Enjoy thy stream, O harmless fish;
And when an angler for his dish,
Through glutton's vile sinne,
Attempts, the wretche, to pull thee out,
God give thee strength, O gentle trout,
To pull the raskall in!

From *The Scottish Field*, January, 1945,
as quoted by Carl and Clemens

FISHES AND FISHERIES OF NEVADA

By

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Nevada State Fish and Game Commission

1962

SPRINGFISHES

Genus *Crenichthys* Hubbs 1932

("Spring fish")

KEY TO SPECIES

Lateral dark spots in two series (White River system)
(*Crenichthys baileyi*)........................ WHITE RIVER SPRINGFISH
Lateral dark spots in a single series (Railroad Valley)
(*Crenichthys nevadae*)....... RAILROAD VALLEY SPRINGFISH

WHITE RIVER SPRINGFISH

Crenichthys baileyi (Gilbert)

(Bailey Minnow, White River Killifish)

Cyprinodon macularius baileyi Gilbert 1893: 233
Cyprinodon baileyi, Jordan and Evermann, 1896B: 675
Cyprinodon baileyi, Jordan, Evermann and Clark, 1930: 182
Cyprinodon baileyi, Schrenkeisen, 1938: 186
Crenichthys baileyi, Sumner and Sargent, 1940: 46, 50
Crenichthys baileyi, Hubbs, 1941: 68
Crenichthys baileyi, Hubbs and Miller, 1941: 1–3 / 1948A: 8, 10
Cyprinodon macularius baileyi, ibid, 1941: 1–3
Crenichthys baileyi, Tanner, 1942: 31
Crenichthys baileyi, Sumner and Lanham, 1942: 319, 326
Crenichthys baileyi, Miller, 1943A: 9, 19
Cyprinodon macularius baileyi, ibid
Crenichthys baileyi, Kopec, 1949, 56–61
Crenichthys baileyi, La Rivers, 1949: 222 / 1950C: 372 / 1952: 91
Cyprinodon macularius baileyi, Tanner, 1950: 32, 35
Crenichthys baileyi, La Rivers and Trelease, 1952: 118
Cyprinodon macularius baileyi, Böhlke, 1953: 53
Crenichthys baileyi, Eddy, 1957: 162
Crenichthys baileyi, Moore, 1957: 151

ORIGINAL DESCRIPTION

"Eleven immature specimens from Pahranagat 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 formulae with *macularius*" (Gilbert 1893: 233).

DIAGNOSIS

Head about 3.2, body depth about 3.2, times in body length, respectively; head large, blunt, flat in profile in young specimens, concave in

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from above; mouth, in latera
scales about 27 in lateral lin
anal; fins—dorsal and anal
removed from caudal base a
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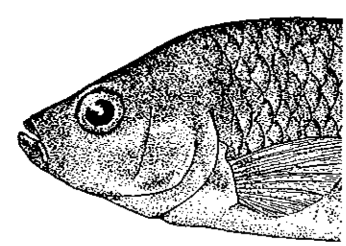

FIG. 228. White Ri
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Vernon Bailey, May 25, 189
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only one interim lapse in the
Cyprinodon macularius baile
As Hubbs noted when desc
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Both of these fundulines ag

older ones, steeply sloping, very broad in older individuals when viewed from above; mouth, in lateral view, small and straight; teeth bicuspid; scales about 27 in lateral line, 18 before the dorsal, 10 from dorsal to anal; fins—dorsal and anal set far back, less than their own lengths removed from caudal base and about 11 and 14-rayed, respectively—dorsal about exactly over anal—pectorals about 16-rayed—pelvics lacking—caudal about 28-rayed, straight in terminal outline; color pattern—the two lateral rows of dark spots against a lighter background are unusually distinctive, although some individuals show but one line or none; size small, reaching a maximum of about 2½ inches.

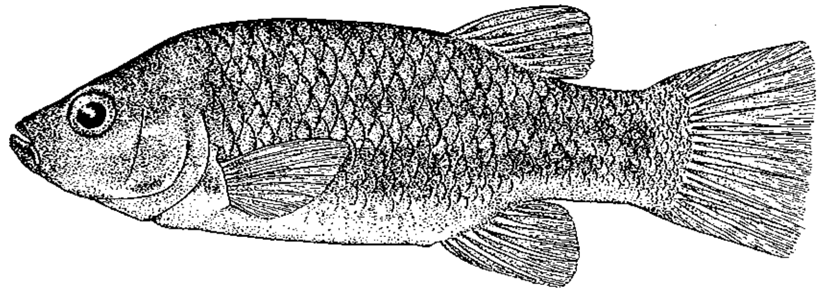

FIG. 228. White River Springfish, *Crenichthys baileyi*. Drawn by Silvio Santina.

TYPE LOCALITY

"Pahranagat Valley, Nevada, collected by C. Hart Merriam and Vernon Bailey, May 25, 1891" (Gilbert 1893: 233). The locality is in Lincoln County, with Alamo the principal town in the valley.

RANGE

Found in suitable warm springs and their effluents at intervals along the now disrupted Pluvial White River drainage system of extreme eastern and southern Nevada, from the vicinity of Preston and Lund in the north (White Pine County), south to Warm Springs, Clark County (headwaters of the Moapa or Muddy River), a lineal distance of some 150 miles.

TAXONOMY

The species has had some nomenclatorial instability of minor importance in the 60-odd years since its initial description, but has accumulated no synonyms. Gilbert originally assigned it to subspecific status under the then widespread *Cyprinodon macularius* Baird and Girard 1853; Jordan and Evermann (1896B) considered it a species, as is its current status. In 1940, Sumner and Sargent, on the advice of Hubbs, associated *baileyi* with its present genus, *Crenichthys*. There has been only one interim lapse in the terminology, that of Tanner's return to *Cyprinodon macularius baileyi* in 1950.

As Hubbs noted when describing *Crenichthys* in 1932, the genus is closely related to Gilbert's *Empetrichthys* of the Amargosa system. Both of these fundulines agree in their loss of the pelvic fins, the extreme posterior position of both dorsal and anal fins, the lack of vomerine teeth and pseudobranchiae, and in oviduct characteristics. They differ in intestinal lengths (the intestine of the herbivorous *Crenichthys* being long and coiled, while that of the omnivorous *Empetrichthys* is much shorter). Other minor differences are detectable in the jaw and tooth structure.

Etymology—Named in honor of the famous U. S. Bureau of Biological Survey field naturalist, Vernon L. Bailey, who was one of the collectors of the type series.

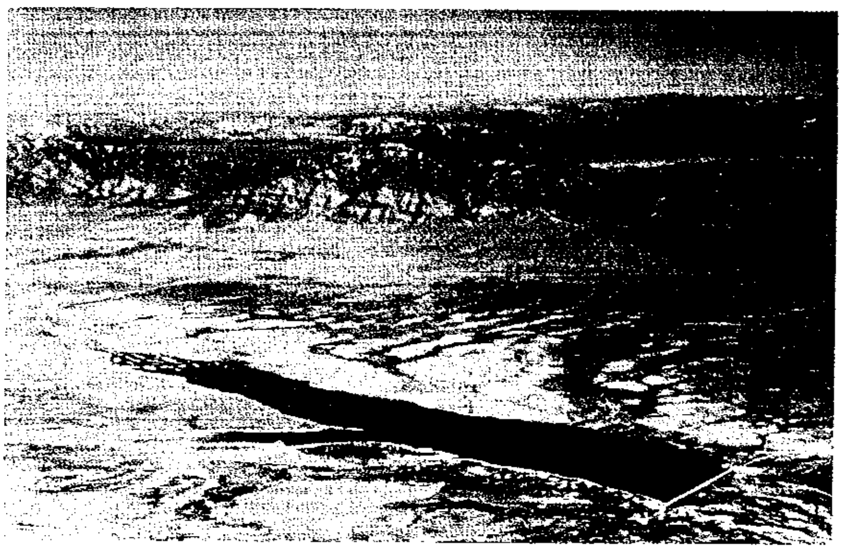

FIG. 229. Adams-McGill Reservoir (Sunnyside Reservoir) in the Sunnyside Wildlife Management Area, looking east to the Egan Range. Cave Valley and Ely Range lie just beyond. The reservoir is in White River Valley and is an impoundment of White River which is fed by numerous springs as well as by the small river. This photograph, taken by Tom Trelease on March 9, 1961, also shows the parallel arrangement of north-south striking valleys and ranges. Note the marked stratification of the limestone mountains.

LIFE HISTORY

More varied and detailed work has been done with this species than any other of our cyprinodonts. Kopec (1949) has described the breeding activities and immature stages, while Sumner et al have published data on certain phases of their metabolism (1940 and 1942).

In general, *C. baileyi* is common wherever found. As Kopec observed them, the male exhibited characteristic courting behavior, and, after sufficient excitation to induce the female to extrude eggs, fertilized them singly as they appeared. Only one egg was laid and fertilized at a time. From 10 to 17 eggs seemed to constitute a spawning. Each egg measured 1.9 mm. in diameter, and the incubation period was from 5 to 7 days. The species apparently lacks cannibalistic tendencies, for he reared the young safely in the presence of adults. His paper contained detailed descriptions of the *prolarva* (newly hatched), *postlarva*

(87 hours old), *juvenile* (15
first two stages being illustra
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Clark County.

Sumner and Sargent (19
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FIG. 230. Crystal Sprin
Photo by

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cannibalistic tendencies, for
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a (newly hatched), *postlarva*

(87 hours old), *juvenile* (15 days old) and *young* (17.7 mm. long), the first two stages being illustrated. Infusoria and *Daphnia* were used as food for these immatures, and Kopec's conclusions were that the species was essentially carnivorous. His material came from Warm Springs, Clark County.

Sumner and Sargent (1940) made field studies on *Crenichthys baileyi* populations in the vicinity of Preston and Lund, White Pine County, to determine the relation of temperature to respiratory metabolism. Their experiments consisted of immersing specimens in thousandth-molar potassium cyanide (KCN) solutions and noting survival times at different temperatures.

Fig. 230. Crystal Springs, Pahranagat Valley, Lincoln County. Photo by the author in July 1937.

"At different temperatures, the reciprocals of the times of survival of fishes in thousandth-molar KCN solution are in very nearly the same ratio as the measured rates of oxygen consumption at the same temperatures . . ." Briefly, they found that populations of *C. baileyi* living in a warmer spring (35.5° C. to 37° C. = 96° F. to 98.5° F.) had less than a fourth the survival time of the same species in a cooler spring (21° C. = 70° F.), each series being tested at its own temperatures of water, the indication being that fish from the warmer spring had metabolic rates some four times those of fish from cooler water.

They also found that specimens could be transferred from warm to cooler water and returned to the warm water without ill-effects; however, when the reverse transferal was attempted, that of placing individuals native to cooler water in warm water, they rapidly succumbed.

"The death of the cold-spring individuals in warm water seems to have been due neither to the greatly reduced oxygen content of the latter nor to the heightened oxygen requirements of the fishes themselves. This is rendered probable by two circumstances: (1) the oxygen content, at the points where the experiments were actually performed, was nearly or quite as great in Mormon Spring [warm water] as in Preston Spring [cooler water]; (2) fishes of the warm-spring population swim freely into the immediate vicinity of the point of outflow, and thus into water having an oxygen content not more than a sixth that of the stream a short distance below. Many fishes are known to be able to adjust themselves to widely different oxygen concentrations in their medium" (p. 53).

In 1942, Sumner and Lanham conducted further field tests on *C. baileyi* in the neighborhood of Preston. In these experiments, the metabolic constants were based upon titration for oxygen content of water, before and after occupancy by test specimens of *Crenichthys*.

"At the close of each test of oxygen consumption, the fishes involved were dried upon paper towels and weighed. The aggregate weight of each lot, together with the estimated original oxygen titre of the water, the oxygen titre at the close of the test, the volume of water in the tube (allowing for volume occupied by the fishes), and the exact duration of the test, are the data upon which the metabolic rates (ml./gm./hr.) are based" (p. 316).

Their conclusions were that the populations in warmer springs had a much higher demand for oxygen than those in cooler springs (the same two springs were used as in the 1940 studies), those of the former consuming about twice as much oxygen in a given period as the latter. Transferring warm spring fishes to the cooler spring resulted in a drop of oxygen demand to the approximate level of the native cool spring population in about 24 hours. Their data also indicated that the oxygen consumption of smaller specimens was much more dependent upon temperature changes than was that of the larger individuals.

ECONOMICS

Although the White River Springfish occurs with other species of fishes,[1] most of these are no larger than it is, or are not predaceous.[2] The White River Colorado Gila (*Gila robusta jordani*) of Pahranagat Valley, and the Colorado Gila in the upper Moapa River are the only native carnivores of any ichthyological importance as possible predators of the springfish, and they are not common. The springfish has no value from the standpoint of human economics.

[1]White River Speckle Dace (*Rhinichthys osculus velifer*), Moapa Dace (*Moapa coriacea*), Spinedace (*Lepidomeda* species), and Mosquitofish (*Gambusia affinis*).

[2]White River Mountainsucker (*Pantosteus intermedius*).

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Crenichthys nevadae, Miller

ORIGINAL DE

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least depth enters the head 2

"The head is very heavy
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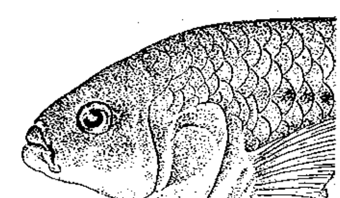

FIG. 231. Railroad V
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to a nearly straight line ab
again on the snout. The len
in the standard length. The
orbital enters the head 2.5
wide as the orbit, which en
combined length of snout a
the postorbital length.

"The mouth in anterior v
jection. The upper lip is
about one-fourth as long (o
of the lips, and also of the n

"Scales in 30 rows from
gill-slit to caudal base, and
and anal fins.