The Fishes of the Chikaskia River in Oklahoma and Kansas[1]

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Like many other Great Plains streams, the Chikaskia River, a northern Oklahoma and southern Kansas tributary of the Salt Fork of the Arkansas River, has received almost no attention from ichthyologists; few literature references to fishes from this river have come to our attention. Hubbs and Black (7) gave a figure of an adult male *Ceratichthys* (=*Pimephales*) *tenellus tenellus* Hubbs and Black. Moore and Cross (16) discussed some specimens of *Moxostoma aureolum* (LeSueur), and Moore (15) and Paden (19) reported *Amphiodon alosoides* Rafinesque from the Chikaskia.

The earliest known collection of fishes from the river system is that of George C. Rinker and W. Ralph Taylor from Sandy Creek, a small tributary in Harper County, Kansas, on December 1, 1939. Various workers in Kansas and Oklahoma made some six additional collections during the next ten years, and these, with two larger series of collections made in the spring of 1949, are the basis of this paper.

Description of the River

The Chikaskia River System drains 2050 square miles of the Great Plains Region. The Chikaskia proper arises from springs and intermittent streams in the southern part of Pratt County, Kansas, and meanders in a general southeasterly direction for 145 miles to its mouth near Tonkawa, Oklahoma. The average stream gradient is 5.4 ft. per mile. Approximately 1666 square miles, or 81 per cent of the drainage area lies in Pratt, Barber, Kingman, Harper, and Sumner counties in Kansas, and 384 square miles, or 19 per cent in Kay and Grant counties in Oklahoma (1).

The greater part of the drainage is covered with Tertiary soil materials consisting of outwash from the Rocky Mountains and Great Plains, and some alluvial deposits in the eastern half are of Permian origin (14). In Kay County the first bottom soils of the Chikaskia are classed with the Yahola series, and the second-bottom, or terrace soils with the Reinach and Kay series. The topography is characterized by treeless plains and gently undulating prairies dissected by wooded streams. The entire area slopes gradually toward the southeast (13).

When observed on March 5, and on May 7, 1949, the stream was swollen and muddy from recent rains. On May 16, 1940, however, Moore and party noted the stream as clear and others (14) found the stream "unusually clear". Over much of its course the average gradient is approximately seven feet per mile. The stream bed in Oklahoma is 50-75 feet wide and is composed of sand, gravel, rocks, shale, and soft mud. The banks are mostly steep and muddy, making seining very difficult except at occasional sand bars or riffles, or where the stream has cut through an outcropping of shale. The water of the stream is definitely alkaline, the *p*H varying from 8.0 (Station 15 on March 16, 1940) to 8.5 (same station on May 17, 1940).

Description of Stations

This paper is based on two separate series of collections. The records

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include five collections from five stations in Kansas, and 14 collections from 10 stations in Oklahoma. All stations have been combined in one series numbering from 1 to 15, and assigned numbers with respect to their proximity to the headwaters of the stream.
Listed below are the collectors' data for each station.

KANSAS STATIONS

1. George C. Rinker and W. Ralph Taylor, December 1, 1939; Sandy Creek, 4 miles north and 2 miles east of Danville, Harper County.
2. A. Byron Leonard and A. B. Williams, March 26, 1948; Sand Creek, 2 miles west of Milan, Sumner County—clear, running, water over sand bottom.
3. Dolf Jennings, Archie Wallace, and Charles Schropp, February 20, 1943; Beaver Creek at Highway 160, 3 miles east of Milan, Sumner County.
4. Jennings, Wallace and Schropp, February 20, 1943; West Prairie Creek, 2 miles west of Mayfield at Highway 160, Sumner County.
5. John Breukelman, July 10, 1940; Chikaskia River at Drury, Sumner County.

OKLAHOMA STATIONS

6. Frank Cross and Homer Buck, March 5, 1949; Chikaskia River in Sec. 19, T29N, R2W at border of Kay and Grant counties.
7. Cross and Buck, May 7, 1949; small tributary in Secs. 18 and 19, T29N, R2W in Kay County. The stream here lay between steep shale banks of red, blue and gray and was 6-7 feet wide with holes (maximum depth 2 feet) between gentle riffles flowing over sand and gravel. Small growths of *Jussiaea* and *Scirpus* lined the banks in quiet water.
8. Cross and Buck, March 5, 1949; small tributary in Secs. 22 and 27, T29N, R2W in Kay County. Although slightly wider and deeper, this stream is quite similar to that of Section 7. Some *Spirogyra* was present in the riffles.
9. Edgar Leonard, J. H. Stevenson, Paul White and Robert Loomis, March 5, 1949; Lake Blackwell, an impoundment of approximately 300 surface acres formed by a dam on the Chikaskia River in Sec. 34, T29N, R2W in Kay County. The area seined had a clean, gently sloping, mud bottom and bank.
10. Moore, *et al*, March 5, 1949; Cross and Buck, May 7, 1949; Chikaskia River just below spillway of Blackwell dam in Sec. 34, T29N, R2W, Kay County. This was a large area of swift, turbulent water running off the cement spillway apron over a pot-holed, red, compacted-clay bottom covered with scattered sand, gravel and shale.
11. Cross and Buck, May 7, 1949; Dry Creek in Sec. 6, T28N, R1W on Highway 177, Kay County. At this point the creek was about 9-10 feet wide with high, steep, mud banks. The deepest holes (3 feet) lay between riffles flowing over a bottom of soft mud, with some sand and gravel bars.
12. Cross and Buck, March 5, 1949; Chikaskia River, (about 70 feet wide) in Sec. 12, T28N, R2W in Kay County. Collections were made in a long riffle bordering one of the river's few large sand bars and in and around willows bordering a deep hole at the foot of the riffle.
13. Moore, *et al*, March 5, 1949; Chikaskia River in Sec. 4, T27N, R1W, Kay County. Collections were made on the west side of the river over bottom of mud and gravel opposite a deep hole under a high mud bank.
14. Cross and Buck, March 5, 1949; Stink Creek [Local name, not in agreement with (1) wherein Stink Creek is shown to be a western tributary] in Sec. 24, T27N, R1W, Kay County. When seined, this intermittent creek with high, steep, and heavily-wooded banks was filled with river backwater. It was a shallow and very muddy stream

of almost imperceptible current.

15. Moore, *et al*, March 16, 1940; Moore, F. M. Baumgartner, *et al*, May 17, 1940; Moore, *et al*, July 12-13, 1946: Chikaskia River in Secs. 25 and 36, T26N, R1W, Kay County. Here the Chikaskia had steep banks of mud on shale, a bottom of mud, sand and gravel, and supported filamentous algae on the rocky riffles.

ANNOTATED LIST OF SPECIES

In the following list the scientific name is followed by the common name, literature references to Chikaskia specimens, station numbers, and pertinent notes in that order. All species except items 2, 6, 21, and 22 are first records for the river.

The following abbreviations are used: OAM=Oklahoma Agricultural and Mechanical College; and UMMZ=University of Michigan Museum of Zoology.

Station numbers such as 3-6 are inclusive.

LEPISOSTEIDAE

1. *Lepisosteus osseus oxyurus* Rafinesque: northern longnose gar.
   Station 15.
   The 3 juvenile specimens available are assigned to the subspecies *oxyurus* on the basis of the following counts and measurements: lateral-line scales 60 to 63, width of head in snout 3.7 to 4.3 and snout in head 1.5.

HIODONTIDAE

2. *Hiodon alosoides* (Rafinesque): goldeye.
   (15) and (19). The single specimen mentioned by Moore (15) and Paden (19) is the only record known from the river. The goldeye has become quite abundant in some Oklahoma reservoirs, especially in Lake Texoma.

CLUPEIDAE

3. *Dorosoma cepedianum* (Le Sueur): gizzard shad.
   Stations 5, 9, 10, and 15.
   The gizzard shad is apparently uncommon in this river.

CATOSTOMIDAE

4. *Carpiodes carpio carpio* (Rafinesque): northern river carpsucker.
   Stations 10 and 15.
   This species, taken most often in large streams, has not been found above the Blackwell dam.
5. *Moxostoma erythrurum* (Rafinesque): golden redhorse.
   Station 5.
6. *Moxostoma aureolum pisolabrum* Trautman and Martin: pealip shorthead redhorse.
   (16) and (23). Stations 5, 10, and 15.
   This form is now known to occur also in the Grand and Illinois rivers.

CYPRINIDAE

7. *Cyprinus carpio* Linnaeus: carp.
   Stations 10 and 15. Only 2 young and 1 adult have been taken.
8. *Hybopsis storeriana* (Kirtland): silver chub.
   Station 15.
   One specimen taken near the river's mouth probably wandered in from the larger Salt Fork of the Arkansas.

9. ***Hybopsis aestivalis tetranema*** Gilbert: Arkansas River speckled dace.
   Station 15.
   This form seldom enters smaller rivers or creeks (21), however, Cross (3) called attention to an interesting migration of considerable numbers into a very small tributary of Stillwater Creek. The types are from small creeks and Dr. Ralph Taylor (personal communication) has taken the species in small permanent streams. The single adult (basis for inclusion of this item) doubtless wandered in from the nearby Salt Fork.
10. *Notemigonus crysoleucas* (Mitchell): golden shiner.
    Stations 1, 2, 4, 7-9, 12, and 13.
    Chikaskia River specimens agree with others of the Arkansas River (17) and (20) in having 12 or 13 (usually 13) anal rays. Oklahoma specimens were formerly identified (10, 11, 18) as *N.c. crysoleucas* and later regarded as *N.c. auratus* (Rafinesque) (6). We prefer to employ only the binomial, since variation in this genus tends to form a clinal pattern.
11. *Notropis percobromus* (Cope): plains shiner.
    Stations 13-15.
    In the Chikaskia, as in the Illinois (17) this species does not move far from the Arkansas River. The specimens herein reported are easily recognized on the basis of characters given by Hubbs (5).
12. *Notropis camurus* (Jordan and Meek): bluntface shiner.
    Stations 5, 6, 10, 12, and 13.
    This is probably near the western edge of the range of *camurus*. In Oklahoma this minnow apparently is found only in relatively clear water. Records in OAM show that this species occurs in large streams (Grand River) as well as in small springs and creeks in the Ozark uplands.
13. *Notropis lutrensis lutrensis* (Baird and Girard): plains red shiner.
    All stations except 4.
    The most abundant minnow in the river system.
14. *Notropis girardi* Hubbs and Ortenburger: Arkansas River shiner.
    Station 15.
    This species is an associate of the two species of *Hybopsis*, and *N. percobromus;* never penetrating far up tributaries of the main muddy rivers.
15. *Notropis deliciosus missuriensis* (Cope): plains sand shiner.
    Stations 2, 3, 6-8, 10-15.
    This small fish is widely distributed in the river basin.
16. *Notropis buchanani* Meek: ghost shiner.
    Stations 10, 12, and 15.
    All specimens of the *N. volucellus* species-group from the Chikaskia are *N. buchanani*. Integradation between *volucellus* and *buchanani* was reported (22), but later evidence (2) indicates that *buchanani* is a distinct species.
17. *Phenacobius mirabilis* (Girard): suckermouth minnow.
    Stations 3, 5, 6, 8, 10-12, 14, and 15.
    Although well distributed, the suckermouth minnow is not abundant. In Oklahoma, the habitat is similar to that preferred in Iowa (21).
18. *Hybognathus placita* Girard: plains minnow.
    Stations 9, 10, 13-15.
    Apparently this fish does not spawn in the Chikaskia River, but enormous numbers are sometimes found there in the spring. In March, 1940 at Station 15, plains minnows were extremely numerous, but in May of the same year they were scarce at the same station. These observations parallel those (3) on Stillwater Creek and differ from observations (21) on the brassy minnow, *H. hankinsoni* Hubbs, in Iowa.

19. *Pimephales promelas* Rafinesque: fathead minnow.
Stations 9, 10, 13-15.
Hubbs and Lagler (9) mentioned an isolated population of *Pimephales promelas promelas* in Oklahoma. Presumedly this record is based on number 109400 in UMMZ collected from Clay Creek, a tributary of the Salt Fork of the Arkansas River 2 1/2 miles east and 2 miles south of Cherokee, Alfalfa County, on June 16, 1930. These specimens have or lack chin tubercles and in one fully adult male there is a chin tubercle on the right and none on the left side. The lateral line is fairly well developed or obsolescent, many scales being without pores. Subspecies of *P. promelas* have been recognized in the past (2, 9, 10, 11, 17, 18, and others). If subspeciation exists, the Chikaskia specimens would be *P. promelas: confertus* × *promelas*. Dr. W. R. Taylor informs us that he does not recognize subspecies of *P. promelas*.

20. *Pimephales notatus* (Rafinesque): bluntnose minnow.
Stations 2, 3, 5, 7, 8, and 10-13.
These records represent a westward extension of the known range of *P. notatus* in Oklahoma. In order to indicate more completely the western edge of its range we present these other locality records from OAM files. Osage County; Big Hominy Creek near Hominy; Bird Creek, 7 miles north and 5 miles east of Wynona; Panther Creek, a tributary of Sand Creek, 2 miles south of Bartlesville. Johnston County: Blue River at the bridge on highway 99, 24 miles south of Ada; Blue River 10 miles west of Wapanucka and 3 miles south of highway 7 at Hughes Crossing; Little Blue River, section 36 of Harris Township. Pontotoc County: Blue River on highway 12 southwest of Ada; Clear Boggy Creek, Chickasaw Township 6 miles south and 1/2 mile west of Ada; Jack Fork Creek, tributary of Clear Boggy, T2N, R6E on highway 99. Creek County: Lagoon Creek north of Oilton. *Pimephales notatus* is widespread in eastern Oklahoma.

21. *Pimephales vigilax perspicuus* (Girard): bullhead minnow.
Hubbs and Black (7), map. Stations 5-7, 9, 10, 14 and 15. The bullhead minnow is quite common and usually taken with *P. tenellus* in the spring, however, tenellus in highest breeding color was found among rocks in very fast water rather than in quiet backwaters frequented by *perspicuus*.

22. *Pimephales tenellus tenellus* (Girard): Neosho slim minnow.
Hubbs and Black (7). Stations 5, 6, 11, 12, 14 and 15. *P. t. tenellus* is outnumbered by *P. v. perspicuus* and seems to occupy a different habitat while breeding. The specimen illustrated in Hubbs and Black (7), was especially beautiful when fresh, with shiny black contrasted with the snowy white of the opercular membranes, caudal base, and the anterior edges of the pectoral and pelvic fins. At the time of publication of the *Certichthys* monograph (7) the above specimen was the only known nuptial male of the species. We have not seen similar coloration in specimens from the Ozark uplands.

23. *Campostoma anomalum pullum* (Agassiz): southwestern stoneroller.
Stations 2, 3, 7, 8, and 10.
The Chikaskia specimens are referred to the subspecies *pullum* on the basis of scale counts, (parenthetic numbers indicate ranges of variation and are followed by the number of specimens counted) 40.4 (36-44) 20, around the body at the dorsal origin, and because they agree well in other characters suggested for this subspecies (8). Elsewhere in the state, however, there are indications of rather extensive intergradation of *C. a. pullum* with *C. a. plumbeum*. Present collections are insufficient to allow a statewide mapping of these distributions, but the OAM files include collections from 25 counties. These collections form the basis for the following

discussion. Scale counts (averages are followed by extremes of variation and number of specimens) indicate that all collections from the eastern part of both the Arkansas and Red River systems represent good *pullum*. In the Arkansas River System the range of *pullum* may be traced as far west as the Chikaskia River in Kay County, 40.4 (36-44), 20 and Beaver Creek in Logan County, 42.6 (40-44), 3. In the Red River System the *pullum* range extends from McCurtain County, 42.6 (40-46), 31, through Pushmataha, 41.3 (40-42), 3, and Choctaw, 41.5 (40-44), 4, counties, as far west as Cedar Creek in Bryan County, 39 (38-40), 2. Farther west both the average and maximum counts increase quite abruptly. In the pooled collections from the Blue River and its tributaries in Johnston County the count is 42.6 (38-48), 43; for Jack Fork Creek, Bois d'Arc Creek, Blue and Clear Boggy rivers in Pontotoc County, 44.3 (39-50), 25; and for Camp Classen and Price's Falls in Murray County, 43.4 (40-50), 28. No collections are available for some distance westward, but in Medicine Park Creek in Comanche County we find a count of 45.5 (42-50), 23, and in Otter Creek in Kiowa County, 44.8 (44-46), 7. On the basis of these counts it is here suggested that the zone of intergradation (if subspecies are to be recognized) in the Red River Drainage probably extends from in or near Johnston County, as least as far west as Otter Creek in Kiowa County, which is the western limit of our collections from this system. The only Oklahoma collection of what appears to be distinct *plumbeum* was taken from Carrizo Creek in Cimarron County, Arkansas River Drainage. These exhibited a much higher scale count of 51.1 (46-56), 7. Since this is the only collection from the Arkansas Drainage west of Kay and Logan counties available to us, neither the eastern limit of the range of this subspecies, nor its zone of intergradation with *pullum* can be given for this system.

AMEIURIDAE

24. *Ictalurus punctatus* (Rafinesque): channel catfish.
Stations 6, 10, and 15.
Although channel catfish have been taken at only 3 stations, it was extremely abundant at station 15 in 1940. There is a possibility that this abundance may be attributed to plantings by Kansas or Oklahoma game and fish departments.

25. *Ameiurus melas catulus* (Girard): southwestern black bullhead.
Stations 1, 5-8, 10, 11, and 14.
A common form.

26. *Pilodictis olivaris* (Rafinesque): flathead catfish.
Stations 10 and 15,
This species probably is not a common inhabitant of the Chikaskia, but wanderers from the Salt Fork move some distance upstream.

27. *Schilbeodes nocturnus* (Jordan and Gilbert): freckled madtom.
Stations 10 and 11.
Although the freckled madtom is quite common in the eastern drainage of the Arkansas River in Oklahoma, the Chikaskia collections extend the known range considerably westward. The known range (9) includes eastern Oklahoma. Previous records in OAM include collections from the Illinois River, Sequoyah County (17), the Poteau River and its tributaries (4), the Clear Boggy River and its tributary Jack Fork Creek in Pontotoc County, and a small tributary of the Washita near Dougherty in Murray County. Murray County lies on the 97th meridian in south central Oklahoma, and with Pontotoc County is in the Red River Basin. The points at which the Chikaskia collections were made lie some 175 miles north and approximately 20 miles west of the

Murray County location. Oklahoma specimens agree quite well with the description by Jordan and Evermann (12), except in regard to anal fin counts, which are 16 to 18 instead of 15 or 16. It is possible that a difference in counting techniques may account for these discrepancies. The counts herein given were taken according to the method of Hubbs and Lagler (9). The Chikaskia specimens, as in other Arkansas River materials, further differ in having only barely discernible white borders on the vertical fins, as compared with very distinct fin borders in the Pontotoc and Murray County specimens. Dr. W. Ralph Taylor of UMMZ is engaged in a revisionary study involving this genus.

ANGUILLIDAE

28. *Anquilla rostrata* (LeSueur): American eel.
Station 15 (sight record).
Eels are seldom taken in nets and therefore the few Oklahoma records are based on hook-and-line specimens. The species appears to be fairly common, judging from fishermen reports.

CYPRINODONTIDAE

29. *Fundulus notatus* (Rafinesque): blackband topminnow.
Station 3.
These specimens agree quite well with characters previously given (17) to distinguish *F. notatus* from *F. olivaceus*, and represent a westward extension of the known range in Kansas. Previous collections have been made as far west as the Little Blue River in Johnston County, the Clear Boggy River and its tributaries in Pontotoc County, and from Lagoon Creek in Creek County. Eastward, the species, though nowhere very abundant, is widely distributed in both large and small streams of both major river systems.

30. *Fundulus kansae* Garman: plains killifish.
Stations 1-3, 7, 8, 10-13, and 15.

POECILIIDAE

31. *Gambusia affinis affinis* (Baird and Girard): Mississippi mosquito fish.
Station 15.

ATHERINIDAE

32. *Labidesthes sicculus* (Cope): brook silversides.
Station 3.
The brook silversides apparently does not penetrate the Plains Region in great numbers, but occasional populations are sometimes rather unexpectedly encountered. Thus a few "islands" of rather large populations occur in midsections of the Arkansas, the North Canadian, and the Cimarron river systems. This somewhat curious distribution warrants further discussion. Though abundant in both lakes and streams of the eastern section of the state, the distribution seems largely limited to reservoirs, or their tributaries, in central and western Oklahoma, where stream collections are quite rare. *L. sicculus* is known to be very abundant in Lake Texoma, and its tributary Pennington Creek, but has been taken only rarely in stream collections from the Red River System west of McCurtain County. Dr. Carl D. Riggs (personal communication) informed us that the brook silversides is common in Canyon Creek, a tributary of Lake Lawtonka in Comanche County and in Jimmy Creek at Meers Station post office, Comanche County. Similarly the species is very abundant in Canton Reservoir, Blaine and Dewey counties, and in Ft. Supply Reservoir, Woodward County,

both of which impound tributary waters of the Arkansas, but has not been taken from any of the streams of this system west of our Chikaskia collection. A population in the Cushing Country Club Lake in Payne County represents another "island" in this distribution. The extremely low quality of the brook silversides as a bait minnow would seem to discount the possibility of its having been planted by fishermen. A better explanation may be that the deeper, less turbid, and more permanent waters of the western reservoirs more nearly simulate the desired habitats found in the eastern streams than do the shallow, very turbid, and sometimes intermittent streams common to the western section of the state. The life requirements of this species should make a very interesting ecological study.

CENTRARCHIDAE

33. *Micropterus punctulatus* (Rafinesque): spotted bass.
Stations 5 and 10.
The spotted bass may not be indigenous in the Chikaskia, there being the possibility that the two records resulted from plantings in the river or in Lake Blackwell.

34. *Micropterus salmoides* (Lacépède): largemouth bass.
Stations 2 and 3.
Doubtless the largemouth bass is more widely distributed in the river than the collections indicate, since there is plenty of acceptable habitat.

35. *Lepomis cyanellus* Rafinesque: green sunfish.
Stations 1-3, 8-11, 14, and 15.
Very common.

36. *Lepomis humilis* (Girard): orangespotted sunfish.
Stations 3-11, 14, and 15.
Very common.

37. *Lepomis megalotis* (Rafinesque): longear sunfish.
Stations 3 and 15.
Uncommon.

38. *Lepomis macrochirus* Rafinesque: bluegill.
Stations 9 and 15.
Uncommon, except in Lake Blackwell and deeper portions of the river near Tonkawa.

39. *Pomoxis annularis* Rafinesque: white crappie.
Stations 6, 9, and 15.
Abundant in Lake Blackwell and deep, quiet waters of the stream.

40. *Pomoxis nigromaculatus* (LeSueur): black crappie.
Station 10.
Uncommon.

PERCIDAE

41. *Hadropterus phoxocephalus* (Nelson): slenderhead darter.
Stations 5, 6, 10, 11, 12 and 15.
This species is abundant in the Chikaskia where it is found on gravelly or stony riffles.

42. *Etheostoma spectabile* (Agassiz): orangethroat darter.
Stations 2 and 3.
For obscure reasons this darter appears to be restricted in the Chikaskia Basin to the small Kansas tributaries. Elsewhere in Oklahoma the orangethroat darter thrives in rather sluggish and even intermittent waters which reach quite high summer temperatures.

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