

REPORT ON THE FISHES OF THE DEATH VALLEY EXPEDITION COLLECTED IN SOUTHERN CALIFORNIA AND NEVADA IN 1891, WITH DESCRIPTIONS OF NEW SPECIES.

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LIST OF SPECIES.

<i>Ameiurus nebulosus</i> Le Sueur.	<i>Salmo irideus</i> Gibbons.
<i>Catostomus aræopus</i> Jordan.	<i>Salmo mykiss aqua-bonita</i> Jordan.
<i>Rhinichthys (Apocope) velifer</i> , sp. nov.	<i>Cyprinodon macularius</i> Girard.
<i>Rhinichthys (Apocope) nevadensis</i> , sp. nov.	<i>Cyprinodon macularius baileyi</i> , subsp. nov.
<i>Rutilus symmetricus</i> (B. & G.).	<i>Empetrichthys merriami</i> , gen. et sp. nov.
<i>Lepidomeda cittata</i> Cope.	<i>Gasterosteus williamsoni</i> Girard.
<i>Cyprinus carpio</i> Linn.	

**Ameiurus nebulosus** Le Sueur.

Two specimens of this introduced species were procured at Lone Pine, on Owens River, where the species was reported as abundant.

**Catostomus aræopus** Jordan.

*Type locality*.—South Fork of Kern River, California.

One specimen from Reese River, Nevada. Collected by Vernon Bailey.

**Rhinichthys (Apocope) velifer**, sp. nov. (Plate VI, Fig. 2.)

*Type locality*.—Pahranaagat Valley, Nevada.

This species is closely related to *Rhinichthys yarrowi*, from which it differs in the much larger scales, the lateral line traversing 55 instead of 74 to 83 scales. Both species mark such perfect transition between *Apocope* and *Rhinichthys* that it seems best to reduce the former to the rank of a subgenus. About half the specimens of *yarrowi* have a narrow frenum, and this is present in each of the three type specimens of *velifer*. In both *yarrowi* and *velifer* the teeth are 2-4-4-2, as in typical *Rhinichthys*. The only character left to distinguish *Apocope* is the narrowness of the frenum when present, it being very wide in typical *Rhinichthys*.

Head 4 in length; depth,  $4\frac{3}{4}$ . Snout narrow, but bluntly rounded, not projecting beyond the front of premaxillaries. Frenum joining premaxillaries to skin of forehead very narrow, varying in width in the three type specimens. It will probably be found that some specimens of this species, as of *yarrowi*, have protractile premaxillaries. Mouth

small, horizontal, the maxillary reaching vertical from front of orbit, equaling diameter of eye,  $3\frac{1}{2}$  in length of head. Interorbital width, 3 in head.

Teeth 2, 4-4, 2, hooked, with sharp edges.

Pectorals nearly reaching base of ventrals, the latter long, overlapping front of anal fin. Origin of dorsal fin midway between base of caudal and middle of eye.

D., 8; A., 7 Lat. l. 56 (pores). 10 scales in a series obliquely forward to lateral line from base of first dorsal ray.

Color in spirits, brown along back, a black band from snout across cheeks and along middle of sides, with a narrow silvery streak above it. Lower half of sides and belly silvery; an ill-defined dark streak from base of pectorals back along sides to the end of the anal fin. A small black spot on base of caudal.

Three specimens were taken in a hot spring in Pahrnagat Valley, Nevada, May 25, 1891, by C. Hart Merriam and Vernon Bailey. Temperature of spring  $36.11^{\circ}$  C. ( $97^{\circ}$  F.).

**Rhinichthys (Apocope) nevadensis**, sp. nov. (Plate VI, Fig. 1.)

*Type locality*.—Ash Meadows, Amargosa Desert, on boundary between California and Nevada.

Differing from other known species in the large head, the short deep body, very small eye, and in the reduction of the outer ventral ray to a mere rudiment.

Head,  $3\frac{3}{8}$  in length (varying from  $3\frac{1}{2}$  to 4); depth,  $3\frac{3}{8}$  (varying from  $3\frac{1}{2}$  to 4). D., 8; A., 7. Lat. l. 65. Ventrals apparently with seven rays, the outer one rudimentary, and often to be detected with difficulty.

Body robust, with broad heavy head, the least depth of caudal peduncle less than half the greatest height of body. Greatest depth of head at occiput 5 in length of body ( $6\frac{1}{4}$  in nubila of equal size). Eye very small, half interorbital width, which equals distance from tip of snout to middle of eye, and is contained  $2\frac{3}{8}$  times in head.

Mouth terminal, very oblique, the lower jaw included, the premaxillaries not at all overlapped by the snout. The maxillary reaches the vertical from front of eye, and is one-third length of head. Maxillary barble well developed.

Scales very irregularly placed, and difficult to enumerate. The lateral line is incomplete in adults, and usually does not reach to opposite dorsal fin. In the young it is variously developed, often extending, though with many interruptions, to end of dorsal or base of caudal. Pores in lateral line (when complete) 58, about 66 oblique series, counted above lateral line.

Fins small, the pectorals not reaching ventrals, the latter not to vent. Front of dorsal midway between base of caudal and middle of occiput.

In spirits, the upper half of sides is speckled and marbled with brown; the belly and lower half of sides immaculate or sparsely spotted. A broad dark lateral stripe usually present, becoming more conspicuous

posteriorly, and ending in an obscure black spot on base of tail. A dark stripe sometimes present along middle of lower half of sides.

Numerous specimens were procured in the warm springs at Ash Meadows, Indian Creek, and Vegas Creek, Nevada.

**Rutilus symmetricus** (Baird and Girard).

*Type locality.*—Old Fort Miller, Fresno Co., San Joaquin Valley, California.

Specimens from Owens Lake, California, seem to agree with those reported on by Jordan and Henshaw (*Leucos formosus*, Rep. Chief Engineer, Wheeler Surv. W. 100th Mer., App. NN, 1878, 193) from Washoe Lake, Nevada, and Kern Lake, California. There are 11 scales between lateral line and front of dorsal, and 52 scales in lateral line. Teeth 4–5. There are seven or eight rays in the anal fin, and the head is  $3\frac{3}{8}$  in the length. The lateral line is imperfect in the young.

The American species of this genus are poorly defined, and may be reducible to one or two species. If the specific forms prove to be numerous there is no assurance that these specimens are identical with the types of *Pogonichthys symmetricus* and *Algansea formosus* from the San Joaquin and Mohave rivers.

**Lepidomeda vittata** Cope.

*Type locality.*—Little Colorado River, Arizona.

Three small specimens from Pahranaagat Valley, Nevada, agree well with the original description of this species, and are probably referable to it. It has been recorded hitherto only from the original locality, the Colorado Chiquito River, Arizona, and its occurrence in the present locality is full of interest. Not only *Lepidomeda* but the whole subfamily (the *Plagopterinae*) to which it belongs, is peculiar to the basin of the Colorado River, to which the Pahranaagat waters must belong.

**Cyprinus carpio** Linn.

A specimen of this introduced species was found dead on the shores of Owens Lake. Carp and catfish are both common in the lower Owens River, and when they enter the lake are soon killed by the alkalinity of the water.

Mr. Palmer and Dr. Fisher reported carp as the staple food fish at Three Rivers on the Kaweah River, where numerous large individuals were taken.

**Salmo irideus** Gibbons.

*Type locality.*—San Leandro Creek, Alameda Co., California.

A single specimen of the 'Rainbow Trout' was preserved by Dr. A. K. Fisher from the Cañon of Kings River. Compared with specimens from the Santa Cruz Mountains in the vicinity of Palo Alto, this is found to agree in all respects. The coloration is very bright as is usual in the colder mountain streams. The scales above the lateral line are arranged in 135 oblique series.

**Salmo mykiss agua-bonita** Jordan.

*Type locality.*—Whitney Creek south of Mt. Whitney, High Sierra, California. (Jordan, Report State Fish Commissioners of California, 1892, p. 62.)

Several specimens of this, the 'Golden Trout' of Kern River, were collected in Whitney Creek, whence came the original types, and from Cottonwood Creek, a tributary of Owens Lake, to which they have been transplanted. Two specimens were also preserved, taken from the South Fork of Kern River. They agree perfectly with the original description cited. The scale formula should read 180 to 200, not 130 to 200, as in the original description.

**Cyprinodon macularius** Girard.

*Type locality.*—Rio San Pedro, Arizona.

(*Cyprinodon nevadensis* Eigenmann, Proc. Cal' Acad. Nat. Sci., 1889, 270.)

This small Cyprinodont inhabits the springs and wells throughout the desert region of southern California, Arizona and Nevada, and is the characteristic denizen of the more or less alkaline waters of this district. The original types are from the Rio San Pedro, a tributary of the Rio Gila, and I have found it abundant at a pond at Lerdo, Mexico, on the lower Colorado River. Specimens obtained at Lerdo have been compared with those from Death Valley and found identical.

The species varies in form and color, and apparently in the size which it reaches in different localities. The males have the back and sides uniform dusky, the lower parts lighter, all the fins in the most brightly colored individuals being broadly margined with black. The females have the lower half of sides as well as belly lighter, often silvery white, the sides crossed by black bars, which are wide along middle of body, but become much narrower than the interspaces on the lower half of sides. The bars vary in number and size and often alternate with narrower, fainter, and shorter ones. The fins are light, and the dorsal either with or without a black blotch on its posterior rays. Although usually uniform in coloration, the males occasionally show lateral bars, which, however, contrast little with the general dusky color of the sides.

The dorsal varies from 9 to 11, and the anal from 10 to 11. There are 24 or 25 transverse series of scales, and the humeral scale is but little enlarged. The head is contained 3 to  $3\frac{1}{4}$  times in the length. Adults are very short and deep, the depth being nearly or quite half the length; in half-grown specimens 1 inch long, the depth is contained  $2\frac{2}{5}$  in the length. The eye is very small, about equaling the snout, contained  $1\frac{1}{2}$  to  $1\frac{3}{4}$  times in the interorbital width, and  $3\frac{3}{8}$  times in the head. The front of dorsal is usually midway between occiput and base of caudal.

The normal number of ventral rays in this species seems to be six. No specimen examined has shown more than this number, and in several but five are present. In one specimen from Ash Meadows, Nevada, the ventral of one side only is present, and contains but three or four

rays. Four young specimens from the same locality and two from Medbury Springs, Amargosa Desert, California, have the ventrals wholly aborted, and show on dissection no trace of the basals. These occur in the same lots with other specimens having normal ventrals, and are otherwise indistinguishable from them. No full-grown adults were found without ventrals, the largest being a half-grown specimen about one inch long with the characteristic coloration of the males already developed. Ten young specimens from the 'Devil's Hole,' Ash Meadows, are all without ventrals, and further collections from this locality would be of interest.

In the intestines were found fragments of insects, and in one series of specimens from Saratoga Springs at the south end of Death Valley, California, very numerous shells of a small Gasteropod mollusk.

Specimens are in the collection from the following localities: Medbury Spring (6 miles north of the Borax Works), Amargosa Desert, California; Ash Meadows, Amargosa Desert, Nevada; Saratoga Springs, Death Valley, California; Amargosa Creek, California.

*Cyprinodon macularius baileyi*, subsp. nov.

*Type locality*.—Pahranaḡat Valley, Nevada, collected by C. Hart Merriam and Vernon Bailey, May 25, 1891.

Eleven immature specimens from Pahranaḡat Valley, Nevada, show no trace of ventral fins. They are olivaceous above, bright silvery on the lower half of sides and below, and have two lengthwise series of coarse black spots, one along middle line of body, the other on a level with the lower edge of caudal peduncle. The anal fin is larger than in typical *macularius*, the eleven specimens having each 13 rays instead of 10 or 11, as constantly in the latter. The material is insufficient to fully decide the status of this form. Except in the characters noted it agrees in proportions and formulæ with *macularius*.

EMPETRICHTHYS gen. nov. (Plate v.)

(Cyprinodontidæ).

Intestines short,  $1\frac{1}{2}$  times length of body. Teeth conic, fixed, in each jaw arranged in a band consisting of two or three rows, the outer series somewhat enlarged. Ventrals absent. Branchiostegals five. Both upper and lower pharyngeals greatly enlarged and bearing molar teeth, tubercular in shape. The lower pharyngeals are firmly attached to the ceratobranchials of the fourth arch, while the massive epibranchials of the same arch serve to connect them firmly at the sides with the pharyngobranchials above. The fourth branchial arch bears normal gills. Its median portion is produced anteriorly, forming a triangular extension of the lower pharyngeals in the middle line. On the oral surface this is indistinguishable from the pharyngeals proper, and like them bears molar teeth.

Scales normal, large, regularly imbricated, nowhere tubercular or ridged.

This genus seems most nearly allied to *Orestias*, of which numerous species have been described from lakes in the high Andes of South America.

***Empetrichthys merriami*, sp. nov.** (Plate v.)

*Type locality*.—Ash Meadows, Amargosa Desert, on boundary between California and Nevada.

In form and general appearance much resembling the mud minnow (*Umbra limi*), though somewhat deeper and more compressed.

Head compressed, its upper surface slightly convex. Mouth very oblique, with a distinct lateral cleft, the maxillary free at tip only, reaching slightly behind front of eye. Length of gape (measured from tip of snout to end of maxillary),  $3\frac{1}{2}$  in head; interorbital width,  $2\frac{1}{2}$ ; length of snout (from front of orbit to middle of upper jaw),  $3\frac{3}{4}$ . Eye small, its greatest oblique diameter 5 to  $5\frac{1}{2}$  in head.

Distance from front of dorsal to middle of base of tail equals one-half its distance from tip of snout. The dorsal begins slightly in advance of anal, and ends above its posterior third. Its greatest height equals length of snout and eye.

Caudal truncate when spread. Pectorals broadly rounded, reaching half way to vent. D., 11 or 12 (13 in one specimen); A., 14 (from 13 to 15). Lat. 1., 30 or 31, counted to base of caudal rays; 33 or 34 in all.

In spirits the color is dark brown above, sides and below lighter, often irregularly blotched with brown and white. The belly often appears checkered, having centers of scales brown and margins white, or the reverse. Fins all dusky, the basal portions of dorsal and caudal with elongated brown spots on the interradial membranes.

Several specimens were secured at Ash Meadows and in Pahrump Valley, Nevada.

***Gasterosteus williamsoni* Girard.**

*Type locality*.—Williamson Pass, California.

Four specimens of this species collected by Dr. A. K. Fisher at San Bernardino, California, seem to differ from *G. microcephalus* only in the entire absence of plates on the sides. In *microcephalus* the plates vary from 3 to 7 in number, but no specimens wholly without plates have been reported from the more northern parts of its range. It is probable that *williamsoni* will prove a southern subspecies of this widely distributed form, in which case the plated specimens must bear the name *Gasterosteus williamsoni microcephalus*. The naked form has been reported heretofore from San Bernardino (by Miss Rosa Smith), and from Williamson's Pass by the original describer. The locality of the pass I have not been able to make out.