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## Observations on the Pygmy Whitefish, *Prosopium coulteri*, from Bull Lake, Montana

GEORGE F. WEISEL AND JOHN B. DILLON

AS far as known, there are but two coregonid fishes native to Western Montana. One is the Rocky Mountain whitefish, *Prosopium williamsoni* (Girard), that is common in the larger lakes and rivers and has become an important sport fish. The other is the small pygmy or brownback whitefish, *Prosopium coulteri* (Eigenmann and Eigenmann), that is extremely rare. This species has been taken previously only once in Montana—from collections made in the mouths of Fish Creek and McDonald Creek, tributaries to Lake McDonald in Glacier National Park (Schultz, 1941). The few other recorded places where it has been caught are Kicking Horse River, British Columbia (Eigenmann and Eigenmann, 1892); Diamond Lake, Stevens County, Washington (Jordan and Snyder, 1909); Second Lake and Lake Aleknagik, Alaska (Kendall, 1917, 1921); and Chignik River, Alaska (Myers, 1932). Its recognized range is therefore from the headwaters of the Columbia River into Alaska, in waters tributary to the Pacific Ocean.

Inasmuch as the pygmy whitefish is taken so infrequently and so little is known of its habits, we believe it worth while to add some recently collected information to the sparse literature concerning the fish.

On December 26, 1952, the junior author observed large numbers of small whitefish in a sandy pool at the mouth of Ross Creek where it empties into Bull Lake. He successfully scooped up nine of these fish with a small dip net. They

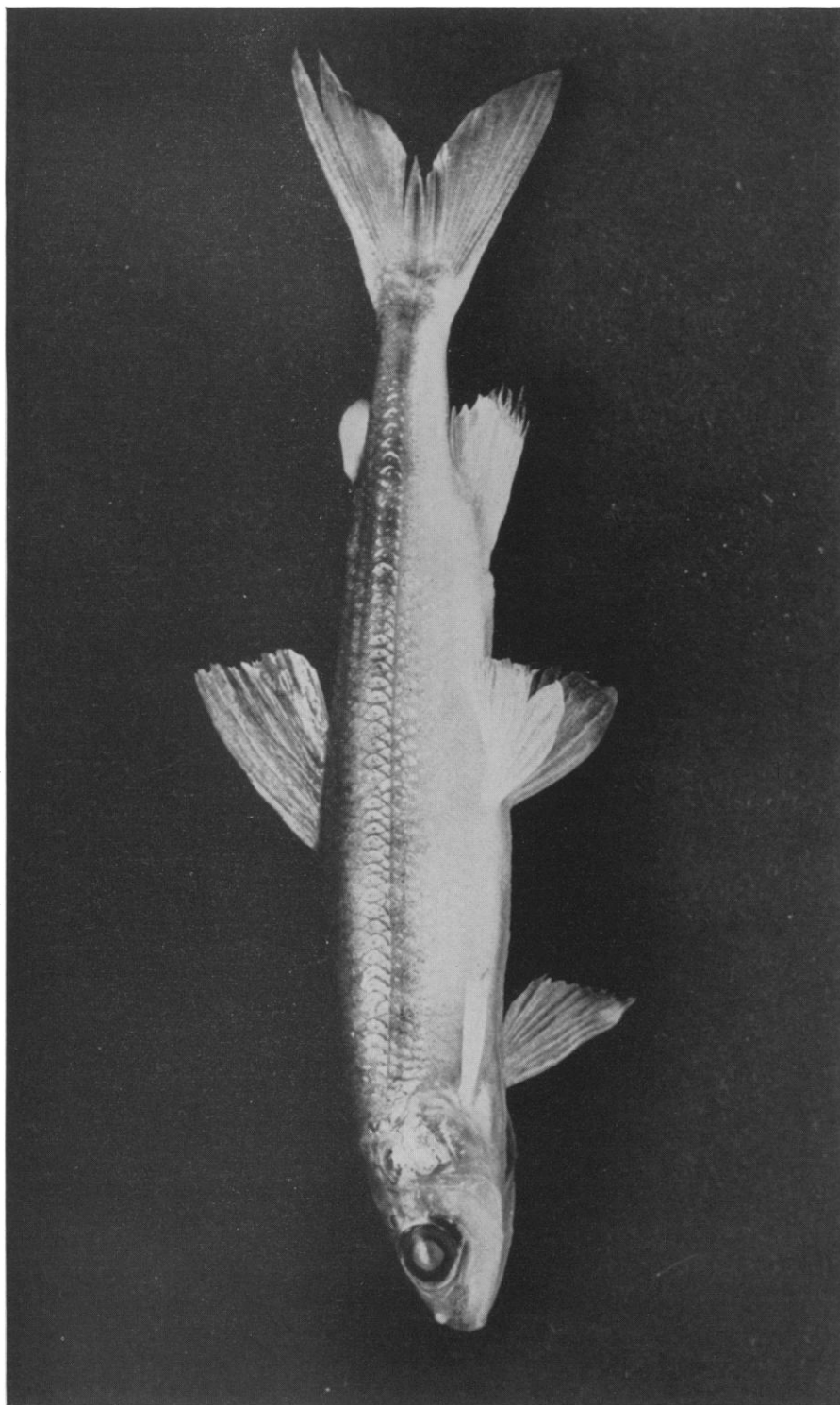
were *P. coulteri*. Eight days later he obtained six small *P. williamsoni* from a catch of 87 made by fishermen in the mouth of Stanley Creek at the opposite end of the lake. The fishermen believed they had seen a fish resembling the pygmy whitefish in Stanley Creek also, but were unable to catch any. However, Mr. Kenneth Hays returned to Ross Creek on January 12 and was able to catch fourteen more *P. coulteri* for us.

Bull Lake is in Lincoln County, Montana, and is tributary to the Kootenai River. It is about 9 miles long and averages about  $\frac{1}{2}$  mile in width. To our knowledge, no soundings have been made in the lake, but it is apparently quite deep for its size. Besides the two species of whitefish, other game fish that inhabit the lake include *Salvelinus malma* (Walbaum), *Salmo clarki* Richardson, and *Micropterus dolomieu* Lacépède.

### DESCRIPTION AND COMPARISON WITH *Prosopium williamsoni*

The 23 specimens of the pygmy whitefish (Pl. I) were freshly preserved when descriptive notes and measurements were taken. The methods of counting and measuring followed the procedures recommended by Hubbs and Lagler (1947).

The back, top of head, and sides down to the lateral line are brown-olive in color, somewhat darker and browner than *P. williamsoni*. The cheeks are silver with a wash of gold; and the



*Prosopium coulteri* (Eigenmann and Eigenmann), a specimen 135 mm. in total length, from Bull Lake, Montana.

lower sides, throat, and belly are light silver. All but one specimen have well defined parr marks, which form irregular black blotches that vary from the size of the pupil to the size of the eye. There are 9 to 13 parr marks in a row along the lateral line and approximately the same number in a second row above them. There is a third row of 8 to 11 that follows the mid dorsal line, but these are less distinct.

In body proportions, *P. coultteri* is more slender, the eye is larger and the maxillary is longer than in *P. williamsoni* (Table I). The maxillary reaches to the anterior margin of the orbit or just beyond, whereas it ends somewhat short of the orbit in *P. williamsoni*. The head in profile is bullet-shaped and the anterior margin of the lower jaw is almost square, com-

pared with the rather abruptly decurved head and narrow, rounded lower jaw of the other species.

In scale and fin ray counts, it is likewise strikingly different from the mountain whitefish (Table II). Although the gillrakers of the two species are similar in size and shape, they are less numerous in our specimens of *P. coultteri* than in *P. williamsoni*. However, Carl and Clemens (1948) recorded "about 26" gillrakers in specimens from British Columbia. It is notable that each meristic character is lower in *P. coultteri* than in *P. williamsoni* and that there is no overlap in these characters between the two species except for the number of pectoral rays.

The proportions and counts agree with those

TABLE I  
SEX, AGE AND SOME PROPORTIONS OF *Prosopium coultteri* FROM BULL LAKE, MONTANA  
The ranges and averages are compared with six specimens of *P. williamsoni* from the same locality

| Sex                   | Age group | Standard length (mm.) | Depth in length | Head in length | Maxillary in head | Eye in head |
|-----------------------|-----------|-----------------------|-----------------|----------------|-------------------|-------------|
| Female                | 2         | 129                   | 5.4             | 4.4            | 3.6               | 3.6         |
| Female                | 2         | 120                   | 4.8             | 4.3            | 3.3               | 3.5         |
| Male                  | 2         | 109                   | 5.2             | 4.2            | 3.2               | 3.2         |
| Male                  | 2         | 108                   | 5.1             | 4.2            | 3.5               | 3.3         |
| Male                  | 2         | 107                   | 5.6             | 4.1            | 3.2               | 3.7         |
| Male                  | 2         | 106                   | 5.3             | 4.2            | 3.3               | 3.1         |
| Male                  | 2         | 105                   | 5.0             | 4.2            | 3.8               | 3.6         |
| Male                  | 2         | 104                   | 5.4             | 4.1            | 3.6               | 3.6         |
| Male                  | 2         | 103                   | 5.7             | 4.1            | 3.3               | 3.3         |
| Male                  | 2         | 102                   | 5.1             | 4.3            | 3.4               | 3.4         |
| Male                  | 2         | 102                   | 5.1             | 4.1            | 3.6               | 3.3         |
| Male                  | 2         | 99                    | 5.8             | 4.0            | 3.5               | 3.5         |
| Male                  | 2?        | 97                    | 5.4             | 4.1            | 3.3               | 3.6         |
| Male                  | 1         | 97                    | 5.4             | 4.2            | 3.3               | 3.5         |
| Male                  | 1         | 96                    | 5.3             | 4.3            | 3.2               | 3.2         |
| Male                  | 1         | 95                    | 5.5             | 4.1            | 3.5               | 3.5         |
| Male                  | 1         | 94                    | 5.9             | 4.3            | 3.7               | 3.7         |
| Male                  | 2?        | 93                    | 5.6             | 4.0            | 3.5               | 3.5         |
| Male                  | 2?        | 91                    | 5.4             | 4.0            | 3.2               | 3.2         |
| Male                  | 1         | 90                    | 5.6             | 4.3            | 3.5               | 3.0         |
| Male                  | 1         | 88                    | 5.2             | 3.9            | 3.8               | 3.2         |
| Male                  | 1         | 86                    | 5.4             | 3.9            | 3.6               | 3.6         |
| Male                  | 1         | 81                    | 5.4             | 4.0            | 3.4               | 3.4         |
| <i>P. coultteri</i>   |           |                       |                 |                |                   |             |
| Range.....            |           | (81-129)              | (4.8-5.9)       | (3.9-4.4)      | (3.2-4.1)         | (3.0-3.7)   |
| Average.....          |           | 100.0                 | 5.3             | 4.1            | 3.4               | 3.4         |
| <i>P. williamsoni</i> |           |                       |                 |                |                   |             |
| Range.....            |           | (185-193)             | (4.3-5.0)       | (4.4-4.7)      | (3.6-4.2)         | (4.0-4.3)   |
| Average.....          |           | 188.0                 | 4.6             | 4.5            | 3.8               | 4.1         |

TABLE II  
MERISTIC CHARACTERS OF *Prosopium coulteri*  
FROM BULL LAKE, MONTANA

The sequence of the individuals on which counts were made are the same as Table I. Most of the dorsal fins have two or more splints before the principal unbranched ray. These are not included in the count. The small scale just behind the anal opening is included in the count of transverse scales between the anal fin and the lateral line. Ranges and averages are compared with six specimens of *P. williamsoni* from the same locality

| Fin rays  |     |         |         | Scales    |           | Gillrakers   |              |
|-----------|-----|---------|---------|-----------|-----------|--------------|--------------|
| D         | sal | Anal    | Pelvic  | Pec-toral | Lat. line |              | D.-A.        |
| 11        |     | 10      | 10      | 15        | 58        | 7/7          | 6 + 9        |
| 10        |     | 10      | 10      | 15        | 58        | 7/6          | ...          |
| 10        |     | 10      | 10      | 16        | 62        | 7/7          | 6 + 8        |
| 9         |     | 9       | 10      | 16        | 59        | 7/7          | 5 + 9        |
| 9         |     | 10      | 10      | 16        | 59        | 7/6          | 5 + 9        |
| 10        |     | 10      | 10      | 16        | 59        | 7/7          | ...          |
| 10        |     | 11      | 10      | 15        | 60        | 7/6          | 5 + 9        |
| 10        |     | 10      | 10      | 15        | 59        | 7/6          | 5 + 10       |
| 9         |     | 10      | 10      | 16        | 59        | 7/7          | ...          |
| 9         |     | 9       | 10      | 17        | 60        | 7/7          | ...          |
| 10        |     | 10      | 10      | 16        | 62        | 7/7          | ...          |
| 10        |     | 10      | 10      | 15        | 58        | 7/7          | ...          |
| 10        |     | 10      | 10      | 16        | 63        | 8/7          | ...          |
| 10        |     | 10      | 10      | 15        | 63        | 7/7          | ...          |
| 10        |     | 10      | 10      | 10        | 59        | 7/6          | ...          |
| 10        |     | 10      | 9       | 15        | 63        | 7/7          | ...          |
| 11        |     | 11      | 10      | 16        | 60        | 7/7          | ...          |
| 9         |     | 10      | 10      | 15        | 59        | 7/7          | ...          |
| 10        |     | 10      | 10      | 14        | 60        | 7/7          | ...          |
| 9         |     | 10      | 10      | 15        | 58        | 6/6          | ...          |
| 9         |     | 10      | 10      | 15        | 61        | 7/7          | ...          |
| 10        |     | 9       | 10      | 15        | 61        | 7/7          | ...          |
| 9         |     | 10      | 10      | 15        | 54        | 7/7          | ...          |
| *(9-11)   |     | (9-11)  | (9-10)  | (10-17)   | (54-63)   | 6-8/6-7      | 5-6 + 8-10   |
| 9.7       |     | 9.9     | 10.0    | 15.2      | 59.7      | .            |              |
| **(12-13) |     | (12-13) | (11-12) | (17-18)   | (74-77)   | 9-10/<br>8-9 | 8-10 + 11-13 |
| 12.5      |     | 12.5    | 11.5    | 17.2      | 75.0      |              |              |

\* Ranges and averages for *P. coulteri*.  
\*\* Ranges and averages for *P. williamsoni*.

given by Eigenmann and Eigenmann (1892). On the whole they are also quite similar to fish from Alaska, although Kendall (1917, 1921) listed fewer transverse scales and gillrakers and about ten more scales in the lateral line.

Representing age groups by the number of annuli on the scales, our specimens of the pygmy whitefish are in age groups I and II. The annuli show clearly, there being only three individuals that we questioned. The fish in age group II range in standard length from 99 to 129 mm., whereas the mountain whitefish, all of this same age, range from 185 to 193 mm. in standard length. The largest *P. coulteri* reported is a

female 174 mm. long from Lake Aleknagik, Alaska (Kendall, 1921).

SEXUAL MATURITY

Most collections of this species have apparently been taken during the spawning runs from deep lake waters into streams. Kendall (1921) stated that males and females caught in Alaska were in breeding condition in August, and that another collection from the territory was mature and ready to spawn on November 1. He also stated that spermaries and ovaries were well advanced by September in specimens from Kicking Horse River, British Columbia. In Lake McDonald, Schultz (1941) believed his fish caught in November were in spawning condition.

All of our fish are mature or have spawned. One female is spent and the other has the coelomic cavity packed with large eggs. Mr. Hays easily stripped eggs from one he took in January. Testes of most of the males are large and milky. The other males appear to have spawned shortly before caught. However, the maturity of fish, particularly males, cannot always be determined by gross examination. Therefore, smears of the testes were made and stained and examined under a microscope. They are full of mature sperm, and spermatogenesis is complete. In Bull Lake it is evident that this little whitefish matures early in life and spawns during late fall and early winter.

Tubercles are profuse on both males and females but are generally better developed on the males. They are located on the top of the head, on the paired fins, and on some of the scales above the lateral line. The female urogenital papilla is noticeably larger and more rounded than the papilla of male. In both sexes it is proportionately larger than in *P. williamsoni*.

The testes of the mountain whitefish from Bull Lake appear as though the fish had recently spawned. They are flaccid and the anterior ends are full of mature sperm. This species spawns from the middle of October to the middle of November in West Gallatin River, Montana (Brown, 1952) and from November to early December in Logan River, Utah (Sigler, 1951). No mature one- or two-year-old mountain whitefish were found in Utah, but those from Bull Lake have only two



annuli. The six examined from Bull Lake represent the smallest specimens taken, and undoubtedly the larger, older ones composed the majority of the spawners.

#### DISCUSSION

It is well known that members of Coregonidae are a plastic group. A single species may vary considerably under different environmental conditions and separate races may exist in the same habitat. Many forms previously considered to be valid species have been reduced to synonymy (Monti, 1931; Dymond, 1943; Kennedy, 1953). One of the variations they exhibit is a form of dwarfism in which the fish are not only smaller but mature earlier and have a shorter life span (Klunzinger, 1900; Kennedy, 1943).

*Prosopium coulteri* is considerably smaller than *P. williamsoni* of the same age; has fewer scales, fin rays, and gillrakers; and may mature a year earlier. From existing data, it is not improbable that its life span never approaches the nine or ten years of *P. williamsoni*. It may be considered a dwarf whitefish, but not in the sense that it is just a variation within the species *P. williamsoni*. In the first place, it is markedly different from the mountain whitefish in the shape of its head, its meristic characters, and in many of its proportions. Furthermore, it cohabits with the mountain whitefish, yet no intergrades or hybrids between the two have been described; and although it is rarely caught, it covers a fair geographic range.

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## Oklahoma Lampreys: Their Characterization and Distribution<sup>1</sup>

GORDON E. HALL AND GEORGE A. MOORE

THE recent acquisition of two fine series of lampreys, *Ichthyomyzon castaneus* Girard, and the paucity of lamprey literature pertaining to Oklahoma, prompts the presentation of this paper. For many years occasional specimens

have been accumulating in the Museum of Zoology of the University of Oklahoma (UOMZ) and the Oklahoma Agricultural and Mechanical College (OAM). These specimens with others in the collections of Tulsa University (TU), University of Michigan Museum of Zoology (UMMZ), Cornell University (CU), and the

<sup>1</sup> Contribution No. 31 from the Oklahoma Fishery Research Laboratory and No. 204 from the Department of Zoology of the Oklahoma Agricultural and Mechanical College.