

## 23.—THE FISHES OF THE COLORADO BASIN.

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In this paper we have attempted to indicate in succinct form our present knowledge of the geographic distribution of the fishes in the basin of the Colorado River of the West. The approximate area drained by the Colorado and its tributary streams is 225,049 square miles. This embraces all of the Territory of Arizona, a narrow strip along the entire length of the western side of New Mexico, a large part of western Colorado, a portion of southwestern Wyoming, nearly all of the eastern half of Utah and a narrow strip in the southwestern part of that Territory, and a small portion of the comparatively arid region of southeastern California.

The Colorado is more than 1,200 miles in length, and is, next to the Columbia, the greatest river of our Western States. It has its rise in the Wind River Mountains of western Wyoming, near the headwaters of four other great rivers, the North Platte, the Big Horn, the Yellowstone, and the Snake, and flows southward through Wyoming into Utah, just touching the northwest corner of Colorado. Until joined by the Grand River in Utah, in about latitude 40° 20', it is known as the Green River. The area drained by the Green River is about 47,222 square miles. Near the middle of the south line of Utah the Colorado passes into Arizona, then, flowing westward through the Grand Canyon, reaches the Nevada line. After receiving the Rio Virgen from the north, the Colorado turns abruptly southward and pursues this general direction until it reaches the Gulf of California, into which it flows about 50 miles south of the international boundary. It forms over two-thirds of the boundary line between Arizona and Nevada, and all of that between Arizona and California.

The following is a classified list of the rivers and more important creeks of the Colorado Basin. Those in which collecting has been done are printed in italics:

*Colorado River:*

*Gila River.*  
*Santa Cruz River.*  
*San Pedro River.*  
Babacomari River.  
*Salt River.*  
*White Mountain Creek.*  
Aqua Frio Creek.  
Cataract Creek.  
Little Colorado River.  
*Zuñi River.*  
San Juan River.  
*Rio de las Animas Perdidas.*  
*Mineral Creek.*  
*Letter Creek.*  
*Rio Florida.*  
*Rio de las Piedras.*  
*Pagosa Springs.*

*Colorado River—Continued.*

Grande River.  
*Gunnison River.*  
*Uncompahgre River.*  
*Cimarron Creek.*  
*Tomichi Creek.*  
*Sweetwater Lakes.*  
*Trapper Lake.*  
*Eagle River.*  
*Roaring Fork.*  
*Cañon Creek.*  
*Green River.*  
White River.  
Yampa River.  
Little Snake River.  
Duchesne River.  
San Rafael River.  
Dirty Devil River.  
*Prioc River.*  
*Virgen River.*

The principal tributaries from the east are the Rio Gila (draining 68,623 square miles) and the Little Colorado or Colorado Chiquito (draining 29,268 square miles), in Arizona; the San Juan in New Mexico, Colorado, and Utah (draining 26,472 square miles); the Grand, White, and Yampa in Colorado, and the Big Sandy River in Wyoming. The streams from the west are few and rather small, the Duchesne, Price, and Virgen being the only ones of any importance. The tributaries from Colorado are all clear, cold, mountain streams well suited to trout; the headwaters of Green River are similar in character; while the tributaries from Utah, Nevada, California, and Arizona are from comparatively arid regions. During time of rains these streams become of considerable size and are very turbid from the easily eroded country through which they flow. They decrease in size as readily, and in some cases disappear in the sand. Such streams are of course unsuited to a large variety of fish life.

While the headwaters of the Colorado are ordinarily clear and pure, the lower Colorado is one of the muddiest rivers in America and is unfit for any but mud-loving species. As already pointed out by Dr. Jordan,\* the headwaters are well supplied with trout, accompanied by *Agosia yarrowi* and the blob (*Cottus bairdi punctulatus*). Lower down appear four species of suckers (*Xyrauchen cypho*, *X. uncomphagre*, *Catostomus latipinnis*, and *Pantosteus delphinus*), and with them the round-tail (*Gila robusta*), the "white salmon" (*Ptychocheilus lucius*), and Williamson's whitefish (*Coregonus williamsoni*). Still lower down are found the bony-tail (*Gila elegans*) and other species of *Catostomus*, while in the Arizona region and the other arid portions are found the peculiar genera *Lepidomeda*, *Meda*, and *Plagopterus*.

Very little collecting has been done in the Colorado Basin, the following being a list of all the collections, or at least all those which have been reported upon and the literature of which is accessible to us:

1. Three nominal species collected by Dr. S. W. Woodhouse, naturalist to Capt. Sitgreaves's expedition, 1852. These were described by Baird & Girard in 1853.
2. Eighteen nominal species collected by the naturalists of the Pacific Railroad Survey and of the United States and Mexican Boundary Survey (John H. Clark, John L. Le Conte, Arthur Schott, Dr. C. B. Kennerly, and Dr. A. L. Heermann). These constituted the first considerable collections, and were described by Baird & Girard, or Girard alone, in 1853-56.
3. Thirteen nominal species obtained by Campbell Carrington, naturalist to the Hayden surveys of 1870 and 1871. These collections were studied and reported upon by Prof. Cope, in 1871 and 1872.
4. Twenty-seven nominal species collected by the various naturalists of the Wheeler Survey (Cope, Yarrow, Henshaw, Newberry, Klett, Rothrock, Rutter, Loew, Biscoff, and Birnie) in 1871-74. These are by far the most extensive collections which have as yet been made in this region, and formed the basis for the admirable report by Cope & Yarrow in volume 5 of the Wheeler Reports and for Prof. Cope's valuable paper on the Plagopterinæ and the Ichthyology of Utah, in 1874.
5. One species (*Xyrauchen cypho*) obtained at the mouth of the Gila, and described by Mr. William N. Lockington in 1880.
6. Seven nominal species collected at Fort Thomas, Ariz., by Lieut. W. L. Carpenter, U. S. A. These were reported upon by Philip H. Kirsch in 1889.

\*Bull. U. S. Fish Commission, ix, 1889 (1891), 22.

7. Eleven nominal species collected in Colorado and Utah in 1889 by Dr. David S. Jordan, Prof. Barton W. Evermann, Mr. Bert Fesler, and Mr. Bradley M. Davis. These were reported upon by Dr. Jordan in 1890.

8. One species (*Gila robusta*) collected in Babacomari Creek near Fort Huachuca, Ariz., in May, 1892, by Dr. A. K. Fisher, to whom we are indebted for the privilege of examining these and other fishes collected by him.

9. Seven species obtained by the present writers from Green River at Green River, Wyo., in 1893. The report upon these species is contained in this paper.

10. Collections have recently been made at Yuma and elsewhere in Arizona by Dr. Charles H. Gilbert, but other than describing one new species he has not yet published the results.

The fish fauna of the Colorado Basin is not rich in number of species, the total number now recognized being but 32 native species. These represent 5 families and 18 genera, as follows:

*Catostomidæ*, 8 species: *Pantosteus*, 3; *Catostomus*, 3; *Xyrauchen*, 2.

*Cyprinidæ*, 19 species: *Ptychocheilus*, 1; *Gila*, 3; *Leuciscus*, 4; *Tiaroga*, 1; *Rhinichthys*, 1; *Agosia*, 4; *Couesius*, 1; *Lepidomeda*, 2; *Meda*, 1; *Plagopterus*, 1.

*Salmonidæ*, 2 species: *Salmo*, 1; *Coregonus*, 1.

*Peciliidæ*, 2: *Cyprinodon*, 1; *Heterandria*, 1.

*Cottidæ*, 1: *Cottus*, 1.

Though the families and species constituting the fish fauna are very few, they are of unusual interest to the student of geographic distribution.

The Cyprinidæ, or minnow family, is by far the most important family as to the number of species, embracing as it does almost 60 per cent of the entire number. The Catostomidæ, or sucker family, comes next, with 8 species, or 25 per cent of the total number. Of the 18 genera, *Xyrauchen*, *Gila*, *Tiaroga*, *Meda*, and *Plagopterus* are thus far known only from the Colorado Basin; *Lepidomeda* was not known to occur elsewhere, until recently discovered by Dr. Gilbert among the fishes collected in the Great Basin in southwestern Nevada by the Death Valley expedition; *Ptychocheilus* is a Pacific Coast genus, represented in most of the larger streams of California, Oregon, and Washington; *Pantosteus*, *Agosia*, and *Heterandria*, as now limited, are genera of rather wide distribution in the western part of the United States; while the 8 remaining genera are found throughout middle North America.

Of the 32 species, all but 7 are thus far known only from this basin. The 7 species which are not confined to the Colorado Basin are the Utah chub (*Leuciscus lineatus*), the western dace (*Rhinichthys cataractæ dulcis*), *Agosia chrysoaster*, Williamson's whitefish, the blob, *Lepidomeda vittata*, and *Girardinus macularius*. The home of the Utah chub is in the Utah and Upper Snake River basins. The western dace belongs in the headwaters of the Missouri, Platte, Arkansas, and Rio Grande, and in the Utah and Columbia basins. Williamson's whitefish and the blob occur in the headwaters of all of our western rivers. *Lepidomeda vittata*, the fifth species, has been taken only once outside of the Colorado Basin. It is thus seen that over 78 per cent of the species of fishes now known from the Colorado Basin are peculiar to it. This is a larger percentage of species peculiar to a single river basin than is found elsewhere in North America.

## BIBLIOGRAPHY OF THE ICHTHYOLOGY OF THE COLORADO BASIN.

We here give, in chronological order, the titles of the papers which contain information regarding the fishes of the Colorado Basin, with the place of publication and a brief summary of contents. In the tables of species we give the page upon which each species is mentioned, the name under which recorded, and our identification of each. Genera and species described as new are printed in italics.

1848. LIEUT. COL. W. H. EMORY. Notes of a military reconnoissance from Fort Leavenworth, in Missouri, to San Diego, in California, including part of the Arkansas, Del Norte, and Gila Rivers. By Lieut. Col. W. H. Emory, made in 1846-47, with the advanced guard of the "Army of the West." Washington: Wendell and Van Benthuysen, Printers. 1848.

This interesting volume, which was printed as Ex. Doc. No. 41, Thirteenth Congress, first session, contains the first reference which we have been able to find to any fish of the Colorado Basin. The reference is contained in the following extract from pp. 62 and 63, and is accompanied by a full-page plate of the fish named Gila trout, which, of course, is *Ptychocheilus lucius*:

A good road was subsequently found turning the spur and following the creek, until it debouched into the Gila, which was only a mile distant. Some hundred yards before reaching this river the roar of its waters made us understand that we were to see something different from the Del Norte. Its section, where we struck it (see the map), 4,347 feet above the sea, was 50 feet wide and an average of 2 feet deep. Clear and swift it came bouncing from the great mountains which appeared to the north about 60 miles distant. We crossed the river, its large round pebbles and swift current causing the mulesto tread warily. We followed its course, and encamped under a high range of symmetrically formed hills overhanging the river. Our camp resembled very much the center of a yard of huge stacks.

We heard the fish playing in the water, and soon those who were disengaged were after them. At first it was supposed they were the mountain trout, but, being comparatively fresh from the hills of Maine, I soon saw the difference. The shape, general appearance, and the color are the same; at a little distance you will imagine the fish covered with delicate scales, but on a closer examination you will find that they are only the impression of scales. The meat is soft, something between the trout and the catfish, but more like the latter. They are in great abundance.

- 1853a. S. F. BAIRD AND CHARLES GIRARD. Descriptions of some new Fishes from the River Zuñi. <Proc. Ac. Nat. Sci. Phila., vi, 1853, 368, 369.

In this short paper are described and named the first species of fishes ever received from the Colorado Basin. Excepting the brief reference in Lieut. Col. Emory's reconnoissance, which we have quoted above, this is the first mention of Colorado Basin fishes. The specimens described were collected by Dr. S. W. Woodhouse while attached as surgeon and naturalist to the expedition of Capt. Sitgreaves, for the exploration of the Zuñi River and its tributaries. Three species were described from this collection, viz: *Gila robusta*, *Gila elegans*, and *Gila gracilis*. The last of these is now regarded as a synonym of *G. robusta*.

- 1853b. SPENCER F. BAIRD AND CHARLES GIRARD. Fishes collected by the expedition of Capt. L. Sitgreaves, 148-152, with 3 plates, 1853. <Report of an Expedition down the Zuñi and Colorado Rivers, by Captain L. Sitgreaves, Corps Topographical Engineers, 1853.

This paper was based upon the material upon which the same authors reported in the Proceedings of the Philadelphia Academy in 1853. This report, however, is given more in detail and is accompanied by 3 plates containing very good figures of the 3 nominal species—*Gila robusta*, *Gila elegans*, and *Gila gracilis*. This expedition left Zuñi September 24, 1852, and reached Yuma November 30.

**1853c.** SPENCER F. BAIRD AND CHARLES GIRARD. Descriptions of New Species of Fishes collected by Mr. John H. Clark, on the U. S. and Mexican Boundary Survey, under Lt. Col. Jas. D. Graham. <Proc. Ac. Nat. Sci. Phila., VI, 1853, 387-390.

This is the first of the several papers based upon the collections made by the parties of the Mexican Boundary Survey proper. In it are mentioned 17 species, all of which are described as new. One of these (*Fundulus tenellus*=*Zygonectes notatus*) is described from Prairie Mer Rouge, La., and Russellville, Ky., 11 from Texas, and 5 from the Colorado Basin.

Page.	Species as recorded.	Present identification.	Page.	Species as recorded.	Present identification.
388	<i>Catostomus latipinnis</i> . . . . .	<i>Catostomus latipinnis</i> .	389	<i>Cyprinodon macularius</i> . . . . .	<i>Cyprinodon macularius</i> .
388	<i>Gila emoryi</i> . . . . .	<i>Gila elegans</i> .	390	<i>Heterandria occidentalis</i> . . . . .	<i>Heterandria occidentalis</i> .
389	<i>Gila grahami</i> . . . . .	<i>Gila robusta</i> .			

**1854.** S. F. BAIRD AND CHARLES GIRARD. Descriptions of new species of Fishes collected in Texas, New Mexico, and Sonora, by Mr. John H. Clark, on the U. S. and Mexican Boundary Survey, and in Texas by Capt. Stewart Van Vliet, U. S. A. Second Part. <Proc. Ac. Nat. Sci. Phila., VII, 1854, 24-29.

This is the second paper by Baird & Girard upon the fishes of the Mexican Boundary Survey. The list contains 19 species, all but 2 of which are described as new. Of these 19 species, 16 were from Texan waters and 3\* from the Colorado Basin.

Page.	Species as recorded.	Present identification.	Page.	Species as recorded.	Present identification.
27	<i>Catostomus clarkii</i> . . . . .	<i>Catostomus clarkii</i> .	204	<i>Tiaroga cobitis</i> . . . . .	<i>Tiaroga cobitis</i> .
28	<i>Catostomus insignis</i> . . . . .	<i>Catostomus insignis</i> .	205	<i>Gila robusta</i> . . . . .	<i>Gila robusta</i> .
28	<i>Gila gibbosa</i> . . . . .	<i>Leuciscus niger</i> .	205	<i>Gila elegans</i> . . . . .	<i>Gila elegans</i> .

**1856.** CHARLES GIRARD. Researches upon the Cyprinoid Fishes inhabiting the fresh waters of the United States of America, west of the Mississippi Valley, from specimens in the Museum of the Smithsonian Institution. <Proc. Ac. Nat. Sci. Phila. 1856, 165-209.

This paper mentions 18 species from the Colorado Basin, 9 of which are described as new.

Page.	Species as recorded.	Present identification.	Page.	Species as recorded.	Present identification.
173	<i>Minomus insignis</i> . . . . .	<i>Catostomus insignis</i> .	205	<i>Gila gracilis</i> . . . . .	<i>Gila robusta</i> .
173	<i>Minomus clarkii</i> . . . . .	<i>Catostomus clarkii</i> .	205	<i>Gila grahamii</i> . . . . .	<i>Gila robusta</i> .
173	<i>Acomus latipinnis</i> . . . . .	<i>Catostomus latipinnis</i> .	205	<i>Gila emoryi</i> . . . . .	<i>Gila elegans</i> .
180	<i>Argyreus osculus</i> . . . . .	<i>Agosia oscula</i> .	206	<i>Tigoma intermedia</i> . . . . .	<i>Leuciscus intermedius</i> .
180	<i>Argyreus notabilis</i> . . . . .	<i>Agosia oscula</i> .	207	<i>Tigoma gibbosa</i> . . . . .	<i>Leuciscus niger</i> .
187	<i>Agosia chrysoq[ui]ster</i> . . . . .	<i>Agosia chrysoqaster</i> .	209	<i>Ptychocheilus lucius</i> . . . . .	<i>Ptychocheilus lucius</i> .
187	<i>Agosia metallica</i> . . . . .	<i>Agosia chrysoqaster</i> .	209	<i>Ptychocheilus vorax</i> . . . . .	<i>Gila robusta</i> .
192	<i>Meda fulgida</i> . . . . .	<i>Meda fulgida</i> .			

**1858.** CHARLES GIRARD. Report upon the Fishes collected by the various Pacific Railroad Explorations and Surveys. Vol. x, part IV, 1-400, with numerous plates.

But little collecting in the Colorado Basin was done by the parties connected with the Pacific railroad surveys. The records mention only three species from this basin. All of these were collected in the Zuñi River in 1852 by Dr. S. W. Woodhouse, under Capt. L. Sitgreaves. Specimens of one of the species (*Gila elegans*) were obtained in the Gila in 1853 by Dr. A. L. Heermann, under Lieut. J. G. Parke; in the Colorado River in 1854 by Arthur Schott, under Maj. Emory; and at Fort Yuma in 1855 by

\* In this paper *Catostomus plebeius* (*Pantosteus plebeius*) and *Gila pulchella* (*Leuciscus nigrescens*) are credited to the "Rio Mimbres, tributary of the Rio Gila." But the Rio Mimbres is not a tributary of the Gila, but of Lake Guzman, in Chihuahua, and these two species are not known to occur in the Colorado Basin.

Maj. S. H. Thomas. This species was also collected in 1854 by Mr. Kruzfeld, under Lieut. E. G. Beckwith, but the exact locality is not known. Only three species are mentioned in this report as coming from the Colorado Basin, being the same described by Baird & Girard in 1853 *a*.

**1859a.** CHARLES GIRARD. Ichthyology of the Boundary. <Report of the United States and Mexican Boundary Survey, made under the direction of the Secretary of the Interior, by William H. Emory, Major, First Cavalry, and United States Commissioner. Vol. 3, Washington, 1858. Part on Ichthyology, 1859, 1-85, plates 1-40.

In this final report upon the fishes collected by this survey Girard mentions 17 species as having been obtained in the Colorado Basin. All of these were described in the Proceedings of the Academy of Natural Sciences for the years 1853, 1854, and 1856. Nothing new is added in the Mexican Boundary Report except plates containing illustrations of all the species.

Page.	Species as recorded.	Present identification.	Page.	Species as recorded.	Present identification.
37	<i>Minomus insignis</i> .....	<i>Catostomus insignis</i> .	61	<i>Gila elegans</i> .....	<i>Gila elegans</i> .
38	<i>Minomus clarki</i> .....	<i>Catostomus clarki</i> .	61	<i>Gila grahami</i> .....	<i>Gila robusta</i> .
39	<i>Acomus latipinnis</i> .....	<i>Catostomus latipinnis</i> .	62	<i>Gila smorii</i> .....	<i>Gila elegans</i> .
47	<i>Argyreus oculus</i> .....	<i>Agosia oscula</i> .	63	<i>Tigoma intermedia</i> .....	<i>Leuciscus intermedia</i> .
47.	<i>Argyreus notabilis</i> .....	<i>Agosia oscula</i> .	64	<i>Tigoma gibbosa</i> .....	<i>Leuciscus niger</i> .
48	<i>Agosia chrysogaster</i> .....	<i>Agosia chrysogaster</i> .	65	<i>Ptychocheilus lucius</i> .....	<i>Ptychocheilus lucius</i> .
49	<i>Agosia metallica</i> .....	<i>Agosia chrysogaster</i> .	68	<i>Cyprinodon macularius</i> .....	<i>Cyprinodon macularius</i> .
50	<i>Meda fulgida</i> .....	<i>Meda fulgida</i> .	78	<i>Girardinus occidentalis</i> .....	<i>Heterandria occidentalis</i> .
60	<i>Tiaroga cobitis</i> .....	<i>Tiaroga cobitis</i> .			

**1859b.** CHARLES GIRARD, M. D. Ichthyological Notices, XLI-LIX. <Proc. Ac. Nat. Sci. Phila. 1859, 113-122.

On page 119 of this paper Girard describes two female specimens of *Girardinus occidentalis* (= *Heterandria occidentalis*) obtained at Tucson, Ariz., by Arthur Schott, and numerous other specimens obtained at Tucson by Dr. A. L. Heermann.

**1860.** CHARLES C. ABBOTT. Descriptions of Four New Species of North American Cyprinidæ. <Proc. Ac. Nat. Sci. Phila. 1860, 473, 474.

This paper contains a description of *Gila affinis* (= *Gila robusta*), the specimens erroneously said to be from "Kansas."

**1871.** E. D. COPE, A. M. Recent Reptiles and Fishes. Report on the Reptiles and Fishes obtained by the Naturalists of the Expedition. <Hayden's Report Geol. Surv. Wyoming for 1870 (1871), 432-442.

In this report Prof. Cope records 13 species from the Colorado Basin, 5 of which he describes as new.

Page.	Species as recorded.	Present identification.	Page.	Species as recorded.	Present identification.
433	<i>Uranidea punctulata</i> .....	<i>Cottus bairdi punctulatus</i> .	438	<i>Hybopsis egregius</i> .....	<i>Leuciscus egregius</i> .
433	<i>Salmo (Salar) virginalis</i> .....	<i>Salmo mykiss pleuriticus</i> .	441	<i>Gila elegans</i> .....	<i>Gila elegans</i> .
433	<i>Coregonus williamsonii</i> .....	<i>Coregonus williamsoni</i> .	441	<i>Gila grahamii</i> .....	<i>Gila robusta</i> .
434	<i>Catostomus latipinne</i> .....	<i>Catostomus latipinnis</i> .	441	<i>Gila gracilis</i> .....	<i>Gila robusta</i> .
435	<i>Catostomus discobolus</i> .....	<i>Catostomus latipinnis</i> .	441	<i>Gila naerea</i> .....	<i>Gila robusta</i> .
435	<i>Minomus delphinus</i> .....	<i>Pantosteus delphinus</i> .	442	<i>Ceratichthys squamilentus</i> .....	<i>Couesius squamilentus</i> .
436	<i>Minomus bardus</i> .....	<i>Pantosteus delphinus</i> .			

**1872.** EDWARD D. COPE, A. M. Report on the Recent Reptiles and Fishes of the Survey, collected by Campbell Carrington and C. M. Daves. <Hayden's Report Geol. Surv. Montana for 1871 (1872), 467-476.

In this report Prof. Cope records but one species from the Colorado Basin. This is *Salmo pleuriticus* (= *Salmo mykiss pleuriticus*), which he describes as new.

1874. EDWARD D. COPE, A. M. On the Plagopterinæ and the Ichthyology of Utah.

In this paper 10 species are credited to the Colorado Basin. Seven of these are described as new.

Page.	Species as recorded.	Present identification.	Page.	Species as recorded.	Present identification.
2	<i>Plagopterus argentissimus</i> .	<i>Plagopterus argentissimus</i> .	5	<i>Rhinichthys henshavi</i> , Var. III.	<i>Rhinichthys cataractæ dulcis</i> .
3	<i>Meda fulgida</i> .....	<i>Meda fulgida</i> .	6	<i>Hybopsis timpanogensis</i> ..	<i>Leuciscus lineatus</i> .
3	<i>Lepidomeda vittata</i> .....	<i>Lepidomeda vittata</i> .	8	<i>Ceratichthys biguttatus</i> ..	
4	<i>Lepidomeda jarrovii</i> .....	<i>Lepidomeda jarrovii</i> .	8	<i>Ceratichthys ventricosus</i> ..	<i>Agosia oscula</i> .
5	<i>Rhinichthys henshavi</i> , Var. II.	<i>Rhinichthys cataractæ dulcis</i> .	10	<i>Catostomus discobolus</i> ...	<i>Catostomus latipinnis</i> .

1876. Prof. E. D. COPE AND DR. H. C. YARROW. Report upon the Collections of Fishes made in portions of Nevada, Utah, California, Colorado, New Mexico, and Arizona, during the years 1871, 1872, 1873, and 1874. <Zoology of the Wheeler Survey west of the 100th meridian, 1875 (1876), 635-703, plates XXVI-XXXII.

This is by far the most important contribution to the literature of the ichthyology of the Colorado Basin that has yet appeared. The authors credit no fewer than 27 species to this basin.

In the body of the report 29 nominal species are recorded from Colorado Basin localities, but 4 of these were apparently erroneously so referred. They are *Gila montana* from "Arizona," *Gila pandora* from "Pagosa, Colo.," *Gila gula* from "Rio de Acama" and "near Fort Wingate, N. Mex.," and *Ptychostomus congestus* from "Ash Creek, Ariz." *Gila montana* (= *Leuciscus hydrophlox*) was probably from some place in the Utah Basin. Both *Gila pandora* and *Gila gula* are now regarded as being identical with *Leuciscus nigrescens*, a Rio Grande species, and Cope & Yarrow's specimens probably came from that basin. *Ptychostomus congestus* (*Moxostoma congestum*) is a Texan species, and the 3 specimens which Cope & Yarrow provisionally referred to this species may have come from some Texan locality.

In the recapitulation of species (p. 699) the authors name 27 species in the Colorado River list, 4 of which are not given in the body of the report, viz: *Ceratichthys squamilentus* (*Ouesius squamilentus*), *Pantosteus bardus* (*Pantosteus delphinus*), *Pantosteus delphinus*, and *Coregonus williamsoni*. All of these are properly credited to the Colorado Basin, as had previously been determined by Prof. Cope.

Page.	Species as recorded.	Present identification.	Page.	Species as recorded.	Present identification.
640	<i>Plagopterus argentissimus</i> .	<i>Plagopterus argentissimus</i> .	665	<i>Gila grahamii</i> .....	<i>Gila robusta</i> .
642	<i>Meda fulgida</i> .....	<i>Meda fulgida</i> .	668	<i>Gila naorea</i> .....	<i>Gila robusta</i> .
642	<i>Lepidomeda vittata</i> .....	<i>Lepidomeda vittata</i> .	668	<i>Gila seminuda</i> .....	<i>Gila seminuda</i> .
643	<i>Lepidomeda jarrovii</i> .....	<i>Lepidomeda jarrovii</i> .	667	<i>Gila emorii</i> .....	<i>Gila elegans</i> .
647	<i>Apocope oscula</i> .....	<i>Agosia oscula</i> .	667	<i>Siboma atraria</i> .....	<i>Leuciscus lineatus</i> .
648	<i>Apocope ventricosa</i> .....	<i>Agosia oscula</i> .	668	<i>Siboma atraria longiceps</i> ..	<i>Leuciscus lineatus</i> .
648	<i>Apocope ouesii</i> .....	<i>Agosia ouesii</i> .	670	<i>Hyborhynchus siderius</i> .....	<i>Agosia chrysoaster</i> .
651	<i>Ceratichthys biguttatus</i> ..		674	<i>Pantosteus jarrovii</i> .....	<i>Pantosteus delphinus</i> .
663	<i>Gila nigra</i> .....	<i>Leuciscus niger</i> .	676	<i>Catostomus insigne</i> .....	<i>Catostomus insignis</i> .
663	<i>Gila robusta</i> .....	<i>Gila robusta</i> .	677	<i>Catostomus discobolus</i> .....	<i>Pantosteus delphinus</i> .
664	<i>Gila elegans</i> .....	<i>Gila elegans</i> .	683	<i>Salmo pleuriticus</i> .....	<i>Salmo mykiss pleuriticus</i> .
665	<i>Gila gracilis</i> .....	<i>Gila robusta</i> .	685	<i>Girardinus sonoriensis</i> .....	<i>Heterandria occidentalis</i> .
			686	<i>Uranidea vhecleri</i> .....	<i>Cottus bairdi punctulatus</i> .

1876. Prof. THEO. GILL. Report on Ichthyology. <Capt. Shupson's Report of Explorations across the Great Basin of the Territory of Utah, in 1859, 385-431.

In this report *Platygobio communis* (*Platygobio gracilis*) is credited to Green River, Utah, probably erroneously. *Potamocottus punctulatus* is described from a "single specimen obtained by Dr. George Suckley, in the summer of 1859, between Bridger's Pass and Fort Bridger."

1880. WM. N. LOCKINGTON. Description of a New Species of *Catostomus* (*Catostomus cypho*) from the Colorado River. <Proc. Ac. Nat. Sci. Phila. 1880, 237-240.

The single specimen upon which this species was based was obtained from the Colorado River at the mouth of the Gila by John E. Curry, esq., and presented to the Museum of the California Academy of Sciences.

1889. PHILIP H. KIRSCH. Notes on a Collection of Fishes obtained in the Gila River at Fort Thomas, Arizona, by Lieut. W. L. Carpenter, U. S. Army. <Proceedings of the United States National Museum, XI, 1888 (1889), 555-558.

This is a report upon a collection of 7 species of fishes sent by Lieut. Carpenter to the Museum of the University of Indiana. The author describes one new species (*Catostomus gila*) and one new genus (*Xyrauchen*).

Page.	Species as recorded.	Present identification.	Page.	Species as recorded.	Present identification.
555	<i>Catostomus latipinnis</i> .....	<i>Catostomus latipinnis</i> .	556	<i>Xyrauchen cypho</i> .....	<i>Xyrauchen cypho</i> .
555	<i>Catostomus gila</i> .....	<i>Catostomus gila</i> .	558	<i>Ptychocheilus lucius</i> .....	<i>Ptychocheilus lucius</i> .
556	<i>Catostomus insignis</i> .....	<i>Catostomus insignis</i> .	558	<i>Gila emorii</i> .....	<i>Gila elegans</i> .
556	<i>Catostomus clarki</i> .....	<i>Catostomus clarkii</i> .			

1891. DAVID STARR JORDAN. Report of Explorations in Colorado and Utah during the summer of 1889, with an Account of the Fishes found in each River Basin examined. <Bull. U. S. Fish Commission, ix, 1889 (1891), 1-40, plates 1-5.

During these explorations Dr. Jordan was assisted by Prof. Barton W. Evermann, Mr. Bert Fesler, and Mr. Bradley M. Davis. Next to the Wheeler Survey the collections obtained by this party are the largest and most important that have yet come from the Colorado Basin. The collections contain 10 species and represent 18 Colorado Basin localities. The following is a list of the species contained in these collections:

Page.	Identification.	Page.	Identification.
26	<i>Catostomus latipinnis</i> .....	27	<i>Gila elegans</i> .
26	<i>Xyrauchen cypho</i> .....	28	<i>Ptychocheilus lucius</i> .
26	<i>Xyrauchen unempahgre</i> .....	28	<i>Agosia yarrowsi</i> .
27	<i>Pantosteus delphinus</i> .....	28	<i>Salmo mykiss pleuriticus</i> .
27	<i>Gila robusta</i> .....	29	<i>Cottus bairdi punctulatus</i> .

In August, 1893, while on their way to Idaho, the present writers stopped one day at Green River, Wyo., where the Green River was examined and a small collection of fishes made. The river was seined from a point about 1½ miles above the town down to below the railroad bridge. At that time (August 1) the stream averaged about 125 feet wide and at least 3 feet deep; the current flowed about 1½ feet per second, and the temperature was about 70° at noon. The water was very green where deep; though clear, it contains a good deal of alkali. The bottom of the channel is of gravel, shale, mud, and sand in different places. The shores are of adobe or sand and gravel where low, but of sandstone or shale where high. The left bank of the river above the town is of very high and picturesque cliffs and buttes of shale and sandstones of varied colors; and the deep side of the stream is at the foot of these cliffs. Seven species of fishes were obtained by us. These represent the result of almost constant seining for the greater part of a day, and thus indicate the paucity of species in this stream.

Our notes on this collection will be found under the appropriate species in the following list.



## LIST OF SPECIES OF FISHES KNOWN FROM THE COLORADO BASIN.

In the following list we give under each species, in chronological order, the different places in the Colorado Basin from which it has been recorded. When a tabular form is used, the name under which the species was recorded is given in the first column, the locality from which recorded in the second, the name of the collector in the third, and the authority in the last. When two or more papers by the same author appeared in the same year, they are designated as *a*, *b*, *c*, etc. The names of species described as new from the Colorado Basin are printed in italics in connection with the type locality.

## CATOSTOMIDÆ. (The Sucker Family.)

1. *Pantosteus arizonæ* Gilbert. Salt River, Tempe, Ariz. (type, Gilbert, 1895).

2. *Pantosteus delphinus* (Cope).

Nominal species.	Locality.	Collector.	Authority.
<i>Minomus delphinus</i> .....	Probably a tributary of Green River.	Hayden collection .....	Cope, 1871.
<i>Minomus bardus</i> .....	do .....	do .....	Do.
<i>Pantosteus jarrovi</i> .....	Zuñi River, New Mexico.	H. W. Henshaw .....	Cope & Yarrow, 1876.
Do .....	Tierra Armarella, New Mexico.	Yarrow & Shedd .....	Do.
<i>Pantosteus delphinus</i> .....	Eagle River, Gypsum, Colo.	Evermann & Davis .....	Jordan, 1889.
Do .....	Gunnison River, Delta, Colo.	Jordan, Evermann, Fesler & Davis.	Do.
Do .....	Uncompahgre River, Delta, Colo.	do .....	Do.
Do .....	Rio de las Animas Perdidas, Durango, Colo.	do .....	Do.
Do .....	Rio Florida, Durango, Colo.	do .....	Do.
Do .....	Green River, Green River.	Evermann & Rutter .....	Evermann & Rutter, 1895.

This species we found abundant in Green River. The specimens secured do not differ materially from those collected by Jordan & Evermann in the Gunnison and Uncompahgre rivers in 1889.

3. *Pantosteus clarkii* (Baird & Girard).

Nominal species	Locality.	Collector.	Authority.
<i>Minomus clarkii</i> .....	Rio Santa Cruz .....	John N. Clark .....	Baird & Girard, 1854.
Do .....	do .....	do .....	Girard, 1859.
<i>Catostomus clarki</i> .....	Gila River, Ft. Thomas, Ariz.	Lieut. W. L. Carpenter .....	Kirsch, 1889.

4. *Catostomus latipinnis* (Baird & Girard).

Nominal species.	Locality.	Collector.	Authority.
<i>Catostomus latipinnis</i> .....	Rio San Pedro, tributary of Gila.	John H. Clark .....	Baird & Girard, 1853c.
<i>Acomus latipinnis</i> .....	do .....	do .....	Girard, 1856 and 1859.
<i>Catostomus latipinne</i> .....	Green River .....	Hayden collections .....	Cope, 1871.
<i>Catostomus latipinnis</i> .....	do .....	Jordan, Evermann, Fesler & Davis.	Jordan, 1889.
Do .....	Gila River, Ft. Thomas, Ariz.	Lieut. Carpenter .....	Kirsch, 1889.
Do .....	Gunnison River, Delta, Colo.	Jordan, Evermann, Fesler & Davis.	Jordan, 1889.
Do .....	Uncompahgre River, Delta, Colo.	do .....	Do.
Do .....	Green River, Green River, Wyo.	Evermann & Rutter .....	Evermann & Rutter, 1895.

This was even more abundant at Green River than *P. delphinus* and was found in the same places as that species. They both seem to prefer rather deep, quiet pools with mud bottoms. These specimens agree with others from Delta, Colo., with which they have been compared. The species is close to *Catostomus griseus*, the latter having a longer, slenderer snout and smaller fins.

5. *Catostomus gila* Kirsch. Types taken in the Gila River at Fort Thomas, Ariz., by Lieut. W. L. Carpenter, and described by Kirsch in 1889.

6. *Catostomus insignis* Baird & Girard.

Nominal species.	Locality.	Collector.	Authority.
<i>Catostomus insignis</i> .....	Rio San Pedro.....	John H. Clark.....	Baird & Girard, 1854.
Do.....	do.....	do.....	Girard, 1856 and 1859.
<i>Catostomus insignis</i> .....	Ash Creek, Arizona.....	Dr. J. T. Rothrock.....	Cope & Yarrow, 1876.
Do.....	"New Mexico".....	Dr. Oscar Loew.....	Do.
<i>Catostomus insignis</i> .....	Gila River, Ft. Thomas, Ariz.....	Lieut. Carpenter.....	Kirsch, 1889.

7. *Xyrauchen cypho* (Lockington).

Nominal species.	Locality.	Collector.	Authority.
<i>Catostomus cypho</i> .....	Colorado River at mouth of the Gila River.....		W. N. Lockington, 1880.
<i>Xyrauchen cypho</i> .....	Gila River, Ft. Thomas, Ariz.....	Lieut. Carpenter.....	Kirsch, 1889.
Do.....	Green River, Blake City, Utah.....	Jordan.....	Jordan, 1889.
Do.....	Gunnison River, Delta, Colo.....	do.....	Do.
Do.....	Uncompahgre R., Delta, Colo.....	do.....	Do.

8. *Xyrauchen uncomphagre* Jordan & Evermann. Types taken in the Uncomphagre River near the railway station at Delta, Colo., by Jordan, Evermann, Fesler & Davis, and described by Jordan & Evermann in 1889.

## CYPRINIDÆ. (The Minnow Family.)

The bulk of the species of the Colorado Basin belong to this family.\*

9. *Ptychocheilus lucius* Girard.

Nominal species.	Locality.	Collector.	Authority.
<i>Gila trout</i> .....	Gila River.....	Lieut. Col. W. H. Emory.....	Emory, 1848.
<i>Ptychocheilus lucius</i> .....	Rio Colorado.....	A. Schott.....	Girard, 1856 and 1859.
Do.....	Gila River, Ft. Thomas, Ariz.....	Lieut. Carpenter.....	Kirsch, 1889.
Do.....	Gunnison River, Delta, Colo.....	Jordan, Evermann, Fesler & Davis.....	Jordan, 1889.
Do.....	Uncomphagre R., Delta, Colo.....	do.....	Do.
Do.....	Green R., Blake City, Utah.....	do.....	Do.
Do.....	Green River, Green River, Wyo.....	Evermann & Rutter.....	Evermann & Rutter, 1895.

We did not secure any specimens of this large cyprinoid at Green River, but were told that it is a common fish in that part of the Green River. It is locally known as "whitefish," "white salmon," or "salmon," and individuals weighing 8 to 10 pounds are often taken with the hook.

10. *Gila elegans* Baird & Girard.

Nominal species.	Locality.	Collector.	Authority.
<i>Gila elegans</i> .....	Zuffi River.....	Dr. Woodhouse.....	Baird & Girard, 1853a and 1853b.
<i>Gila emoryi</i> .....	Near mouth of Gila River.....	John L. LeConte.....	Baird & Girard, 1853c.
Do.....	Gila River.....	do.....	Girard, 1856.
<i>Gila elegans</i> .....	Colorado River.....	A. Schott.....	Girard, 1856, 1858.
<i>Gila emoryi</i> .....	Gila River.....	John L. LeConte.....	Girard, 1858.
<i>Gila elegans</i> .....	Zuffi River.....	Dr. Woodhouse.....	Do.
<i>Gila emoryi</i> .....	Near mouth of Gila River.....	John L. LeConte.....	Girard, 1859.
<i>Gila elegans</i> .....	Colorado River, Cal.....	A. Schott.....	Do.
Do.....	Forks of Green River.....	Hayden collection.....	Cope, 1871.
Do.....	Ft. Bridger, Wyo.....	do.....	Do.
Do.....	San Juan River, New Mexico.....	Lieut. Birnie.....	Cope & Yarrow, 1876.
Do.....	Southwestern Arizona.....	F. Bischoff.....	Do.
<i>Gila emoryi</i> .....	Gila River.....	Lieut. Carpenter.....	Kirsch, 1889.
<i>Gila elegans</i> .....	Gunnison River, Delta, Colo.....	Jordan, Evermann, Fesler & Davis.....	Jordan, 1889.
Do.....	Green River, Blake City, Utah.....	Dr. Jordan.....	Do.

\* *Cyprinus carpio* Linnæus. *The German Carp*. This species was introduced from Europe into the United States in 1875 by the Government, and even earlier by private individuals. From the ponds it has escaped to the rivers and is now found in many of the larger rivers, including the Colorado.

11. *Gila robusta* Baird & Girard.

Nominal species.	Locality.	Collector.	Authority.
<i>Gila robusta</i> .....	River Zuni .....	Dr. Woodhouse.....	Baird & Girard, 1853a, 1853b.
<i>Gila gracilis</i> .....	do .....	do .....	Do.
<i>Gila grahami</i> .....	Rio San Pedro, tributary of Rio Gila...	John H. Clark .....	Baird & Girard, 1853c.
<i>Pychocheilus vorax</i> .....	Unknown .....	Lieut. Beckwith .....	Girard, 1856.
<i>Gila robusta</i> .....	River Zuni .....	Dr. Woodhouse .....	Do.
<i>Gila grahami</i> .....	Rio San Pedro, tributary of Rio Gila...	John H. Clark .....	Do.
<i>Gila gracilis</i> .....	River Zuni .....	Dr. Woodhouse .....	Girard, 1856, 1858.
<i>Gila robusta</i> .....	do .....	do .....	Girard, 1858, 1859.
<i>Gila grahami</i> .....	Rio San Pedro, tributary of Rio Gila...	John H. Clark .....	Do.
<i>Gila affinis</i> .....	"Kansas"; evidently an error .....	W. A. Hammond .....	Abbott, 1860.
<i>Leuciscus zunnensis</i> .....	Zuni River .....	Dr. Woodhouse .....	Günther, 1868.
<i>Gila grahami</i> .....	Ft. Bridger .....	Hayden collection .....	Cope, 1871.
<i>Gila gracilis</i> .....	do .....	do .....	Do.
Do .....	Henry's Fork of Green River .....	do .....	Do.
<i>Gila grahami</i> .....	do .....	do .....	Do.
<i>Gila nacrea</i> .....	Forks of Green River .....	do .....	Do.
<i>Gila robusta</i> .....	do .....	Campbell Carrington .....	Do.
<i>Gila robusta</i> .....	Gila River .....	H. W. Henshaw .....	Cope & Yarrow, 1876.
<i>Gila grahami</i> .....	do .....	Jas. M. Rutter .....	Do.
<i>Gila robusta</i> .....	Arizona .....	H. W. Henshaw .....	Do.
<i>Gila gracilis</i> .....	White River, Arizona .....	do .....	Do.
<i>Gila grahami</i> .....	do .....	Loew, Henshaw & Rutter .....	Do.
Do .....	Camp Apache .....	Dr. Loew .....	Do.
Do .....	Colorado Chiquito .....	Dr. Newberry .....	Do.
Do .....	Ash Creek, Arizona .....	Dr. Rothrock .....	Do.
<i>Gila nacrea</i> .....	Green River, Wyoming .....	do .....	Do.
<i>Gila robusta</i> .....	Uncompahgre R., Delta, Colo .....	Jordan, Evermann, Fesler & Davis .....	Jordan, 1889.
Do .....	Gunnison River, Delta, Colo .....	do .....	Do.
Do .....	Green River, Green River, Wyo .....	Evermann & Rutter .....	Evermann & Rutter, 1895.
Do .....	Babacomari Creek, Ariz .....	Dr. A. K. Fisher .....	Do.

This species seems to be distributed throughout the Colorado River Basin and is extremely variable. Compared with specimens from Salt River at Tempe, Ariz., ours from Green River differ in the obviously smaller eye and the possibly wider union of the gill-membranes with the isthmus. If, on further investigation, a northern form is found separable from the southern, it will bear the name *nacrea* Cope. The following is a detailed description of the six examples taken by us in Green River at Green River, Wyo., near the type locality of *Gila nacrea*:

Head, 3½ to 4; depth, 4½ to 4¾; eye, 3¼ to 4; snout, 3½ to 4; interorbital width, 2½; D. 9 or 10; A. 9 or 10; scales, 23 to 25-85 to 103-13 or 14; teeth, 2, 5-4, 2, hooked, no grinding surface. Body moderately slender, head broad, the upper profile longitudinally and transversely convex; snout decurved; mouth oblique, jaws subequal, maxillary barely reaching beyond front of orbit, about as long as from tip of snout to pupil; interorbital space very convex, 1½ times diameter of eye; back not strongly arched; caudal peduncle rather slender, compressed, the least depth 4 in head. Origin of dorsal behind insertion of ventrals, midway between nostrils and base of middle caudal rays; anterior dorsal rays somewhat produced, their length 1½ in head; anal smaller, length of longest ray 1½ in head; equal to length of pectoral; pectorals not quite reaching ventrals, the latter barely reaching vent, 1½ in head; caudal widely forked, the lobes longer than head. Scales very small, crowded on back; lateral line strongly decurved.

Two of these specimens, 3½ and 4 inches long, respectively, differ from the others in having a shorter, blunter head, and a slightly deeper caudal peduncle.

12. *Gila seminuda* Cope & Yarrow. Types taken in the Rio Virgen, Washington, Utah, and described by Cope & Yarrow in 1876.

13. *Leuciscus lineatus* (Girard).

Nominal species.	Locality.	Collector.	Authority.
<i>Hybopsis timpanogensis</i> .....	Gunnison River .....	Mr. Klett .....	Cope, 1874.
Do .....	do .....	do .....	Cope & Yarrow, 1876.
<i>Siboma atraria</i> .....	do .....	Mr. Henshaw .....	Do.
Do .....	Zuni River .....	do .....	Do.
Do .....	Colorado Chiquito River, New Mexico .....	do .....	Do.
<i>Siboma atraria longiceps</i> .....	Colorado Chiquito River .....	Dr. Newberry .....	Do.
Do .....	Snake Creek, Nevada .....	Dr. Yarrow .....	Do.
Do .....	Rio Virgen .....	do .....	Do.

14. *Leuciscus intermedius* (Girard). Types taken in the Rio San Pedro, tributary of Rio Gila, by John H. Clark, and described as *Tigoma intermedia* by Girard in 1856 and 1859.

15. *Leuciscus niger* (Cope).

Nominal species.	Locality.	Collector.	Authority.
<i>Gila gibbosa</i> .....	Rio Santa Cruz, tributary of Rio Gila.	John H. Clark.....	Baird & Girard, 1834.
<i>Tigoma gibbosa</i> .....	Tucson, Sonora, Ariz. ....	Heermann & Clark .....	Girard, 1856, 1859.
Do.....	Rio Santa Cruz, tributary of Rio Gila.	John H. Clark .....	Girard, 1859.
<i>Gila nigra</i> .....	Ash Creek, Arizona .....	Dr. Rothrock .....	Cope & Yarrow, 1876.
Do.....	San Carlos, Arizona .....	H. W. Henshaw .....	Do.

16. *Leuciscus egregius* Cope. Types taken in the Green River by the Hayden expedition and described as *Hybopsis egregius* by Cope in 1871.

17. *Tiaroga cobitis* Girard. Types taken in the Rio San Pedro, tributary of Rio Gila, by John H. Clark, and described by Girard in 1856 and 1859.

18. *Rhinichthys cataractæ dulcis* (Girard).

Nominal species.	Locality.	Collector.	Authority.
<i>Rhinichthys henshawi</i> , var. II.....	Colorado Chiquito .....	H. W. Henshaw .....	Cope, 1874.
<i>Rhinichthys henshawi</i> , var. III.....	Camp Apache, Arizona.....	do .....	Do.

19. *Agosia oscula* (Girard).

Nominal species.	Locality.	Collector.	Authority.
<i>Argyreus osculus</i> .....	Babacomari, tributary of Rio San Pedro, tributary of Rio Gila.	John H. Clark .....	Girard, 1856, 1859.
<i>Argyreus notabilis</i> .....	Rio Santa Cruz .....	do .....	Do.
<i>Ceratichthys ventricosus</i> .....	From Arizona .....	do .....	Cope, 1874.
<i>Apocope oscula</i> .....	Camp Apache, Arizona .....	H. W. Henshaw .....	Cope & Yarrow, 1876.
Do.....	Zuñi River .....	G. M. Keasby .....	Do.
Do.....	Pagosa, Colorado .....	Yarrow & Allen.....	Do.
<i>Apocope ventricosus</i> .....	From Arizona .....	do .....	Do.
Do.....	From New Mexico.....	do .....	Do.

20. *Agosia yarrowi* Jordan & Evermann.

Nominal species.	Locality.	Collector.	Authority.
<i>Agosia yarrowi</i> .....	Tomichi Creek, Colo. ....	Jordan, Evermann, Fesler & Davis.	Jordan, 1889.
Do.....	Gunnison River, Gunnison .....	do .....	Do.
Do.....	Gunnison River, Delta, Colo .....	do .....	Do.
Do.....	Uncompahgre River, Delta .....	do .....	Do.
Do.....	Green River, Blake City, Utah .....	Dr. Jordan .....	Do.
Do.....	Eagle River, Gypsum, Colo .....	Evermann & Davis .....	Do.
Do.....	Rio de las Animas Perdidas, Durango, Colo.	Jordan, Evermann, Fesler & Davis.	Do.
Do.....	Rio Florida, Durango, Colo.....	do .....	Do.
Do.....	Leiter Creek, Durango, Colo .....	do .....	Do.
Do.....	Green River, Green River, Wyo.	Evermann & Rutter.....	Evermann & Rutter, 1895.

Our collection from Green River, Wyoming, contains 57 specimens, which we provisionally refer to this species. They show some differences, however, and may prove to be an undescribed species. The following is a description of these specimens: Head, 4; depth, 4½; eye, 5; snout, 2½; interorbital width, 3½. D. I, 8; A. I, 7; scales, 13-73-10, about 30 before the dorsal. Body rather slender, compressed; head long, snout long; mouth inferior, horizontal; barbel present; opercle rather short and evenly rounded. Caudal peduncle long, compressed, and rather deep. Scales larger than in *A. yarrowi*, much reduced in size on back on anterior part of body; lateral line complete, nearly straight.

Fins moderate, the height of the dorsal 1½ in head, the free edge somewhat concave; origin of dorsal fin behind ventrals, midway between base of middle caudal rays and nostril; anal fin falcate, its anterior rays equal to longest dorsal rays; pectorals rather short, 1½ in head, not reaching ventrals; ventrals short, barely reaching front of anal fin; caudal fin widely forked. Color in alcohol, olivaceous above, with darker marbling and small dark spots scattered irregularly over back and sides, few of which are, however, found below lateral line; under parts pale straw-color or silvery; fins all plain. The numerous specimens show but little variation from the above description, except in the squamation; the number of scales in the lateral line varies from 70 to 76. Occasionally there are 9 dorsal rays; eye, 4½ to 5; depth, 4½ to 4¾; head, 4 to 4¾. From specimens of *Agosia yarrowi*, from Gunnison, Colo., these differ in having larger scales (16-74 to 80-13 in *yarrowi*), deeper and more compressed caudal peduncle, and narrower head.

This species was found to be quite abundant at Green River. It seemed to go in schools and to be found in the current, where they were feeding upon the gravelly bottom. At some hauls of the seine none at all would be taken, while at others considerable numbers would be secured.

- 21. *Agosia couesii* (Yarrow). Types from near Camp Apache, Arizona, described as *Apocope couesi* by Yarrow in 1876, and recorded by Cope & Yarrow, 1876.
- 22. *Agosia chrysoaster* Girard.

Nominal species.	Locality.	Collector.	Authority.
<i>Agosia chrysoaster</i> .....	Rio Santa Cruz.....	John H. Clark .....	Girard, 1856, 1859.
<i>Agosia metallica</i> .....	Rio San Pedro, tributary of Rio Gila.	.....do .....	Do.
<i>Hyborhynchus siderius</i> .....	Camp Lowell, Arizona .....	Jas. M. Rutter .....	Cope & Yarrow, 1876.

- 23. *Couesius squamilentus* Cope. Types from Henry Fork of Green River, Hayden collection, described as *Ceraticthys squamilentus* by Cope, 1871.
- 24. *Lepidomeda vittata* Cope. Types collected in the Colorado Chiquito by Dr. Newberry, described by Cope in 1874, and again recorded by Cope & Yarrow, 1876.
- 25. *Lepidomeda jarrovii* Cope. Types collected in the Colorado Chiquito by Yarrow & Henshaw, and described by Cope in 1874, and recorded by Cope & Yarrow, 1876.
- 26. *Meda fulgida* Girard.

Nominal species.	Locality.	Collector.	Authority.
<i>Meda fulgida</i> .....	Rio San Pedro, tributary of Rio Gila.	John H. Clark.....	Girard, 1856, 1859.
Do.....	.....do .....	Yarrow & Henshaw .....	Cope, 1874.
Do.....	.....do .....	.....do .....	Cope & Yarrow, 1876.

- 27. *Plagopterus argentissimus* Cope. Types from San Luis Valley in western Colorado, described by Cope, 1874, and again reported by Cope & Yarrow, 1876.
- 28. *Salmo mykiss pleuriticus* (Cope).

Nominal species.	Locality.	Collector.	Authority.
<i>Salmo (Salar) virginialis</i> .....	Near Ft. Bridger, Wyo .....	Hayden collection .....	Cope, 1871.
Do.....	Henry Fork of Green River .....	.....do .....	Do.
<i>Salmo pleuriticus</i> .....	Headwaters of Green River .....	Carrington & Logan .....	Cope, 1872.
Do.....	White River, Ariz. ....	H. W. Henshaw .....	Cope & Yarrow, 1876.
Do.....	White Mountains, Ariz. ....	.....do .....	Do.
<i>Salmo mykiss pleuriticus</i> .....	Pagosa, Colo. ....	C. B. Aiken .....	Do.
Do.....	Trapper Lake, Colorado .....	Jordan, Evermann, Fesler & Davis.	Jordan, 1880.
Do.....	Eagle River, Gypsum, Colorado...	Evermann & Davis .....	Do.
Do.....	Cañon Creek, Glenwood Springs, Colo.	Jordan, Evermann, Fesler & Davis.	Do.
Do.....	Sweetwater Lake, Eagle Co., Colo.	.....do .....	Do.
Do.....	Gunnison River, Gunnison, Colo.	.....do .....	Do.
Do.....	Rio Florida, Durango, Colo .....	.....do .....	Do.

No trout were seen by us at Green River, but we were informed that they are occasionally taken there and that they are common further up the river in the small tributaries.

29. *Coregonus williamsoni* Girard. *Rocky Mountain Whitefish*. The only reference to this species which we have seen, applying to this basin, is that of Cope, 1871, who had specimens in the Hayden collections, probably from Green River, near Fort Bridger. Numerous young individuals were taken by us at Green River, Wyoming, where it is a common fish, attaining considerable size and being of value as a food-fish.
30. *Cyprinodon macularius* Baird & Girard. The types of this species were collected by John H. Clark in the Rio Gila and described by Baird & Girard in 1853 (c). In the Mexican Boundary Survey Girard credits the same specimens to the Rio San Pedro of the Gila. Only the types are known.
31. *Heterandria occidentalis* Baird & Girard.

Nominal species.	Locality.	Collector.	Authority.
<i>Heterandria occidentalis</i> .....	Rio Santa Cruz .....	John H. Clark .....	Baird & Girard, 1853 c.
<i>Girardinus occidentalis</i> .....	.....do .....	.....do .....	Girard, 1859 a.
Do .....	Tucson .....	{ Dr. Heermann .....	Girard, 1859 b.
<i>Girardinus sonoriensis</i> .....	Camp Lowell, Ariz .....	{ Arthur Schott..... } H. W. Henshaw.....	Cope & Yarrow, 1876.

32. *Cottus bairdi punctulatus* (Gill). *Blob*; "Bullhead."

Nominal species.	Locality.	Collector.	Authority.
<i>Uranidea punctulata</i> .....	Headwaters of Green River.....	Hayden collections .....	Cope, 1871.
<i>Potamocottus punctulatus</i> ...	Between Bridger Pass and Fort Bridger.	.....do .....	Gill, 1876.
<i>Uranidea vheeleri</i> .....	Rio San Juan, Pagosa, Colo.....	Yarrow & Aiken .....	Cope, 1876.
<i>Cottus bairdi punctulatus</i> ...	Eagle River, Gypsum, Colo.....	Evermann & Davis.....	Jordan, 1889.
Do .....	Roaring Fork, Glenwood Springs, Colo.	Jordan, Evermann, Fesler & Davis.	Do.
Do .....	Gunnison River, Gunnison, Colo.	.....do .....	Do.
Do .....	Gunnison River, Delta, Colo.....	.....do .....	Do.
Do .....	Rio Florida .....	.....do .....	Do.
Do .....	Leitner Creek, Durango, Colo.....	.....do .....	Do.
Do .....	Rio de las Animas Perdidas, Durango, Colo.	.....do .....	Do.
Do .....	Green River, Green River, Wyo..	Evermann & Rutter .....	Evermann & Rutter, 1895.

The blob was quite abundant at Green River, but most of the individuals secured were young. They were found in greatest numbers in some small isolated ponds or pools on the river bank.