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## NEMACHEILUS AND RELATED LOACHES IN CHINA<sup>1</sup>

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### REVIEW OF THE GENERA AND SUBGENERA

There are a great number and variety of small loaches in Asia with no suborbital spine and three pairs of barbels, more or less generally referred to the genus *Nemacheilus*, and The American Museum of Natural History's recent Chinese collections contain several species of these, representing four distinct groups.

First, there is a very prettily marked species from Hainan Island, *Nemacheilus pulcher* Nichols and Pope (in press). This is a moderately short-bodied, symmetrical fish; finely scaled; lateral line complete; the caudal margin slightly forked; nostrils close together, well before the eye, the anterior in an even margined tube. It is evidently not distantly related to *Nemacheilus fasciatus* (Valenciennes), the type of *Nemacheilus*.

Secondly, there are specimens of Regan's *Nemacheilus nigromaculatus* and *Nemacheilus pleurotænia* from Yunnan. This latter fish is short-bodied, well compressed, the head slightly so; scales small, non-imbricate but distinct, lateral line imperfect; caudal margin slightly forked; nostrils separated by a distance greater than that of the posterior from eye, the anterior in a flap-like tube. The new subgenus **Yunnanilus** is proposed for *Nemacheilus pleurotænia* Regan, 1904, to include also *Nemacheilus nigromaculatus* Regan, 1904, and *Nemacheilus salmonides* Chaudhuri, 1911, doubtfully distinct from it, all from Yunnan.

Thirdly, there are three or four species from northern China which are more elongate, little compressed; without evident scales but the lateral line complete or essentially so, distinct; nostrils narrowly separated from eye, close together, the anterior with a flap behind, its rim little raised in front; caudal variously truncate or slightly indentate. One of these is *Nemacheilus toni* (Dybowski) Fowler, 1924. Berg, 1916, makes *Cobitis toni* Dybowski, 1869, a race of European *Nemacheilus barbatulus* (*Cobitis barbatula* Linnæus, 1758), which is the type of the genus *Barbatula*. *Barbatula* is, by the present writer, considered worthy of full generic rank for loaches of this third group.

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The genus *Diplophysa* is an old one for barbatuloid loaches, mostly from high central Asia, having the posterior part of the air-bladder free and only the anterior part enclosed in a bony capsule. Herzenstein, 1888, in an analytical study of numerous forms of *Diplophysa* and *Barbatula* in Turkestan, Tibet, and elsewhere, concludes that this air-bladder character has here little systematic value and does not recognize *Diplophysa* as a genus or natural group. Berg, 1916, however, gives it full generic rank, and Hora, 1922, does so with emphasis. The present writer is inclined to agree with Herzenstein, but is not familiar with any member of the genus.

The classification of barbatuloid loaches with center of abundance and variety in high central Asia presents a problem of extreme intricacy and difficulty. Hora, 1922, bases his conclusions on a careful consideration of anatomical details, and a reasonable idea of the importance of such details, which, however, may or may not apply in the present case. In attacking the same problem, Herzenstein, 1888, had more material, or material from a wider area, and was more influenced in its arrangement by the apparent closeness of relationship of one form to another in view of his knowledge of the whole. It is not unreasonable to suppose, bearing in mind the inherent taxonomic difficulties these loaches present, that Herzenstein's findings may be emended to advantage, but the present writer agrees with his opinions where they differ from those of Hora as to the distinctness of the genus *Lefua*, as to the probable wide range, perhaps with geographic modification, of *Barbatula stoliczkae* and other species, and as to the comparative slight importance of certain structural characters here, and to the relatively great importance of other characters, usually trivial.

Fourthly, there is in the Museum's collections a singular small loach from Szechwan which is identified with *Nemacheilus potanini* Günther, 1896, from the River Ya. On the basis of this identification, *N. potanini* Günther is here made the type of **Homatula**, new (from *Homaloptera*, which it suggests, and *Barbatula*; for the present considered a subgenus of *Barbatula*), to include also *Barbatula berezowskii* (Günther, 1896) from Kansu and *Barbatula oxygnathus* (Regan, 1908) from Yunnan. Our specimens of *B. (Homatula) potanini* are moderately elongate, head well depressed, tail strongly compressed, approximately as deep as the greatest depth of body; caudal truncate; no evident scales, lateral line complete, well marked; nostrils close together at a moderate distance before eye, the anterior in a short tube with pointed flap behind. The jaws are peculiar, premaxillaries fused in a rounded point above, and each mandible firm, curved, prominent, the two separated by a notch.

NEW RACES OF *BARBATULA* IN NORTH CHINA***Barbatula toni fowleri*, new subspecies**

*Nemacheilus toni* FOWLER, 1924, Bull. Amer. Mus. Nat. Hist., L, p. 396.

*Barbatula toni* (Dybowski), *Cobitis toni* Dybowski, 1869, was described from the Onon and Ingoda Rivers in Siberia, in the area north of eastern Mongolia and west of northern Manchuria. Berg, 1916, recognizes it as a widely distributed Asiatic subspecies of *Barbatula barbatula* of Europe and gives a very excellent figure of the form which he had to hand (*Nemacheilus barbatulus toni*, p. 341, Fig. 263, Lake Hanka, Ussuri drainage). Fowler, 1924, lists American Museum of Natural History material from Eastern Tombs, Chihli Province, as *Nemacheilus toni* (Dybowski), and considers *Nemacheilus pechiliensis* Fowler, 1899, the same. The present writer, however, cannot agree that the Eastern Tombs material is identical with that figured by Berg, or with *pechiliensis* as described by Fowler, 1899, from northeast of Dolon-nor close to the northern boundary of Chihli, and which resembles Berg's figure. He here proposes the name *Barbatula toni fowleri* for the Eastern Tombs fish.

DESCRIPTION OF TYPE.—No. 8409, American Museum of Natural History, Eastern Tombs, Chihli, August 7, 1921, Clifford H. Pope.

Length to base of caudal 85 mm. Depth in length 6.2; head 4.6. Eye in head 5.7; snout 2.4; interorbital 4; maxillary 3; width of mouth 3.8; barbel 3.6; width of head and of body 1.8; depth of peduncle 2.3; its length 1.3; pectoral 1.3; ventral 1.7; longest dorsal ray, 1.4; longest anal ray 1.8; caudal 1.3.

Dorsal 9; anal 7½. Scales very fine, only evident on peduncle.

Elongate, sub-cuboid; very little compressed except behind; snout bluntly pointed, vent almost immediately before anal origin in a low, backwardly directed tube. Interorbital slightly concave; orbital rim free above and in front adnate below and behind; mouth inferior curved transverse, appreciably behind tip of snout; lips thick, smooth, free, the lower cleft in the center with keel-like flaps on either side of the cleft; nostrils close together, the anterior in a low tube with pointed flap behind; eye slightly superolateral; maxillary not nearly to under front of eye; with a terminal barbel equalling in length the outer and longer of 2 barbels on the snout; gill-cleft vertical, gill-membranes broadly joined to side of breast before the lower pectoral axil. Dorsal origin equidistant from tip of snout and base of caudal; ventral placed below the front part of dorsal; pectoral broad, extending ⅔ the distance to ventral; ventral ⅔ to anal; caudal oblong, subtruncate, its outer rays a little the longer; base of caudal slightly oblique forward and downward, with slight precurrent keels above and below. Lateral line complete, in the center, rising slightly to meet opercle.

Color dull yellowish, darker above; numerous vague broken dark bars on sides; faint ones on dorsal and caudal.

Prominent keel-like flaps on either side of the cleft of the lower lip, and appreciable precurrent caudal keels on the peduncle appear to be significant characters in Asiatic fishes of the genus and subgenus *Barba-*

*tula*, characteristic of the races of *B. toni*. Compared with *B. toni* as figured by Berg, 1916, *B. t. fowleri* has a longer pectoral, slightly concave versus truncate caudal, ventral origin slightly behind that of dorsal, and double versus single row of dark marks on the side.

***Barbatula toni posteroventralis*, new subspecies**

DESCRIPTION OF TYPE.—No. 8410, American Museum of Natural History, Chin Ssu, Taiyuanfu, Shansi, August 15, 1922, Clifford H. Pope.

Length to base of caudal 66 mm. Depth in length 7.3; head 4. Eye in head 5.3; snout 2.5; interorbital 3.3; width of mouth 2.5; maxillary barbel 3; width of head 1.5; depth of peduncle 3; length of peduncle 1.4; pectoral 1.3; ventral 1.6; longest dorsal ray 1.6; height of anal 1.7; caudal 1.4.

Dorsal with 9 developed rays; anal with  $7\frac{1}{2}$ . No evident scales.

Slender, little compressed, deepest at shoulder; head large; belly flat. Mouth inferior, transverse, with thick soft lips loosely surrounding the smooth firm jaws; two membranous keels at the chin; two barbels on each side of the snout overhanging the front of the mouth; and one at the end of the maxillary; no spines about the eye; eye superolateral, with a free rim best developed above and in front; nostrils close together in front of the eye, the anterior with a shallow tube and flap behind; gill-membranes confluent with the breast, the clefts separated by about  $\frac{2}{3}$  snout. Paired fins in a horizontal plane; origin of dorsal about equidistant from tip of snout and base of caudal; ventral under hind part of dorsal, their axils apposed; pectoral not reaching ventral, ventral not quite reaching anal, anal not reaching caudal; caudal subtruncate, very slightly concave, its rudimentary rays precurrent above and below on the peduncle in rather conspicuous low keels. Lateral line ceasing on the peduncle shortly before caudal base, straight to its end.

Back and caudal freckled, the latter with a narrow pale tip; a series of small obscure dark blotches more or less confluent along the lateral line; dorsal speckled; lower parts and lower fins pale.

This race differs markedly from *B. t. toni* and *B. t. fowleri* by the more posterior position of the ventrals, placed under the hind part of the dorsal.

***Barbatula yarkandensis sellæfer*, new subspecies**

*Barbatula yarkandensis*, *Nemacheilus yarkandensis* Day, 1876, was described from Turkestan. Herzenstein, 1888, credits it with a wide distribution in high Asia, where he divides it into several subspecies, but it has not been listed from even the western Chinese provinces. Nevertheless, we have a small loach from Shansi which agrees sufficiently with Herzenstein's diagnosis of *yarkandensis* to lead the writer to describe it as a race of that form. Its most noticeable difference is one of color, sharply marked, dark, cross-saddles on the back, whereas *yarkandensis* is said to have less tendency to dark cross markings than related forms. On

the other hand, it differs from the figure of *B. y. brevisbarbus* (Herzenstein, 1888, p. 78, Pl. II, fig. 1), the subspecies to which it stands nearest, in having a decidedly longer peduncle, 1.4 versus 2 in the head.

DESCRIPTION OF TYPE.—No. 8411, American Museum of Natural History, Chin Ssu, Taiyuanfu, Shansi, August 20, 1922, Clifford H. Pope.

Length to base of caudal 73 mm. Depth in length 6.8; head 3.9; peduncle 5.5; dorsal base 7.5; length of pectoral 4.7; ventral 6.4; anal base about 10. Eye in head 6.2; snout 2.3; interorbital 5; width of head 1.7; width of mouth 3; maxillary barbel 3.1; pectoral 1.2; ventral 1.7; longest dorsal ray 1.5; height of anal 1.8; caudal lobe 1.3; depth of peduncle 3.3; length of peduncle 1.4. Postdorsal depth in the greatest depth 1.3; depth of peduncle 1.9; depth of peduncle in its length 2. Eye in interorbital 1.4. Dorsal base in its longest ray 1.4; ventral in pectoral 1.4; anal base in its longest ray 2.

Dorsal with 9 developed rays; anal with 6. No evident scales.

Body elongate, little compressed; head large; belly flat; depth of peduncle considerably greater than its thickness. Mouth inferior, curved, with thick grooved lips; maxillary extending  $\frac{2}{3}$  the distance to eye from snout; 2 pairs of barbels at snout overhanging front of mouth, one at end of maxillaries; nostrils close together in front of the eye, the anterior with a shallow tube and flap behind; eye superolateral, with a free rim best developed above and in front; gill-membranes broadly joined to isthmus. Pectorals and ventrals in a horizontal plane, the former broad; ventral base somewhat behind dorsal origin; dorsal origin equidistant from nostril and base of caudal; last simple ray of dorsal stiffened for somewhat less than half its length; pectoral bluntly pointed, not reaching ventral; ventral  $\frac{3}{4}$  to vent; anal not reaching caudal; caudal shallowly lunate. Lateral line well developed, complete, ending in an abrupt drop and rise at base of caudal. Distance from the base of caudal to the vent equal to that from the vent to the tip of the pectoral; distance from the vent to the ventral axil greater than the snout by the diameter of the eye.

Broad dark saddles along the back, and irregular blotches on sides; pectoral and dorsal marked with dark; caudal with a broad dark V on its base opening backward, the limbs of the V brokenly produced as a streak on each lobe, also dark streaks between the limbs on center of fin.

### ***Barbatula stoliczkai* (Steindachner)**

*Cobitis stoliczkai* STEINDACHNER, 1866, Verh. Zool.-Bot. Ges., Wien, XVI, p. 793, Pl. XIV, fig. 2.

This is an abundant and very widely distributed form in high central Asia, also listed from the western provinces of China by Günther, 1896. As Herzenstein, 1888, differentiates several subspecies to the westward, it is reasonable to suppose that our material from Shansi is differentiable. On the other hand, the writer finds no marked peculiarities therein and, such being the case, hesitates to recognize it as subspecifically distinct, lacking other material for comparison, more especially as Berg, 1916, synonymizes with *stoliczkai* forms recognized as full species by Herzen-

stein. For the benefit of those who would follow a different course, *Barbatula stoliczkai shansi*, new name, is available.

DESCRIPTION OF A SPECIMEN.—No. 8412, American Museum of Natural History, from Mai-tai-chao, Shansi (42 miles east of Paotow, Mongolia), May 27, 1922, Clifford H. Pope.

Length to base of caudal 78 mm. Head in length 4.5. Depth in head 2; head width 1.6; eye 6; snout 2.6; interorbital 3.6; width of mouth 3; maxillary barbel 3.6; depth of peduncle 2.9; length of peduncle 0.8; pectoral 1.3; ventral 1.5; longest dorsal ray 1.5; longest anal ray 1.9; caudal 1. Maxillary in snout 1.4.

Dorsal 10; anal 7. No evident scales.

Elongate, cylindrical, snout bluntly pointed; depressed before dorsal origin, compressed behind; belly flattened, the paired fins in a horizontal plane. Mouth inferior, curved, with thick grooved lips; two barbels on each side from snout overhanging the mouth in front, and one from near end of maxillary; eye superolateral with rim imperfectly free; nostrils close together in front of the eye, the anterior with a shallow tube, and flap behind; gill-membranes confluent with breast in front of pectoral base. Dorsal origin equidistant from front of nostrils and base of caudal; ventral origin slightly behind that of dorsal; pectoral falling far short of ventral, ventral almost to anal, passing vent; anal far short of caudal; caudal with margins converging, but notched shallowly behind, the lower "lobe" longest. A cutaneous roll or flap in ventral axil; lateral line well developed, straight, stopping just short of caudal base.

Freckles on the back; irregularly cross marked and spotted on the side; an incomplete dark bar across the base of caudal. None of the markings bold.

In addition to the above, the following species listed from China appear to belong to the genus and subgenus *Barbatula*. *Nemacheilus bleekeri* Sauvage and Dabry de Thiersant, 1874, western Shensi, *Nemacheilus grahami* Regan, 1906, Yunnan. *Nemacheilus robustus* Kessler, 1876, Kansu, a doubtful species. *Nemacheilus scleropterus* Herzenstein, 1888, extending eastward into Kansu. *Nemacheilus mongolicus* Bleeker?, listed from Yunnan by Regan, 1914. Incidentally, *Cobitis spiloptera* Cuvier and Valenciennes, 1846, from Cochinchina, looks like a race of *Barbatula toni*.

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