

Notes on the Fishes of Kansas.

By CHAS. H. GILBERT, PH. D.

The material forming the basis of the present paper has been collected in various tributaries of the Kansas River by Prof. F. W. Cragin and forwarded to the writer for examination. Of the 19 species here enumerated, 3 are believed to be new, 4 are known only from the western States and Territories, and 12 are of general distribution in the Mississippi Valley.

1. *Amblyurus melas* Raf.—A single young specimen from the Kansas River at Topeka.

2. *Amblyurus eragrinus* sp. nov.—Closely related to *Amblyurus brunneus* Jordan. Body rather high and compressed, much as in *A. catus*, which the present species much resembles in appearance. Profile straight, but not steep, from snout to front of dorsal. Head depressed, flat and narrow, becoming little narrower forwards, its greatest width $1\frac{1}{2}$ in its length, the depth at occiput $1\frac{1}{3}$. Upper jaw the longest, conspicuously projecting beyond the lower. Outline of gape strongly convex forwards, the width of mouth equaling interorbital width, slightly less than half length of head. Eye small, $3\frac{1}{2}$ in interorbital width, $7\frac{1}{2}$ in head. Maxillary barbel reaching beyond basal third of pectoral spine; inner mental barbels scarcely reaching margin of branchiostegal membrane, the outer slightly beyond it. Top of head with a longitudinal median groove extending from snout to occiput, bounded by two strong, nearly parallel ridges.

Dorsal fin high, its longest ray $\frac{3}{4}$ head, the spine weak, not serrated, $2\frac{1}{2}$ in head, slightly more than half the space between dorsal and adipose fin. Pectoral spines short, with a few weak serrae on inner margin, smooth without, their length about equaling dorsal spine. Ventrals nearly reaching the front of the anal, which is short, its base 5 in length. Caudal somewhat mutilated, apparently emarginate with the upper lobe the longest.

Head $3\frac{3}{8}$ in length; depth 4 $\frac{1}{8}$. A. 17.

Color in spirits: Very light brownish above and on sides, belly and lower side of head silvery; the back and top of head darker than the sides, which are dusted with fine brown points. Fins and barbels dusky.

A single specimen, 5 inches long, from "the Lake," (a blind arm of the Arkansas River,) at Garden City, Kansas.

3. *Ictiobus carpio* Raf.—A specimen from Manhattan, Kansas, and one from Ward's Creek.

4. *Catostomus teres* Michx.—Numerous specimens from Shunganunga Creek, and the Kansas River at Topeka.

In all of these there are three large round dusky spots on middle of sides, as large as eye: one on middle of caudal peduncle, one under dorsal fin, the third above middle of pectorals. These are very conspicuous in specimens 3 inches long, and are still well defined, though fainter, in one 5 inches long.

This peculiar coloration, which led to the establishment of the nominal species *tristigmatus* (Cope), is as well marked in immature specimens from Indiana and Illinois.

5. *Campostomus anomalum* Raf.—Several examples of this widely distributed species from Alma, and from the Kansas River at Topeka and at Ellis; collected at the last-mentioned place by Dr. L. Watson.

The very young have a conspicuous black lateral streak, which ends in a small black spot at base of caudal. These are wanting in a specimen of three inches.

Teeth 4-4. Head 4 in length; depth 4 $\frac{1}{8}$. Eye 4 in head. Lat. 1.

52. Origin of dorsal midway between tip of snout and base of caudal.

6. *Hypognathus nuchalis* Agassiz.—Girard fails to assign a single character to his species *argyrus*, *evansi*, or *placatus*, which could indicate that they are distinct from each other, or from *nuchalis*; and if other forms are found in the West, it will probably be impossible to identify them with his painfully inadequate descriptions.

Numerous specimens from Ward's Creek, Menoken, and the Kansas River at Topeka, agree well with others* collected by Prof. S. A. Forbes, in Illinois, and show the following characters:

Snout rounded, but not heavy, protruding but little beyond the mouth, which is small, rounded or angulated anteriorly, somewhat oblique; maxillary reaching vertical from nostrils, about 4 in head. Suborbital bones slender, the greatest depth of the anterior suborbital half its length. Eye $3\frac{1}{2}$ to 4 $\frac{1}{2}$ in head, $1\frac{1}{2}$ to $1\frac{1}{4}$ in interorbital width. Teeth 4-4, grooved, without hook.

Origin of dorsal usually midway between tip of snout and base of caudal, sometimes nearer head; highest dorsal ray $1\frac{1}{8}$ in head. Ventrals inserted about under third dorsal ray, not reaching vent, $1\frac{1}{2}$ in head. Caudal $\frac{1}{2}$ total length. Lateral line little decurved, rising anteriorly. Intestines about $6\frac{1}{2}$ times length of body.

Head 4 to 4 $\frac{1}{2}$ in length. D. 8: A. 8. Lat. 1. 38 $\frac{1}{2}$; 16 scales before dorsal.

Back dusky-olive, with minute, dark punctulations. Sides and below silvery; the middle of sides grayish, with coarse, dark specks. Specimens from 1 to 4 inches long.

7. *Pimephales conertus* Girard.—This species must be very abundant in Kansas, as numerous specimens are at hand from all localities in which collections were made.† The specimens before me show the following characters:

Body short and heavy, the back much elevated in adult males, the profile forming a decided reentrant angle at occiput. Cheeks vertical, snout exceedingly blunt in males, descending vertically, the head thus from occiput forwards forming a cube. Mouth terminal, very small, with but little lateral cleft, decidedly oblique, the maxillary reaching vertical from posterior nostril.

*Specimens from Illinois appear to have a slightly shorter, blunter snout, which is less than diameter of eye, and a smaller, less oblique mouth, with longer mandible. The differences are very slight, and are probably due to difference in state of preservation.

† Including Ellis, whence specimens have been sent us by Dr. Watson.—[Edr.]

Eye small, $2\frac{1}{2}$ in interorbital width in adult males with fleshy head, ($1\frac{3}{8}$ to 2 in adult females and immature males), $3\frac{3}{8}$ to $4\frac{1}{8}$ in head. In adult males, the top of the head, and the back anterior to dorsal, is covered with a thick layer of fat in which the scales have disappeared, being apparently absorbed; about 15 large tubercles cover the snout, these not extending onto the top of the head. Teeth 4-4, with deep groove and no hook.

Origin of dorsal midway between tip of snout and base of caudal, always in advance of insertion of ventrals; rather more advanced in adult males, where the insertion of ventrals is often under fourth dorsal ray. Dorsal slightly higher than long, the longest ray $1\frac{1}{2}$ in head. Caudal as long as head. Pectorals $1\frac{1}{3}$, ventrals $1\frac{1}{2}$ in head, the latter reaching (in adult males) beyond vent, about to origin of anal.

Scales moderate, becoming much smaller forwards; those in front of dorsal exceedingly fine, and closely crowded. Lateral line with a slight curve, rising anteriorly to the shoulder; frequent short gaps occur in the lateral line, but in this interrupted fashion it usually runs to base of caudal. It is very irregular in this, however, specimens frequently having lateral line of one or both sides wanting on posterior half or two-thirds.

Intestinal canal $2\frac{1}{2}$ times total length; peritoneum black.

Head $3\frac{3}{8}$ to $4\frac{1}{8}$ in length; depth, 4 to $4\frac{1}{8}$. D. I. 8: A. 7. Lat. 1.47 (pores).

Color—Males, dusky-olive, the margins of the scales and the whole upper anterior profile black. Dorsal uniformly black; anal dusky; caudal black, whitish at base of lobes; paired fins, light at base, with black margins. Young males much lighter, with a dusky streak along sides, more distinct on sides of tail. Females, light olive, a narrow, vein-like black line along middle of tail, with short, diverging branches. Fins more or less dusky, the dorsal sometimes with an indistinct black bar across its middle.

A female $2\frac{1}{8}$ inches long has fully developed ovaries, and males of the same size have full nuptial dress.

There seems to be no reason for retaining the genus *Hyporhynchus*. It is not possible to separate *confertus* generically from *Pimphales pro-melas*, a very closely allied form, which frequently has the lateral line complete, or nearly so.

9. *Pimphales notatus* Raf.—One specimen from Ward's Creek.

9. *Chola straminea* Cope.—A single immature example ($1\frac{1}{8}$ inches long) from Ward's Creek, Kansas, I fail to distinguish from specimens of *straminea* taken in the Wabash Valley. It agrees very fairly also with the current descriptions of *Chola inaeolata* Agassiz (= *Hypopsis scylla* Cope), but if it really represent this species, the latter can hardly be considered distinct from *straminea*.

The following is a description of the Kansas specimen:

Head rather blunt, the mouth terminal at the lower margin of the snout, somewhat oblique, the maxillary reaching somewhat beyond anterior margin of orbit, about $3\frac{1}{2}$ in head. Premaxillaries on level of lower margin of orbit. Eye large, 3 in head, slightly greater than interorbital width. Snout $4\frac{1}{8}$ in head.

Origin of dorsal fin over insertion of ventrals, slightly nearer snout than base of caudal; longest dorsal ray $1\frac{1}{2}$ in head.

Head 4 in length; depth $4\frac{1}{8}$, D. 8; A. 7, Lat. 1.32, 13 scales before dorsal.

Color in spirits—Back, light olive, margins of scales, dusky; a narrow silvery lateral streak rendered dusky by minute black specks; pores of lateral line made conspicuous by clusters of dark specks; a cluster of these at base of caudal, and a broad band on sides of snout and behind eye. A dark vertebral streak. Fins plain.

10. *Chola* (*Hypopsis*) *topreka* sp. nov.—Body compressed, the back elevated, the anterior profile convex from dorsal forward to occiput, which is depressed. Snout rather blunt, not at all projecting beyond the mouth, which is terminal, oblique, and very small; maxillary not reaching beyond vertical from nostril, about $4\frac{1}{8}$ in length of head. Eye equalling snout, $4\frac{1}{8}$ in head; interorbital width $2\frac{1}{8}$. Teeth 4-4, with well-developed grinding surface.

Insertion of ventrals directly under origin of dorsal, which is much nearer tip of snout than base of caudal; highest dorsal ray $1\frac{1}{2}$ in head. Caudal broad with many rudimentary basal rays above and below, the longest ray about equalling head. Pectorals reaching ventrals, and the latter to vent (both these fins shorter in one specimen).

Scales large, not high nor very closely imbricated, of uniform size throughout; 14 scales before dorsal; lateral line straight, not at all decurved, rising very slightly immediately behind head.

Head 4 to $4\frac{1}{8}$ in length; depth $3\frac{3}{8}$. D. 8, A. 7, Lat. 1.35 $\frac{1}{2}$.

Olivaceous, more or less silvery on middle of sides, scales of back with dusky margins; a dark vertebral streak; a dusky streak formed by coarse dark points, runs from snout through eye across opercles and along middle of sides to tail, where it ends in a small dusky spot. Fins unmarked. This species resembles somewhat *Chola straminea*, but differs conspicuously in the greater depth, smaller eye, and in its terminal, oblique, smaller mouth.

Three specimens, $2\frac{1}{8}$ inches long, from Shunganunga Creek.

11. *Chola* (?) *stibosa* Grd.—I refer to this species, with much doubt, two specimens, each 2 inches long, from Ward's Creek, Kansas.

Body very deep, compressed; head short, the mouth terminal, oblique, the snout sharp, not at all projecting; jaws equal, the lower shutting within the upper in closed mouth; maxillary reaching lower vertical from front of orbit, 3 in head. Eye longer than snout $\frac{3}{8}$ interorbital width, $3\frac{1}{8}$ in head. Teeth 4-4, without grinding surface, the cutting edge strongly crenate.

Front of dorsal over or slightly behind insertion of ventrals, nearer base of caudal than tip of snout by diameter of orbit; dorsal not high. Pectorals long, about reaching origin of ventrals, $4\frac{1}{8}$ in length of body. Ventrals reaching front of anal, $1\frac{1}{8}$ in head. Lateral line somewhat decurved anteriorly.

Head 4 in length; depth $3\frac{3}{8}$. D. 8, A. 8. Lat. 1.33, 14 scales before dorsal.

Olivaceous above, dusted with dark points; light below; a silvery lateral streak becoming dusky towards tail. One specimen with a narrow black streak between rami of lower jaw.

12. *Minutus cornutus* (Mitch.) J. & G.—Ellis; collected by Dr. Watson.

13. *Minutus (Lythyrurus) nigripinnis* sp. nov.—Body very high, the back moderately compressed, and much elevated, rising in a strong curve from occiput to front of dorsal; supra-orbital region depressed, the profile of top of head concave; snout convexly rounded, rather short and blunt. Mouth terminal, wide, very oblique, the lower jaw slightly included, its tip not projecting; maxillary scarcely reaching front of orbit, $2\frac{2}{3}$ in head. Eye moderate, its diameter nearly equaling snout, $\frac{3}{4}$ interorbital width, 4 in head. Teeth 2-4-4-2, with strong hook, and visible grinding surface.

Dorsal fin inserted behind front of ventrals, its origin midway between tip of snout and base of median caudal rays (slightly nearer base of caudal in a younger specimen, a female, with back less elevated). Base of dorsal $\frac{3}{4}$ its height, the longest ray $1\frac{1}{3}$ in head. Base of anal but little shorter than its longest ray, which is $\frac{3}{4}$ length of head. Caudal rather short, less than length of head. Ventrals reaching vent, $1\frac{1}{3}$ in head; pectorals reaching base of ventrals, $1\frac{1}{2}$ in head.

Scales much higher than long, very closely imbricated, becoming very small on nape; about 30 scales before dorsal; lateral line much decurved anteriorly.

Petionenum bright silvery.

Head 4 in length; depth $2\frac{2}{3}$. D. 8. A. II, 10 or 11. Lat. 1. 40.

Color olivaceous, everywhere thickly dusted with fine black specks, lighter on belly and below; no dark stripe on back; snout and upper anterior profile dusky; traces of orange red along scales of belly. Fins all jet black, most intense on anterior rays of vertical fins, and on outer rays of paired fins. Caudal paler. Some of the scales along sides still showing fine tubercles, which in life doubtless covered sides of body and top of head.

The specimen serving as type of this description is an adult male, 3 inches long, from Shungnunga Creek. A smaller female specimen is also in the collection from the same locality. This latter is filled with ripe spawn, the depth being $3\frac{1}{2}$ in length. The profile rises in an almost straight line from snout to base of dorsal, and the fins are uniformly pale, with the exception of a dark spot at base of anterior dorsal rays. No trace of this dusky blotch is visible in the male.

14. *Phenacobius mirabilis* Girard.—Mouth horizontal, subinferior, quite on the lower side of the thick snout, which scarcely projects beyond it; maxillary reaching the vertical from nostril, 4 in head; lips thin, the lower much less developed than in other species. Eye equalling interorbital width, less than length of snout, $3\frac{1}{2}$ to $3\frac{3}{4}$ in head; snout 3. Height of preorbital $1\frac{1}{2}$ times in its length, which equals that of eye. Teeth 4-4, hooked and without evident grinding surface; pharyngeal bones and teeth very small and weak.

Origin of ventrals under 3d or 4th ray of dorsal, slightly nearer snout than base of caudal; length of fin $1\frac{1}{3}$ in head, tips about reaching vent. The middle distance between tip of snout and base of caudal falls under the 4th dorsal ray; highest dorsal ray $1\frac{1}{3}$ in head. Caudal well forked, equalling length of head.

Scales moderate, becoming somewhat smaller and more crowded anteriorly. About 18 scales before dorsal. Lateral line nearly straight.

Head $4\frac{1}{2}$ to $4\frac{3}{4}$ in length; depth (γ) $4\frac{1}{4}$. D. 8; A. 7. Lat. 1. 43 $\frac{1}{2}$. Back olivaceous, the scales broadly edged with dusky. A dusky silvery streak following lateral line, ending in a jet black spot as large as pupil, on base of tail; back with an indistinct dusky streak. Fins unmarked.

Three specimens, 2 to $2\frac{1}{2}$ inches long, from Ward's Creek.

15. *Semotilus corporalis* Mitch.—One specimen, 4 inches long, from Shungnunga Creek.

Head $3\frac{3}{4}$ in length; depth $4\frac{1}{4}$. D. 8. A. 8. Lat. 1. 59. A dark stripe along sides; base of dorsal with the characteristic black spot in front; a dark line from snout to eye.

16. *Fundulus zebrius* J. & G.—Three specimens of this species, (two males and one female,) from Ellis, Kansas, collected by Dr. Watson, are the first that have been seen since the original discovery of the species in the Rio Grande River, and afford material for a full description. They show the following characters:

Head and body shaped much as in *Fundulus similis*, but the snout somewhat less elongate. Width of preorbital about $6\frac{1}{2}$ in length of head; eye moderate, 4 to $4\frac{1}{2}$ in head, $1\frac{1}{3}$ in interorbital width; posterior margin of orbit in middle of length of head; teeth in both jaws in a villiform band, with the external series much enlarged; interorbital width $2\frac{1}{2}$ in head; snout $3\frac{1}{2}$.

Branchiostegals 5.

Dorsal fin long and rather low, the base longer and the rays higher in males than in females; origin of dorsal nearly equidistant between snout and margin of caudal, slightly nearer the snout in males, and nearer end of caudal in females; base of dorsal in males 6 to $6\frac{1}{2}$ in total length, the highest dorsal ray about half head; in females the base is $7\frac{1}{2}$ in total length. Origin of anal opposite that of dorsal in males, behind it in females; in the latter the anal is sharply angulated, the anterior rays more than thrice the height of the posterior, and more than two-thirds length of head. In males the margins of both dorsal and anal fins are evenly rounded, the anal is the highest, its rays beset with minute white prickles. Oviduct forming a low sheath along base of anterior half of anal. Pectorals not reaching base of ventrals, equalling distance from snout to preopercular margin. Ventrals about reaching vent. Caudal truncate, $1\frac{1}{2}$ in head.

Scales very small, in about 60 oblique series from opercle to base of caudal; about 21 in an oblique series from vent upwards to middle of back; no enlarged humeral scale. In males the margins of scales are rough with minute tubercles.

Head $3\frac{3}{4}$ to $3\frac{1}{2}$ in length; depth $4\frac{1}{2}$ to $4\frac{3}{4}$. D. 14 or 15; A. 13 or 14. L. 3 inches.

Color: Greenish above, sides and below silvery-white, the sides tinged with sulphur-yellow; the greater part of each scale on back rendered dusky by black points; sides with from 14 to 18 dusky bars from back to ventral region, occasionally meeting on ventral line; these bars are very variable in width, seemingly narrower in females, in which half-bars are frequently inserted between the others; the interspaces are as wide as the bars, or usually wider. Fins yellowish, without distinct markings, in the males all very dusky except the anal.

This is, in all probability, the species described by Girard from the Rio Grande, under the name *Hydrargyra zebra*. It has but 5 branch-istolegal rays, (the number is not mentioned by Girard) and would therefore fall in the division *Fundulus*.

17. *Lepomis humilis* (ad.)—Many specimens of this widely distributed species are in the collection, from Ward's Creek and Shunganunga Creek, near Topeka. One of these, 3 inches long, shows the coloration of adults, the sides being marked with the characteristic orange spots, and the opercular flap surrounded by a red (in spirits, white) margin. The sides of caudal peduncle are marked with olive-brown spots and mottlings. Younger specimens have no orange spots, but the sides are covered with numerous small, round, olive-brown spots, (as figured by Girard, U. S. Pac. R. R. Surv. Fish, pl. vii, fig. 13,) these sometimes with a tendency to form double bars. Soft dorsal, and base of caudal often likewise spotted.

18. *Lepomis cyanellus* Raf.—Five specimens from "the Lake" at Garden City, Kansas. An adult has the nuchal region swollen and very prominent, as figured by Girard, (*Callinurus longulus*, U. S. Mex. Bound. Surv. Ichth., pl. iv, fig. 1;) but the dorsal spines are much lower, their length considerably less than that of snout.

19. *Pachlichthys cernuus* (Storer) Ag.—Ellis; collected by Dr. Watson.

First Contribution to the Knowledge of Kansas Lichens.

By H. WILLEY.

Thelosectes chrysophthalmus (L.) Norm.—"Edge of pine board in crevice of walk and in several other localities in and about Topeka." (F. W. Cragin.)

Thelosectes concolor Dicks.—"Topeka." (F. W. Cragin.)

Thelosectes concolor Dicks., var. *effusa* Tuckerm.—"Topeka." (F. W. Cragin.)

Parmelia Horresi Tunn.—"Various places about Topeka; also sent from Nelawaka, Brown Co, by Miss Mara Becker." (F. W. Cragin.)

Physcia stellularis L.—"Topeka and Tecumseh; also collected at Nelawaka by Miss Mara Becker." (F. W. Cragin.)

Physcia obscura (Ehnh.) Nyl.—"Topeka." (F. W. Cragin.)

Physcia adglutinata (Floerk.) Nyl.—"Topeka." (F. W. Cragin.)

Peltigera canina (L.) Hoffm.—"Topeka." (F. W. Cragin.)

Peltigera canina (L.) Hoffm., var. *juvenilis* (—)—"Tecumseh." (F. W. Cragin.)

Collema pycnocarpum Nyl.—"Tecumseh." (F. W. Cragin.)

Placodium cerinum (Tiedw.) Naeg. & Hepp.—"Topeka." (F. W. Cragin.)

Placodium ferrugineum (Huds.) Hepp.—"Topeka." (F. W. Cragin.)

Lecanora subfusca (L.) Ach.—"Topeka." (F. W. Cragin.)

Rhinodina sophodes (Ach. Nyl.) Tuckerm.—"Topeka." (F. W. Cragin.)

Perusaria communis D. C.—"Topeka." (F. W. Cragin.)

Cladonia mitrula Tuckerm.—"Tecumseh; on a clayey bank, at foot of an old stump. I have also taken a *Cladonia* of apparently the same species on the face of the limestone bluff facing the Republican River at Milford. *Cladonia* of the *mitrula* section of the genus are evidently not generally distributed in Kansas, as I have searched for them through the northeastern quarter of the State some three months since finding the first specimens, and have been able in that time to add but a single locality." (F. W. Cragin.)

First Contribution to the Knowledge of Kansas Algae.

By FRANCIS WOLLE.

Ocellularia limosa, (Boh.) Ag.—"On a submerged stone in rapids of Deer Creek, a little east of Topeka." (F. W. Cragin.)

Ocellularia tenerima, Kg.—"Eastern suburbs of Topeka, in a muddy (temporary) stream, clinging to a submerged weed." (F. W. Cragin.)

Protococcus viridis, Ag.—"Covering, as with a kalsomine of Paris-green, the bark on the lower part of the trunk of a living tree, in Shunganunga woods, near Topeka." (F. W. Cragin.)

Closterium summa, Müller.—"In sediment clinging to a weed in a muddy stream in the eastern suburbs of Topeka." (F. W. Cragin.)

Cosmarium ———— "Small species, not determined. "Manhattan, among specimens collected by Mr. W. H. Cowles A. B., instructor in English and History at the State Agricultural College." (F. W. Cragin.)

Spirogyra longata, Kg.—"Submerged stone in rapids of Deer Creek, east of Topeka." (F. W. Cragin.)

Spirogyra quinina, Ag.—"Streams, horse-troughs, and temporary pools about Topeka; common. Also collected at Manhattan in the stream running through the Agricultural College grounds, by Mr. Cowles." (F. W. Cragin.)

Spirogyra ———— "Species not yet determined. "This species, which seems very near (if, indeed, not) *S. diluta*, Wood, occurred in large felted masses in pools of a tributary of Shunganunga Creek which becomes partially dry in summer; Topeka." (F. W. Cragin.)

Cladophora fracta, (Dillw.) Kg., var. *subsimplex*, Kg.—"Somewhat peculiar in form. It has, in some respects, the appearance of a *Rhizodolium*. Needs further examination. "Growing on the back of a young snapping-tortoise [*Chelydra serpentina*, (L.) Schw.] in an upland stream south-east of Topeka, in early spring." (F. W. Cragin.)

Cladophora fracta, (Dillw.) Kg., var. *gossypina*, Kg.—"Manhattan, from the stream in Agricultural College grounds; collected by Mr. Cowles." (F. W. Cragin.)