak below each eye. The eye, therefore, seems to be in the center of a dark cross. There is also a small black spot at the insertion of the caudal fin.

\*An abridgement of this description will be found in Jordan & Gilbert's Synopsis Fishes N. A., p. 519.

The ventral fins are white, the pectorals and anals nearly white. The dorsals and the caudal are ornamented with narrow dusky bars, which run transversely to the fin-rays. In life there is a scarlet band running along near the upper edge of the spinous dorsal.

The specimen from which the above description is taken has a total length of two inches. It was seined from a shallow pool along the Big Black River, near Vaughan's Station, Yazoo County, Mississippi, on the 20th of August.

In the collection of fishes made at Memphis is another and smaller specimen of this species, the colors of which are arranged according to a more definite pattern. The square olive blotches along the back are more distinct. From each of the anterior five or six there is a narrow band of the same color running downward and forward to the ventral region. On the posterior half of the body there are five or six bands, somewhat broader than the oblique ones just mentioned, that alternate with the dorsal blotches and run directly downward.

9. *Vaillantia camura* (Forbes) Jor.

*Boleosoma camurum*, FORBES, S. A. Bull. No. 2, Ills. Lab. Nat. Hist., 1873, 40.

*Vaillantia camura*, JORDAN, D. S. Bull. U. S. Nat. Mus., No. 12, 89.

*Vaillantia chlorosoma*, HAY, O. P. Proc. U. S. Nat. Mus., iii, 1880, 495.

One specimen of this species was obtained at Memphis, Tenn., and another at Jackson, Miss.

It now appears to be highly probable that the specimens that I described as *V. chlorosoma*, from Eastern Mississippi, belong to Professor Forbes's *Boleosoma camurum*, found in Illinois.

10. *Microperca præliaris* Hay.—*Southern Least Darter*.

This species was originally described from a single specimen seined at Corinth, Miss. On my last trip I succeeded in getting additional specimens at Memphis, from the Big Black at Edwards, and from the Pearl at Jackson. It therefore appears to be a common and rather widely-diffused species. It is known also from Alabama. The characters assigned the species in the original description hold good in the case of the new materials, except that my last specimens all have two anal spines instead of one, as in the type. Two are probably the normal number.

LABRACIDÆ.

11. *Morone interrupta* Gill.—*Brassy Bass*.

Two small specimens of this fish were secured at Memphis. It is reported to be a very common fish at some seasons, and to be very highly prized for food.

CENTRARCHIDÆ.

12. *Pomoxys sparoides* (Lac.) Grd.—*Grass Bass*.

Abundant specimens were captured at Memphis, Vicksburg, Edwards, Vaughan's, and Grenada.

13. *Pomoxys annularis* Raf.—Crappie.

Probably even more abundant than the preceding; found at Memphis, Jackson, and Vaughan's.

14. *Centrarchus macropterus* (Lac.) Jor.—Long-finned Sunfish.

Many specimens were seined from ponds along the Big Black west of Edwards. A few were taken at Jackson.

15. *Lepomis pallidus* (Mitch.) Gill & Jor.—Blue Sunfish, "Blue Brim."

This species was found at every locality visited, except Memphis, where the failure to get it was no doubt accidental. Vicksburg, Edwards, Jackson, Vaughan's and Grenada.

16. *Lepomis obscurus* (Ag.) Jor.—Blue-mouthed Sunfish.

One adult specimen was taken at Jackson.

17. *Lepomis humilis* (Grd.) Cope.—Red-spotted Sunfish.

A number of specimens of a *Lepomis* are in the collections from Memphis, Vicksburg, and Jackson, which I refer to this species. They belong to that section of the genus characterized by having palatine teeth.

The gill-rakers are about as long as those of *L. pallidus*. The opercular membrane is elongated into a conspicuous "ear." This is narrower at the base than further back, so that its shape is peculiar. There is a large black spot near the extremity of the flap; and this is surrounded by a broad band which, in alcoholic specimens, is silvery white; but which, in life, is probably of an orange or red color. The operculum is covered with large scales. The forehead is slightly convex to near the posterior border of the eye. At this point the front is suddenly elevated so as form an angle between the head and the body.

18. *Lepomis megalotis* (Raf.) Cope.—Sun Perch.

*Lepomis fallax* HAY, Proc. U. S. Nat. Mus. iii, 1880, 499.

Specimens of this variable fish were obtained at all points, except Memphis. Some of the specimens cannot be distinguished from specimens taken in Indiana, while others have quite a different appearance. Two small specimens captured in the Big Black at Vaughan's are of a dark color, and have a very short opercular flap. In other respects, however, they agree with typical specimens.

I have in my collection a fish from the Chickasawha River that I am compelled to refer to this species, but which departs still further from the ordinary form. The body is low for the genus, the height being contained  $2\frac{2}{3}$  times in the length. The outline is regularly arched from the lip to the dorsal fin. The flap is not large, and is narrowly bordered with a pale color; the eye is large, greater than the length of the snout, and contained in the head 3 times. Its color is its most remarkable feature, if there can be anything remarkable about the variations in color that a fish may exhibit. The snout and upper part of the head are of a livid blue; the flap is black, while the rest of the body is very

pale, almost white, with a few dusky markings along the side. Running along each side of both the dorsals and of the anal there is a scarlet streak. The dorsal spines are low and slender, and the gill-rakers short.

*Lepomis fallax* is doubtless a form of *L. megalotis*.

19. *Apomotis cyanellus* (Raf.) Jor.—*Blue-spotted Sunfish*.

A number of fine specimens of this fish were captured at Memphis, and others at Jackson.

20. *Chænobryttus gulosus* (C. & V.) Jor.—*Black Sunfish*.

Abundant everywhere. From the Mississippi at Memphis and Vicksburg, the Big Black at Edwards and Vaughan's, the Pearl at Jackson, and the Yalabusha at Grenada.

21. *Micropterus salmoides* (Lac.) Henshall.—*Large-mouthed Black Bass*, "*Trout*."

An abundant fish everywhere. The young are found in every pond. Specimens were obtained at the same localities as the preceding.

I have never succeeded in finding in the South a specimen of the small-mouthed black bass, *Micropterus dolomieu* Lac.

### APHREDODERIDÆ.

22. *Aphredoderus sayanus* (Gilliams) DeK.—*Pirate perch*.

This was found to be a rather common fish at most of the localities visited. Specimens are in the collections from Memphis, Vicksburg, Jackson, and Vaughan's.

### SCIÆNIDÆ.

23. *Haplodonotus grunniens* Raf.—*White Perch*, *Drum Grunter*.

Specimens of this species were secured at Vicksburg only. Evidences of its occurrence at Jackson were obtained. I have seen it captured by a fisherman at Demopolis, Ala., at the confluence of the Black Warrior and Tombigbee Rivers. It is esteemed as one of the best food-fishes.

### ATHERINDIÆ.

24. *Labidesthes sicculus* Cope.—*River Silverside*.

This curious fish has representatives in my collections from the Mississippi at Memphis, the Big Black at Edwards, the Pearl at Jackson, the Yalabusha at Grenada, and the Chickasawha at Enterprise. It is, therefore, probably distributed from Michigan to the Gulf of Mexico.

25. *Menidia audens*,\* sp. nov.

In form and appearance much like *Menidia notata*, but with a broader, flatter head and a narrowed lateral silvery band.

Head in the length of the body to the caudal  $4\frac{1}{2}$  times. Diameter of

\*An abridgment of this description will be found in Jordan & Gilbert's Synopsis Fishes N. A., p. 908.



the eye equal to one-third the length of the head, to the snout, and to the interorbital space. The width of the head across the occiput is equal to one-half the length of the head. Lower jaw oblique and equal in length to the snout. Mouth small, the cleft being about one-half the length of the lower jaw. Upper jaw concave and protractile. Lower jaw projecting slightly beyond the upper.

The greatest depth in the length 6 times. The caudal peduncle is a little shorter than the head and its medium depth one-half its length. Dorsal fin IV or V-I, 8 or 9; Anal I, 17 or 18. The first spine of the dorsal is situated a little in front of the first anal ray, and somewhat nearer the base of the caudal than the snout. Height of spinous dorsal equal to one-half the head. The two dorsals are separated by a space equal to twice the diameter of the eye. Beginning of the second dorsal two-thirds of the distance from the snout to the base of the caudal. Its height and length each equal to one-half the length of the head. First anal fin ray situated equally distant from the posterior border of the eye and the base of the caudal. Length of anal equal to head, its height three-fifths of the same unit. Pectoral fins extending beyond the insertion of the ventrals; the latter attaining the vent.

The anal aperture is a longitudinal slit, having a length in the larger individuals, equal to two-thirds the diameter of the eye. The beginning of the first, or spinous, dorsal is immediately over the anterior end of this slit.

There are 45 transverse rows of scales, and 10 horizontal rows at the beginning of the first dorsal. The top of the head is covered with large scales as far forward as the anterior margin of the pupil. This covering of scales descends on each side, overlying the opercle and sending forward below the eye a row of enlarged scales to the angle of the lower jaw. On the lower edge of the opercle are two rows of smaller scales. The lateral line runs above the silvery band for about 8 scales anteriorly, after which it drops below this band and continues thus until near the caudal fin where it runs into the band. This stripe, so characteristic of this genus, lies principally on the fifth row of scales below the dorsal fins. It is lacking on the upper and the lower ends of the scales of this row, while it involves the lower ends of those of the fourth row and the upper ends of those of the sixth row. Its width is one-half the diameter of the eye. Its upper edge is bordered by a narrow line of leaden blue. The scales of the body have entire edges. The postero-superior and postero-inferior borders of each scale are straight and meet each other at an obtuse angle. The exposed portions of the scales are therefore rhombic.

The color is about that of *M. notata*. The edges of the scales on the upper surface are marked with a row of black dots, but not so conspicuously as the above species. There is a dusky band along each side of the anal fin. Soft dorsal, caudal, and pectoral fins sprinkled with black dots; other fins plain.

A few specimens were obtained at Memphis; many at Vicksburg;

one from the Big Black at Edwards; and a few from the Pearl River at Jackson. The total length of the largest specimen is 3 inches. It perhaps ascends from the Gulf, although no specimens have yet been received from salt water.

### CYPRINODONTIDÆ.

#### 26. *Zygonectes dispar* Ag.—*Striped Minnow*.

A female of this species was obtained in the Big Black River, near Edwards, and a male in the Pearl at Jackson. It has not been known hitherto to occur further south than Southern Illinois.

#### 27. *Zygonectes notatus* (Raf.) Jor.—*Top Minnow*.

Numerous specimens were obtained at Jackson, in the ponds along the Pearl River, and in a branch of the Yalabusha at Grenada.

#### 28. *Gambusia patruelis* Baird & Girard.

*Zygonectes melanops* HAY, Proc. U. S. Nat. Mus. iii, 1880, 501.

A large number of specimens of the above species were found wherever I made collections during the past summer, except at Memphis. I had previously found the same fish at Artesia and Macon in Eastern Mississippi, and supposed that it was Professor Cope's *Zygonectes melanops*. In re-examining my materials from Artesia I found a single male that had been previously overlooked. This male possessed the peculiar intermittent anal fin of *Gambusia*, and therefore furnished a clew to the disposition to be made of the specimens. The males appear, for some reason, to be very rare. Out of twenty-four specimens that I have from Artesia but one is a male. Several specimens of those collected at Macon are yet at hand, but all are females. Of thirty-two specimens collected at Vaughan's all are females. I have one male from Vicksburg and another from the Big Black at Edwards. All these males are considerably smaller than the average of the females. The description of Professor Cope's species agrees so well with the females of *Gambusia patruelis*, it may be a question whether it was not founded on such females.\* There is but one character that appears to distinguish the two, and that is the position of the dorsal fin with respect to the anal. In *Z. melanops* the dorsal is said to have its beginning opposite the middle of the anal; in my specimens of *G. patruelis* it begins opposite the seventh anal ray. *Zygonectes atrilatus*, Jordan & Brayton, is also probably the same fish.

A large proportion of the females in my collections are greatly distended with the partially-developed young.

*Localities*.—Vicksburg, Edwards, Jackson, Vaughan's, Grenada.

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\* This conclusion has been independently reached by Messrs. Jordan & Gilbert in the current volume of the Proceedings: cf. Proc. U. S. Nat. Mus. v, 1882, 257.

## ESOCIDÆ.

29. *Esox reticulatus* Le Sueur.—*Green Pike*, “*Jackfish*.”

Several specimens of fishes belonging to the genus *Esox* were obtained in the Big Black, near Edwards, and in pools along the Pearl at Jackson, which I refer to the above species. I am not able to distinguish my specimens from specimens of *E. reticulatus* from New England. The dorsal rays number as high as 17, as in *E. reticulatus*; while there are said to be but 12 in *E. Ravenelii*. The series of vomerine teeth is certainly not longer than the palatine, while they are posteriorly weak and scattering.

30. *Esox umbrosus* Kirt.—*Little Pickerel*.

This appears to be a very abundant fish in the Lower Mississippi Valley, as well as further north. Specimens were secured at Memphis, Jackson, Vaughan's, and Grenada.

## HYODONTIDÆ.

31. *Hyodon selenops* Jor. & Bean.—*Southern Moon Eye*.

Two specimens of this beautiful species were caught for me in the Pearl River at Jackson.

32. *Clupea chrysochloris* (Raf.) Jor.—*Skip Jack*.

Two small specimens were secured at Vicksburg.

33. *Dorosoma cepedianum* (LeS.) Gill.—*Hickory Shad*.

Abundant everywhere. Collected at Memphis, Vicksburg, Edwards, Jackson, and Grenada.

## CYPRINIDÆ.

34. *Hyborhynchus notatus* (Raf.) Ag.—*Blunt-nosed Minnow*.

Specimens of this widely distributed species were obtained at Vicksburg, in the Big Black at Edwards, and in the Yalabusha at Grenada.

35. *Hybognathus nuchalis* Ag.—*Blunt-jawed Minnow*.

*Hybognathus argyritis* HAY, Proc. U. S. Nat. Mus. iii, 1880, 503 (in part).

Of the minnows in my collection belonging to the genus *Hybognathus*, there are two well-marked species. One of these I refer to Agassiz's species, *H. nuchalis*, the other to *H. argyritis*, Girard. The examination of a considerable number of specimens has led me to recognize the following differences: *H. nuchalis* has a small eye, its diameter being equal to or less than the snout. The mouth is small and horizontal; the lower jaw is shorter than the upper, and is received within the upper in the closed mouth, so that the mouth is inferior. The suborbital bones are broader than in *H. argyritis*. This difference is especially noticeable in the case of the anterior suborbital, which in the species last named is very narrow. It may be said that in *H. nuchalis* the anterior suborbital is twice as long as wide, while in *H. argyritis* it is three times as long

as wide. The intestines of both species vary much in length. Those of *H. nuchalis* are usually from 7 to 10 times as long as the whole body, but are occasionally shorter.

*H. argyritis* has a large eye, its diameter exceeding the length of the snout. The mouth is small, but more oblique than in the other species; while the lower jaw is fully equal to the upper. The intestines are shorter than in *H. nuchalis*, being generally about  $4\frac{1}{2}$  or 5 times as long as the body. Now and then one is found with the elementary canal  $7\frac{1}{2}$  times the body. The most obvious distinctions between the two species are to be found in the size of the eye and the position of the mouth, whether terminal or inferior.

The specimens of *Hybognathus* that I collected at Macon, Miss., and described as above cited, belong here. Those collected at Enterprise were properly assigned to the next species.

Numerous specimens collected at Memphis, Vicksburg, Edwards, Jackson, Vaughan's, and Grenada.

**36. *Hybognathus argyritis* Grd.—*Silvery Minnow.***

These appear to be quite as abundant as the preceding. Found at the same places.

*Tirodon*, gen. nov.

Pharyngeal teeth 2, 4-4, 2; compressed, not hooked, and with a broad triturating surface. Pharyngeal bones broad and sharply curved. Intestinal canal elongate and convoluted. No barbels at the angles of the mouth. Upper jaw protractile; both jaws thin. Dorsal over the ventrals.

(Etymology: *τερω*, to wear away; *ὀδός*, tooth.)

This genus is undoubtedly very closely related to *Hybognathus*, differing apparently in no important respect except in having two rows of pharyngeal teeth instead of one. This character has hitherto been regarded as of sufficient value to distinguish genera, and I follow custom. The intestinal canal in the specimen in my possession is not so elongate as in species of *Hybognathus*, being but  $3\frac{1}{2}$  times the length of the body; but this canal in the latter genus varies so greatly in length in individuals of the same species that its shortness in the case before us may be an individual peculiarity.

**37. *Tirodon amnigenus*, sp. nov.**

Form and general appearance much as in *Hybognathus argyritis*. In the single specimen known the head is broad while the body is much compressed. This may be due to mechanical injury to the specimen. Head long, contained in the body  $3\frac{1}{2}$  times. Both upper and lower jaws thin, the lower slightly the longer. Mouth rather more oblique than in *Hybognathus argyritis*, rather small, the maxillary not extending back to a vertical from the front of the eye. Eye contained in the head 3 times, equal to the snout.

Teeth 2, 4-4, 2, without hook and with a masticatory surface; appearing to differ from those of *Hybognathus* only in being in two rows.

Lateral line complete, running rather low anteriorly. Transverse rows of scales 38. Of the horizontal rows of scales there are five between the lateral line and the front of the dorsal, and three between the lateral line and the base of the ventrals. Dorsal I, 8; Anal I, 7. Dorsal slightly nearer the base of the caudal and the snout, beginning slightly in front of the ventrals, rather high, four-fifths the length of the head; its length one-half the same unit. Anal small; its height scarcely two-thirds the length of the head; its length about one-third the head.

Caudal peduncle short, contained in the length of the body nearly 5 times; its depth about one-half its length.

Color in spirits a clear yellowish green. The lower jaw, the sides of the head, and the body below the lateral line silvery. On the scales above the lateral line from head to tail there is a great number of minute black dots. A few of these occur just below the lateral line anteriorly, while on the hinder half of the body these punctulations are condensed into a dark line just above the line of pores. A row of black points arises at the beginning of the anal, and runs on each side backward to the base of the caudal. Top of the head dusky, fins pale.

A single specimen,  $1\frac{1}{4}$  inches long, was obtained in the Pearl River at Jackson, Miss.

**38. *Alburnops taurocephalus* Hay.—Bull-headed Minnow.**

This minnow appears to have a wide distribution in the South. I obtained specimens of it at Memphis, Vicksburg, Jackson, and Grenada.

**39. *Alburnops xænocephalus* Jor.**

Numerous specimens of this species were seined in the vicinity of Jackson.

In the autumn of 1881 I received from Mr. W. A. Warner, of Enterprise, Miss., a number of fishes which had lain in alcohol but a short time. Among these were several belonging to this species which showed some peculiarities of coloration that I have not seen described. The ground color on the upper half of the body is olive, below it is pale. A blue band runs along the side, palest on the anterior half, deepening posteriorly to indigo, and ending at the base of the caudal in a spot of the same color. Top of the head, opercles, and a band across the snout, leaden blue. Snout above the blue band rosy. Tip of lower jaw blue. A dark blue stripe along the back, broadest in front of the dorsal. Body below the lateral line white, except that there is more or less blue on the belly, and a blue streak on each side of the anal fin. The dorsal and the caudal fins are red.

**40. *Alburnops longirostris* Hay.—Long-nosed Minnow.**

No specimens of this species were found on my last excursion. I have additional specimens from the Chickasawha River at Enterprise. In

these the edges of the scales, especially on the upper surface of the body, are tinged with purple. There is a faint band of purple along the sides, while the whole top of the head, the opercles, and the snout are bluish purple. The bases of the dorsal and caudal fins are red. These colors are soon lost in alcoholic specimens.

**41. *Hemitremia maculata* Hay.**—*Spot-tailed Hemitreme.*

Several specimens of this species were secured at Vicksburg and at Jackson.

**42. *Luxilus cornutus* (Mitch.) Raf.**—*Common shiner.*

No specimens of this species were found in Western or Central Mississippi. It is abundant enough in the eastern part of the State. I have adult specimens from Enterprise.

**43. *Luxilus stigmaturus* Jor.**—*Spot-tailed Minnow.*

*Luxilus chickasavensis* HAY, Proc. U. S. Nat. Mus. 1880, iii, 506.

This proves to be an exceedingly variable species, both in the form and proportions of the body and in the style of its ornamentation; and on one of its forms was established the species *chickasavensis*. I have now specimens from the Big Black at Edwards, and from the Pearl at Jackson. These, together with specimens from Eastern Mississippi and from the Alabama River, enable me to give a more comprehensive description of the species. In form the fish varies from stout and heavy to elongated, the depth running from  $3\frac{1}{2}$  to 5 times in the length. The number of scales in a horizontal row ranges from about 36 to 45. The large jet-black spot at the base of the caudal fin is one of the most distinctive marks of the species; but in some of my specimens from the Big Black even this spot is obsolete. In other specimens taken along with these the spot is very distinct. The diameter of the eye is usually somewhat less than the length of the snout, sometimes equal to it; but in a few specimens it is contained nearly twice in it.

A few of the specimens that I obtained were quite highly colored. The sides of the body were of a bright leaden blue, this color sometimes extending down to the bases of the paired fins. The scales on the dorsal region were olive, edged with blue. Top of the head and a streak along the back also blue. The base of the caudal red, the top blue. The base of the dorsal red, the upper half filled with white satiny pigment. Anal and paired fins also charged with the same pigment. The resemblance of such highly colored individuals to *L. analostanus* in their full nuptial dress is so complete that they might easily be mistaken for the latter species, were it not for the black caudal spot.

Sometimes the males have considerable areas of their bodies covered with tubercles. Most commonly we find the tip of the snout swollen and densely covered with prickles. Behind this the region in front of the eyes, the whole upper surface of the head, and the middle line as far back as the dorsal fin are furnished more or less with similar prickles.

In some cases we may find along the exposed edge of every scale, on each side of the body below the lateral line, beginning as far forward as the bases of the ventrals, a row of small, hard tubercles. These become larger and more numerous over the anal fin and on the caudal peduncle, and make these regions decidedly rough to the feel. They even continue down on to the anal rays. Some of the males thus tuberculated show the faintest outlines of the caudal spot.

**44. *Ericymba buccata* Cope.—*Silver-mouthed Dace.***

This is one of the most common species of the *Cyprinidæ* in the Chickasawha River, but I have met with it at no point in the South nearer the Mississippi River. I have specimens taken at Enterprise, in the autumn, that are much more highly ornamented than any that I have seen elsewhere. The edges of all the scales on the upper half of the body, except a triangular patch from the back of the head to the dorsal fin, are broadly edged with blue. Top of the head to the lower edge of the orbit blue. Snout blue. An ill-defined band of blue along the sides, most intense behind. Many blue specks scattered over the body below the lateral line and behind the ventrals. Dorsal and caudal red.

**45. *Opsopæodus emiliæ* Hay.—*Emily's Minnow.***

A very common minnow throughout the region visited. Collected at Memphis, Vicksburg, Jackson, and Grenada.

**46. *Minnilus dilectus* (Grd.) C. & J.—*Delectable Minnow.***

Collected at Memphis, Vicksburg, Edwards, Jackson, Grenada.

**47. *Minnilus rubripinnis* Hay.—*Mississippi Red-fin.***

No specimens of this species were obtained on my last trip. From new material obtained from the Chickasawha, in the autumn, and which had lain in alcohol but a short time, I add the following particulars as to the coloration: The scales above are olive, with dusky edges. There is a broad blue band along the sides, which becomes narrower, better defined, and of an indigo hue on the caudal peduncle. Whole top and upper half of the sides of the head, together with the tip of the lower jaw, blue. A blue streak on each side of the anal fin. A narrow dusky line running along the back from the occiput to the caudal fin. Dorsal fin red, with a blue stripe running along the tips of the rays. Caudal mostly red. Other fins and the lower part of the body white.

**48. *Minnilus lirus* Jor.—*Steel-sided Minnow.***

*Nototropis lirus* JORDAN, Annals N. Y. Lyc. Nat. Hist., xi, 1877, 342.

At Memphis I caught a single specimen of a *Minnilus* which I cannot distinguish from typical specimens of *M. lirus* from the Etowah River, in Georgia.

**49. *Notemigonus chrysoleucus* (Mitch.) Jor.—*Shiner.***

Found in abundance in the little lakes and ponds along the Mississippi

at Memphis and Vicksburg, in the Big Black at Edwards and Vaughan's, and in the Pearl at Jackson.

50. *Semotilus corporalis* (Mitch.) Putnam.—*Horned Dace*.

A few were found along the Big Black near Edwards.

51. *Ceraticichthys amblops* (Raf.) Cope & Jor.—*Big-eyed Chub*.

A few good specimens were secured in the Pearl River at Jackson.

#### CATOSTOMIDÆ.

52. *Moxostoma macrolepidotum* var. *duquesnii* (Le S.) Jor.—*Red Horse*.

One well-characterized specimen of this species was obtained at Jackson, Miss.

53. *Moxostoma pæcilurum* Jor.—*Variiegated-tailed Mullet*.

*Moxostoma macrolepidotum* et *pæcilurum* HAY, Proc. U. S. Nat. Mus. iii, 1880, 512.

Two small specimens of a *Moxostoma* that were caught at Jackson are referred, with a good deal of doubt, to this species. They appear to have some indications of the peculiar coloration of the caudal fin of this species. The specimens of this genus described as above cited from Eastern Mississippi were all of this species, as a re-examination of my collection has shown. No doubt it exists throughout the southern half of the State.

54. *Cycleptus elongatus* (Le S.) Ag.—*Black Horse; Missouri Sucker*.

One specimen having a total length of 21 inches was taken from the Pearl River.

55. *Carpiodes carpio* (Raf.) Jor.—*River Carp Sucker*.

This is an abundant fish everywhere in the region visited. Specimens were obtained at Memphis, Vicksburg, Edwards, and Jackson.

56. *Ictiobus cyprinella* (C. & V.) Ag.—*Brown Buffalo Fish*.

Quite as common as the preceding. The young were taken at Memphis, Vicksburg, Edwards, and Vaughan's. One specimen 9 inches long was taken in the Big Black near Edwards.

#### SILURIDÆ.

57. *Ictalurus punctatus* (Raf.) Jor.—*Channel Cat*.

Common everywhere and attaining a great size. Taken at Vicksburg, Edwards, Jackson, and Grenada.

58. *Amiurus melas* (Raf.) Jor. & Copeland.—*Black Cat*.

Abundant everywhere. Specimens taken at every point visited, except Grenada.

59. *Amiurus marmoratus* (Holb.) Jor.—*Marbled Cat*.

Two specimens that I refer to this species were captured at Memphis.



One has a total length of 14 inches. The head is as broad as long and contained in the body  $3\frac{1}{2}$  times. Depth in the length  $3\frac{1}{2}$ . Anal fin scarcely one-fourth the length of the body. The body narrows rapidly posteriorly. Interorbital space in the head  $1\frac{3}{8}$  times. Branchiostegals 10.

60. *Noturus leptacanthus?* Jor.

*Noturus leptacanthus?* HAY, Proc. U. S. Nat. Mus. iii, 1880, 514.

In giving an account of a collection of fishes made in Eastern Mississippi in 1880, I referred to Professor Jordan's *Noturus leptacanthus*, with some hesitation, a specimen that I captured at Enterprise, Miss. I have now another specimen that I caught in a small sandy creek flowing into the Big Black River near Edwards. This preserves the characters shown by the Enterprise specimen, the spines being one-half, or nearly one-half, the length of the head. Without being able to compare it with typical specimens of *Noturus leptacanthus*, I am not prepared to describe it as a new species.

#### ANGUILLIDÆ.

61. *Anguilla rostrata* (Le S.) DeK.—*American Eel*.

The head of a specimen of the common eel was given me by a fisherman at Jackson.

#### AMIIDÆ.

62. *Amia calva* L.—*Bowfin Mud-fish*; "Grinnell."

Many of these were taken at Memphis. They are eaten by the negroes.

#### LEPIDOSTEIDÆ.

63. *Lepidosteus osseus* (L.) Ag.—*Garfish*.

A very common fish. Found at Memphis, Vicksburg, and Jackson.

64. *Atractosteus tristœchus* (Bloch & Schn.) Gill.—*Alligator Gar*.

Many of these were captured at Memphis, Vicksburg, and Jackson. One has a length of 19 inches. They are said to grow to a length of 8 feet or more.

#### RECAPITULATION.

The following table indicates the distribution of the species in the waters of Southwestern Tennessee, and in the northern two-thirds of the State of Mississippi, as shown in the collections that I have thus far made. In the first column are included the species collected at Corinth, Miss., Memphis, Tenn., and Vicksburg, Miss. In the second are checked the species collected at Edwards, Vaughan's, and Grenada, in the Big Black, and its tributary, the Yalabusha. The third column indicates the species taken from the Pearl. In the fourth column are noted the species taken from the Tombigbee and the Chickasawha. To enable us to compare these Southern fishes with those of the Mississippi Valley further north, I have added a fifth column, in which are checked those species that occur north of Kentucky. All, or nearly all, of these are found in the State of Illinois.

Table showing the distribution of the fresh-water fishes of the Lower Mississippi Valley.

	Mississippi.	Big Black.	Pearl.	Tombigbee and Chickasawba.	Upper Missis- sippi Valley.
1. <i>Ammocrypta beani</i> Jor.....			x	x	
2. <i>Ammocrypta vivax</i> Hay.....			x	x	
3. <i>Ioa vigil</i> Hay.....			x	x	
4. <i>Percina caprodes</i> (Raf.) Grd.....	x		x	x	x
5. <i>Alvordius aspro</i> Cope & Jor.....		x			
6. <i>Hadropterus spillmani</i> Hay.....		x		x	
7. <i>Boleosoma olmstedii</i> (Stor.) Ag.....		x			x
8. <i>Nanostoma elegans</i> Hay.....				x	
9. <i>Nanostoma zonale</i> (Cope) Jor.....				x	x
10. <i>Pecilichthys artesiæ</i> Hay.....				x	
11. <i>Pecilichthys saxatilis</i> Hay.....				x	
12. <i>Pecilichthys butlerianus</i> Hay.....	x	x			
13. <i>Vaillantia camura</i> (Forbes) Jor.....	x	x	x	x	x
14. <i>Microperca proliaris</i> Hay.....	x	x	x		
15. <i>Morone interrupta</i> Gill.....	x				x
16. <i>Micropterus salmoides</i> (Lac.) Hens.....	x	x	x	x	x
17. <i>Ambloplites rupestris</i> (Raf.) Gill.....	x			x	x
18. <i>Chænobryttus gulosus</i> (C. & V.) Jor.....	x	x	x	x	x
19. <i>Apomotis cyanellus</i> (Raf.) Jor.....	x			x	x
20. <i>Lepomis pallidus</i> (Mitch.) Gill & Jor.....	x	x	x	x	x
21. <i>Lepomis obscurus</i> (Ag.) Jor.....				x	
22. <i>Lepomis humilis</i> (Grd.) Cope.....	x				?
23. <i>Lepomis megalotis</i> (Raf.) Cope.....		x	x	x	x
24. <i>Centrarchus macropterus</i> (Lac.) Jor.....		x	x	x	x
25. <i>Pomoxys sparoides</i> (Lac.) Grd.....	x	x	x	x	x
26. <i>Pomoxys annularis</i> Raf.....	x	x	x	x	x
27. <i>Elassoma zonatum</i> Jor.....				x	x
28. <i>Aphredoderus sayanus</i> (Gms.) DeK.....		x	x	x	x
29. <i>Haplodionotus grunniens</i> Raf.....	x			x	x
30. <i>Labidesthes sicculus</i> Cope.....	x	x	x	x	x
31. <i>Menidia audens</i> Hay.....	x	x			
32. <i>Zygonectes notatus</i> (Raf.) Jor.....	x	x	x	x	x
33. <i>Zygonectes dispar</i> Ag.....	x	x	x		x
34. <i>Gambusia patrucelis</i> B. & Grd.....	x	x	x	x	?
35. <i>Esox reticulatus</i> Le S.....		x	x		
36. <i>Esox umbrosus</i> Kirt.....	x	x	x		x
37. <i>Hyodon seletops</i> Jor & Bean.....				x	
38. <i>Chupea chrysochloris</i> (Raf.) Jor.....	x		x	x	x
39. <i>Dorosoma cepedianum</i> (Le S.) Gill.....	x	x	x	x	x
40. <i>Hyborthynchus notatus</i> (Raf.) Ag.....	x			x	x
41. <i>Hybognathus nuchalis</i> Ag.....	x	x	x	x	x
42. <i>Hybognathus argyritis</i> Grd.....	x	x	x	x	x
43. <i>Tfrodon amnigenus</i> Hay.....			x		
44. <i>Alburnops tarrocephalus</i> Hay.....	x	x		x	
45. <i>Alburnops xanoocephalus</i> Jor.....			x	x	
46. <i>Alburnops longirostris</i> Hay.....				x	
47. <i>Hemitromia maculata</i> Hay.....	x		x		
48. <i>Luxilus cornutus</i> (Mitch.) Raf.....				x	x
49. <i>Luxilus stigmaturus</i> Jor.....		x	x		
50. <i>Ericymba buccata</i> Cope.....				x	x
51. <i>Opsopodus emilia</i> Hay.....	x	x	x	x	x
52. <i>Minnilus dilectus</i> (Grd.) C. & J.....		x	x		x
53. <i>Minnilus rubripinnis</i> Hay.....				x	
54. <i>Minnilus lirus</i> Jor.....	x				
55. <i>Minnilus punctulatus</i> Hay.....					
56. <i>Minnilus bellus</i> Hay.....					
57. <i>Notemigonus chrysolencus</i> (Mitch.) Jor.....	x	x	x	x	x
58. <i>Semotilus corporalis</i> (Mitch.) Putnam.....		x		x	x
59. <i>Ceratichthys biguttatus</i> (Kirt.) Grd.....				x	x
60. <i>Ceratichthys amblops</i> (Raf.) Cope & Jor.....			x	x	x
61. <i>Moxostoma macrolepidotum</i> (Le S.) Jor.....			x		x
62. <i>Moxostoma pæcilurum</i> Jor.....				x	
63. <i>Erimyzon sucetta</i> (Lac.) Jor.....				x	x
64. <i>Antostomus nigricans</i> Le S.....				x	x
65. <i>Cycleptus elongatus</i> (Le S.) Ag.....			x		x
66. <i>Carpiodes carpio</i> (Raf.) Jor.....	x	x	x		x
67. <i>Ictalurus cyprinella</i> (C. & J.) Ag.....	x	x	x		x
68. <i>Ictalurus punctatus</i> (Raf.) Jor.....	x	x	x	x	x
69. <i>Amiurus vulgaris</i> (Thomp.) Nelson.....				x	x
70. <i>Amiurus melas</i> (Raf.) Jor. & Copeland.....	x	x	x	x	x
71. <i>Amiurus marmoratus</i> (Holb.) Jor.....	x				x
72. <i>Leptops olivaris</i> (Raf.) J. & G.....				x	x
73. <i>Noturus gyrinus</i> (Mit.) Raf.....				x	x
74. <i>Noturus leptacanthus</i> ? Jor.....		x		x	
75. <i>Anguilla rostrata</i> (Le S.) DeK.....				x	x
76. <i>Amia calva</i> L.....	x				x
77. <i>Lepidosteus osseus</i> (L.) Ag.....	x		x		x
78. <i>Atractosteus tristæchus</i> (Bloch & Schn.) Gill.....	x		x		x

A glance at the above table will suffice to show that the fish fauna of all the streams in the region under consideration is essentially the same. Indeed it appears to me that it would be somewhat hazardous in the present state of our knowledge to say that any fish now known from but one or two of these streams will not yet be found in all.

All the species in the table except *Morone interrupta*, *Minnilus lirus*, *Amiurus marmoratus* and *Amia calva*, have been collected by myself in the State of Mississippi. These species also doubtless occur in that State.

BUTLER UNIVERSITY, *Irrington, Ind., July 26, 1882.*

### STRIPED BASS IN PIANKATANK RIVER, VIRGINIA.

By R. HEALY.

[From a letter to Prof. S. F. Baird.]

I see it stated in the New York Herald, under the heading "Sea-fish culture," that the "eggs of the striped bass have been hatched in many instances, but the place where they spawn in numbers sufficient to make it profitable to seek them on their breeding-grounds, has never yet been discovered." If this be true, probably I can give you a clew.

The Piankatank River, upon which I live, is about 65 miles long. About 30 of this is estuary. The remainder is a fresh-water stream, about 25 or 30 feet wide, which makes its way, for 30 miles, through an alluvial country, and for 15 miles of the lower part through a cypress swamp. The water is clear but dark colored, and the stream is 2 or 3 feet deep, with bars of white sand, and deeper holes where the bottom is covered with leaves and fallen wood. Up this stream, as far as I can remember, two kinds of rockfish have been caught; one a large fish with the stripes upon the sides broken; on the other the stripes run from head to tail. The first we know as bass, the other as rockfish. These fish when full of roe are called green-roe rock. They come up the river late in February and in March, and years ago were very abundant. They are becoming scarce in consequence of the high price of fish at the North, and the many devices to catch them, among others that of an old fellow named Norton (since dead), who used to make a coarse wattle across the stream with a large hole in it. At this he would stand with a large hand-net, in the night, and whenever he felt a fish, would raise it quickly and land the fish on shore. All these fish had large green roes—very fine—finer than shad or herring.

A friend of mine told me that one morning Norton brought him three of these fish, and told him he had taken over a dozen during the night, and would have taken more but that an immense fish had broken his net. I have seen them taken in seines, but never with hook and line. Those that bite at hooks have very small roes, yellowish-white, which are called "he-roes." These fish are becoming scarce. Very few large