PROCEEDINGS

OF THE

UNITED STATES NATIONAL MUSEUM,

1886.

LIST OF FISHES COLLECTED IN ARKANSAS, INDIAN TERRITORY, AND TEXAS, IN SEPTEMBER, 1884, WITH NOTES AND DESCRIPTIONS.

By DAVID S. JORDAN and CHARLES H. GILBERT.

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 U. S. National Museum and the U. S. Fish Commission by the writers, assisted by Prof. Joseph Swain and by Mr. Seth E. Meek. The present paper is the second of the series intended to place on record the results of these explorations. The first of the series, enumerating the collections of Jordan & Meek in Iowa and Missouri, was published in these Proceedings for 1885, pp. 1–17.

In the present paper is the record of the collections made by the writers working together in the streams farther south. The streams examined were the White River (Arkansas), the Poteau River and other tributaries of the Arkansas, the Washita River and its large tributary, the Saline, the Red River, the Sabine River, the Trinity River, the Lampasas River, the Colorado River, the Rio San Marcos and the Rio Comal.

Most of the specimens were taken with a fine-meshed seine of large size. These specimens are now in the U. S. National Museum, with the exception of a series retained for the museums of the Indiana University and the University of Cincinnati.

A.—WHITE RIVER, NEAR EUREKA SPRINGS, ARKANSAS.

The northwestern part of Arkansas is an extremely broken and rocky region, although none of the hills are of any great height. The streams of this region are fed by numerous springs. The waters are very clear, and the bottoms are gravelly. The general character of the streams resembles that of parts of East Tennessee, and the fish fauna is remarkably similar to that of the Tennessee River.

Our collections were made in the White River, above the "Narrow and in a somewhat smaller but very similar stream called King's Riv at a point east of Eureka Springs. A few specimens were taken fr the brook which has its rise in the different springs at Eureka.

1. **Noturus miurus** Jordan.
2. **Ictalurus punctatus** Rafinesque.
3. **Moxostoma macrolepidotum** Le Sueur.
4. **Placopharynx carinatus** Cope.

   Not rare.

5. **Quassilabia lacera** Jordan & Brayton.

   Not rare.

6. **Campostoma anomalum** Rafinesque.
7. **Hybognathus nubila** Forbes (var.).

   (*Alburnops nubilus* Forbes; *Hybognathus meeki* Jordan & Gilbert, MSS. Catalogue Fish, N. A.; no descr.)

Common. Our specimens of this species differ from typical examp received from Professor Forbes (from Kishwaukee River at Belvide Ill.) in the greater slenderness of the body and in the much paler colo tion. We therefore took them at first for a distinct species, to which w given the MSS. name of *H. meeki*. A fuller comparison seems to lea no doubt of their identity with *H. nubila*.

Color light olivaceous above, sides with a plumbeous band overla by bright silvery; no caudal spot, and few dark punctulations on sid only traces of a dark band along sides of head. In life the male fi has all the fins except the ventrals washed with light red. A r shade on temporal region.

Head, $4\frac{1}{2}$ in length; depth, $4\frac{1}{2}$ to $4\frac{3}{4}$. Eye, 3 in head. Scales, 5–37– 12 scales before dorsal. Teeth, 4–4, with broad grinding surface, the t middle ones slightly but distinctly, [? hooked], as in so-called *Diond* Suborbitals extremely narrow. Snout short, not very blunt. Mou rather larger than in other *Diondæ*, the maxillary reaching to opposi posterior nostril, $3\frac{1}{2}$ in head. Pectorals, $1\frac{1}{5}$ in head.

This species was also obtained in different streams of Southweste Missouri.

8. **Pimephales notatus** Rafinesque.
9. **Notropis galacturus** Cope.

Very abundant; the commonest inhabitant of all the streams. Ste blue in life. Base of caudal milky; the fin otherwise dusky, no re Not evidently different from specimens from Tennessee.

10. **Notropis zonatus** Agassiz.

    (*Alburnus zonatus* Agassiz. Putnam Bull. Mus. Comp. Zool., 1, 9, 1863. Osa R.; not *Cliola zonata* Jor. & Gilb., Synopsis, 183, which is *N. piptole* Cope.)

Our specimens are all nearly plain, olivaceous above, with a more less distinct plumbeous lateral band from snout to base of caudal, n

ending in a dark spot. In a few this band is quite distinct, but in most, especially the larger examples, it is very obscure and overlaid by silvery. Fins pale, the caudal somewhat dusky, with a little pale at base. None of these specimens show the very distinct dusky lateral band and the bright crimson flush of the sides and lower parts shown in specimens taken a few days earlier by Gilbert & Meek in Niangua River, Missouri. In these the red shades were very brilliant. All the specimens, red and pale, however, evidently belong to the same species and correspond well to Agassiz's scanty description of *Alburnus zonatus*.* Allied to *N. coccogenis* Cope, but with much smaller mouth.

Body comparatively elongate, moderately compressed. Head rather long, not very acute, rather broad and flattish above. Snout shortish, $3\frac{1}{3}$ in head. Eye very large (subject to considerable variation in different specimens), about 3 in head.

Mouth oblique, the jaws equal, the maxillary not quite reaching front of eye, its length 3 in head.

Scales not especially crowded, little deeper than long anywhere, their edges indistinct along the flanks, not being marked by any special dusky shade. Pores of the lateral line without dark dots. Lateral line complete, considerably decurved. Scales before dorsal large, about 16 in number.

Insertion of dorsal behind that of ventrals, at a point midway between tip of snout and base of caudal fin. Vertical fins moderately high. Pectoral fins reaching nearly to ventrals, the latter not quite to vent.

Head, $4\frac{1}{4}$ in length; depth, $4\frac{1}{2}$ to $4\frac{3}{4}$. D. 8; A. 8 or 9. Scales, 6–39–4. Teeth, 2, 4–4, 2, hooked, with slight grinding surface. Length, 4 to 5 inches.

This species is found in the river channels with *N. galacturus*, and is equally abundant.

11. Notropis scabriceps Cope.

Our specimens agree well with Cope's description (Proc. Ac. Nat. Sci. Phila., 1867, 166), and also with the description given in our Synopsis.

Head, $3\frac{4}{5}$ in length; depth, $4\frac{4}{5}$. D. 8; A. 8 or 9. Scales about 6–36–3. Teeth, 2, 4–4, 2, with traces of grinding surface. Length of longest specimen, $2\frac{3}{5}$ inches.

Body comparatively robust, not strongly compressed, the back somewhat elevated. Head large, broad, and flattish above, the interorbital width about equal to length of eye. Snout short, $3\frac{1}{2}$ in head. Eye large, about 3. Mouth rather large, oblique, the jaws equal, the maxillary extending to opposite front of eye, 3 in head.

* "Brown upon the back; a silvery band from the nose across the eye to the caudal fin; beneath this a slightly broader dark band, which extends from the snout to the tip of the central rays of the caudal fin; silvery below the dark band. Head large and rounded. Average length of specimens 3 inches. Osage River. Mr. Stolley." (Agassiz MSS., Putnam Bull. M. C. Z., 1883, 1, 9.)

Scales large, with well-defined edges; about 13 before dorsal. Later line decurved.

Insertion of dorsal very slightly behind ventrals, slightly nearer t of snout than base of caudal. Dorsal fin rather high and pointe other fins moderate.

Color greenish, sides with a silvery shade, above some plumbeou Some dusky on sides of snout and on opercle. Dusky points along t pores of the lateral line, and forming an obscure blotch at base of ca dal. Fins plain, with some dusky at base. Scales above, with dusk edges, their outlines therefore well defined.

This species is common with the two preceding. It is not very d ferent from the young of *N. zonatus*. Compared with the latter, it seem to be rather more robust, with larger scales, the boundaries of whi are more easily traced. There are also some slight differences in colo We regard it, however, as without much doubt a distinct species.

12. Notropis megalops Rafinesque.

Common.

13. Notropis micropteryx Cope.

Very abundant. Identical with specimens from Tennessee.

Head, $4\frac{1}{2}$ in length; depth, $5\frac{1}{2}$. D. 8; A. 10. Scales 5–38–2. Tee 2, 4–4, 2. Length, $2\frac{1}{2}$ to $2\frac{3}{4}$ inches. Body very slender, elongate. He rather small, the snout pointed; mouth oblique, margin of upper lip level with the pupil, tip of maxillary reaching slightly past vertic from front of orbit, its length $3\frac{1}{4}$ in head; snout, $3\frac{3}{5}$ in head. Eye rath small, its diameter $3\frac{1}{2}$ in head; interorbital width about equal to leng of snout, slightly less than diameter of orbit. Pectorals short, $1\frac{1}{2}$ head, their tips reaching about $\frac{3}{5}$ distance to ventrals. Ventrals ve short, 2 in head, their tips reaching slightly more than $\frac{1}{2}$ distance anal. Dorsal fin situated far back, origin of its anterior ray midwa between anterior margin of opercle and base of caudal fin. Base dorsal, $2\frac{1}{2}$ in head; longest dorsal ray, $1\frac{3}{5}$ in head; base of anal, 2 in hea longest anal ray, $1\frac{3}{4}$ in head; 18 to 20 scales in front of dorsal. Colo olivaceous; sides, bright silvery; dorsal scales conspicuously dar edged; a dusky blotch at base of caudal underlying the silvery luste No red on specimens examined.

14. Hybopsis amblops Rafinesque.

Very common. Not evidently different from Indiana specimens.

15. Hybopsis dissimilis Kirtland.

Common. Lat. l. 49.

16. Hybopsis kentuckiensis Rafinesque.

(*Luxilus kentuckiensis* Raf. = *Semotilus biguttatus* Kirtland.)

17. Phoxinus neogæus Cope.

A single specimen, not agreeing very well with Cope's descriptio rather better with that of Jordan & Gilbert (Synopsis, 243), but pro

ably identical with the types of each. Only the original specimens of Cope, from Southern Michigan, and ours, from Baraboo River, Wisconsin, have been hitherto known.

Head, $4\frac{1}{5}$; depth, $4\frac{1}{2}$. D. 8; A. 8. Scales, 18–80–10. Length, $2\frac{1}{2}$ inches. Teeth, 2, 4–5, 2.

Body rather stout, little compressed. Head large, broad, with rounded outline; the snout blunt, 3 in head. Eye small, $3\frac{2}{5}$. Mouth rather small, terminal, oblique, the jaws about equal, the maxillary reaching front of eye, $2\frac{4}{5}$ in head.

Scales minute, covering the body evenly. Lateral line decurved, incomplete, its pores visible for about half length of body. Insertion of dorsal behind that of ventrals, at a point midway between nostril and base of caudal. Dorsal fin high, $1\frac{1}{5}$ in head. Pectorals rather long, $1\frac{1}{5}$ in head; other fins pointed.

Color everywhere pale; sides with a well-defined plumbeous lateral band overlaid by silvery; no caudal spot.

18. **Fundulus catenatus** Storer.

Very abundant; even more so than in the Tennessee Basin.

19. **Zygonectes notatus** Rafinesque.

Common.

20. **Labidesthes sicculus** Cope.

Common.

21. **Micropterus dolomiei** Lacépède.

Common.

22. **Lepomis megalotis** Rafinesque.

Common.

23. **Lepomis humilis** Girard.

Common.

24. **Percina caprodes** Rafinesque.

Common.

25. **Hadropterus evides** Jordan & Copeland. (36325.)

Common. These specimens agree with those taken by Jordan & Meek in the Des Moines River at Ottumwa. Lat. l. 64 or 65.

26. **Diplesion blennioides** Rafinesque. (36334.)

Common.

27. **Etheostoma cœruleum spectabile** Agassiz. (36329.)

Common.

28. **Etheostoma zonale arcansanum**, subsp. nov.

Scarce.

The specimens of *E. zonale* (Cope) obtained by us in the Ozark region differ from the typical form in having the breast nearly or quite naked.

The following specimens of this type are in the National Museum:
36249. Spring River (Neosho), Carthage, Mo.
36275. James Fork of White River, Marshfield, Mo.
36399. Poteau River, near Hackett City, Ark.
36410. Washita River, Arkadelphia, Ark.
36447. Saline River, Benton, Ark.

In other respects it is not materially different from the typical *zonale*.

29. **Uranidea richardsoni** Agassiz.

Common, especially about springs in cool water.

B.—TRIBUTARIES OF ARKANSAS RIVER IN THE VICINITY OF FOR SMITH.

Our collections in this region were made in the Poteau River at Sla Ford, Indian Territory, some distance west of the village of Hacke City; in the James Fork of the Poteau, a smaller stream flowing into t Poteau from the west; in the Arkansas River opposite Fort Smit and in Lee's Creek, above the town of Van Buren.

The Poteau River is a rather muddy stream, flowing over shaly rock and at the time we were there its waters were very low on account dry weather. Lee's Creek is a similar stream, but smaller, with clear waters, made up of a succession of pools, often muddy on the botto alternating with stony shoals.

The Arkansas River is there, as elsewhere, very muddy and re Fishes are scarce in that part of the river shallow enough for our ne to be used.

The other streams mentioned are comparatively rich in species. U less otherwise specified, all the species below were found both in t Poteau and in Lee's Creek.

1. **Lepidosteus osseus** Linnæus.

2. **Lepidosteus tristœchus** Bloch & Schneider.

A large skin seen.

3. **Noturus miurus** Jordan.

4. **Noturus nocturnus**, sp. nov.

Abundant in flowing water in the Poteau River.

Head, $3\frac{2}{3}$ in length; depth, $5\frac{2}{3}$; width of head, $4\frac{2}{5}$. D. I, 6; A. 15 16. Length, 2 to 3 inches.

Body moderately robust, slenderer than in *N. gyrinus*, but more r bust than in *N. flavus* or *N. insignis*. Head not very large, little d pressed, rounded above. Eyes small, $2\frac{1}{2}$ in interorbital width, 5 to in head. Lower jaw included. Band of premaxillary teeth not pr longed backward. Barbels shortish, the maxillary barbel scarce reaching gill-opening. Origin of dorsal fin a little nearer front of ad pose fin than snout, its spine $2\frac{2}{5}$ in head. Pectoral spine short, 2

head, its inner margin with short sharp teeth on the basal half, its outer margin nearly entire, with a few points near its tip. Adipose fin rather high, its edge continuous with that of the caudal, with no evident notch between. Anal fin rather long and high, its base $4\frac{1}{5}$ in body, its longest ray $1\frac{3}{5}$ in head.

Color uniform dark brown, without bars or markings, the body and fins being densely covered with dark points, visible under the lens; fins all dusky, with narrow pale margins.

This species is nearest to *N. leptacanthus* among those now known. It differs from that species in the stronger spines and in the more robust form.

It was also obtained by us in the Washita and Saline Rivers. The best specimens obtained (36461, U. S. N. M.) were from the Saline, at Benton.

5. **Noturus flavus** Rafinesque.

6. **Leptops olivaris** Rafinesque.

Arkansas River.

7. **Amiurus natalis** Le Sueur.

8. **Ictalurus punctatus** Rafinesque.

Very common, especially in the Arkansas.

9. **Ictiobus velifer** Rafinesque.

10. **Catostomus nigricans** Le Sueur.

11. **Moxostoma macrolepidotum** Le Sueur.

12. **Placopharynx carinatus** Cope.

13. **Campostoma anomalum** Rafinesque.

14. **Hybognathus nuchalis** Girard.

15. **Pimephales notatus** Rafinesque.

Scarce.

16. **Cliola vigilax** Baird & Girard.

Scarce.

17. **Notropis scabriceps** Cope.

Poteau River; rather scarce. Specimens apparently identical with those taken in White River, except that they are much more silvery than the latter and almost destitute of dark points on the scales except at base of caudal.

18. **Notropis illecebrosus** Girard.

Identical with Girard's types. Coloration very pale and silvery.

19. **Notropis dilectus** Girard.

Very abundant.

20. **Notropis umbratilis** Girard.

Not rare; originally described from tributaries of the Poteau.

21. **Notropis lutrensis** Baird & Girard.

Abundant in the Poteau; described from Sugar Loaf Creek, a tribu tary of the Poteau, under the name of *Moniana pulchella.*

22. **Notropis whipplei** Girard.
(*Cyprinella analostana* Girard.)

Common. Our Arkansas specimens are all slender as compared wit the ordinary Eastern *analostana*, but we detect no other difference. Th species was first described from Sugar Loaf Creek.

23. **Phenacobius mirabilis** Girard.

Common. Originally described from Fort Smith. Scales 47 to 5

24. **Hybopsis storerianus** Kirtland.
(*Ceratichthys lucens* Jordan.)

Common.

25. **Hybopsis amblops** Rafinesque.
(? *Gobio vernalis* Girard.)

26. **Hybopsis æstivalis** Girard.

Abundant in the Arkansas River; not found in the smaller stream

Color very pale olivaceous-silvery, sparsely and irregularly covere with small black dots as in *H. hyostomus*, &c. Fins plain.

Head, $3\frac{3}{4}$ in length; depth, $5\frac{1}{3}$. D. 8; A. 8. Teeth, 4–4. Scale 6–36–4. Length, $2\frac{1}{2}$ inches.

Body slender, with long and slender caudal peduncle, the bac scarcely elevated. Head long and low, the snout rather pointed, an projecting much beyond the mouth. Mouth small, inferior, the maxillar extending to opposite the large posterior nostril. Barbel very conspi uous, as long as snout, $2\frac{3}{4}$ in head. Eye comparatively small, 4 to 4 in head. Fins all high, the caudal deeply forked, its lobes subequa Pectorals reaching ventrals. Insertion of dorsal over that of ventral nearer snout than base of caudal.

On comparison of our specimens with the types of *Ceratichthys ste letus* Cope, we find no difference.

27. **Dorosoma cepedianum** Le Sueur.

28. **Zygonectes notatus** Rafinesque.

Common.

29. **Gambusia patruelis** Baird & Girard.

In Lee's Creek.

30. **Labidesthes sicculus** Cope.

31. **Stizostedion canadense** H. Smith.

Coloration very dark.

32. **Stizostedion vitreum** Mitchill.

One specimen in Lee's Creek.

33. **Percina caprodes** Rafinesque. (36388.)

Common.

34. **Ammocrypta vivax** Hay. (36361, 36385.)

Very abundant.

This species differs from *A. pellucida* in a feature of coloration. There is a blackish bar constantly across the base of the soft dorsal, and usually a fainter one across the base of the caudal. The scales are firmer and rougher in *A. vivax* than in *A. pellucida*, and the nape before the dorsal is more or less closely scaled, while in *A. pellucida* this is naked. Perhaps the two species may be found to vary into each other.

D. XI, 10. Lat. l. about 75.

35. **Hadropterus phoxocephalus** Nelson. (36387.)

Not very common.

36. **Hadropterus aspro** Cope & Jordan. (36354, 36403.)

Not rare; coloration very pale.

37. **Boleosoma camurum** Forbes. (36402.)

One specimen taken in Poteau River.

38. **Ulocentra histrio** Jordan & Gilbert. (36386.)

Abundant in swift places in the Poteau River.

39. **Cottogaster shumardi** Girard.

Not very common; the only Darter taken in the Arkansas River. No bright colors in life.

40. **Cottogaster copelandi** Jordan. (36360, 36404.)

Abundant. This is the first notice of this species other than in the original locality, White River, at Indianapolis.

No bright colors in life. A dusky bar across spinous dorsal, but no distinct spot. D. XI, 11; A. II, 8. Lat. l. 57 to 59. Arkansas specimens have the cheeks usually more or less scaly, as is also the nape.

41. **Diplesion blennioides** Rafinesque. (36392.)

Lee's Creek.

42. **Etheostoma whipplei** Girard. (36353, 36377.)

(*Pœcilichthys punctulatus* Jordan & Gilbert, Synopsis 516; not *P. punctulatus* Agassiz.)

Very abundant; the commonest of the Darters, living in the small streams. Adults with many bright orange spots on the body, arranged somewhat in vertical rows; young usually, but not always, with orange. Vertical fins largely blue-black, especially in the males.

We have found Girard's type of *Boleichthys whipplei* a young female of this species. The *punctulatus* of Agassiz is a different fish, never fully described, and not seen since Agassiz's time until lately taken by Gilbert & Meek in tributaries of the Osage.

43. **Etheostoma fusiforme** Girard. (36400.)

A few small specimens without bright colors, agreeing closely with the types of *Pœcilichthys palustris* Gilbert, a species which we are now

unable to separate from *E. barratti* and *E. fusiforme*. The types of *Boleichthys gracilis* are identical with the *P. palustris*.

44. Micropterus salmoides Lacépède.

Very abundant.

45. Lepomis cyanellus Rafinesque.

Poteau River.

46. Lepomis humilis Girard.

Poteau River.

47. Lepomis megalotis Rafinesque.

Common. Coloration very green, with blue spots and with little red fins with little orange; opercular flap long, with broad edgings.

48. Lepomis pallidus Mitchill.

Common.

49. Pomoxys annularis Rafinesque.

Poteau River.

50. Aplodinotus grunniens Rafinesque.

Common.

C.—WASHITA RIVER AT ARKADELPHIA AND SALINE RIVER AT BEN TON, ARKANSAS.

The Washita River and its large tributary, the Saline, are very clear streams, flowing down from the Ozark Mountains. At the localities examined both are moderately rapid, forming alternations of ripples and deep quiet pools. In both the bottom is chiefly made up of fine gravel. The Caddo River, another tributary of the Washita, is a swift, cold stream, with the bottom largely rocky. In this few species were found. The Washita was examined by us about one-half a mile above Arkadelphia. We found this a better locality for collecting fishes than any other mentioned in this paper. The Etheostomoids were especially abundant, a greater number being found here than in any other locality thus far recorded in the United States. The Saline River was examined near Benton, at a point just above the railroad bridge. This locality is also a most excellent collecting ground. Although the stream is much smaller than the Washita, the number of species obtained is scarcely less than was taken at Arkadelphia. Unless otherwise stated all the species noted below were found both in the Washita and the Saline.

1. Ictalurus punctatus Rafinesque.

2. Noturus nocturnus Jordan & Gilbert

Abundant in shallow rapids.

3. Noturus miurus Jordan.

4. Ictiobus velifer Rafinesque.

Color very brassy in life; lower fins pink.

5. **Catostomus nigricans** Le Sueur.

6. **Moxostoma macrolepidotum** Le Sueur.

7. **Placopharynx carinatus** Cope.

Abundant.

A large, coarse Sucker, externally identical with the species of *Moxostoma*, from which genus it differs only in the remarkable development of the lower pharyngeals and their teeth. The coloration is much deeper than in most species of *Moxostoma*, the back dark olive-green, the sides brassy, without silvery luster; the caudal fin deep red. The dusky coloration persists even in alcohol.

Head about 4 in length; depth, $3\frac{4}{5}$. D. 12; A. 7. Scales, 6–45–5. Longest rays of dorsal longer than base of fin, $1\frac{1}{5}$ in head. Head rather broad and flattish above, its upper surface somewhat uneven. Upper lobe of caudal narrower than lower, and more or less longer.

8. **Campostoma anomalum** Rafinesque.

9. **Hybognathus nuchalis** Agassiz.

Very abundant in the Saline, where it is the commonest of all the Minnows.

10. **Pimephales notatus** Rafinesque.

Common. Numerous young specimens from the Saline are very slender, but seem to show no tangible points of distinction.

11. **Notropis whipplei** Girard.

Very abundant. These specimens are all rather more slender than the Eastern *analostanus* of the same size, but we find no other differences.

12. **Notropis umbratilis** Girard.

13. **Notropis scabriceps** Cope.

Abundant in the swift current, especially in the colder waters of the Caddo River.

14. **Notropis dilectus** Girard.

Very abundant.

A little fish very abundant in the Saline River; was at first taken by us for a distinct species, and referred to under the manuscript name of *Notropis ionthas*.

Renewed comparison leaves little doubt that this is the young of *Notropis dilectus*. The body in these young fishes is profusely sprinkled with black dots, as in *Hybopsis æstivalis*.

15. **Hybopsis dissimilis** Kirtland.

Common.

16. **Clupea chrysochloris** Rafinesque.

17. **Dorosoma cepedianum** Le Sueur.

18. **Hyodon tergisus** Le Sueur.

19. **Gambusia patruelis** Baird & Girard.

Abundant in the springs tributary to Caddo River.

20. Zygonectes notatus Rafinesque.

21. Fundulus catenatus Storer.

22. Esox vermiculatus Le Sueur.

In ponds and cut-offs tributary to the Saline.

23. Labidesthes sicculus Cope.

24. Roccus chrysops Rafinesque.

25. Micropterus salmoides Lacépède.

26. Micropterus dolomiei Lacépède.

The two species of Black Bass are about equally abundant in th Washita and Saline.

27. Lepomis cyanellus Rafinesque.

28. Lepomis humilis Girard.

29. Lepomis megalotis Rafinesque.

30. Lepomis pallidus Mitchill.

31. Ammocrypta vivax Hay. (36414, 36444.)

32. Crystallaria asprella Jordan. (36412.)

Three specimens taken in the Washita River, the largest about inches in length.

This species differs quite strongly from the *Ammocryptæ* in havin the premaxillaries non-protractile, in the much greater development the vertical fins, and in the less hyaline structure of the body, whic is also more closely and firmly scaled. In all these regards it represent a transition from *Ammocrypta* toward *Hadropterus*.

The description in our Synopsis Fish. N. A., p. 490, is badly vitiate by the count of the fin-rays having been taken from a young exampl supposed to be the same as the type, but really belonging to *Ammocrypt vivax*. D. XIV, 13; A. I, 12. Scales, 7–83–x. The statement made b Mr. Worthen, the original discoverer of the species, that in life it "pre sents all the colors of the rainbow," is erroneous. The life coloratio is substantially as described in the Synopsis, there being no red or blu markings.

33. Boleosoma camurum Forbes. (36420, 36441.)

Abundant in the small pools and cut-offs.

34. Cottogaster copelandi Jordan. (36416, 36471.)

Very abundant.

35. Cottogaster uranidea Jordan & Gilbert. (36413.)

Five or six specimens taken in shallow rapid water in the Washita

36. Etheostoma histrio Jordan & Gilbert. (36409, 36448.)

Not rare in the current. The frenum of the upper jaw in this specie is very narrow, so that the premaxillaries are almost protractile. Th skull is narrow and high across the parietal region, as in *E. cæruleum*

37. Diplesion blennioides Rafinesque. (36418, 36469.)

Abundant.

38. Hadropterus aspro Cope & Jordan. (36422.)

One specimen taken in Saline River.

39. Hadropterus ouachitæ Jordan & Gilbert. (36449.)

Several specimens from Saline River.

40. Hadropterus scierus Swain. (36411.)

Abundant. These specimens agree well with the original types from the streams about Bloomington, Ind. It is remarkable that these three species (*Hadropterus scierus*, *Hadropterus evides*, *Cottogaster copelandi*), hitherto known from a few localities in Central Indiana only, should prove to be characteristic of the Ozark region.

41. Percina caprodes Rafinesque. (36417.)

42. Etheostoma cœruleum spectabile Storer. (36445.)

43. Etheostoma whipplei Girard. (36419, 36442.)

Specimens from the Washita, supposed to be of the same species, lack the red spots.

44. Etheostoma saxatile Hay.

A few from the Saline.

45. Etheostoma zonale arcansanum Jordan & Gilbert.

Not rare.

46. Etheostoma fusiforme Girard. (36415, 36470.)

Abundant in the muddy pools along the Washita and Saline. The specimens are similar to the type of *P. palustris* Gilbert.

47. Alvarius fonticola Jordan & Gilbert. (36607.)

One specimen from the Washita.

D.—RED RIVER AT FULTON, ARKANSAS.

The Red River at Fulton, Ark., flows with a moderate current over a bed of fine reddish sand and mud or silt. It is subject to great variations in level, according to the rain-fall, being in the winter and spring a torrent of muddy water, overflowing its banks, and in summer and autumn clear and reduced to 2 or 3 rods in width and 5 to 7 feet in depth in the channel. Along its shores are numerous "lakes," ponds of shallow muddy water in the forests, fed by the spring overflow, and drying up gradually in the summer.

At the time of our visit (September) the water was near its lowest point, and everything was favorable for collections. The stream is, however, singularly barren of fish-life, and although it was as carefully and fully seined as the Washita, we found barely half as many species as in the latter stream. The character of the bottom of the Red River is evidently unfavorable for fishes.

1. Scaphirhynchops platyrhynchus Rafinesque.

2. Lepidosteus osseus Linnæus.

3. Ictalurus punctatus Rafinesque.

4. Leptops olivaris Rafinesque.

Locally known as "Russian Cat."

5. Ictiobus bubalus Rafinesque.
(*Bubalichthys bubalus* Agassiz.)

6. Ictiobus velifer Rafinesque.

7. Hybognathus nuchalis Agassiz.

Very abundant; by far more numerous in individuals than any oth species in the river. None of the specimens are as large as those tak in the Saline River, but we can find no specific distinction betwe them.

8. Hybopsis storerianus Kirtland.

Rather common.

9. Hybopsis æstivalis Girard.

Abundant in the current.

10. Notropis dilectus Girard.

Abundant; some of the specimens are much more slender than othe but all seem to belong to the same species.

11. Notiopis venustus Girard.
(*Cyprinella venusta* Girard. *Cyprinella cercostigma* Cope = *Luxilus chicka vensis* Hay = *Cliola urostigma* Jordan & Meek.)

A few small specimens obtained of this species so characteristic the rivers of Texas. Although some of Girard's types, as the one e amined by Meek (see Proc. U. S. Nat. Mus., 1885, 124), may belong some other species, yet his figure represents this species so well that am compelled to regard this as the original *venusta*.

12. Clupea chrysochloris Rafinesque.

13. Dorosoma cepedianum Le Sueur.

14. Hyodon alosoides Rafinesque.

15. Gambusia patruelis Baird & Girard.

16. Zygonectes notatus Rafinesque.

17. Micropterus salmoides Lacépède.

18. Lepomis pallidus Mitchill.

19. Pomoxys sparoides Lacépède.

20. Cottogaster shumardi Girard. (36338.)

One specimen.

21. Ammocrypta clara Jordan & Meek. (36337.)

Three specimens.

22. Roccus chrysops Rafinesque. "Rock Bass."

23. Aplodinotus grunniens Rafinesque.

E.—SABINE RIVER AT LONGVIEW, TEXAS.

The Sabine River, 5 miles south of Longview, Tex., is, in midsummer, a small, rather clear stream, flowing with little current over a bottom of fine gravel, mud, and sand.

It is a better stream for fishes than the Red River, but, as it almost dries up in the summer, the larger species do not thrive in it.

1. **Noturus nocturnus** Jordan & Gilbert.

2. **Moxostoma pœcilurum** Jordan.

Young specimens, the caudal fin having precisely the same bright coloration as the original types.

3. **Hybognathus nuchalis** Agassiz.

Abundant.

4. **Cliola vigilax** Baird & Girard.

5. **Notropis dilectus** Girard.

A row of dark points above the base of the anal fin exists in this species, and may prove a convenient diagnostic mark.

6. **Notropis lutrensis** Baird & Girard.

Common.

7. **Notropis venustus** Girard.

Common.

8. **Notropis sabinæ**, sp. nov. (36484.)

Head, $3\frac{4}{5}$ in length; depth, $4\frac{2}{3}$. D. 8; A. 7. Scales, 4–33–2. Teeth, 4–4, hooked, with some grinding surface. Length, about 2 inches.

Allied to *Notropis deliciosus*, but notably different in form, the outline of the body resembling that of a young Red Horse (*Moxostoma*). Body moderately compressed, the caudal peduncle long and thick, the back distinctly elevated, the profile from the tip of the snout to the front of the dorsal forming a nearly regular curve. Back rather broad above, its edge little compressed. Head rather long, broad and flattish above. Interorbital width $2\frac{2}{3}$ in length of head. Snout $3\frac{2}{5}$ in head. Eye small, $3\frac{2}{5}$. Mouth rather large, nearly horizontal, the lower jaw a little shorter than the upper, the maxillary reaching to a little past front of pupil, $2\frac{1}{2}$ in head.

Scales very large, those on the back not reduced in size, 14 before dorsal. Lateral line not strongly decurved.

Insertion of dorsal fin slightly nearer tip of snout than base of caudal, nearly over insertion of ventrals. Dorsal fin rather short and small; anal fin small; pectoral fins comparatively long, about reaching ventrals; their length $1\frac{1}{4}$ in head.

Color very pale, scarcely silvery; margins of scales on back and sides with dark points, so that their edges are distinctly traceable; fins pale.

9. **Phenacobius mirabilis** Girard.

Lat. l. 48.

10. Gambusia patruelis Baird & Girard.

11. Zygonectes notatus Rafinesque.

12. Micropterus salmoides Lacépède.

13. Lepomis humilis Girard.

14. Ammocrypta clara Jordan & Meek. (36488.)

Abundant.

15. Ammocrypta vivax Hay. (36487.)

Rather common.

16. Hadropterus scierus Swain, var. *serrula*, var. nov. (36481.)

Abundant. The Texas specimens of this species differ somewha from those examined from Indiana and Arkansas, and may be taken a a distinct variety (*serrula*). The scales are somewhat smaller in va *serrula* (lat. l. 68 to 71 in *serrula;* 64 to 66 in most Indiana examples The coloration in *serrula* is paler, with more sharply-defined marking the black blotches on the side being less confluent, and the sides of th belly without dark clouds.

In the Texas specimens the breast is naked, while in most Indian examples it is more or less scaly. The preopercle is very weakly, bu generally distinctly, serrulate.

In very old specimens from Indiana these serrations disappear.

17. Etheostoma jessiæ Jordan & Brayton. (36482.)

(*Pœcilichthys jessiæ* Jordan & Brayton=*Pœcilichthys asprigenis* Forbes=*P cilichthys swaini* Jordan.)

Several specimens, all less than 2 inches long. In life these wer dark olivaceous, with cross blotches or bars of dark greenish; bod everywhere above and below covered with dark dots. Dorsals an caudal with dark cross streaks, the spinous dorsal with an orange-re bar across it near the edge. Three dark spots at base of caudal, th median one most distinct. The usual dark markings about eye. N dark humeral spot. Lower fins dusky.

Scales 5–48–7, their outlines distinct from the dark edgings. Breas naked; nape scantily scaled or partly naked. Opercles well scaled Cheeks nearly naked; a few small scales above. Lateral line extend ing about to middle of caudal peduncle.

These specimens differ a little from typical examples of *E. asprigen* (=*P. jessiæ* Jordan & Brayton), but these differences seem to b within the range of individual variation in this variable species.

F.—TRINITY RIVER, AT DALLAS, TEXAS.

The Trinity River at Dallas, Tex., is in midsummer a very small strea of muddy-gray water running with a sluggish current over dirty grave and mud. The conditions are unfavorable to fish-life, and very fe species were taken, although the locality was very thoroughly exam

ined. A few specimens were taken from a spring brook north of the city.

1. **Noturus nocturnus** Jordan & Gilbert.

2. **Leptops olivaris** Rafinesque.

3. **Campostoma anomalum** Rafinesque.

4. **Hybognathus nuchalis** Agassiz.

5. **Cliola vigilax** Baird & Girard.

6. **Phenacobius mirabilis** Girard.

7. **Notropis lutrensis** Baird & Girard.

Abundant.

8. **Notropis texanus** Girard.

A few specimens of a small Minnow of the *deliciosus* type, which we are compelled to believe identical with the *Cyprinella texana* of Girard.

Body more slender than in Girard's figure (perhaps deeper with age), the depth about 4½ in length. Head about 4. D. 8; A. 8. Scales about 5–35–4; 15 scales before dorsal. Eye 3 in head, a trifle longer than snout. Maxillary 3 in head, about reaching front of eye. Mouth nearly horizontal, the lower jaw little longer than upper. Lateral line nearly straight; fins moderate.

Color silvery, the scales above dark-edged; scales of lateral line with dark points; a small jet-black spot at base of caudal a little larger than pupil; a row of dark points along base of anal.

Compare with Meek's description of the type of *Cyprinella texana* (Proc. U. S. Nat. Mus., 1885, 124).

9. **Zygonectes notatus** Rafinesque.

10. **Gambusia patruelis** Baird & Girard.

11. **Lepomis pallidus** Mitchill.

12. **Hadropterus scierus serrula** Jordan & Gilbert. (36476.)

Rather abundant in flowing water in the river.

13. **Etheostoma fusiforme** Girard. (36541.)

Abundant in the spring outlet.

G.—RIO LAMPASAS, AT BELTON, TEXAS.

The Rio Lampasas, at a point some 5 miles south of Belton, Tex., is a clear, swift stream, fed by limestone springs, and with a gravelly or somewhat rocky bottom, the swift ripples alternating with deep quiet areas, in which the water reaches a depth of 6 or 7 feet. At the locality examined, just below the bridge on the toll-road, everything is favorable for seining, and our list, although short, is probably nearly complete for the locality. A large spring flows into the river at this point, and in the spring and its outlet we found all our specimens of *Etheostoma* and *Gambusia*.

The Rio Leon, at a point about 3 miles north of Belton, just ab the upper railroad bridge, is a smaller stream than the Lampasas, flows very shallow in a broad, rocky bed. Its waters are not very cl and wherever the current is slackened the bottom is covered with mud. The locality is not a very good one, and nothing was fou that was not taken also in the Lampasas, into which the Leon flo a few miles lower down.

1. **Lepidosteus osseus** L.

The Gar Pikes obtained in the Lampasas have the round spots the sides of the jaws and the dark suborbital bar much more disti than in any other specimens we have seen. The eye is also unusua large. An examination of a considerable series of Gars shows that these as in various other respects the species are extremely varial and little weight can be attached to these differences.

2. **Ictalurus punctatus** Rafinesque.

3. **Leptops olivaris** Rafinesque.

Rather common.

4. **Noturus nocturnus** Jordan & Gilbert.

Scarce.

5. **Moxostoma congestum** Baird & Girard.
(*Ptychostomus albidus* Girard.)

Abundant in the Lampasas River in deep water, and reaching a c siderable size. A description of specimens from Belton is given in J dan's Cat. Fish. N. A. 1885, 19. It differs from *M. aureolum* chiefly the size of the dorsal fin, which is low and small, with but 12 rays. D sal always dusky; none of the fins red in life.

6. **Ictiobus velifer** Rafinesque, var.
(*Carpiodes tumidus* Baird & Girard.)

Our specimens agree very well with the figure given by Girard in Report of the Mexican Boundary Survey. Compared with a specim of what I call *Ictiobus velifer*, of nearly the same size, taken in White River, at Gosport, Ind., we find the following differences:

The general outline in the two is similar, but the Texas specimen less compressed, more robust in appearance, darker and more brassy color, with rather larger and coarser scales. The depth in both is o third the length. The head is 4 in length in the Texas specimen, $3\frac{2}{3}$ the other. The eye in both is 4 in head in specimens of 8 inches, a in both cases the snout projects not far beyond the mouth. The op cles in the Texas examples are strongly and sharply striate, as shown Girard's figure, while in the other the striations, similar in number a position, are very inconspicuous. In both, the long rays of the dor reach about to the base of the fourth ray from the last. In the Tex examples the anterior rays are much stouter than in the Indiana fi The scales in the Texas example are 6–37–5, in the other 7–40–6. are without doubt referable to a single species.

7. **Campostoma anomalum** Rafinesque.

8. **Cliola vigilax** Baird & Girard.

9. **Notropis lutrensis** Baird & Girard.

10. **Notropis venustus** Girard.

Very abundant. Males with the fins bright orange-yellow in life; the tips milky. Back steel-blue.

11. **Notropis deliciosus** Girard.

Identical with specimens taken in the Rio Comal, but a little paler than the latter.

12. **Notropis texanus** Girard.

A single specimen, identical with those from the Trinity already mentioned.

13. **Gambusia patruelis** Baird & Girard, var.

Suborbital bar scarcely visible; otherwise essentially as in the Eastern form (*patruelis*).

14. **Zygonectes notatus** Rafinesque.

15. **Micropterus salmoides** Lacépède.

16. **Lepomis cyanellus** Rafinesque.

17. **Lepomis megalotis** Rafinesque.

Coloration peculiar; young, in life, light green, with light bronze streaks along the rows of scales, alternating with grayish-blue. Opercular flap with broad pale edging.

18. **Chænobryttus gulosus** Cuv. & Val.

In Leon River. (36546.)

19. **Hadropterus scierus** Swain (*serrula*).

Common in the river.

20. **Etheostoma lepidum** Baird & Girard. (36547.)

Abundant in the springs and their outlets.

General form and appearance of *E. cœruleum*. Olivaceous above; male with broad cross-bars, broader and less oblique than in *E. cœruleum*, of a bluish-green color, and separated by bright orange interspaces. First dorsal bluish on edge, then pale, then a stripe of bright orange, then dusky and yellowish at base. Soft dorsal speckled, with a diffuse median band of orange. Breast and throat orange; anal pale; ventrals bluish; caudal speckled, with some yellowish.

This species is extremely close to *E. cœruleum*, with which, through var. *spectabile*, it may prove to be connected by intermediate forms. In details of form there is no appreciable difference between the two. In *E. lepidum*, the head is, however, entirely scaleless, and the bars on the sides are greener in color, broader and less oblique. The nape is usually thinly scaled, as is often the case in *E. cœruleum*. We count D. IX, 12; A. II, 6. Scales, 5–48–8.

H.—RIO COLORADO, AT AUSTIN, TEXAS.

The Colorado River at Austin, Tex., is a broad, rather swift, cl stream, flowing over a bottom of gravel and rocks, occasionally mud in places where there is no current. Above Austin, a little over a m on the west side of the river, Spring Creek flows into the Colora This is a very clear, cold, limestone stream, fed in summer, in large pa by the waters of Barton Spring. This spring is a round cavity so 50 feet across and 8 to 10 feet deep, from which flows a strong curre of pure cold water. The spring is full of water plants, and is the abo of Eels, *Gambusia*, and the Catfishes.

We seined very carefully and successfully the spring, the creek, a the river. Large numbers of individuals were obtained, but only small number of species. The fact is, apparently, that only a sm number of species actually inhabit the river. The Colorado River larger than the Washita or the White River, Indiana. It is a strea of similar character in many respects to these, and it was more th oughly explored than the Washita. Our records show 75 species in t White River (results of repeated work), 47 species in the Washita (sults of the work of a single morning), and 25 in the Colorado.

1. **Ictalurus punctatus** Rafinesque.
2. **Amiurus nebulosus catulus** Girard.

In Barton Spring.

3. **Leptops olivaris** Rafinesque.
4. **Ictiobus carpio** Rafinesque.

Numerous specimens, apparently specifically identical with Northe specimens which we have called by this name, but rather more elonga than any of these, and rather more brassy in color.

Head short, 4 in length; depth, $3\frac{1}{10}$. Eye rather small, $4\frac{1}{3}$ in hea Snout projecting little beyond the mouth, its length a little more th that of eye. Opercle very strongly striate. Longest ray of dorsal r quite reaching to the middle of the fin when depressed; anterior ra little thickened, D. 32. Scales, 7–40–5. Body subfusiform, the ba compressed, little arched.

5. **Ictiobus velifer** Rafinesque (*tumidus*).
6. **Moxostoma congestum** Baird & Girard.
7. **Campostoma anomalum** Rafinesque.
8. **Pimephales notatus** Rafinesque.
9. **Cliola vigilax** Baird & Girard.
10. **Notropis lutrensis** Baird & Girard.
11. **Notropis venustus** Girard.

Abundant.

12. **Notropis notatus** Girard.

A few small specimens, which we refer to this species. They ha the caudal spot faint, overlaid by the scales, and but 34 scales in t

lateral line. In other respects they agree with *N. venustus*, from which species they may prove to be not distinct.

13. **Notropis swaini** Jordan & Gilbert.

Abundant in the outlet of the spring.

14. **Hybopsis æstivalis** Girard.

Abundant in the current of the river.

15. **Anguilla anguilla rostrata** De Kay.

Abundant in Barton Spring.

16. **Gambusia patruelis** Baird & Girard (*humilis*).

17. **Zygonectes notatus** Rafinesque.

18. **Micropterus salmoides** Lacépède.

These specimens agree with Northern ones in form and squamation. The mouth is, however, a little smaller, and the coloration is somewhat different. The lateral band is broken up into numerous irregular dark cross-streaks, which reach the dorsal fin, and below this there are very distinct longitudinal streaks following the rows of scales. The caudal fin has narrow cross-streaks formed of dark spots.

19. **Lepomis cyanellus** Rafinesque.

20. **Lepomis megalotis** Rafinesque.

Coloration very green.

21. **Lepomis pallidus** Mitchill.

With cross-shades of coppery-red on lower part of sides.

22. **Percina caprodes** Rafinesque.

23. **Etheostoma lepidum** Baird & Girard. (36587.)

Abundant in the outlet to the spring.

24. **Aplodinotus grunniens** Rafinesque.

In the river.

I.—RIO SAN MARCOS, AT SAN MARCOS, TEXAS.

The San Marcos River takes its rise in a very large spring, one of the largest in the United States, in the limestone hills at San Marcos. From the spring flows a strong stream of very clear and somewhat cold water, rather swift, and full of grass and water-weeds. The size of the stream varies little with the change of season. Three or four miles below San Marcos the Rio Blanco, a long stream, flowing over gravel, and nearly dry in summer, flows into the San Marcos. Our collections were made in the Rio Blanco and in the Rio San Marcos, just below the mouth of the former. In the Rio Blanco we found little except *Notropis lutrensis*, which swarmed in all the pools. In the Rio San Marcos Darters were very abundant, as was to be expected in such waters.

1. **Lepidosteus osseus** Linnæus.

2. **Amiurus nebulosus catulus** Girard.

Two large specimens of the black Texas variety of the common Bu head. The original type of *Pimelodus catulus* Girard has the pecto spines long, and belongs to *A. nebulosus* rather than to *A. melas.*

3. **Moxostoma congestum** Girard.

4. **Cliola vigilax** Baird & Girard.

Abundant.

5. **Notropis lutrensis** Baird & Girard.

Very abundant in the Rio Blanco; the males brightly colored. The specimens are more elongate than most of those from Iowa, but they not seem to differ specifically.

6. **Notropis swaini** Jordan & Gilbert.

(*Alburnus megalops* Girard; not *Cyprinus megalops* Raf.)

Not rare.

7. **Notropis deliciosus** Girard.

Scarce. Our specimens do not evidently differ from those taken us in the Des Moines.

8. **Hybopsis æstivalis marconis**, var. nov.

Abundant in the San Marcos, and reaching a length of 3 inch The specimens of this species from the San Marcos differ from the othe we have in a few respects. The eye is larger than in the types of *sterletus*, or than in specimens from the Arkansas River, it being 3½ head in *marconis* and about 4 in specimens of *æstivalis* of the sa size. The caudal peduncle is stouter in *marconis* than usual in *æsti lis*, its least depth being half the greatest depth of the body.

H. hyostomus Gilbert is another very closely related species. In th the eye is still larger, and the snout shorter and less projecting. all the body is profusely sprinkled with black dots.

9. **Gambusia patruelis** Baird & Girard (var. *humilis*. Gthr.).

(*Zygonectes patruelis* Girard.)

Common; some of the specimens nearly 2 inches long; therefore ve large for this species.

These evidently represent the *Zygonectes brachypterus* of Cope, a apparently the *Gambusia gracilis* of Girard (=*humilis* Gthr.). From t ordinary *patruelis* they do not evidently differ except in color, t black suborbital spot being very faint or occasionally even obsolete, a the fins nearly plain. It is not likely that this form will be found su ficiently different from the ordinary *patruelis* to be worthy of speci notice.

10. **Anguilla anguilla rostrata** Le Sueur.

A large Eel taken in the San Marcos Spring

11. **Micropterus salmoides** Lacépède.

12. **Lepomis megalotis** Rafinesque.

Coloration greener than usual in Northern specimens, but otherwise very similar.

13. **Hadropterus scierus serrula** Jordan & Gilbert.

Abundant in the San Marcos; not different from Northern examples.

14. **Etheostoma lepidum** Baird & Girard.

Abundant.

15. **Etheostoma lepidum** Baird & Girard. (36516.)

16. **Alvarius fonticola** Jordan & Gilbert. (36523.)

Abundant in the San Marcos.

This species or variety is very close to the Northern *Alvarius* (*Microperca*) *punctulatus*. The only tangible differences seem to lie in the coloration and in the constant presence in *A. fonticola* of but one anal spine. The head in *A. fonticola* is nearly or quite devoid of scales. In life it is light olivaceous, the scales broadly margined behind with dusky. About eight indistinct dusky cross-blotches on back, the dorsal region dusted with fine dusky specks. A series of dark stitch-like short horizontal lines along the middle of the sides, forming an interrupted lateral streak. Three small dark spots at base of tail. Soft parts of vertical fins with light and dark bars. Lower half of spinous dorsal jet-black, then a broad red band narrowly edged above with black. A dusky streak below orbit and one in front of it.

J.—RIO COMAL, AT NEW BRAUNFELS, TEXAS.

At New Braunfels, Tex., the Rio Comal flows into the Guadalupe River. The latter is a considerable stream, very swift, and with rough rocky bottom, not suitable for seining at any point where we have seen it. In summer most of the water of the Comal comes from a large spring near New Braunfels, the outlet of which runs down a steep slope, turning a mill and flowing into the half dry bed of the main branch of the stream. Most of our fishing was done about the point of junction of the two streams. Not many species were obtained, but certain Minnows were extremely abundant.

1. **Moxostoma congestum** Baird & Girard.

2. **Cliola vigilax** Baird & Girard.

Very abundant.

3. **Dionda episcopa** Girard.

Small specimens, rather more slender than Girard's types. Lat. l. 40. Caudal spot distinct.

4. **Notropis deliciosus** Girard.

Abundant. Compared with specimens from the Des Moines, these show some differences. The form is more slender; the coloration is darker; the dark points on the edges of the scales being conspicuous.

These form a narrow, metallic lateral band, and also a dark area o upper edge of caudal peduncle.

The original *deliciosus* being from Texas, is probably the present form in which case the Northwestern form may be recognized, perhaps, as va *missuriensis*.

This species appears in Jordan's Catalogue Fish N. A., under the MSS name of *Notropis nocomis*, but the characters distinguishing it from *deliciosus* do not seem to warrant its separation. *Notropis comalis* another MSS. species mentioned in the same paper, should also b suppressed.

5. **Notropis lutrensis** Baird & Girard.

Only young ones taken.

6. **Notropis swaini** Jordan & Gilbert.

Very abundant. This species seems in Texas to take the place oc cupied in clear streams farther north by *N. scabriceps*.

7. **Hybopsis æstivalis** Girard (*marconis*).

8. **Dorosoma cepedianum** Le Sueur.

9. **Gambusia patruelis** Baird & Girard.

10. **Micropterus salmoides** Lacépède.

11. **Lepomis pallidus** Mitchill.

12. **Lepomis megalotis** Rafinesque.

13. **Hadropterus scierus serrula** Jordan & Gilbert.

14. **Etheostoma lepidum** Baird & Girard.

GENERAL CONSIDERATIONS.

The following general conclusions in regard to the distribution of fresh water fishes seem to follow from the data given in the present paper:

(1) Our species of small fishes, especially the *Etheostomatinæ*, ar probably much less local in their distribution than has usually been as sumed. Many of the species hitherto regarded as rare or local hav been shown to have a very wide distribution in the West and South, an what is true of these species will very likely be found true of all thos now known from only a few localities.

(2) As our knowledge of the geographical range of a species widen it becomes necessary to extend our ideas of the range of variation in cluded by it, and we are compelled to admit under it geographical va rieties or subspecies.

In other words, similar conditions obtain with the species of fishe that obtain with our birds, and when we know our fishes as well as w do our birds we shall have the same need of a trinomial nomenclatur in ichthyology that is already felt in ornithology.

In fishes, as in birds, we find all possible grades of differences, an in the one case as in the other our only ultimate test of specific distinc tion is our failure to find or to recognize the intermediate forms.

(3) The fauna of the Ozark region is substantially identical with that of the hilly regions of Tennessee. The environment and conditions of life being similar, and water communication being free, we have a similar fauna in regions widely separated.

(4) The fauna of any Texas river is much less rich than that of any stream of similar size and character connected with the basin of the Mississippi. In other words, free water communication is essential to a varied fauna. The larger a river system the greater the number of species in each of its affluents. The reason for this seems obvious.

(5) The fish fauna of Texas differs from that of the Lower Mississippi Valley mainly by its deficiencies. Texas does not properly constitute a distinct faunal region. The paucity of its fish fauna is in some degree connected with its dry, hot summers. Most of the streams are flooded and often very muddy in spring, and are almost dry in summer; both conditions unfavorable to the increase of many species. These conditions do not affect the spring-fed streams of the limestone region.

(6) Some of the conditions favorable to the production in any stream of a large number of species of fishes are the following:

Clear water, a moderate current, a bottom of gravel preferably covered by a growth of weeds; water not too cold and not stagnant; connection with a large hydrographic basin; little fluctuation in the year in volume of the stream or in the character of the water.

These conditions are well realized in the Washita River and in certain affluents of the Ohio and the Tennessee, and in these, among American streams, the greatest number of species has been recorded.

INDIANA UNIVERSITY, *September* 18, 1885.

NOTES ON FISHES COLLECTED AT BEAUFORT, NORTH CAROLINA, WITH A REVISED LIST OF THE SPECIES KNOWN FROM THAT LOCALITY.

By DAVID S. JORDAN.

Two catalogues of the fishes of Beaufort Harbor have been published. The one (Notes on the Natural History of Fort Macon, N. C., and Vicinity, No. 3, Proc. Ac. Nat. Sci. Phila., 1877, 203–208), by Dr. Henry C. Yarrow, represents the collections made by Dr. Coues and Dr. Yarrow during their residence at Fort Macon, near Beaufort. The other (Notes on Fishes of Beaufort Harbor, North Carolina, Proc. U. S. Nat. Mus., 1878, 365–388), by Professor Gilbert and the writer, includes both the species of the previous list and those actually collected by the authors and the students (A. W. Brayton, B. W. Evermann, and others) who accompanied them at Beaufort in the summer of 1878.

During the present summer (1885) a considerable collection has been made at Beaufort by Mr. Oliver P. Jenkins, teacher of science in the Indiana State Normal School of Terre Haute, in connection with the Johns Hopkins Summer Laboratory, then in session at Beaufort.