

Leuciscus and Richardsonius. The genus *Richardsonius* was proposed by Girard in 1856. It was said to bear some resemblance to *Squalius*, from which it could "be distinguished by a smooth edge of the dental ridge and the long anal, together with the peculiar position of the latter in reference to the dorsal. The dorsal is also much deeper than long, which is not the case in *Squalius*." Species discovered since Girard's description was written have shown that no such differences between *Squalius* (*Leuciscus*) and *Richardsonius* exist. Dr. Günther classed the only two species of the genus *Richardsonius* with his *Abramis*, characterized by elongate anal and compressed ventral ridge behind the ventrals. Jordan and Gilbert separated the genus *Richardsonius* from *Leuciscus*, etc., on the basis of the compressed ventral ridge and elongate anal. I have examined a very large series of specimens and find that ventral ridge is very variable, especially with age, and is of no worth whatever to separate *Richardsonius* even subgenerically from *Leuciscus*. In one specimen, which might have served Girard's artist when he drew *R. balteatus*, there is the merest vestige of a ventral ridge. The ridge seems best developed in specimens about medium size (75 mm.). The characters selected to separate the species of the old genus *Richardsonius* from each other seem no more fortunate. Neither the teeth nor the scales are of any value whatever in this respect. The anal fin is no means an absolute guide, as will be seen later. In fact, I have been unable to detect a single character which will always separate the two forms, each of which is variable in extreme. All those species of *Leuciscus* with increased number of anal rays, *montanus*, *hepophlox*, *gilli*, *balteatus*, and *lateralis* may be classed under the subgeneric name *Richardsonius*. I find in examining 41 specimens of *Leuciscus montanus*, collected by Jordan at Provo, Utah, that in some the ventral ridge is much more developed than in typical specimens of *Richardsonius*. The anal rays are: 28 with 12½; 12 with 13½; 1 with 14½.

34. *Leuciscus atrarius* (Girard). This species is quite abundant in the Snake River at Idaho Falls. It readily takes the hook. The lateral line is not developed until late in life; in specimens 2 inches long the pores are formed on but few scales.

35. *Leuciscus hydrophlox* (Cope). Abundant in the Snake River at Idaho Falls. The anal rays a number of specimens examined vary from 12½ to 14½. Two specimens have 12½ and fourteen have 13½, and four have 14½. The dorsal rays vary from 10½ to 11½, and the scales the lateral line from 51 to 58. There is present a slight median keel behind the ventrals. These specimens agree very closely with specimens of *L. montanus* collected by Jordan at Provo, Utah, except that a larger percentage have 13 and 14 anal rays, and a smaller percentage have 12 rays.

36. *Leuciscus balteatus* (Richardson).

Cyprinus (*Abramis*) *balteatus* Richardson, Fauna Bor. Amer., III, 301, 1836; Storer, Synopsis I. N. A., 160, 1846.

Richardsonius balteatus Girard, Proc. Acad. Nat. Sci. Phila., VII, 1856, 202; id., U. S. P. R. R. I. & Surveys, x, 278, pl. LX, figs. 1-4, 1859 (Fort Dalles, Oreg., Fort Vancouver, Oreg. ?); B. Proc. U. S. Nat. Mus., 1882, 33 (Garrison Creek, Wash.); Jordan & Gilbert, Syn. Fish. N. A., 251, 1882 (Columbia River and northward); Jordan, Cat. Fish. N. A., 33, 1885.

Abramis (*Blicca*) *balteatus* Günther, Cat. Fish. Brit. Mus., VII, 309, 1868.

Of this species I obtained two unquestionable specimens at Kamloops. There is a distinct median ridge behind the ventrals, and the anal has 20½ and 22½ (11, 18½-20½) rays. Teeth 5-1, 2. At Mission this species is abundant, the largest individuals measuring 140 mm. In the larger specimens the postventral keel is very variable and frequently not at all distinguishable; it is best developed in medium-sized specimens (80 mm.). The teeth are usually 2, 5-4, 2, when normally developed. Of these, the anterior tooth on the left is thicker, shorter than the others, dagger-shaped, and remote from them. I have made detailed measurements of over 20 specimens, and have counted the rays of all the rest. The rays are as follows: 16½ in two specimens; 17½ in seven; 18½ in thirteen; 19½ in twenty; 20½ in eighteen; 21½ in eight; 22½ in two; 23½ in two; 24½ in two. The usual number, then, is 19½ or 20½. The dorsal varies from 11½-13½. I have found no coordination of variations whatever. Each character varies independently. The scales vary from 11 to 13-53 to 63-54. According to the Mission specimens the normal number of anal rays is 19½ or 20½, and variation is three or four rays in both directions.

* I have from
† Equidistant
‡ Anterior
§ Equidistant
|| Equidistant

37. *Leuciscus*
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