XIII.—Notes on the Fishes of Cayuga Lake Basin.

BY SETH E. MEEK.

Read April 10th, 1888.

During the year 1885-6, as a Fellow in Cornell University, Ithaca, N. Y., I spent some time in the study of the fishes of Cayuga Lake and vicinity. In the following paper is given a list of the fishes known in this region, together with such notes as seem proper. The material which forms the basis of this paper is chiefly in the museum of Cornell University. Some of this material was collected in former years by Dr. Wilder and Professor Gage, and by friends of the University; the rest for the most part by myself, aided by Prof. Gage and Prof. Comstock, also by students from time to time; of these, Mr. Harry Summers and Mr. G. D. Harris deserve special mention. Dr. Wilder employed a fisherman to aid me for a few days. To those students who assisted me, I acknowledge my indebtedness. I am also under many obligations to Dr. Wilder, Prof. Gage, and Prof. Comstock, for their kind assistance and encouragement, and especially to the first named for notes and other aids. The completion of this paper has been very much retarded by causes apparently uncontrollable.

The collecting at the northern end of the Lake, at Cayuga and Montezuma, was delayed until late in the spring of 1886, and until only a few days before I was called away. I was unable, at the time, to make a careful study of that collection. Since then, I have been prevented, either by other duties or by separation from my notes or specimens, from completing the paper previously to this date.

It is to be hoped that the following list will be found approximately correct, and that the results of my labors may aid some one to undertake the work and give it a more extended and careful study. It will be a pleasure to me to aid any student who may attempt this research.

To Dr. Jordan, and especially to Prof. Gilbert, I am indebted for aid in identifying doubtful species. Mr. H. V. Kipp, of

Montezuma, N. Y., has kindly furnished some valuable notes which are included in the paper.

The classification is that adopted by Dr. Jordan.

FAMILY I. PETROMYZONTIDÆ.

1. AMMOCÆTES BRANCHIALIS Linnæus.

Ammocætes niger * A., 349. B., 9.

Ammocætes æpypterus. C., 4.

This species, no doubt, inhabits most of the streams and lakes in the North Eastern United States, although only known at present from Indiana, Wisconsin and Ithaca, N. Y.

On May 8th, 1886, Professor Gage¹ and myself caught five specimens in Cayuga Lake Inlet. We saw as many more, but were unable to capture them. On May 22d we visited the Inlet a second time, but failed to find other examples of this species.

The five specimens were compared by us with other specimens from Indiana. In those from the Inlet, the extreme mandibular cusps on either side were much longer than the four remaining cusps; all the cusps were pointed. In the specimens from Indiana the cusps were all bluntish and subequal in length; no other differences could be detected. We consider this difference too small to be of specific value.

The five specimens from the Inlet were all males, and each was busily engaged in building his nest.

The habits of this species seem to be similar to those of the next species; they ascend the Inlet to spawn about two weeks earlier, and in smaller numbers.

*The references are as follows:—

A. Jordan's Manual of Vertebrates, 4th Edition.

B. Jordan and Gilbert, Synopsis Fishes N. A., 1882.

C. Jordan, Catalogue Fishes N. A., 1885.

Figures refer to pages in the above-named works.

"*" Indicates that the adult of the species is a food-fish.

"†" Indicates that the adult of the species is used as food by some of the larger fishes.

¹ Proc. Amer. Assoc. Adv. Sci., Buffalo meeting, page 269.

2. PETROMYZON MARINUS • Linnæus.

(Sea Lamprey: Large Lake Lamprey.)

A., 348. B., 11. C., 4.

Petromyzon nigricans. A., 349. B., 12.

This lamprey is found in much larger numbers than the preceding; it also reaches a much larger size.

During the spring of 1886, more than one thousand specimens were taken from Cayuga Lake Inlet, and all of them within five miles of Ithaca. They began to ascend the inlet, for the purpose of spawning, on May 21st, and continued to do so until late in June.

Their nests are excavations made in the bed of the stream, where the water is shallow, and usually just above ripples. In the fine sand and gravel at the bottom of these nests, eggs are deposited by the females, and the embryos developed. The larvæ live in the sand along the edge of the stream, just below the water-line.

This species is frequently taken by the fishermen. It is usually found attached to the bull-heads, suckers, and other large soft-rayed fishes. It seldom attacks the spiny-rayed fishes.

The following count was made of a number of the lampreys which were caught during the spawning season and brought to the University by fishermen, within two weeks:

May 21st,	156	males	and	69	females.
“ 25th,	132	“	“	110	“
Later,	106	“	“	37	“
“	86	“	“	49	“

Total, 480 males and 265 females.

Length of longest male specimen,	42	cm.
“ “ shortest “ “	23	cm.
“ “ longest female “	35	cm.
“ “ shortest “ “	25	cm.

One small female, 18 cm. in length, was captured; the ova in it were quite immature.

During the spring a crest is developed upon the back of the male, between the nape and the dorsal fin; a similar crest is developed upon the ventral surface of the female, between the vent and the caudal fin.

The crest on the male was first noticed by Dr. B. G. Wilder, in 1875, and was then considered to be characteristic of the males of Cayuga Lake, and made the basis of a new species.

The crest has since been found characteristic of specimens from the Atlantic slope. It is said by Seeley to be a feature of European specimens, during the breeding season. The crest is seasonal and sexual, and, so far as I know, is characteristic of this species only. During other seasons of the year, the difference between the sexes of this fish is not easily, if at all, recognizable.

Family II. ACIPENSERIDÆ.

3. ACIPENSER RUBICUNDUS* Le Sueur.

(Sturgeon.)

A., 345. B., 87. C., 13.

A large specimen of this species, now in the museum of Cornell University, is reported as being from Cayuga Lake.

Mr. Seth Green informs me that sturgeons have occasionally been taken in Cayuga Lake; but, so far as he knows, they have never been found in any other of the small lakes of Central New York.

I copy the following extract from a letter of recent date from Mr. H. V. Kipp, Montezuma, N. Y.:

“There have not been any *sturgeons* taken from Cayuga Lake since 1880, but quite a number before that date, and the largest known weighed thirty-five pounds.”

Family III. LEPIDOSTEIDÆ.

4. LEPIDOSTEUS OSSEUS Linnaeus.

[(Gar-pike: Bill-fish.)

A., 342. B., 91. C., 13.

Occasionally taken from the northern end of the Lake. Not as numerous as they used to be (Kipp).

Family IV. AMIIDÆ.]

5. AMIA CALVA Linnaeus.

(Dog-fish), (Bow-fin), (Wave-fin.)

A., 340. B., 94. C., 13.

Seldom taken near Ithaca; not common at the northern end of the Lake.

Family V. SILURIDÆ.

6. NOTURUS GYRINUS + Mitchell.

(Stone-Cat.)

A., 337. B., 98. C., 14.

I have no knowledge of this species as being taken near Ithaca. There are a few specimens in the Museum of Cornell University from the Lake, but no definite locality is given. Several were taken by Mr. Harris and myself from a small stream near Montezuma.

7. AMIURUS NEBULOSUS + Le Sueur.

(Bull-head.)

C., 14.

Amiurus catus. A., 332. B., 104.

Very abundant throughout the entire Cayuga Lake basin.

Jaws subequal; anal rays 18 to 22; base of the anal fin 4 to 5 in the length of the body; individual variations many.

8. AMIURUS VULGARIS + Thompson.

(Long-jawed Cat.)

This species seems to be quite scarce; I found but one specimen among over one hundred of the former species. It was taken near Ithaca.

Lower jaw decidedly longer than the upper. Upper lip thin; anal rays 19; caudal fin slightly emarginate. Physiognomy considerably different from other species of the genus.

9. AMIURUS NATALIS + Le Sueur.

A., 331. B., 105. C., 15.

I have seen but one specimen of this species from the Lake. It was taken a few years ago.

Upper jaw usually the longer. Anal rays 26; base of the anal $3\frac{3}{4}$ in the length of the body; caudal fin rounded.

10. LEPTOPS OLIVARIS * Rafinesque.

(Mud-Cat.)

C., 14. *Pilodictis olivaris*. B., 101. A., 334.

The following is from a note kept by Dr. Wilder: "A large cat-fish was taken on a set line two miles below Sheldrake, about 1855, by Alex. Merian."

Mr. H. V. Kipp informs me that cat-fish are caught in the northern end of the Lake, reaching a weight of 25 pounds.

It is probable that these statements refer to this species, but possibly to *A. nigricans*.

Family VI. CATOSTOMIDÆ.**11. CATOSTOMUS CATOSTOMUS * Forster.**

(Long-nosed Sucker.)

C., 17. *C. longirostris*. A., 320. B., 126.

My search for this species was in vain. It is found in the Adirondack region, and no doubt is a member of the Cayuga Lake fauna.

12. CATOSTOMUS TÉRES * Mitchill,

(Common White Sucker.)

A., 320. C., 18.

Catostomus commersoni. B., 129.

Very abundant through the entire Lake basin.

13. ERIMYZON SU CETTA * Lacepede.

(Chub Sucker.)

A., 319. B., 133.

Erimyzon sucetta oblongus. C., 19.

Very common about Cayuga and Montezuma. I know of none taken near Ithaca.

14. MOXOSTOMA MACROLEPIDOTUM * Le Sueur.

(Common Red Horse.)

A., 313. B., 140. C., 19.

I have seen but one specimen of this species from the Lake. Rather common at the northern end, so Mr. Kipp informs me.

Family VII. CYPRINIDÆ.

15. PIMEPHALES PROMELAS⁺ Rafinesque.

(Black-headed Minnow.)

A., 288. B., 158. C., 22.

Length of largest specimen, about 6½ cm.

Head, 4 in the length of the body; depth 3½ to 4.

Dorsal rays, 1-8; anal rays, 7; scales in the lateral line, 42-44.

Body elongate, robust; dorsal region rather prominent, more so than in *P. notatus*.

Snout bluntish, the mouth small and terminal, its gape forming a slight angle with the axis of the body. Margin of upper lip on a level with the ventral surface of the pupil; maxillary reaching about ¾ distance to vertical from the cephalic margin of the orbit. Premaxillaries protractile. Lateral line incomplete, pores on about 15 scales. Scales between the dorsal fin and the nape small and crowded.

Peritoneum black; alimentary canal about 2½ times the length of the body.

Teeth, 4-4, not hooked, all with the grinding surface developed.

Color olivaceous, somewhat silvery, darker on the sides.

The dark bar across the dorsal fin not very distinct; a faint dark spot at the base of the caudal.

The above description is based upon ten specimens taken from Fall Creek, between Triphammer Falls and Forest Home. I found this species only in this one locality.

This species is easily distinguished from others of the Cayuga cyprinoids by the very long intestine. Apparently not common.

16. PIMEPHALES NOTATUS⁺ Rafinesque.

(Blunt-nosed Minnow.)

A., 288. B., 159. C., 22.

Length of largest specimens, about 7 cm.

Head, 4½ in the length of the body; depth 4 to 5.

Scales in the lateral line, 42-44.

Body elongate, dorsal region not prominent.

Snout very blunt, mouth small, the gape parallel with the axis of the body; the lower jaw the shorter, slightly overhung by the very blunt snout.

Margin of the upper lip on a level with the ventral surface of the orbit; end of the maxillary reaching ¾ distance to vertical from the cephalic margin of the orbit.

Lateral line complete, its cephalic half slightly decurved. Scales between nape and dorsal fin much crowded, being, as in *P. promelas*, much smaller in this region than on other parts of the body, 25 to 27 in a series.

Eye rather large, much larger than in *P. promelas*.

Teeth, 4-4, first slightly hooked, and the grinding surface developed on the first three.

Last ray of dorsal fin $\frac{3}{4}$ the length of the first ray. First dorsal ray slightly nearer the base of the caudal than the tip of the snout.

Peritoneum dark; alimentary canal about $1\frac{1}{2}$ times the length of the body.

Color olivaceous, more silvery than in the last species. The young have a dark lateral band, and a dark spot at the base of the caudal fin.

This species is found in large numbers in the southern end of the lake, and in streams on the flats. Not very abundant at the northern end of the lake, and in streams near Ithaca, above the falls.

17. *EXOGLOSSUM MAXILLINGUA* + Le Sueur.

(Cut-lips: Stone-toter.)

A., 308. B., 160. C., 22.

Found by me, in small numbers, in Six-Mile-Creek and Fall Creek below the falls. It inhabits clear running water.

In this species, the dentary bones are united throughout their length; and on either side is a fleshy lobe, giving the lower jaw the appearance of a hare-lip when viewed from the ventral side. This character at once distinguishes this species from all others of the family.

18. *NOTROPIS ANOGENUS* + Forbes.

Length of largest specimens, about $4\frac{1}{2}$ cm.

Head 4 to $4\frac{1}{2}$ in the length of the body; depth $3\frac{1}{4}$ to 4. Dorsal rays 8; anal rays 8. Scales in the lateral line, 33 to 35.

Body rather elongate, dorsal region prominent. Snout pointed; mouth very small, its gape making an angle of 45° or 50° with the axis of the body. Maxillary reaching about $\frac{2}{3}$ distance to vertical from cephalic margin of the orbit, its length $4\frac{1}{2}$ to 5 in the length of the head. Margin of the upper lip on a level with the centre of the pupil. Eye large, its diameter 3 in the length of the head.

Pectoral fins small, their tips reaching $\frac{2}{3}$ distance to ventrals; tips of ventrals reaching the vent. Lateral line nearly complete. Teeth 4-4, all hooked and with the grinding surface slightly developed. Scales between nape and dorsal fin not crowded, about 14 in a series.

Color olivaceous, lighter below. A black band on sides passing around snout, about $\frac{3}{4}$ as wide as eye, the black on the snout on both jaws.

Quite common in the canal near Montezuma. It is the smallest of all the Cayuga fishes.

This species differs from *Notropis heterodon*, which it most resembles, in the small and very oblique mouth, and in the dentition.

10. NOTROPIS HETERODON + Cope.

Hemitremia heterodon. A., 303. B., 163. C., 22.

Length of longest specimens, about 5 cm.

Head 4 in the length of the body; depth $4\frac{1}{2}$ to $4\frac{1}{2}$. Dorsal rays 8; anal rays 8. Scales in the lateral line, 34 to 36.

Body elongate, with the dorsal region prominent. Snout pointed; mouth rather large, terminal; the jaws subequal in length; gape of mouth forming a small angle (less than 35°) with the axis of the body.

Maxillary reaching to vertical from the cephalic margin of the orbit; its length 4 in the length of the head.

First dorsal ray slightly nearer the tip of the snout than the base of the caudal fin. Pectoral fins reaching $\frac{3}{4}$ distance to ventrals; ventrals reaching the vent.

Scales between the nape and the dorsal fin not crowded, 12 to 13 in a series.

Teeth 1-4-4-1; grinding surface little developed, usually crenate on the edges.

Straw-colored, with darker punctulations on the edges of the scales on upper part of the body; nearly plain below. A dark plumbeous marking on the sides and around the snout, about $\frac{3}{4}$ as broad as the diameter of the eye. The black on snout on both jaws.

Quite common in all the sluggish water on the flats near Ithaca. Not found at the north end of the Lake; it seems to be replaced there by the former species, from which it is quite different.

All the specimens examined by me had teeth 1-4-4-1. Prof. Gilbert has studied specimens of this species from New York, Indiana, Illinois and Missouri. He finds the teeth 1-4-4-1 or 2-4-4-2, and is of the opinion that examples will be found in which the teeth are 1-4-4-2.

20. NOTROPIS CAYUGA + sp. nov.

Length of the longest specimens, 6 cm.

Head $4\frac{1}{2}$ to $4\frac{1}{2}$ in the length of the body; depth 4 to $4\frac{1}{2}$. Dorsal rays 8; anal 7.

Scales in the lateral line, 34 to 36.

Body elongate, rather deep, the dorsal region very prominent. In general form and appearance, this species closely resembles *N. heterodon*.

Snout short, less in length than the diameter of the eye, about $4\frac{1}{2}$ in the length of the head; mouth very small, its gape nearly parallel with the axis of the body; lower jaw the shorter, slightly overhung by the very blunt snout. Maxillary reaching about $\frac{1}{2}$ distance from vertical, from cephalic margin of the orbit. Eye 3 to $3\frac{1}{2}$ in the length of the head. Scales between the nape and the dorsal fin not crowded, 12 to 13 in a series.

First ray of dorsal fin nearer the tip of the snout than the base of the caudal fin, by a distance nearly equal to the length of the snout.—

Length of the dorsal fin nearly the length of the head. Tip of first ray of dorsal reaching beyond the tip of last ray when the fin is deflexed.

Tips of pectoral fins reaching $\frac{1}{2}$ to $\frac{3}{4}$ distance to ventrals. Tips of ventrals reaching vent. Anal fin similar to dorsal fin, smaller.

Lateral line developed on 10 to 15 scales. Teeth 4—4, slightly hooked at their tips and with narrow grinding surface.

Color as in *N. heterodon*, the dark band on the snout on upper jaw only.

The specimens from the canal near Montezuma are darker than those from near Ithaca; this is probably due to the greater abundance of vegetation in the waters of the former situation.

There appears to be considerable individual variation in this species. The above description is taken from a number of specimens, which seem to represent the more constant and typical forms. Several specimens were taken near Ithaca, in which the first dorsal ray was situated midway between the tip of the snout and the base of the caudal fin, the scales between the nape and the dorsal fin being about 16 in a series. The body was more slender and the dorsal region less prominent than in those upon which the description is based.

These few latter specimens were of a larger size. I submitted examples of each to Prof. Gilbert, who compared them with specimens of the same genus from Indiana, Illinois and Missouri. He finds that the apparent differences between the Ithaca specimens are of no specific value. The lateral line is seldom if ever complete on any of the Ithaca specimens of either this or the two preceding species.

Prof. Gilbert is of the opinion that this species may be identical with *Minnilus microstomus* Raf. or with *Alburnus lineolatus*

Agassiz, or with both. As neither of these names is available, I have proposed a new name for it.

21. NOTROPIS WHIPPLEI† Girard.

(Silver-fin.)

B., 178. C., 25.

Hudsonius analostanus. A., 292,

Cliola analostana.—B., 179.

Teeth 1—4—4—1, edges crenate, no distinct grinding surface.

Body compressed, scales on sides of the body deeper than long, appearing diamond-shaped.

Mouth terminal and oblique, snout pointed.

Eye small, 4 to 5 in the length of the head.

Lateral line complete. A large dark spot on last dorsal rays near their tips.

First dorsal ray midway between the nostril and base of the caudal fin.

Common on flats near Fall Creek, and in the southern end of the Lake. Not taken by me in other localities.

22. NOTROPIS MEGALOPS† Rafinesque.

(Shiner.)

C., 26.

Luxilus cornutus. A., 293.

Cliola cornuta. B., 186.

Teeth 2—4—4—2. Scales between the nape and the dorsal fin small and crowded, 22 to 30 in a series. First dorsal ray much nearer the tip of the snout than base of caudal fin. Scales on the sides of the body much deeper than long. Lateral line complete.

This species is very common throughout the entire lake basin.

23. NOTROPIS MEGALOPS FRONTALIS† Agassiz.

A., 293. B., 187. C., 26.

This variety differs from the typical form in having larger scales between the nape and the dorsal fin, 15 to 19 in a series.

Scarce near Ithaca. Common near Montezuma.

24. NOTROPIS LYTHRURUS† Jordan.

(Red-fin.)

Minnilus diplæmius. B., 197.

Teeth 2—4—4—3. Scales between dorsal fin very small, about thirty in a series. Body slender, similar in form to *N. atherinoides*.

One specimen taken from a small stream near Montezuma Dry Dock.

25. NOTROPIS ATHERINOIDES† Rafinesque.

(Rosy Minnow.)

C., 27.

Minnilus rubellus. A., 296. B., 202.

Head $4\frac{3}{4}$ in the length of the body ; depth $5\frac{1}{4}$. Dorsal rays 8 ; anal 9. The last ray of the anal fin is produced into a short filament which is about $\frac{1}{2}$ its entire length. First dorsal ray midway between the pupil and the base of the caudal fin. Base of anal 2 in the length of the head. Teeth 2-4-4-? (Teeth somewhat abnormally developed.)

I found but one specimen of this species near Ithaca. It was caught in Six Mile Creek, below the falls. A few specimens were also found with the preceding species. The above notes are from the former specimen only.

26. RHINICHTHYS CATARACTÆ† Cuvier and Valenciennes.

(Long-nosed Dace.)

A., 307. B., 207. C., 27.

I have seen no specimens of this species from the Lake basin. I insert it as possibly being a member of the Cayuga Lake fauna. It is quite common in the streams south of Ithaca, near Vaneterville, N. Y.

27 RHINICHTHYS ATRONASUS† Mitchell.

(Black-nosed Dace.)

A., 307. B., 208. C., 28.

Head about $\frac{1}{4}$ the length of the body. Mouth sub-inferior, less so than in the preceding species. Scales in the lateral line 60 to 68. Dorsal rays 8 ; anal rays 7. The young have a very distinct lateral band.

Common near Ithaca in all streams above and below the falls. None were taken near Montezuma.

28. HYBOPSIS KENTUCKIENSIS† Rafinesque.

(Horny-head ; River Chub.)

Chiola biguttata. B., 212.

Head 4 in the length of the body ; depth 4.

Scales in the lateral line 41. Eye 4 in the length of the head. Barbel at end of maxillary well developed. Dorsal rays 7 ; anal 7.

A few specimens taken from Montezuma only.

29. SEMOTILUS ATROMACULATUS† MITCHILL.

(Common Chub; Horned Dace.)

C., 29.

Semotilus corporalis. A., 304. B., 221.

Teeth 2—4—5—2; two or three hooked, without grinding surface. Snout pointed; mouth terminal and very large. End of maxillary reaching vertical from pupil.

Eye $4\frac{1}{2}$ to $5\frac{1}{2}$ in head. A dark spot at the root of first rays of the dorsal.

Very abundant throughout the entire Lake basin.

30. NOTEMIGONUS CHRYSOLEUCUS† MITCHILL.

(Golden Shiner.)

A., 301. B., 250. C., 23.

Body very much compressed. Teeth 5—5.

Dorsal rays 8 or 9; anal rays 12 or 13. Scales in the lateral line, 44 to 46. Lateral line decurrent with the ventral outline.

Ventral surface between ventral fins and the vent forming a sort of keel, over which the scales do not pass.

Found in sluggish water on the flats near Ithaca; none were taken near Cayuga or Montezuma, but it no doubt occurs there.

Family VIII. CLUPEIDÆ.

31. CLUPEA PSEUDOHARENGUS* WILSON.

[(Alewife; Branch-herring; Saw-belly.)

B., 267. C., 36.

Pomolobus pseudoharengus lacustris. A., 279.

This species, although not a native of Cayuga Lake, is often found in large numbers in its waters. The fishermen about Ithaca know it by the name Saw-belly.

It is thought to have been introduced into the lakes of Central New York by the State Fish Commission.

Large numbers are often found dead upon the shores of Cayuga and Seneca Lakes.

All specimens seen by me were small.

For a full discussion of this species, see "Natural History of Aquatic Animals," by G. Brown Goode, page 588

Family IX. SALMONIDÆ.**32. COREGONUS CLUPEIFORMIS* Mitchill.**

(Lake White-Fish.)

A., 275. B., 299. C., 48.

I have seen no specimens of this species from the Lake, of which it is, however, undoubtedly an inhabitant.

33. COREGONUS ARTEDI* LeSueur.

(Lake Herring; Cisco.)

A., 274. B., 301. C., 48.

I have seen a few specimens of this species from the Lake, which had been taken some few years ago.

I here record but two species of Coregoni from the Lake. Others, no doubt, are inhabitants.

34. SALVELINUS NAMAYCUSH* Walbaum.

(Lake Trout.)

A., 272. B., 317. C., 44.

Hon. H. W. Sage informs me that this species used to be quite common in the Lake near Ithaca. About 1830 a large specimen was found stranded in Cayuga Lake Inlet, about 1½ miles from the Lake.

35. SALVELINUS FONTINALIS* Mitchill.

(Brook Trout.)

A., 272. B., 320. C., 44.

Found in small streams on the uplands throughout the Lake basin.

Family X. PERCOPSIDÆ.**36. PERCOPSIS GUTTATUS† Agassiz.**

(Trout Perch.)

A., 270. B., 322. C., 44.

I have seen no specimens of this species from the Lake, of which it no doubt is an inhabitant.

Family XI. CYPRINODONTIDÆ.;**37. FUNDULUS DIAPHANUS† LeSueur.**

(Barred Killifish.)

A., 263. B., 334. C., 49.

Lateral line 45 to 50. Dorsal rays 12 to 13; anal 11 or 12.

Common on the flats and in the southern end of the Lake; streams on the uplands; Cayuga and Montezuma.

Family XII. UMBRIDÆ.

38. UMBRA LIMI Kirtland.

(Mud Minnow.)

A., 205. B., 350. C., 51.

Not found by me near Ithaca. Taken in small numbers near Cayuga and Montezuma.

Family XIV. ESOCIDÆ.

39. ESOX RETICULATUS* LeSueur.

(Eastern Pickerel. Green Pike.)

A., 267. B., 353. C., 50.

Lateral line 116 to 120. Branchiostegals 13 to 15. Dorsal rays 13 or 14; anal rays 12 or 13. The largest specimen seen by me from the lake was 55 cm. in length.

This species seems to be subject to individual variations. In many respects the specimens seen from the Lake seem to be intermediate between this species and the *E. vermiculatus*.

Not very common.

40. ESOX LUCIUS* Linnaeus.

(Great Lake Pike; Pike.)

A., 266. B., 353. C., 51.

Lateral line 110. Branchiostegals 15. Dorsal rays 18; anal rays 15.

Not common, found only in the Lake and streams below falls.

This species reaches a much larger size than the preceding. It is probably confounded by fishermen with the Muskallonge (*E. masquinongy*=*nobilior*).

Seth Green informs me that the Muskallonge has been taken from Cayuga Lake. Several fishermen also maintain the same. Yet in no case were they able to recognize more than two species, *E. reticulatus* and *E. lucius*. Mr. Kipp does not regard the Muskallonge as an inhabitant of Cayuga Lake. I am inclined to believe that he is correct, and so omit it from this list.

E. lucius is light-spotted, while *E. masquinongy* is dark-spotted; and so the two are easily distinguished.

Family XV. ANGUILLIDÆ.

41. ANGUILLA ANGUILLA ROSTRATA* LeSueur.

(Common American Eel.)

A., 338. B., 361. C., 55.

Not common, occasionally taken from each end of Cayug Lake.

Family XVI. GASTEROSTIDÆ.

42. EUCALIA INCONSTANS CAYUGA† Jordan.

(Brook Stickleback.)

A., 259. C., 68.

Gasterosteus inconstans. B., 394.

Free dorsal spines, 4 to 6.

Common in standing and sluggish water on the flats; none were taken by Mr. Harris or myself at the northern end of the Lake.

Family XVII. ATHERINIDÆ.

43. LABIDESTHES SICCOLUS† Cope.

? (Silver Skip-Jack.)

A., 261. B., 406. C., 65.

Not found near Ithaca. Several specimens were taken from a small stream which empties into the Canal a few rods south of Montezuma. This locality is the most Eastern known for this species.

Family XVIII. CENTRARCHIDÆ.

44. POMOXIS SPAROIDES* Lacépède.

(Grass Bass; Calico Bass.)

B., 464. C., 76.

Pomoxys nigromaculatus. A., 247.

One specimen, 17 cm. in length, was taken with the former species. Fishermen say that it is frequently taken from the Canal.

Pomoxis annularis Raf. may also be found in the Canal.

45. AMBLOPLITES RUPESTRIS* Rafinesque.

(Rock-Bass.)

A., 237. B., 466. C., 76.

A very common and well-known species.

46. LEPOMIS CYANELLUS* Rafinesque.

(Blue-Spotted Sun-fish.),

B., 473. C., 77.

Apomotis cyanellus. A., 239.

Not found by me near Ithaca. A few specimens were taken near Montezuma.

47. LEPOMIS PALLIDUS* Mitchill.

Found in small numbers with the preceding.

48. LEPOMIS GIBBOSUS* Linnaeus.

(Pumpkin-Seed.)

B., 482. C., 77.

Eupomotis aureus. A., 244.

Very common throughout the entire Lake basin.

49. MICROPTERUS SALMOIDES* Lacepede.

(Large-mouthed Black Bass; Oswego Bass.)

B., 484. C., 77.

Micropterus pallidus. A., 236.

Rather scarce near Ithaca. More common near Montezuma and Cayuga.

50. MICROPTERUS DOLOMIEU* Lacepede.

(Small-mouthed Black Bass.)

B., 485. C., 77.

Micropterus salmoides. A., 236.

Not found by me near Ithaca; less common than the preceding near Cayuga and Montezuma.

Family XIX. PERCIDÆ.

51. ETHEOSTOMA NIGRUM OLMSTED† Storer.

(Tessellated Darter.)

A., 224. B., 492. C., 78.

Common at each end of the Lake, but not found in the streams at the Southern end above the Falls.

52. ETHEOSTOMA FLABELLARE† Rafinesque.

(Fan-tailed Darter.)

A., 227. B., 513. C., 80.

Found with the preceding. These two are the only species of darters found. It seems very strange to me that even these were not found in the streams on the uplands.

Darters frequent shallow running water, especially if it is clear and the bottom of the stream is rocky.

Such are the characters of the upland streams near Ithaca.

Both Six Mile Creek and Fall Creek flow from the uplands to the lake in a series of cascades. It is impossible for fishes to ascend these falls, even in the case of high water. This fact gives considerable interest to the study of the fishes of these two streams; and the same is true of Cascadilla and Buttermilk creeks.

PERCA FLAVESCENS* Mitchill.

(Common Yellow Perch.)

C., 81. *Perca americana*. B., 524. A., 229.

Common throughout the Lake basin.

53. STIZOSTEDION VITREUM* Mitchill.

(Wall-eyed Pike.)

A., 230. B., 325. C., 81.

Found in the Lake, but not common.

54. STIZOSTEDION CANADENSE* Smith.

(Sand-Pike.)

A., 230. B., 526. C., 81.

Found with the preceding species; less common.

Family XX. COTTIDÆ.**55. COTTUS ICTALOPS† Rafinesque.**

(Miller's-thumb; Star-Gazer.)

B., 696. C., 111. *Potamocottus richardsoni*. A., 254.

Palatine teeth developed. Ventral rays 1-4, dorsal fins connected. Body very robust. Paired fins broad.

Southern end of Cayuga Lake.

56. COTTUS ICTALOPS BAIRDI† Girard.

A., 254. B., 607. C., 111.

This variety differs from the former in having a less robust body; the dorsal fins scarcely if at all connected; and the paired fins and palatine teeth less developed.

The two forms apparently grade into each other.

Found with the preceding.

57. COTTUS GRACILIS† Heckel.

A., 253. B., 609. C., 111.

Palatine teeth usually absent. Ventral rays 1—3. Head $3\frac{1}{2}$ to $3\frac{1}{4}$ in length of the body; depth $4\frac{1}{2}$ to $5\frac{1}{4}$. Dorsal rays vii., viii. Anal 11–13.

I have examined specimens of this species from the southern end of Cayuga Lake, Beaver Creek, McLean, N. Y., Worcester, N. Y., and Bangor, N. Y. All apparently belong to the same species.

Less common than the former species.

58. COTTUS GRACILIS CAYUGA† Var. Nov.

One female specimen 10 cm. in length.

Head $3\frac{1}{2}$ in the length of the body; depth $6\frac{1}{4}$. Dorsal rays vii.–17. Anal rays 12.

Body very slender. Preopercular spines large and strongly hooked, not covered by the skin. Paired fins comparatively small, otherwise not essentially different from *C. gracilis*.

This specimen was taken from Cayuga Lake a few years ago. It appears quite different from the preceding.

It is not unlikely that these, as well as other described forms, will prove to be but varieties of *C. ictalops*.

Family XX. GADIDÆ.

59. LOTA MACULOSA Le Sueur.

(Aleky Trout; Burbot.)

A., 257. B., 802. C., 129.

Found in the Lake; very scarce.

In the foregoing list, we have represented 20 families and 59 species, including varieties. Of these species, 26 are commonly used as food for man. 28, together with the young of all species, are used as food by all the carnivorous fishes, while the remaining 5 are of little or no economic value.

COE COLLEGE, CEDAR RAPIDS, IOWA, March 20, 1888.