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A REVIEW OF THE GENUS NOTOLEPIDOMYZON WITH A DESCRIPTION OF A NEW SPECIES (PISCES-CATOSTOMIDAE)⁽¹⁾

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In 1876 when Professor Cope⁽²⁾ established the genus *Pantosteus* for the mountain suckers found in the Rocky Mountains and Great Basin he made *Minomus platyrhynchus* Cope the type of the genus. Species of this genus were said to differ from those of a closely related genus *Catostomus* by having the bones of the head thick with the parietals and frontals more or less united thus, in some instances, obliterating the fontanelle; also both jaws with cutting edges and lower lip not very deeply cleft.

Mr. Henry W. Fowler⁽³⁾ in 1913 proposed that *Pantosteus arizonae* (Gilbert) be made the type of a new sub-genus *Notolepidomyzon*; since the

"scales along predorsal region and back all well enlarged; less than twenty between occiput and origin of dorsal, and contrasting with the small scales in the lateral line."

It will be noted that Mr. Fowler's characterization of this sub-genus is based upon the enlarged anterior scales of a single species in the Gila basin.

(1) Contribution No. 100, Department of Zoology and Entomology, Brigham Young University.

(2) Cope, E. D. and Yarrow, H. C., 1876. Report upon the Collection of Fishes made in Portions of Nevada, Utah, California, Colorado, New Mexico, and Arizona during the years 1871-2-3 and 4. Rept. Geog. and Geol. Expl. and Survey, West of the One Hundredth Meridian. Vol. V. Zoology pp. 635-703.

(3) Fowler, Henry W., 1913. Notes on Catostomoid Fishes. Proc. Acad. Nat. Sci. Phila., p. 47.

A comparative study of the species of the genus *Pantosteus* was made in 1916 by Professor J. O. Snyder⁽⁴⁾ which resulted in his separating the species

"into two well defined, natural groups, one characterized by a thick cranium in which the parietals and frontals meet in a close, strong suture, and another by a relatively thin cranium where parietals and frontals are separated by a long, often very narrow fontanelle which apparently does not close even in very old individuals."

For the first group Professor Snyder used the subgeneric name *Notolepidomyzon* of Fowler and for the second, Cope's *Pantosteus*. He assigned the following species to the genus *Notolepidomyzon*: *clarki*, *santa-anae*, *generosus*, and *plebicus*. In 1932 the writer⁽⁵⁾ added the species *utahensis*, and in this paper is described the sixth species of the genus *intermedius*. This leaves the following species in the genus *Pantosteus*: *platyrhynchus*, type of the genus; *delphinus*; *jordani*, *columbianus*; *virescens*; and *lahontan*.

My study of the species of these genera supports the conclusion that *Notolepidomyzon* and *Pantosteus* represent natural genera characterized by definite characters and that they are, in the main, geographically separate. *Delphinus* is the only species of *Pantosteus* found in the Colorado River basin. A large series of this species should be studied in the light of our understanding of these genera. It is now known that *Notolepidomyzon*, as here considered, is not represented in the Great Basin fauna. According to the geographical distribution of the species of this genus the center of distribution for the complex is, undoubtedly, the Colorado River basin.

These genera may be characterized as follows:

Lips with well defined cutting edges; cranium thin; no fontanelle; scales between the occiput and dorsal larger and usually less than on anterior lateral line; Colorado River basin and eastward in distribution *Notolepidomyzon*

Lips with well defined cutting edges; cranium thin; fontanelle poorly to well developed; median scales between occiput and dorsal small, about the same in number and size as on the anterior lateral line; mainly Great Basin and westward..... *Pantosteus*

A morphological study of the species of *Notolepidomyzon* has re-

(4) Snyder, John O., 1916. Notes on a collection of Fishes made by Dr. A. Mearns from rivers tributary to the Gulf of California. Proc. U. S. Nat. Mus. Vol. 49, pp. 473-586, 2 pls. In this paper Snyder illustrated the crania of several catostomids including *Notolepidomyzon* and *Pantosteus*.

(5) Tanner, Vasco M., 1932. A Description of *Notolepidomyzon utahensis*; a new Catostomid from Utah. Copeia, No. 3, pp. 135-136.

sulted in the separation of the species by means of the following key:

- a. Scales of back very much to only slightly enlarged.
 - b. Scales between occiput and dorsal fin 15 to 17 along the median line; 8 above the lateral line; 75 scales in the lateral line; head broad and flat above. Gila Basin of Arizona. *clarki*⁽⁶⁾ (Baird and Girard)
 - bb. Scales between occiput and dorsal fin 27 to 29 along the median line; 11 above the lateral line; 75 to 85 scales in the lateral series; ventrals reach the anus; head 4 into length, flat above; White River, Nevada. During Pleistocene epoch this river drained into Colorado River; now a closed isolated basin. *intermedius*, n. sp.
 - bbb. Scales between occiput and dorsal fin 29 to 33 along the median line; 14 to 15 above lateral line; 76 to 80 lateral line; ventrals do not reach the anus; Santa Ana River, Southern California *santa-anae* Snyder
- aa. Scales of back not noticeably, if at all, enlarged.
 - c. Scales between occiput and dorsal fin 34 to 40 along median line; 14 to 17 above lateral line; 90 to 100 lateral line; Colorado River drainage from Virgin River north to Green River in Utah. *utahensis* Tanner
 - cc. Scales between occiput and dorsal fin 40 to 50 along median line; 15 to 17 above the lateral line; 80 to 92 in the lateral line series.
 - d. Head short and small, 4.9 to 5.1 in length; body slender; total length 3 to 6 inches. Rio Grande basin in Colorado. *generosus*⁽⁷⁾ (Girard)
 - dd. Head fairly large, 4.5 in length; body robust; 10 to 12 inches in length; Rio Grande basin of Colorado to Chihuahua. *plebeius* (Baird and Girard)

Notolepidomyzon intermedius Tanner n. sp.

DESCRIPTION OF THE TYPE No. 4252: Head 4.0 times in length to base of caudal; depth 5.1; depth of caudal peduncle 11; dorsal rays 11; anal rays 7; scales before the dorsal 29; scales above lateral line 11; scales below the dorsal line 12; scales on the lateral line 85; snout to dorsal in proportion to total length 2; scales on the caudal peduncle 11 to 12.

The head is long and slender, depth about 2/3 the length, interorbital width 2.1 of length; top of head flat; fontanelle completely closed; width of mouth contained four times in length of head; width of mouth including lip 10 mm; papillae in 4 rows on upper lip and 8 to 9 rows on lower lip, the outer and inner rows smaller; cleft on lower lip moderate; 9 rows of papillae cleft to inner cutting edge of mouth.

(6) *Arizonae* Gilbert is considered as a synonym of *clarki*.

(7) The writer concurs in Professor Snyder's suggestion, Proc. U. S. Nat. Mus. Vol. 59, 1922, p. 23, that *generosus* and *plebeius* may be one and the same species. A large series of these forms is needed in making a study.

MEASUREMENTS OF THE TYPE AND TWELVE PARATYPES OF
NOTOLEPIDOMYZON INTERMEDIUS IN MILLIMETERS

All specimens were taken in small tributaries of the White River at Preston and Lund, White Pine County, Nevada.

Number	4252	5002	4255	4253	5003	4900	4902	4898	4901	4256	4257	4899	5007
Length of body.....	104.0	95.5	88.0	91.0	97.5	101.0	102.0	98.0	97.0	94.2	99.0	94.5	85.5
Length of head.....	25.5	23.6	20.5	22.5	24.2	25.5	24.5	25.3	23.0	23.0	23.9	23.0	20.5
Depth of body.....	20.0	18.0	16.0	19.0	19.1	21.4	19.5	19.1	19.0	18.0	20.0	18.3	17.0
Depth of caudal peduncle..	9.5	8.3	8.0	8.7	8.6	9.0	9.0	9.0	9.0	8.3	9.0	8.0	7.5
Diameter of eye.....	3.9	3.9	3.9	3.7	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.9
Interorbital width.....	11.8	9.5	9.0	9.8	10.3	11.6	10.4	11.0	9.5	9.5	10.0	9.5	9.0
Depth of head.....	17.2	16.0	13.5	15.5	16.5	17.0	17.6	16.7	16.0	15.5	16.5	15.5	14.0
Snout to occiput.....	21.5	21.0	17.5	20.0	22.0	22.7	22.3	22.0	20.0	20.0	20.0	20.0	18.0
Snout to dorsal.....	53.5	49.0	43.6	46.2	51.0	53.5	51.5	50.0	49.0	46.5	49.0	47.1	43.0
Snout to ventral.....	62.0	56.0	48.5	51.6	59.8	61.5	60.5	59.1	57.0	54.8	59.0	55.0	55.5
Length base of dorsal.....	14.5	13.4	12.6	13.0	13.9	14.5	15.5	15.0	13.4	14.0	14.1	13.0	12.7
Length base of anal.....	6.5	6.5	6.4	6.1	6.8	7.5	8.0	7.5	6.5	7.0	6.5	7.0	6.2
Height of dorsal.....	19.0	19.0	17.0	19.0	21.5	20.0	20.0	21.1	19.8	19.0	20.0	18.6	18.0
Length of anal.....	19.0	19.0	17.5	19.0	20.0	22.0	23.0	21.0	19.7	20.0	20.5	19.7	17.0
Length of ventral.....	17.0	16.5	14.5	15.3	17.0	19.0	17.0	16.3	16.3	16.5	17.0	16.0	14.0
Length of caudal.....	18.3	18.5	17.5	19.0	22.0	23.0	22.5	23.2	21.0	21.0	23.1	20.9	17.9
Length of pectoral.....	22.0	21.0	18.3	20.0	22.0	23.0	22.2	23.0	21.8	21.0	21.5	21.0	18.5
Dorsal rays.....	11	11	11	11	11	11	11	11	11	11	11	11	11
Anal rays.....	7	7	7	7	7	7	7	7	7	7	7	7	7
Scales lateral series.....	85	77	78	83	83	83	83	77	77	84	77	83	79
Scales above lateral line...	11	11	11	11	11	11	11	11	11	11	11	11	11
Scales below lateral line...	12	12	12	12	12	12	12	12	12	12	12	12	12
Scales before dorsal.....	29	29	28	28	29	27	27	27	29	27	27	29	27

The dorsal is about 1/4 greater in height than length of base; anal 1.3 in head; the anal just reaches base of caudal; the ventrals just reach the anus; 5 scales above the lateral line on the caudal peduncle; lateral line straight except for a short upward curve at its origin where it passes above the operculum.

In life this species is greyish to olive green above becoming light yellow to whitish on the venter. In alcohol the specimens are dark to blackish above; mottled above, along and irregularly below the lateral line and whitish on the belly region; with a dark circular area on the operculum.

COMPARISON: *Notolepidomyzon intermedius* is closely related to cotype specimens of *N. santa-anae* which are before me. In *santa-anae* the ventrals do not reach the anus while in *intermedius* they do. *Intermedius* is also a much coarser scaled species than *utahensis*, as well as a smaller fish, being only 4 to 5 inches in maximum length.

TYPE LOCALITY: White River, streams and springs, at Lund and Preston, White River Valley, White Pine County, Nevada. The type, no. 4252, paratypes Nos. 4253 to 4258; 4898 to 4902 and 5002 to 5011 and 5 small untagged specimens were collected by Mr. Guy L. Hendrix in July, 1942. The type and paratypes, except two each that are being deposited in the U. S. National Museum, Washington, D. C., Natural History Museum, Stanford University and Museum of Zoology, University of Michigan, are in the Vertebrate Collection of the Brigham Young University.

ASSOCIATED SPECIES: The following species were collected with *N. intermedius*: *Crenichthys baileyi* (Gilbert); *Rhinichthys (apocope) velifer* Gilbert, or a new subspecies of it; and *Rhinichthys (apocope) nevadensis* Gilbert.

THE WHITE RIVER DRAINAGE: During the Pleistocene epoch this area, as well as the entire Great Basin, according to erosional features, was alternately dry and humid. Aside from large lakes of the basin, such as Bonneville and Labontan, there were many small ones. These small ones were connected by streams during the humid years and isolated or dry during the arid times. Fossil remains of a drainage system which connected White River with the Muddy and Colorado rivers is clearly preserved throughout its course. According to Mr. Everett Carpenter⁽⁸⁾ there are two well defined

“drainage systems in southeastern Nevada, those of Virgin River and of Las Vegas Wash, are tributary to Colorado River. Virgin River rises in southern Utah,

(8) Carpenter, Everett, 1915. Water-supply paper 365, Department of Interior, United States Geological Survey, p. 9.

flows southeastward across the northwest corner of Arizona, enters Nevada at Mesquite, flows past Bunkerville and St. Thomas, and discharges into Colorado River. The main tributary to this stream is Muddy River, which at present rises in the Moapa Indian Reservation but which in former geologic times had its source many miles to the north in the head of the White River valley. A well-developed and open channel extends from near the town of Preston southward through Pahrangat valley and into the Muddy River valley."

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