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LIST OF FISHES COLLECTED IN IOWA AND MISSOURI IN AUGUST,
1884, WITH DESCRIPTIONS OF THREE NEW SPECIES.

By DAVID S. JORDAN and SETH E. MEEK.

During the months of July, August, and September, 1884, a series of explorations of the streams of the south and southwest was undertaken under the direction of the United States National Museum and the United States Fish Commission by Professor Jordan, assisted by Prof. Charles H. Gilbert, Prof. Joseph Swain, and Mr. Seth E. Meek. The present paper is the first of a series intended to place on record the result of these explorations. It includes the streams examined by the present writers, namely, the Des Moines, the Chariton, the Hundred and Two, the Missouri, and several tributaries of the La Mine and the Osage. Nearly all the specimens mentioned were obtained with a fine-meshed seine of large size. These are now in the United States National Museum, with the exception of series retained for the Indiana University and the Academy of Natural Sciences at Philadelphia.

A.—*Des Moines River at Ottumwa, Iowa.*

Most of the streams of Southern Iowa are muddy and excessively sluggish, and they become nearly dry in summer. The Des Moines is, however, exceptional in these respects. Its waters are comparatively clear, and at Ottumwa it flows with considerable current. Its bottom is in part hard clay, with some rocks, but at the mouths of tributaries and where the current slackens, it is covered with soft black mud. Our collections here were made opposite the city on the right bank of the river. A number of specimens were taken from a muddy slough, and still others from a brook called Village Creek southwest of the city. In August this is a small stream of clear water flowing over muddy sand.

1. *Noturus flavus*, Rafinesque.

One taken in the river.

2. *Amiurus nebulosus*, Le Sueur.

Anal rays 22.

3. *Ictalurus punctatus*, Rafinesque.

Very common in the river channel; also in the bayou.

4. *Ictiobus velifer*, Rafinesque.

Common in the river.

Bluish silvery above, silvery below, with darker streaks along the rows of scales. Paired fins red; other fins pale olive. Mouth small, the snout projecting much beyond it. Longest dorsal rays reaching nearly to end of fin in adult, rather shorter in the young; D. 26. Scales, 7-37-5. Head, 4 in length; depth, 3.

No one has yet obtained sufficient material for the thorough study of the Buffalo fishes. At present we regard the group called *Carpiodes* as containing three distinct species. *I. cyprinus*, Le Sueur, found only east of the mountains, and characterized by the nearly smooth, scarcely striate opercle, and by the small size of the eye. *I. carpio*, distinguished by the elongate form, short head and low dorsal fin, and *I. velifer* having the general form of *I. cyprinus* and a strongly striate opercle like *I. carpio*.

Among the specimens referred to *I. velifer*, we find much difference in the form of the body, the size of the head, the position of the mouth, the size of the eye, and in the height of the dorsal fin. We find individuals corresponding more or less perfectly to the descriptions or the typical examples of *I. tumidus*, *damalis*, *grayi*, *thompsoni*, *bison*, *velifer*, *selene*, *cutisanserinus*, and *difformis*, as well as others apparently in all degrees intermediate. Either all constitute one polymorphous species, or else we have as yet failed to separate individual from specific characters, and the latter still remain to be detected. Generally no doubt exists in regard to *I. carpio* (= *nummifer*, Cope), and *I. cyprinus* (= *vacca*, Agassiz), but puzzling and variant specimens of these are occasionally found.

5. *Moxostoma macrolepidotum duquesnei*, Le Sueur.

Common in the river. D. 12 to 14.

6. *Campostoma anomalum*, Rafinesque.

But one specimen seen—in Village Creek.

7. *Hybognathus nuchalis*, Agassiz.

A specimen agreeing entirely with the ordinary *nuchalis* type, but much darker in color.

In life, light green, silvery below, with dark punctulations. A black vertebral streak and a rather distinct dusky lateral band, not ending in a spot at base of caudal. Caudal yellowish.

8. *Pimephales promelas*, Rafinesque.

(*Coliscus parietalis*, Cope, Hayden's Geol. Survey Wyo., 1872, 437.)

Many specimens taken in Village Creek and in the bayous. These agree fully with Cope's description of *Coliscus parietalis*, and differ considerably in appearance from the adult of *Pimephales promelas*. On comparison of our specimens with large series of the latter species we find what appears to be a complete gradation, and we have no doubt that *Coliscus* is simply the immature form of *Pimephales*.

In life, light green above, the scales edged with darker; a plumbeous band formed of dark points along the side, ending in a faint spot at base of caudal; a dusky dorsal streak; a dark dash on upper part of opercle. Fins plain, the caudal a little yellowish, with some dark points.

Body more elongate than in the adult *Pimephales*, the head less deep. Caudal peduncle very long. Fins small. Scales small, crowded above; lateral line appearing on some 5 to 15 scales. Dorsal fin inserted above ventrals.

Head $4\frac{1}{8}$; depth $4\frac{5}{8}$. Scales 43. Teeth 4-4, scarcely hooked. Intestines long. Peritoneum black. Mouth small, oblique, as in *Pimephales*.

9. *Pimephales notatus*, Rafinesque.

Common.

10. *Cliola vigilax*, Baird and Girard.

(*Ceraticthys vigilax*, Baird and Girard, Proc. Ac. Nat. Sci., Phila., 1853, 390.

Cliola velox, Girard, l. c., 1856, 192.

Cliola vivax, Girard, l. c., 1856, 192.

Hybopsis tuditanus, Cope, Trans. Amer. Phil. Soc., Phila., 1866, 381.

Alburnops taurocephalus, Hay, Proc. U. S. Nat. Mus., 1880, 503.

Hypargyrus tuditanus, Gilbert, Proc. U. S. Nat. Mus., 1884, 200.)

Examination of a very large series of specimens of this widely distributed and very abundant species in the National Museum leaves no doubt that all the above names refer to a single species. Among these are the types of *Cliola vivax* and *Alburnops taurocephalus*, as well as that of Professor Gilbert's description above cited. As this species is the original type of the genus *Cliola*, that name becomes equivalent to *Hypargyrus*, Forbes, and must be used for this group if its separation from *Notropis* be approved. Our specimens agree well with Gilbert's description.

In life, light green above, the scales slightly edged with darker; a distinct plumbeous lateral band, narrower than in *Pimephales notatus*; a distinct round black spot at base of caudal. Belly silvery. Fins mostly creamy, the dorsal with a sharply-defined black spot in front, surrounded by yellowish.

As already noticed, this species bears much resemblance to *Pimephales notatus*. It has, however, a more terminal mouth, with the gape slightly oblique. Its coloration is paler, with the dark markings, es-

pecially the dorsal spot, much more sharply defined, less blended with the surrounding coloration.

Common in the river.

11. *Notropis deliciosus*, Girard.

(*Moniana deliciosa*, Girard, Proc. Ac. Nat. Sci. Phila., 1856, 199.

Hybopsis missouriensis, Cope, Hayden's Geol. Surv. Wyo., 1872, 437.)

Rather common in the river.

Our specimens are undoubtedly identical with *Hybopsis missouriensis*, Cope. We have lately found the types of *Moniana deliciosa*, Girard. These have 35 or 36 scales in the lateral line, and we are unable to distinguish them from *H. missouriensis*. The latter in turn agrees fully with *H. stramineus*, Cope, except that in the latter (found east of the Mississippi River) the scales are rather smaller in size.

Seven specimens from White River, Indiana (*stramineus*), show the following numbers of scales: 34, 36, 36, 37, 37, 38, 38. Two from Cumberland River (*deliciosus*), 34, 34. Eleven from Des Moines River (*deliciosus*), 32, 32, 33, 33, 33, 33, 34, 34, 35, 35. We regard, then, *stramineus* as a scarcely tangible variety of *deliciosus*. *Hybopsis longiceps*, Cope, and *H. volucellus*, Cope, are probably also varieties of the same species. *Minnilus microstomus*, Rafinesque, may be the same as *longiceps* or *stramineus*, but it is too briefly described to justify us in using the name.

Our specimens of *N. deliciosus* vary somewhat in color, some being in life very pale green, silvery below, with traces only of a vertebral streak, and no dark punctulations along the lateral line. Others are darker, the scales dark-edged, a strong dark vertebral line, and numerous dark points along the sides of the body and of the snout. Fins pale.

12. *Notropis gilberti*, sp. nov.

(? *Alburnus lineolatus*, Agassiz, Bull. Mus. Comp. Zool. 1863, 9; ? *Leuciscus lineolatus*, Günther, vii, 260; ?? *Hybopsis scylla*, Cope, Hayden's Geol. Surv. Wyo., 1872, 433.)

Common in Village Creek; not seen in the river.

As this species was later found in abundance in tributaries of the Osage River, the original locality of the *Alburnus lineolatus* of Agassiz, we have tried to identify our specimens with the latter species, although the original description is of very little value.

Hybopsis scylla, Cope, is perhaps the same species, but the description is not very satisfactory. As, however, both *lineolatus* and *scylla* are said to have the teeth 4-4, we have deemed it safest to apply a new name to our species.

Color, greenish above, paler below; the sides with numerous dark points, which form an obscure dusky lateral band, which ends in a faint spot; a dusky dorsal streak; top of head dusky; fins, soiled whitish.

Form more elongate than that of *N. deliciosus*, with longer, slenderer head, longer and more contracted caudal peduncle. Head long and low, flattish above and rather broad. Snout moderately decurved; $3\frac{3}{4}$ in head. Mouth rather large, nearly horizontal, the maxillary extending

to beyond the front of the eye, its length $3\frac{2}{3}$ in head. Lower jaw included, little shorter than upper. Eye small, smaller than in *N. deliciosus*, 4 in head; its length scarcely greater than interorbital width.

Scales rather smaller than in *N. deliciosus*; those in front of dorsal somewhat reduced, about 17 in number. Lateral line somewhat de-curved. Breast naked, or nearly so.

Dorsal fin rather high, its longest rays $1\frac{1}{8}$ in head, its insertion slightly behind base of ventrals, near middle of length of body. Caudal peduncle slightly longer than head. Pectoral moderate, not reaching ventrals.

Head 4 in length; depth, 5. D. 8; A. 9. Scales, 5-34 to 36-4. Teeth, 1, 4-4, 1. Length, about $2\frac{1}{2}$ inches.

13. *Notropis whipplei*, Girard.

(*Cyprinella whipplei*, Girard, Proc. Ac. Nat. Sci. Phila., 1856, 198.

Cyprinella analostana, Girard, Proc. Ac. Nat. Sci. Phila., 1859, 38.)

Exceedingly common in the river channels. The lower fins in the males are of a bright creamy yellow.

On comparison of specimens of *N. analostanus* from various regions with specimens of *N. whipplei*, among them Girard's original types, we are unable to detect any differences, except that in the Arkansas examples (*whipplei*) the body is rather more elongate.

14. *Notropis megalops*, Rafinesque.

(*Cyprinus megalops*, Rafinesque, Amer. Monthly Mag., 1817, 120=*Cyprinus cornutus*, Mitchill, Amer. Monthly Mag., 1818, 324.)

A single specimen taken in Village Creek.

It seems necessary to adopt Rafinesque's name for this species, as it is earlier than that given by Mitchill. His description applies very well to *N. cornutus*, and in his manuscript note-books we find his original drawings and notes, which render the identification almost certain.

15. *Notropis boops*, Gilbert. (?)

Two small specimens were obtained, which we are unable certainly to identify at present.

Color, pale green, silvery below; fins, pale; no distinct markings. Eye large; mouth short, oblique, the lower jaw projecting. Scales, about 40. A, 8; teeth, 2, 4-4, 1. They belong, perhaps, to *Notropis boops*.

16. *Notropis rubrifrons*, Cope.

(*Alburnus rubrifrons*, Cope, Proc. Acad. Nat. Sci. Phila., 1865, 85.

Alburnellus percobromus, Cope, Hayden's Geol. Surv. Wyo., 1870, 440.)

Rather scarce, in the river channel.

These specimens and others obtained farther west appear to represent Cope's *percobromus*. We cannot, however, separate it from *N. rubrifrons*.

Color, light green in life, silvery below, with reddish lateral and vertebral streaks; head, reddish above; fins, pale; the base of dorsal red-

dish; upper lip dusky; scales little edged with darker; base of caudal a little dusky. Head, 4; depth, $5\frac{1}{2}$; scales, $6\frac{1}{2}$ -38-4.

17. *Phenacobius mirabilis*, Girard.

(*Exoglossum mirabile*, Girard, Proc. Ac. Nat. Sci. Phila., 1856, 191.

Sarcidium scopiferum, Cope, Hayden's Rept. Geol. Surv. Wyo., 1872, 440.

Phenacobius teretulus liosternus, Nelson, Bull. Ills. Lab. Nat. Hist., 1, 1876, 46.)

Rather scarce, in the river.

Very pale greenish, silvery below; a silvery lateral stripe, rather distinct; a conspicuous black spot at base of caudal, smaller than eye; fins, pale. Scales, 7-50-5; head, $4\frac{1}{3}$; depth, $4\frac{1}{2}$.

On comparing numerous specimens of *Phenacobius mirabilis* we find two types which we at first took for two distinct species or varieties, but which seem to intergrade fully. One of these (*mirabilis*) has the scales comparatively small and with their outlines blended, not emphasized by dark edgings. The following is the count of the scales: Des Moines River, 49, 50; Illinois River, 50; Fort Smith, Arkansas, 52. Other specimens (*scopifer*) from Illinois, Iowa, Missouri, Arkansas, Texas, &c., have scales larger, with dusky and therefore sharply defined edges; their numbers 43, 43, 44, 44, 44, 45, 45, 45 in eight specimens. There is no other tangible difference, and we refer all to *P. mirabilis*.

18. *Hybopsis storerianus*, Kirtland.

(*Rutilus storerianus*, Kirtland, Boston Journal Nat. Hist., 1, 71, 1842.

Hybopsis storerianus, Girard, Proc. Ac. Nat. Sci. Phila., 1856, 211.

Ceratichthys lucens, Jordan, Proc. U. S. Nat. Mus., 1879, 238, not

Hybopsis storerianus, Cope, *Leuciscus storerianus*, Günther, or *Cliola storeriana*, Jordan & Gilbert, which are *Notropis hudsonius amarus*.)

Very abundant in the current of the river; next to *N. whipplei*, the most common fish in the river.

The specimens called *Hybopsis storerianus* by Girard are still preserved in the National Museum. They belong to the species lately described as *Ceratichthys lucens*, and we are now convinced that this is the original *storerianus* of Dr. Kirtland. This species is far more widely distributed and abundant in the West than has been hitherto supposed.

Color in life, light olive above, bright silvery below; scales above with a few dark points along their edges; sides with a bright silvery band, above which is a green-stripe, which is visible in certain shades. Sides with faint golden and bluish shades. Fins pale, the caudal dusky at base, a little milky at tip.

Teeth usually 1, 4-4, 0, not 4-4. Barbel very conspicuous. Preorbital bone large, silvery.

19. *Hybopsis hyostomus*, Gilbert.

A few small specimens found in the river. These agree with Gilbert's original types of *Nocomis hyostomus*. The "black parasitic specks" mentioned by Professor Gilbert are found in all specimens of this species, and are apparently permanent color markings, rather than parasites.

20. *Hybopsis dissimilis*, Kirtland.

Rather rare in the river.

Light green above, irregularly speckled above with darker, some of the scales being wholly or partly dusky; more of these on back of tail; lower parts silvery; a faint plumbeous lateral shade; several dusky roundish blotches on sides of body, the one near base of caudal most distinct; some yellowish behind this and on snout; a blackish area behind nostrils; fins a little yellowish. Maxillary extending to below nostrils. Head, 4 in length; depth, $4\frac{2}{3}$. Scales, 6-12-5.

These specimens are paler in color than is usual in *H. dissimilis*, the body is less slender and the scales are larger. Similar specimens have been taken from White River, Indiana. Examination of a very large series shows some intergradation between these two forms which are probably not distinct species. The case seems to be parallel with that of *Phenacobius mirabilis*.

21. *Hybopsis biguttatus*, Kirtland.

One specimen taken in the river.

22. *Semotilus atromaculatus*, Mitchill.

A few specimens from Village Creek. Scales 60.

23. *Pomoxys annularis*, Rafinesque.

Young very common in the bayous.

24. *Lepomis humilis*, Girard.

Two small specimens.

25. *Lepomis cyanellus*, Rafinesque.

Common.

26. *Micropterus dolomiei*, Lacépède.

Common.

27. *Hadropterus evides*, Jordan and Copeland.

A few in the river channel.

These differ somewhat in coloration from specimens taken in White River, Indiana.

Light clear olive, shaded with light green; sides with rather faint broad green cross-bars about twice as wide as the interspaces, which are light orange, the color deepening to an orange spot on the middle line of the side, on each cross-bar. Some light orange on back of tail and on base of caudal. Cheeks pale, translucent. A distinct, oblique, light yellow [stripe] from below eye, upward and backward across temporal region. A curved green bar behind pectoral. Top of head and snout rusty orange. Lower parts and lower fins pale. Spinous dorsal entirely rusty red, its basal part mostly red, the outer orange; no black spot on dorsal. Soft dorsal and caudal translucent, the latter light orange at base.

Palatines with teeth. Nape scaly; breast naked; cheeks naked; oper-

cles scaly. Head, $3\frac{4}{5}$ in length; depth, $5\frac{1}{2}$. D. XI-12; A. II, 9. Scales, 9-65 to 67-11.

The scales are a little smaller than in Indiana specimens (lat. l. 63), but probably no permanent distinction exists.

28. *Hadropterus phoxocephalus*, Nelson.

Not abundant in the river channel. D. XII-13. Lat. l. 70.

29. *Boleosoma olmstedii maculatum*, Agassiz.

Common in Village Creek.

30. *Ammocrypta clara*, sp. nov.

Allied to *Ammocrypta pellucida*, but with the squamation much less perfect.

Head, $4\frac{1}{5}$; depth, 8. D. XI-10; A. I, 8. Lat. l. 69. Length, $2\frac{1}{4}$ inches. Body elongate, hyaline, subcylindrical, formed as in *A. pellucida*. Head formed as in *A. pellucida*, the snout a little more acute. Mouth sub-terminal, the upper jaw protractile, the maxillary extending nearly to front of eye, its length $4\frac{1}{2}$ in head. Teeth rudimentary, excessively minute, appreciable along the edge of the jaws only with the lens, none evident on vomer. Eye moderate, $4\frac{1}{2}$ in head, nearly as long as snout and more than double the width of the narrow, grooved, interorbital space. Cheeks and opercles with rather few thin scales imbedded in the skin. Opercular spine well developed. Gill membranes very little connected.

Body naked, except for a strip of scales along the lateral line, consisting of 5 or 6 series of small, imbedded, wide-set, ctenoid scales. On the caudal peduncle this band widens out, covering the whole depth of the tail.

Fins of moderate height, developed about as in *A. pellucida*. Ventrals slightly shorter than pectorals, which are a little shorter than head.

Color in life, translucent, yellowish on top of head. Some dark points on snout, middle of back, and tail; a few along lateral line. Traces of faint orange spots along sides, connected by a lateral streak. Two dark spots, one before the other at base of caudal. Fins all pale.

A few specimens taken in a sandy part of the river opposite Ottumwa. Specimens were also obtained in Red River at Fulton, Arkansas, and in the Sabine River at Longview, Texas.

B.—*Chariton River.*

The Chariton River at Chariton, Iowa, is a narrow, sluggish stream, with a muddy or sandy bottom, in summer reduced to a succession of greenish pools of dirty water.

1. *Noturus gyrinus*, Rafinesque.

Young specimens.

2. *Amiurus melas*, Rafinesque.
3. *Catostomus teres*, Mitchill.
4. *Pimephales promelas*, Rafinesque.

Adults brassy olive, the head blackish. Pectoral and caudal dull reddish. Dorsal with a large black spot on the anterior rays. Several young specimens ("Coliscus") also taken.

5. *Notropis deliciosus*, Girard.
Common.
6. *Notropis gilberti*, Jordan & Meek.
7. *Notropis lutrensis*, Baird & Girard.

(*Leuciscus lutrensis*, Baird & Girard, Proc. Acad. Nat. Sci. Phila., 1853, 391.
Moniana gibbosa, pulchella, couchi, rutila, and gracilis, Girard, l. c. 1856, 199-201.
Hypsilepis iris, Cope, Wheeler's Expl. W. 100th Mer. v, 653, 1876.
Moniana jugalis, Cope, Hayden's Geol. Surv. Wyo., 1-72, 439.
Cyprinella forbesi, Jordan, Bull. Ills. State Lab. Nat. Hist. ii, 57, 1878.)

We have examined the typical examples of all the nominal species above enumerated, as well as many other specimens from various streams between Illinois and Mexico. We are unable to point out any permanent distinctive characters whatever among them, and regard all as belonging to a single species. Considerable variation in form is shown in any large series. The types of *gibbosa* and *forbesi* being very deep (depth more than $\frac{1}{3}$ length), while other specimens (especially females) are more elongate (depth $\frac{2}{7}$ to $\frac{1}{4}$ length). Similar variations occur in *Notropis megalops*, *Notropis chipplei*, and other widely diffused species. Of the other species called by Girard "*Moniana*," *deliciosus*, *nitida*, and *proserpina*, seem to be valid species, of the "*stramineus*" type. *Aurata* is close to *lutrensis*, having the head heavier, the mouth more inferior. *Frigida* (= *leonina* and *complanata* probably—these two lost) has rather smaller scales (lat. l. 37) and the body more elongate. *Latabilis* and *formosa* we are unable to find. The latter is probably a distinct species.

In life, the male of *N. lutrensis* is olivaceous above; edges of scales light clear blue, this color especially distinct in a broad saddle at the nape, which extends downward to the pectoral; this bar of a clear vitriol blue. Behind this and parallel with it is a scarlet area. Opercle scarlet. Front of head crimson. Dorsal fin creamy, shaded with dusky. Other fins light clear blood-red. A slight dusky area at base of caudal. No black blotch on chin (in Iowa specimens; this usually present in Texas examples).

Females are light olive, the fins dull red. Immature examples are variously intermediate. Scales pretty constantly 6-34-3.

8. *Notropis rubrifrons*, Cope.

One male specimen. Silvery; upper part of head, sides of breast, base of dorsal, pectoral, and caudal, bright light brick red. Anal rays 9.

9. *Notropis megalops*, Rafinesque.
10. *Semotilus atromaculatus*, Mitchill.
11. *Lepomis cyanellus*, Rafinesque.
12. *Etheostoma iowæ*, sp. nov.

Three specimens. In life, light green, finely blotched with darker green; a dark-green blotch on opercle; a dark stripe below eye. Lower fins plain. Spinous dorsal shaded with light red, its edge darker red, almost black on the posterior edge. Soft dorsal and caudal barred with green speckles.

Head, $3\frac{5}{8}$; depth, $5\frac{1}{2}$. D. IX-11; A. II, 7. Scales, 5-59-9. Lateral line with tubes on 28 scales. Length, about 2 inches.

Body rather more elongate than in *E. jessiae* (= *asprigenis*, Forbes), the caudal peduncle rather long and slender. Head moderately acute, the snout a little decurved, its length about equal to that of the eye, which is 5 in head. Mouth small, nearly horizontal, the lower jaw included, the maxillary reaching to opposite front of eye, its length 4 in head. Teeth rather small. Preopercle entire. Opercular spine strong. Gill membranes scarcely connected. No black humeral scale. Checks, opercles, and nape closely scaled. Breast naked. Top of head without scales.

Scales smaller than in *E. jessiae*. Lateral line straight, ceasing near the middle of the body.

Fins all low, the spines slender. Dorsal fins well separated, caudal subtruncate. Pectorals $1\frac{1}{4}$ in head.

This species much resembles *E. jessiae*, and may prove to be identical with it. Numerous specimens of the latter from Illinois (typical of *P. asprigenis*) have been compared with the types of *E. iowæ*. *E. jessiae* is less elongate, with longer and higher fins, and we find but 47 to 50 scales in its lateral line. Otherwise, no difference of importance appears.

13. *Boleosoma olmstedii maculatum*, Agassiz.

Not uncommon.

C.—Hundred and Two River.

The two forks of the Hundred and Two River, near Bedford, Iowa, have the same character as the Chariton River, the bottom being still more muddy and the current equally sluggish. An abandoned stone quarry at Bedford has become filled with water from the river, and in this reservoir we obtained many specimens.

At Maryville, Missouri, the river is considerably larger than at Bedford, and has more current. The general character of the stream is, however, similar. Specimens were obtained at both these localities.

1. *Noturus flavus*, Rafinesque.
2. *Amiurus melas*, Rafinesque.

These specimens correspond exactly to the type of *Amiurus cragini*, Gilbert (Bull. Washburn Soc. Nat. Hist., 1883) and also to the type of

Amiurus obesus, Gill, also from Kansas. It differs from *A. nebulosus* in the much shorter pectoral spines, as well as in the shorter anal.

3. *Ictalurus punctatus*, Rafinesque.

4. *Ictiobus velifer*, Rafinesque.

5. *Catostomus teres*, Mitchill.

6. *Hybognathus nuchalis*, Agassiz.

A single dusky specimen, similar to that taken in the Des Moines.

7. *Pimephales promelas*, Rafinesque.

Many specimens taken in the quarry. They exhibit much variation in form and coloration, depending on age and sex. Some of them have the lateral line complete, thus corresponding to *Hyborhynchus nigellus*, Cope (♂), and *Hyborhynchus confertus*, Grd. (♀), while others have the tubes as little developed as usual in Eastern examples.

Most of the Kansas specimens of this species examined by us have the lateral line complete, or nearly so, while those from farther East have it always incomplete. The former possibly represent a tangible subspecies (*confertus*).

8. *Pimephales notatus*, Rafinesque.

9. *Notropis deliciosus*, Girard.

10. *Notropis topeka*, Gilbert.

(*Cliola topeka*, Gilbert, Bull. Washburn Soc. Nat. Hist., 1884.)

Our specimens are identical with Professor Gilbert's original types, with which they have been compared.

Males, in life, greenish, with bluish reflections and a bluish lateral stripe; a dark dorsal streak; scales above edged with darker. Snout, iris, cheeks, opercles, and sides flushed with red. Fins all bright crimson.

Female similar, the fins pale, a small blackish spot at base of caudal.

Teeth, 4-4; lat. l. 35; anal rays, 8; depth, 4 in length; eye, $3\frac{1}{2}$ in head; 18 scales before dorsal.

Numerous specimens taken in the quarry.

11. *Notropis lutrensis*, Baird & Girard.

Abundant.

12. *Notropis umbratilis*, Girard.

Alburnus umbratilis, Girard, Proc. Ac. Nat. Sci. Phila., 1856, 193. (♀).

Notropis nigripinnis, Gilbert, Bull. Washburn Soc. Nat. Hist., 1884.

Our specimens are identical with the original types of *N. umbratilis*, as we have ascertained by direct comparison.

The types of *N. nigripinnis* are larger in size than any of our specimens or any of Girard's. They are also deeper in body and with blacker fins.

As, however, we find the differences due to age and sex considerable in our specimens, we have no doubt of the identity of *nigripinnis* with

umbratilis. The species is a genuine *Lythrurus*, as stated by Gilbert, and is closely related to *N. ardens*, differing in coloration, in the more compressed form, and smaller eye.

Young male, in life steel-blue, smutty above with dark spots; a dark curved bar on scapular region. Top of head dusky, flushed with rosy. Caudal brick-red, with dark punctulations. Dorsal black, except at base mesially. No distinct black spot at its base in front. Pectorals, ventrals, and anal dusky, the anal tinged with rosy.

Females very pale, plain greenish, with dark punctulations above and at base of dorsal and anal. A dark dorsal streak; a black scapular bar, as in the male. Dorsal and anal pale, with dusky cross-shades; darker in larger specimens. Lat. l. 40 (44 in type of *umbratilis*).

Depth about $3\frac{2}{3}$ in length in females.

13. *Notropis megalops*, Rafinesque.

Common. The specimens taken here, as elsewhere in Iowa and Missouri, are very slender in form.

14. *Phenacobius mirabilis*, Girard.

15. *Hybopsis biguttatus*, Kirtland.

16. *Semotilus atromaculatus*, Mitchill.

17. *Lepomis humilis*, Girard.

Very abundant in the quarry.

In life, green above; belly more or less orange, its hue varying from golden to red. Opercular flap large, surrounded by a broad whitish margin. Posterior part of body and dorsal and caudal fins usually but not always with some dark-green spots. Some of these are always present on base of caudal. Some scattered spots of deep scarlet, about as large as pupil on sides of body; these usually very distinct. Opercle with larger (orange) spots. Three narrow orange stripes across cheeks. No blue on cheeks. Both dorsals broadly margined with orange. Caudal dusky, reddish on lower lobe only. Anal deep-orange or golden, darkest anteriorly. Ventrals a little paler; pectorals pale. One specimen had, in life, only deep olive-green spots, the belly and lower fins pale; no red or orange anywhere.

18. *Lepomis cyanellus*, Rafinesque.

19. *Boleosoma olmstedii maculatum*, Agassiz.

D. IX—13. Lat. l. 46.

D.—*Missouri River*.

The Missouri River at Saint Joseph, Missouri, is shallow, muddy, full of quicksands and snags, with a considerable current in places, the bottom in such cases being hard; in other places so charged with soft mud as to render it impossible to haul the seine. The seining done by us was on the Kansas shore, opposite the city. A few specimens were obtained from fishermen and a few others from a dirty slough.

1. *Lepidosteus osseus*, L.
2. *Leptops olivaris*, Rafinesque. Flat-head Cat.
3. *Amiurus melas*, Rafinesque.
4. *Amiurus natalis*, Rafinesque.
5. *Ictalurus punctatus*, Rafinesque.
6. *Ictalurus furcatus*, Rafinesque.
7. *Ictiobus cyprinella*, Cuv. & Val. Common Buffalo.
8. *Ictiobus urus*, Agassiz. Razor-back Buffalo.
9. *Ictiobus bubalus*, Rafinesque. Sucker-mouth Buffalo.

There appear to be three species represented among the Buffalo fishes taken at Saint Joseph, and these seem to correspond to the three species given in the Synopsis Fish. N. A. The whole group is much in need of thorough revision, but sufficient material does not yet exist in any collection. *I. bubalus* can generally be distinguished, but we cannot yet discriminate the young of *I. cyprinella* and *I. urus*, and more than three species may perhaps exist.

10. *Ictiobus carpio*, Rafinesque (35883).

A specimen 1 foot long is rather dusky in color. Head, $4\frac{3}{8}$ in length; depth, $3\frac{1}{10}$; the form, subfusiform; the back somewhat arched behind nape; anterior rays of dorsal about half length of the fin; eye about $4\frac{1}{2}$ in head; muzzle short, rather conic, somewhat projecting; D. 27; scales, 40-14; opercle, coarsely striate.

11. *Hybognathus nuchalis placita*, Girard.

We have compared our specimens with the original types of *Hybognathus placita* and can find no differences. The specimens look somewhat unlike the ordinary *nuchalis*, but no difference of importance seems to exist. The eye in *placita* is a little smaller than the average in *nuchalis*, the sides are more silvery, and the caudal peduncle possibly a little deeper.

12. *Notropis deliciosus*, Girard.

Described from Saint Joseph as *Hybopsis missuriensis*, Cope.

13. *Platygobio gracilis*, Richardson.

Abundant in the current of the river. *Platygobio pallidus*, Forbes, (Synopsis Fish. N. A., 220) is probably the young of this species.

14. *Hybopsis gelidus*, Girard.

Abundant in the river channel.

In life everywhere very pale, the sides silvery, without dark spots or punctulations, the lower lobe of the caudal blackish.

Head, 4 in length; depth, $5\frac{1}{2}$; Lat. l. 44; length, 2 inches.

Body slender, somewhat compressed. Head short, spongy in texture, its anterior profile bluntish, the thick snout overhanging the mouth. Mouth rather large, slightly oblique, the lower jaw included. Maxillary

not reaching front of eye, its length $2\frac{2}{3}$ in head. Barbel conspicuous, as long as eye. A raised rim above nostrils on each side, the space between them concave. Snout long, $2\frac{3}{5}$ in head. Eye very small, placed high, $4\frac{1}{2}$ in head. Interorbital space flattish, about as wide as eye.

Fins all very high, the pectorals somewhat filamentous, reaching past front of dorsal, a little longer than head. Dorsal elevated in front, its longest rays slightly longer than head, its insertion nearly over that of the long ventrals. Caudal long, very deeply forked, its lobes $3\frac{1}{4}$ in body.

This species is closely related to *H. hyostomus*, *H. æstivalis* (= *sterletus*), *H. montanus*, *H. labrosus*, and *H. zanemus*. These species form a group by themselves (perhaps worthy of generic distinction from *Hybopsis*), characterized by the great development of the maxillary barbel, and by their small size and feeble structure. All seem to abound chiefly in flowing water, especially in river channels.

15. *Dorosoma cepedianum*, Le Sueur.
16. *Hyodon alosoides*, Rafinesque.
17. *Micropterus salmoides*, Lacépède.
18. *Lepomis cyanellus*, Rafinesque.
19. *Lepomis pallidus*, Mitchill.
20. *Pomoxys annularis*, Rafinesque.
21. *Stizostedion canadense*, Smith.
22. *Aplodinotus grunniens*, Rafinesque.

E.—*Tabo Creek.*

Tabo Creek, about 6 miles east of Lexington, Missouri, is a small tributary of the Missouri River, rather swift and muddy. At the time of our visit its waters had risen on account of heavy rains, so that we got but few fishes. In the U. S. National Museum is a specimen (35758) of *Enneacanthus eriarchus* taken in this stream by Dr. P. R. Hoy.

1. *Amiurus melas*, Rafinesque.
2. *Ictalurus punctatus*, Rafinesque.
3. *Notropis deliciosus*, Girard.
4. *Notropis lutrensis*, Baird & Girard.
5. *Phenacobius mirabilis*, Girard.
6. *Semotilus atromaculatus*, Mitchill.
7. *Hyodon alosoides*, Rafinesque.
8. *Dorosoma cepedianum*, Le Sueur.
9. *Lepomis cyanellus*, Rafinesque.

F.—*La Mine River.*

Two tributaries of La Mine River were examined—Blackwater Creek at Brownsville, Saline County, Missouri, and Flat Creek, near Sedalia. The former is muddy and swift, and at the time was swollen by fresh-

ets. Flat Creek and its Spring Fork are clear and gravelly, being the only streams mentioned in this paper in which the bottom can be seen where the water is a foot in depth. Most of the specimens enumerated below are from Flat Creek :

1. *Noturus flavus*, Rafinesque.
2. *Amiurus melas*, Rafinesque.
3. *Ictiobus velifier*, Rafinesque. (*Carpiodes bison*, Agassiz).

Similar to specimens obtained later at Clinton. Scales, 48-14.

4. *Catostomus teres*, Mitchill.
5. *Moxostoma macrolepidotum duquesni*, Le Sueur.
6. *Campostoma anomalum*, Rafinesque.
7. *Pimephales notatus*, Rafinesque.
8. *Notropis lutrensis*, Baird & Girard.
9. *Notropis deliciosus*, Girard.
10. *Notropis umbratilis*, Girard.
11. *Notropis megalops*, Rafinesque. "Shiner."
12. *Notropis rubrifrons*, Cope.
13. *Notemigonus americanus chrysoleucus*, Mitchill.

Many specimens from a slough of Blackwater Creek. These are unusually slender in form, and in one of them the lateral line is developed only on the anterior half of the body. A. 12; Lat. 1. 54.

Comparison of numerous specimens of *Notemigonus americanus* and *chrysoleucus* leads us to consider them as geographical varieties of one species, the northern form (*chrysoleucus*) having fewer anal rays and the scales more crowded and less regular. The following is the count of numerous examples :

Americanus.

	Anal.	Scales.
Virginia	15	46
Columbia, S. C.	15	46
Columbia, S. C.	15	50
Columbia, S. C.	15	46
Columbia, S. C.	17	46
Columbia, S. C.	17	43
Georgia.....	15	44
Florida	17	44

Chrysoleucus.

Nova Scotia	13	51
Susquehanna River	12	47
Maryland.....	14	48
Michigan	12	48
Red River of the North.....	12	48
Illinois	13	51
Potomac River.....	14	48
Missouri	12	54
Missouri.....	13	49
Louisiana	13	46
Texas.....	13	49

14. *Phenacobius mirabilis*, Girard.
15. *Hybopsis biguttatus*, Kirtland. Blue Chub.
16. *Semotilus atromaculatus*, Rafinesque. Riffle Chub.
17. *Labidesthes sicculus*, Cope. Clear Tail.
18. *Micropterus salmoides*, Lac.
19. *Lepomis cyanelus*, Raf.
20. *Lepomis humilis*, Girard.
21. *Pomoxys annularis*, Raf.
22. *Boleosoma olmstedii maculatum*, Agassiz.
23. *Etheostoma variatum spectabile*, Agassiz.

This variety, abundant in the clear waters of Missouri, seems to differ from the typical *variatum* (= *cærulea*, Storer) only in the distinctness of the dark streaks which run along the series of scales along the sides of the back. No specimens having exactly this coloration have been observed east of Western Illinois, nor has the typical *variatum* been seen west of the Mississippi River.

24. *Aplodinotus grunniens*, Raf.

G.—Osage River.

Specimens were selected by us in Grand River, a large branch of the Osage River at Clinton, Missouri, a moderately clear stream, having some current, and at Tabo Creek at Calhoun, a similar stream, much smaller in size. In both the bottom is of clay, with some rock and gravel.

1. *Lepidosteus osseus*, L.
2. *Noturus flavus*, Rafinesque.
3. *Amiurus melas*, Rafinesque.
4. *Leptops olivaris*, Rafinesque.
5. *Ictalurus punctatus*, Rafinesque.
6. *Ictiobus velifer*, Rafinesque.

Specimens correspond apparently to the *Carpoides bison* of Agassiz. Head, $4\frac{1}{5}$ in length; depth, $2\frac{1}{2}$. Longest dorsal rays not extending quite to the end of the fin. Eye large, 4 in head. Dorsal rays, 24. Scales, 36-12. Opercle coarsely striate.

7. *Catostomus teres*, Mitchill.
8. *Campostoma anomalum*, Rafinesque.
9. *Pimephales notatus*, Rafinesque.
10. *Cliola vigilax*, Baird & Girard.
11. *Notropis deliciosus*, Girard.
12. *Notropis gilberti*, Jordan & Meek.
13. *Notropis dilectus*, Girard.

(*Alburnus dilectus*, Girard, Proc. Ac. Nat. Sci. Phila., 1856, 193.
Alburnus oligaspis, Cope, Proc. Ac. Nat. Sci. Phila., 1864, 282.)

The specimens from Grand River agree with others from Poteau River, and with the original types of Girard, which came also from the neighborhood of Fort Smith. *Alburnus oligaspis*, Cope, seems to be the young of the same species. Its anal rays are 11 instead of 14, as stated by Professor Cope.

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This species is related to *N. atherinoides* (= *rubellus*), but it appears to be distinct.

Color, pale greenish; sides, brightly silvery, a little rosy on the head and bases of the fins. Head shorter and less pointed than in *N. rubrifrons*, its length $4\frac{1}{2}$ in body. Eye large, longer than snout, 3 in head. Mouth oblique, smaller than in related species, the jaws subequal, the maxillary $3\frac{1}{2}$ in head, reaching front of eye.

14. *Notropis umbratilis*, Girard.
15. *Notropis megalops*, Rafinesque.
16. *Notropis lutrensis*, Baird & Girard.
17. *Phenacobius mirabilis* Girard.
18. *Hypopsis storerianus*, Kirtland.
19. *Semotilus atromaculatus*, Mitchill.
20. *Micropterus salmoides*, Lac.
21. *Dorosoma cepedianum*, Lac.
22. *Lepomis cyanellus*, Rafinesque.
23. *Lepomis humilis*, Girard.
24. *Hadropterus phoxocephalus*, Nelson.

Very abundant.

25. *Boleosoma olmstedii maculatum*, Agassiz.
26. *Etheostoma variatum spectabile*, Agassiz.

Abundant.

27. *Aplodinotus grunnius*, Rafinesque.

INDIANA UNIVERSITY, December 19, 1884.

— ON *CESTRELATA FISHERI* AND *CE. DEFILIPPIANA*.

By ROBERT RIDGWAY.

In the original description of *Ce. fisheri* (these "Proceedings," vol. 5, pp. 656-658), I tabulated for purpose of comparison what appeared to be the more striking differences between this species and *Ce. defilippiana*, Gigl. & Salvad., the diagnostic characters of the latter being derived from Mr. Salvin's description and colored plate in Rowley's "Ornithological Miscellany," part iv, p. 255, pl. xxxiii. The suggestion which I there made to the effect that "some of the differential characters adduced would (probably) not be found to hold good on actual examination of specimens" proves correct, as I am able to discover by having the opportunity of comparing specimens of the two species. The specimen of *Ce. defilippiana* now before me is a male, and is labeled in Jules Verreaux's handwriting. It belongs to the collection of the American Museum of Natural History in New York City, and agrees very closely with the description and plate cited above, except in some rather unimportant respects which will be alluded to further on. The locality