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A New Gudgeon of the Genus *Gobio* from Shansi (Pisces, Cyprinidae)

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INTRODUCTION

Through the kindness of the Department of Ichthyology of the American Museum of Natural History, we received for study a large collection of Chinese Gobioidae, among them a series of 19 gudgeons from Niang-tze-Kwan, Shansi (A.M.N.H. No. 10567), labeled as *Gobio rivuloides* Nichols. Eleven of these specimens were *G. rivuloides*, whereas eight proved to belong to a new species that differed from *rivuloides* in several features and were more similar to the east-European *Gobio kessleri*.

SYSTEMATIC ACCOUNT

Gobio shansiensis, new species

Figure 1

Gobio argentatus (non Sauvage and Dabry de Thiersant) RENDAHL, 1928, p. 77; between Yuan-hu-hsien and Szu-shui-hsien, Honan.

Gobio rivuloides (non Nichols, 1925) RENDAHL, 1932, p. 26; *partim*, Honan.

Gobio rivuloides NICHOLS, 1943, p. 173; *partim*.

TYPE MATERIAL: The holotype (A.M.N.H. No. 20493), 77.0 mm. in standard length, was collected at Niang-tze-Kwan, Shansi Province, northern China (Hwang-ho drainage), by Clifford H. Pope. Seven para-

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types (A.M.N.H. No. 20494), 70.0 to 91.3 mm. in standard length, were collected with the holotype.

DIAGNOSIS: A rather elongated gudgeon of the genus *Gobio*, with well-developed epithelial keels on the dorsal scales; seven branched rays in the dorsal fin (last two rays counted as one); the caudal peduncle laterally compressed, higher than wide. Eye rather large, its longitudinal

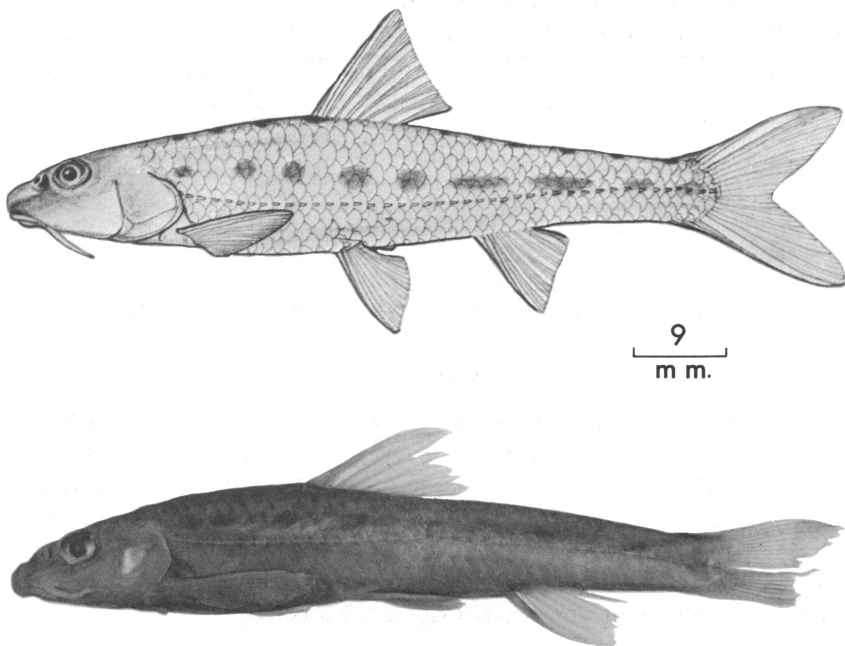


FIG. 1. *Gobio shansiensis*, new species, Niang-tze-kwan, Shansi. Top: Holotype, A.M.N.H. No. 20493. Drawing by Teodor T. Nalbant. Bottom: Paratype, A.M.N.H. No. 20494; photograph reversed to facilitate comparison.

diameter being 69.0 per cent to 91.3 per cent of the interorbital distance (including fleshy portion) and 56.2 per cent to 68.4 per cent of the snout length. Scales in lateral line 42 to 43, rarely 41; three and a half scales between lateral line and insertion of ventral fin. Color light; lateral dark spots somewhat squarish or rectangular, the anterior ones definitely above lateral line.

GENERAL DESCRIPTION: The body is more slender than that of most other Chinese species of *Gobio* (except *G. rivuloides*), the greatest height (depth) of the body being 16.9 per cent to 19.8 per cent of the standard length (including the last scale of the lateral line). The length of the

caudal peduncle is 22.8 per cent to 24.6 per cent, its least height (depth) being 8.3 per cent to 9.8 per cent of the standard length. The peduncle is compressed; in every case its least height is greater than its width at the anterior end of the anal fin. The origin of the dorsal fin lies nearer the tip of the snout than the base of the caudal fin, and the origin of the ventral is a short distance behind that of the dorsal. The edge of

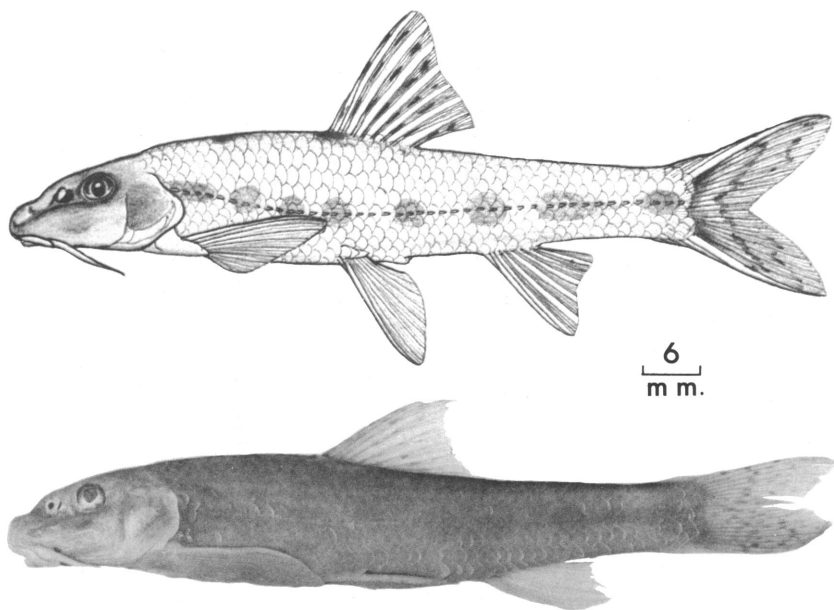


FIG. 2. *Gobio rivuloides* Nichols, A.M.N.H. No. 10567, Niang-tze-kwan, Shansi. Drawing by Teodor T. Nalbant.

the dorsal is slightly emarginate. This fin has three simple rays (the first one very short) and seven branched rays (the last of these, which is divided to the base, could be counted as two). In the anal fin there are two simple and six branched rays, the last one divided to its base. The pectoral fins do not reach the ventrals, nor the ventrals the anal. The ventrals are oriented in a horizontal plane. The caudal fin is deeply forked, and its two lobes are equal or almost equal. In most specimens the vent is nearer the origin of the ventrals than that of the anal; in two specimens it is nearer the anal.

The lateral line is straight and complete, with 42 or 43, rarely 41, scales. There are five and a half to six scales between the lateral line and the insertion of the dorsal, and three and a half between the lateral line and the origin of the ventral. The breast is scaleless.

TABLE 1
PROPORTIONAL MEASUREMENTS OF *Gobio shanstenis*, *G. rivuloides*, AND *G. coriparoides*,
EXPRESSED IN THOUSANDTHS OF STANDARD LENGTH

	<i>Gobio shanstenis</i>			<i>Gobio rivuloides</i>			<i>Gobio coriparoides</i>		
	Niang-tze-Kwan, Shansi A.M.N.H. Nos. 20493, 20494 8 specimens			Niang-tze-Kwan, Shansi A.M.N.H. No. 10567 11 specimens			Chin-su, Shansi A.M.N.H. No. 10559 22 specimens		
	Range	M±S.E.		Range	M±S.E.		Range	M±S.E.	
Standard length in mm.	70.0-91.0	80.0±2.32		62.9-98.0	75.3±2.72		69.5-96.5	87.6±1.37	
Body, greatest depth	169.0-198.0	182.5±3.60		163.0-192.0	175.7±2.40		187.0-226.0	203.2±2.20	
Caudal peduncle, length	228.0-246.0	237.8±2.80		226.0-245.0	236.1±2.00		216.0-252.0	231.0±2.30	
Caudal peduncle, least depth	83.0-98.0	90.2±1.81		87.0-97.0	92.9±1.10		84.0-113.0	97.2±1.20	
Dorsal origin to snout tip	409.0-440.0	421.6±3.50		433.0-460.0	447.5±2.30		410.0-452.0	430.5±2.30	
Anal origin to snout tip	665.0-685.0	678.4±2.50		670.0-720.0	685.0±3.50		647.0-695.0	680.0±2.40	
Ventral origin to snout tip	448.0-466.0	458.0±2.90		451.0-495.0	472.0±3.50		445.0-482.0	466.0±2.20	
Pectoral origin to ventral origin	232.0-252.0	241.0±2.40		221.0-251.0	237.4±2.80		226.0-276.0	248.0±2.50	
Ventral origin to anal origin	211.0-240.0	229.0±2.40		204.0-244.0	221.9±3.00		198.0-242.0	223.0±2.20	
Pectoral fin length	189.0-218.0	200.5±3.50		218.0-249.0	238.2±3.30		187.0-230.0	200.5±1.90	
Ventral fin length	157.0-186.0	170.1±3.20		192.0-220.0	202.1±2.20		158.0-191.0	170.5±2.10	
Dorsal, length of last simple ray	189.0-214.0	199.5±3.20		192.0-226.0	212.7±3.10		197.0-228.0	207.0±1.60	
Dorsal, base	120.0-143.0	131.6±2.30		115.0-138.0	127.1±2.40		124.0-143.0	131.3±1.10	
Anal, length of last simple ray	134.0-159.0	149.0±2.50		164.0-194.0	180.4±2.70		135.0-169.0	154.5±1.80	
Anal, base	72.5-92.5	82.5±2.60		78.0-95.0	85.7±1.40		75.0-93.5	85.0±1.00	
Head, length (including membranous opercle)	238.0-266.0	252.0±2.90		254.0-277.0	269.7±2.00		222.0-252.0	242.1±1.60	
Snout, length	82.0-96.0	88.2±1.70		101.0-117.0	109.5±1.60		72.0-91.5	84.4±1.30	
Eye, diameter	47.5-60.0	54.2±1.20		40.8-55.5	51.4±1.10		42.5-54.6	48.0±0.30	
Barbel, length	82.0-111.0	97.2±3.60		96.0-125.0	110.0±2.70		66.0-117.0	85.0±1.90	

TABLE 2
PROPORTIONAL MEASUREMENTS OF *Gobio shansiensis*, *G. rivuloides*, AND *G. coriiparoides*,
EXPRESSED IN THOUSANDTHS OF HEAD LENGTH, SNOUT LENGTH, AND INTERORBITAL DISTANCE

	<i>Gobio shansiensis</i>		<i>Gobio rivuloides</i>		<i>Gobio coriiparoides</i>	
	Niang-tze-Kwan, Shansi A.M.N.H. Nos. 20493, 20494 8 specimens	Range	M±S.E.	Niang-tze-Kwan, Shansi A.M.N.H. No. 10567 11 specimens	Range	M±S.E.
Snout, length in ‰ of head length		323.0-382.0	352.6± 5.80		375.0-445.0	406.5± 6.30
Eye, diameter in ‰ of head length		203.0-236.0	215.0± 3.30		150.0-205.0	191.0± 4.50
Eye, diameter in ‰ of snout length		562.0-684.0	612.1± 13.7		357.0-545.0	471.8± 15.1
Eye, diameter in ‰ of interorbital distance (including fleshy portion)		690.0-913.0	800.7± 25.8		580.0-800.0	717.7± 18.7
					583.0-790.0	687.5± 9.50

The length of the head, including the membranous part of the opercle, is 23.8 per cent to 26.6 per cent of the standard length. The snout is rather short; the eye, large. The mouth is inferior and horseshoe-shaped. The barbels reach under the posterior edge either of the eye or of the preopercle. The pharyngeal teeth are hooked and in two rows; there are five teeth in the main row and two or three in the second.

For other body proportions, see tables 1 and 2.

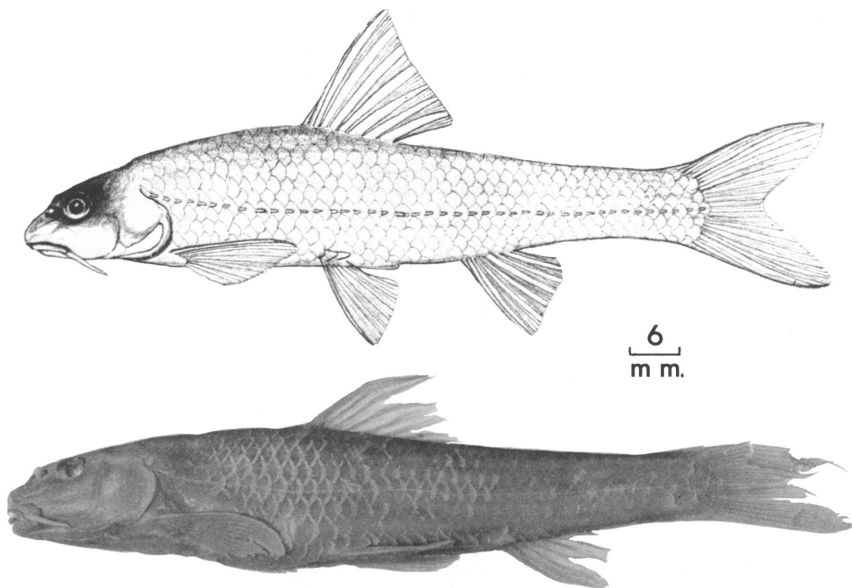


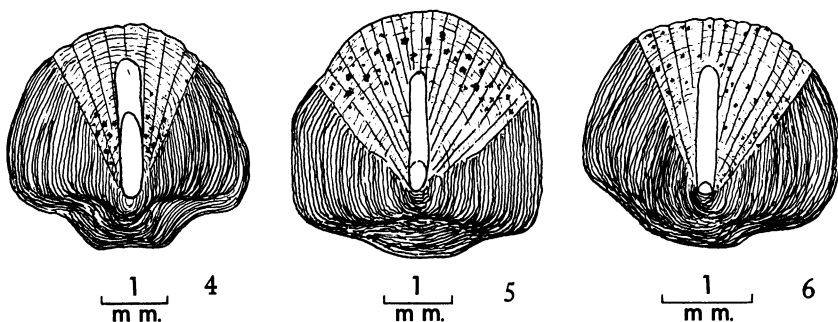
FIG. 3. *Gobio coriparoides* Nichols, A.M.N.H. No. 10559, Chin-suu, Shansi. Drawing by Teodor T. Nalbant.

The color in preservative (isopropyl alcohol 35%) is a light yellow-brown. There are eight to 10 (in most cases nine) lateral dark spots, most of them either squarish or elongated but rectangular. The posterior spots are on the lateral line; the anterior ones, above it. The fins of most specimens are immaculate; a single specimen has a few rows of barely distinct small spots on the dorsal and pectoral fins.

RANGE: This new species is apparently endemic in the Hwang-ho River drainage, northern China.

COMPARATIVE OBSERVATIONS AND RELATIONSHIP: The specimens on which this new species is based were collected with *G. rivuloides* and were considered to belong to the latter species. Tables 1 and 2 show the dif-

ferences, in body proportions, between *G. shansiensis*, *G. rivuloides*, and *G. coriparoides*. In *G. shansiensis* the predorsal, preanal, and preventral measurements are somewhat less than those in *G. rivuloides*. In *G. shansiensis* the distances between the pectorals and ventrals and between the ventrals and anal are slightly greater; the body is somewhat deeper; the pectorals, ventrals, head, barbels, and especially the snout are shorter. The values of the diameter of the eye, expressed in thousandths of the



FIGS. 4-6. Scales from the lateral line. 4. *Gobio shansiensis*. 5. *Gobio rivuloides*. 6. *Gobio coriparoides*.

snout, do not overlap: 357-545 in *rivuloides* and 562-684 in *shansiensis* (table 2). Because of these differences in snout and eye, the shape of the head in both species is distinctive (compare fig. 1 with fig. 2). There are also other differences between the two species. In *G. rivuloides* epithelial keels occur only on the most anterior scales, the general color is much darker, and the lateral spots are larger, rather circular, and all of them are situated on the lateral line. Figures 4 and 5 show the differences in shape of the scales of the two species.

Rendahl (1928, p. 77) mentioned a gudgeon from the Hwang-ho River between Yuan-hu-hsien and Szu-shui-hsien, Honan, which he identified as *Gobio argentatus* Sauvage and Dabry de Thiersant (= *Squalidus chankaensis argentatus*). Rendahl (1932) recorded 12 specimens of *Gobio rivuloides* from Lanchow in Kansu (upper Hwang-ho), and he decided that his 1928 specimen from Honan belonged to the same species. According to Rendahl's 1928 description, however, his specimen from Honan is apparently *G. shansiensis*.¹ The 12 specimens from Kansu, on the contrary, seem to belong to *G. rivuloides*, probably a new subspecies.

¹ We have recently examined Rendahl's specimen (N.R.M.S. No. 9974) and find that it is indeed *Gobio shansiensis*.

Gobio shansiensis resembles the European species *G. kessleri* Dybowski, the range of which includes the drainages of the Dnjestr, Danube, Vistula, and Vardar.¹ In both *shansiensis* and *kessleri* most of the body proportions, the color, and the general shape are the same. The main differences between them are: seven divided dorsal rays in *shansiensis*, as against eight in *kessleri*; and the caudal peduncle, which in *shansiensis* is high and laterally compressed, as compared with low (5.5% to 8.1% of the standard length) and broader than high in *kessleri*.

Banarescu (1961) proposed the new subgenus *Romanogobio* for *G. kessleri*, *G. albipinnatus*, and *G. persa*, characterized by: epithelial keels on the dorsal scales, caudal peduncle wider than high (slightly higher than wide in *G. albipinnatus*), lateral scales higher than long, and vent nearer the ventral than the anal. *Gobio shansiensis*, as well as another Chinese gudgeon, *G. coriparoides* Nichols, has epithelial keels, and in most specimens of each species the vent is nearer the ventral than the anal. Both belong, therefore, to *Romanogobio*, although their caudal peduncle is higher than wide. In *G. rivuloides* there are epithelial keels on only the first one or two rows of the dorsal scales; the vent, in some specimens, is nearer the ventral, in others nearer the anal; and the peduncle is higher than wide. The taxonomic position of this species is rather obscure; it seems to link together the subgenera *Gobio*, *sensu stricto*, *Rheogobio*, and *Romanogobio*.

The similarity between *Gobio shansiensis* and *G. kessleri* is the result not only of genetic relationship, but also of convergence. *Gobio shansiensis* probably lives, as does *G. kessleri*, in moderately swift rivers with sandy beds. Each of the four species of *Gobio* from the Hwang-ho drainage is similar to one of the species from the Danube drainage: *G. shansiensis* to *G. kessleri*, *G. rivuloides* to *G. uranoscopus*, *G. coriparoides* to *G. albipinnatus*, and *G. gobio minus* to *G. gobio obtusirostris*. This similarity is surely due to an identity of habitat. It is remarkable that in the Danube, *G. uranoscopus*, *G. kessleri*, and *G. albipinnatus*, all of which live in running water (the first-named being the most rheophil), exhibit a caudal peduncle that is broader and lower than that in the corresponding Chinese species. The Danube species are therefore better adapted to life in running water.

ZOOGEOGRAPHY: The species belonging to the subgenus *Romanogobio* live in eastern Europe (*Gobio kessleri*, *G. albipinnatus*), Transcaucasia (*G. persa*), and the Hwang-ho drainage in northern China (*G. shansiensis*, *G. coriparoides*). They are missing from northern Europe and Siberia. This discontinuous range is a consequence of the Ice Age. Several cases of dis-

¹ A detailed study of the species, which includes three subspecies and intergrades, was published by Banarescu (1961, pp. 336-344, pl. 3, figs. 3-8; 1962, tables 8-12).

continuous distribution in Europe and eastern Asia have been recorded, for example, in *Cyprinus carpio*, *Rhodeus sericeus*, *Misgurnus*, and *Eudontomyzon*. All these fishes inhabit either most of eastern Asia or only the Amur, the northernmost river of eastern Asia. The only exception is *Cobitis elongata* which lives in the Danube drainage (*C. elongata elongata*), Anatolia (*C. e. bilseli*), and the Yangtze (*C. e. macrostigma*) but not in the Amur or Hwang-ho. *Romanogobio* is the first European subgenus known to occur in the Hwang-ho and to be missing from the Amur.¹

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¹ The fish fauna of the Amur has been thoroughly studied, so that it is quite improbable that the occurrence of *Romanogobio* in this river drainage has been overlooked. The fish fauna of the Yangtze, on the other hand, is still imperfectly known.

