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STUDIES OF THE FISHES OF THE ORDER CYPRI-  
NODONTES. XII. A NEW GENUS RELATED  
TO *EMPETRICHTHYS*

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ONE of the outstanding ichthyological surprises of recent years is the discovery of a very distinct new genus of cyprinodont fishes in a warm spring of central Nevada. The two known specimens were collected by Dr. and Mrs. C. T. Brues, in the course of an extended investigation of hot spring faunas. My thanks are due Dr. Brues for permission to make this novelty known. I am also indebted to George S. Myers who has loaned comparative material of *Empetrichthys merriami*, and to Grace Eager who has made the beautiful and accurate portrait of the holotype reproduced on the accompanying plate.

*Crenichthys*, as this new fish is named in reference to its spring habitat, is to all appearances a relative of *Empetrichthys*. That remarkable genus was discovered on the Death Valley Expedition, near the border of California and Nevada. In describing *Empetrichthys*, Gilbert (1893: 233-234) remarked that it "seems most nearly allied to *Orestias*, of which numerous species have been described from lakes in the high Andes of South America." Garman (1895: 116) regarded the genus as "allied to *Fundulus* through the more com-

pressed species," though he approximated and compared *Empetrichthys* with *Orestias* in his key (p. 19). Jordan and Evermann (1896: 631 and 667) placed *Empetrichthys* in the Orestiinae. Eigenmann (1920) commented at some length on the possible relationships of the two genera, concluding that:

They are so similar that they might readily be considered as forming but one genus. The double series of teeth in the jaws and the terminal though oblique mouth and the slightly more posterior position of the dorsal are the only characters distinguishing *Empetrichthys* from all of the species of *Orestias*.

Myers (1931: 250 and 252) finds, however, that *Empetrichthys* lacks skeletal features supposed to characterize the Orestiinae (Orestiinae), and concludes that "it appears to have nothing to do with *Orestias*."

The ascertained characters of the new genus do not add much to the problem of the possible relationship of the geographically widely separated genera *Empetrichthys* and *Orestias*. The jaw teeth are like those of *Orestias* in being uniserial, but the scarcely united lower pharyngeals of *Crenichthys* would indicate that the union of these bones in *Empetrichthys* and in *Orestias* was a matter of independent evolution. I am of the opinion that the pelvic fins in those two genera were independently lost, as the degeneration of these fins characterizes isolated desert stocks of cyprinodonts. There is probably no immediate relationship between *Empetrichthys* and *Orestias*, although both were probably derived from some such basic stock as *Profundulus* (Hubbs, 1924).

Superficially, *Crenichthys* is very much like certain of the Goodeidae, a group which centers in the Lerma fauna of Mexico. The difference in dentition between *Empetrichthys* and *Crenichthys* is strikingly paralleled by that separating the goodeid genera *Zoogoneticus* and *Characodon*. The resemblances, however, are almost certainly of independent origin, for *Crenichthys* is obviously oviparous, and must therefore lack the secondary sexual modifications characteristic of the Goodeidae; but again the resemblance may be due in part to a common origin from *Profundulus*.

The differences separating *Crenichthys* from *Empetrichthys* are related to feeding differences. *Crenichthys* appears to be the herbivorous modification of the other genus. Thus we have further evidence of the repeated independent acquisition of an herbivorous habit, with associated structural modifications, in the cyprinodont fishes.

**Crenichthys**, new genus

Holotype, *Crenichthys nevadae*, new species.

Diagnosis.—A funduline cyprinodont with protractile premaxillaries; pectoral fins set low but with vertical base; orbital rim distinct; preorbital more than half as wide as eye; vomerine teeth absent; pseudobranchiae absent; oviduct borders swollen but not forming a pouch about anal fin; dorsal and anal fins set far back; pelvic fins lacking. In these respects *Crenichthys* agrees with *Empetrichthys* from which it differs in the following characters:

1. Intestine considerably coiled, instead of merely forming a sigmoid curve.
2. Lower pharyngeal arches very much slenderer: dentigerous portion not more than one-third, instead of about two-thirds, as wide as long.
3. Lower pharyngeals scarcely, rather than completely, united: the union occupying not more than a fourth of the inner margin.
4. Lower pharyngeal teeth conical, not molarlike.
5. Jaw teeth uniserial instead of biserial.
6. Jaw teeth bicuspid (**Y**-shaped), rather than conical.
7. Lower jaw much weaker; its halves not strongly conjoined.
8. Jaws equal: the lower not projecting.
9. Anterior portion of gape about horizontal (not strongly oblique).

*Crenichthys nevadae* differs further from *Empetrichthys merriami* in having the dorsal and anal fins somewhat more posteriorly inserted: the distance from origin of dorsal to caudal base is slightly less instead of more than one-third the

standard length. Coloration differences are also striking: *C. nevadae* is much less mottled, but has the lateral blotches much bolder.

From *Orestias*, the only other funduline genus lacking pelvic fins, *Crenichthys* differs in the same characters by which it is distinguished from *Empetrichthys*, except that the jaw teeth are uniserial as in *Orestias*, and the pharyngeal teeth conical as in some species of *Orestias*.

### *Crenichthys nevadae*, new species

#### Plate I

Holotype.—A maturing female 44 mm. long to caudal, collected by Dr. and Mrs. C. T. Brues in an isolated warm spring at Duckwater, Nye County, Nevada, on July 21, 1930; field number 58. The location of the spring is given by Dr. Brues as being 16 miles east and 46 miles south of Ely; in Township 12 N., Range 56 E.; near the north end of Warm Spring Valley. The species abounds in this spring, according to the collectors. The only other specimen taken, also a maturing female, is 29 mm. long. The holotype is retained as Cat. No. 32,948 in the Museum of Comparative Zoology of Harvard University, while the paratype is deposited (as Cat. No. 95,024) in the Museum of Zoology of the University of Michigan, through the kind permission of Dr. Thomas Barbour.

The body is massive, two-thirds as wide as deep, especially heavy and turgid forward. The greatest depth (in female) enters the standard length 3.3 times (3.2 times in paratype). The caudal peduncle is rather slender, though only one-fifth (one-third) longer than deep; the least depth enters the head 2.6 (2.7) times.

The head is very heavy, almost as wide as it is deep below the occiput. Its upper profile carries forward the nuchal hump, but flattens to a nearly straight line above the eye, to become moderately convex again on the snout. The length of the head is contained 3.1 (3.2) times in the standard length. The bony width of the somewhat convex interorbital enters the head 2.5 (2.4) times. The preorbital is 0.6 (0.7) as wide

as the orbit, which enters the head length 5.3 (4.0) times. The combined length of snout and eye is equal to (or a little longer) than the postorbital length.

The mouth in anterior view is twice as wide as in the lateral projection. The upper lip is heavier than in *Empetrichthys merriami*, about one-fourth as long (on mid-line) as wide. The general structure of the lips, and also of the nostrils, is alike in the two species.

Scales in 30 rows from the moderately constricted upper end of gill-slit to caudal base, and in 13 (11) rows between origins of dorsal and anal fins.

Dorsal rays 12 and anal 13 (counting small anterior rays, and the last ray as doubled).

The color pattern of the holotype is well shown on the figure. In the paratype the scale centers, in pale bars between the dark blotches, are pearly.

The eggs are minute, and numerous, indicating an oviparous habit.

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PLATE I

Holotype of *Crenichthys nevadae*, with insert showing dentition.









