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SOME CHINESE FRESH-WATER FISHES¹

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XIX.—NEW LEUCOGOBIOID GUDGEONS FROM SHANTUNG

With the publication of number XVIII of this series in 1926, it was assumed that most of the obviously new forms of Chinese fresh-water fishes in the collections of the Asiatic Expeditions of The American Museum of Natural History had been reported upon. Considerable attention has since been given to a study of the literature with reference to material already examined. A more critical study of specimens has been resumed only recently in the examination of material obtained at Tsinan, Shantung, in 1924, by a native collector under the direction of Mr. Clifford H. Pope. Herein are found the following forms.

Leucogobio polytænia microbarbus, new subspecies

DESCRIPTION OF TYPE.—No. 9651, American Museum of Natural History, from Tsinan, Shantung, April–June, 1924.

Length to base of caudal, 54 mm. Depth in this length, 3.8; head, 3.4. Eye in head, 3.9; snout, 3.9; interorbital, 3; maxillary, 3.2; depth of peduncle, 2; its length, 1.3; pectoral, 1.6; ventral, 1.8; longest dorsal ray, 1.5; longest anal ray, 1.8; caudal lobe, 1.4. Barbel in eye, 5.

Dorsal, 9; anal, 8. Scales 37–38.

Moderately compressed; head rather blunt; vent a little before anal (about one-fifth the distance to ventral axil); lower parts rounded. Jaws equal; mouth moderately oblique; maxillary not reaching to under front of eye, with a minute subterminal barbel; gill membranes forming a narrow fold across isthmus. No spinous dorsal or anal rays; dorsal origin equidistant from end of snout and base of caudal; ventral origin slightly behind that of dorsal; pectoral rounded, ventral bluntly pointed; pectoral reaching two-thirds the distance to ventral, ventral four-fifths to anal; caudal moderately forked. Scales with close-spaced slightly radiating striæ, weaker than their strong concentric markings; lateral line complete, in the middle of side except for a slight rise in front.

Color much as in *polytænia*; a broad dark central stripe, and narrower stripes above and below it. Dorsal with a dark cross-shade, strongest on the front rays.

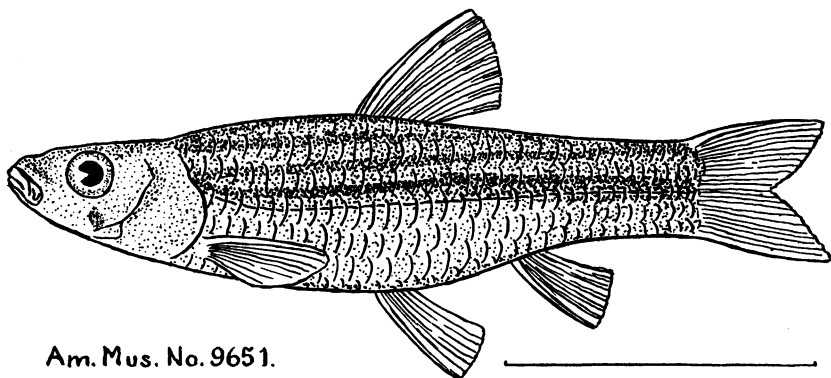
This form is obviously very close to *Leucogobio polytænia* from Shansi (Nichols, 1925, Amer. Mus. Novitates, No. 181, p. 6). Its

¹Publications of the Asiatic Expeditions of The American Museum of Natural History. Contribution No. 94.

²Drawings of type specimens by Gleb Botkin.

body form tends to be more pointed in front; its decidedly smaller barbel and other slight differences hold in other specimens in this collection, as follows.

Standard Length	Depth	Head	Eye	Dorsal	Anal	Scales	Barbel in Eye
61 mm.	3.9	3.6	4	9	8	36	4.5
63	4.1	3.7	3.8	9	8	38	3.5
69	4.2	3.8	4.1	9	8	37	3.5
76	4.1	3.7	4	9	8	36	4
81	4	3.8	4.5	9	8	39	3.8
86	3.9	3.7	4.8	9	8	38	4.5



Am. Mus. No. 9651.

Fig. 1. *Leucogobio polytzenia microbarbus*, type.

Numerous small specimens seem to represent the young of this form. They have a dark lateral band, not very broad, the only conspicuous color marking. A few of the largest measure as follows.

Standard Length	Depth	Head	Eye	Dorsal	Anal	Scales	Barbel in Eye
29 mm.	3.7	3.6	3.5	9	8	37	4
29	3.8	3.4	4	9	8	36	4
30	4	3.3	4	9	8½	38	4
30	4	3.4	4.3	9½	8	36	4
31	4.3	3.5	4	9	8	37	3
31	4.3	3.6	3.7	9½	8	37	4
31	4	3.5	3.8	9	8	36	4
31	4	3.5	4	9	8	36	4
32	4	3.6	4.4	9	8	36	4.5

Gnathopogon intermedius, new species

DESCRIPTION OF TYPE.—No. 9652, American Museum of Natural History, from Tsinan, Shantung, April–July, 1924.

Length to base of caudal, 65 mm. Depth in this length, 3.7; head, 3.6. Eye in head, 3.7; snout, 3; interorbital, 3.2; maxillary, 3.5; depth of caudal peduncle, 2.7; its length, 2; pectoral, 1.6; ventral, 1.6; longest dorsal ray, 1.4; longest anal ray, 1.8; caudal lobe, 1.4. Barbel in eye, 1.8.

Dorsal, 9; anal, 8. Scales, 36.

Moderately compressed; head rather pointed; vent at three-quarters the distance from ventral axil to anal origin; lower parts broadly rounded. Eye very slightly superolateral; lower jaw slightly included; mouth moderately oblique; maxillary not reaching to below front of eye, with a rather small subterminal barbel; gill membranes narrowly joined to the isthmus under edge of preopercle. No spinous dorsal or anal rays; dorsal origin equidistant from end of snout and middle of peduncle; ventral origin under the middle of dorsal base; pectorals and ventrals bluntly pointed; pectoral reaching two-thirds the distance to ventral, ventral three-quarters to anal; caudal moderately forked. Scales with radiating striæ; breast completely scaled; lateral line complete, in middle of side except for a slight rise in front.

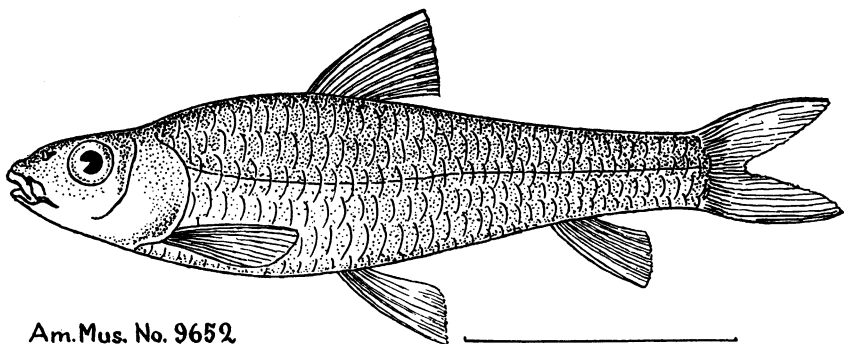
A faint dark shade along the middle of side posteriorly; otherwise unmarked, including the fins.

Measurements of several other specimens are given in the following table.

Standard Length	Depth	Head	Eye	Dorsal	Anal	Scales	Barbel in Eye
52 mm.	3.5	3.6	3.7	9	8	37 or 38	1.9
53	3.5	3.5	3.7	9	8	35	1.8
53	3.8	3.6	3.5	9	8	38	2.3
54	4	3.4	4	9½	8½	35	1.9
58	3.4	3.4	3.8	9	8	36	1.6
59	3.6	3.4	4	9	8	35	2
61	4	3.8	3.8	9	8	36	2.5
62	3.5	3.5	3.8	9	8	37	1.8
63	3.9	3.6	3.7	9	8	37	2
69	3.4	3.3	4	9	8	36	1.9

The 69 mm. specimen is a female distended with large eggs. In color it has a dark lengthwise shade in the middle of the side and narrower broken stripes above it. It has obscure markings along the lateral line in front suggestive of those most pronounced in *G. wolterstorffi* but also found in other species of this genus; and faint dark marks across the dorsal. It seems to be an abnormal individual, and has the lateral line distinctly bent down in front. The 52 mm. specimen has the lateral line slightly bent down with similar markings.

This form differs from any other examined by the writer and, in view of the number of closely related ones that exist, is probably distinct from *Gnathopogon elongatus* of Japan, though an apparently slightly lower scale count and shorter barbel are poor characters by which to separate it therefrom. It is markedly variable or instable, and also approaches *Leucogobio tæniellus* Nichols (1925, Amer. Mus. Novitates, No. 181, p. 7) from Fukien, being intermediate between these two genera of convenience (*op. cit.*, p. 6). A similar instability is noticeable in certain other fishes in the Tsinan collection and seemingly dependent on the locality. If the cause of this instability could be rightly deter-



Am. Mus. No. 9652

Fig. 2. *Gnathopogon intermedius*, type.

mined, this would probably be more interesting than solution of the systematic problem. As it is, each of these two problems complicates the other and renders it more difficult.

There is a single specimen, almost sufficiently like *G. intermedius* to be an aberrant individual of it, but with standard gnathopogon characters pronounced, which at the same time is very close to the geographically distant *G. atromaculatus* Nichols and Pope (1927, Bull. Amer. Mus. Nat. Hist., LIV, p. 351) from Hainan. It has a shorter barbel than that species and may be described as follows.

***Gnathopogon similis*, new species**

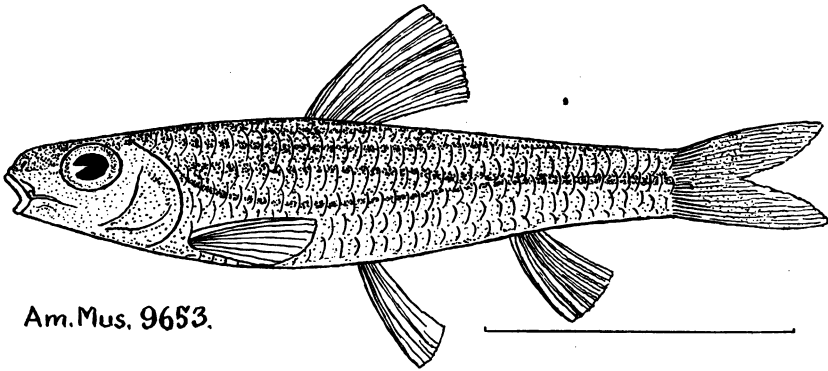
DESCRIPTION OF TYPE.—No. 9653, American Museum of Natural History, from Tsinan, Shantung, April–July, 1924.

Length to base of caudal, 58 mm. Depth in this length, 4.5; head, 3.7. Eye in head, 3; snout, 3; interorbital, 3.4; maxillary, 3.6; barbel, 4; width of body at shoulder, 2; depth of peduncle, 2.6; its length, 1.5; pectoral, 1.4; ventral, 1.4; longest dorsal ray, 1.3; longest anal ray, 1.9; caudal lobe, 1.1.

Dorsal, 9; anal, 8. Scales, 37 to 38.

Moderately compressed; breast and belly rounded; vent at three-eighths the distance from anal origin to ventral axil. Interorbital slightly concave; eye large, oval, slightly superolateral; maxillary slightly oblique, not reaching to under front of eye; lower jaw without free lip, distinctly included; gill membranes narrowly joined to isthmus slightly behind margin of preopercle. Dorsal and anal without spinous rays; dorsal origin equidistant from end of snout and middle of last anal ray; ventral origin under middle of dorsal base; pectoral reaching four-fifths the distance to ventral, ventral three-quarters to anal; caudal well forked, with narrow pointed lobes. Scales thin; body completely scaled; lateral line complete, dipping slightly in front, in the center of peduncle.

Color pale; a small dark spot on dorsal origin; a rather obscure dark stripe in center of peduncle, rising above lateral line over ventral; a faint dark stripe behind the vent, and dark mark at base of each caudal lobe; faint specking along lateral line suggesting *wolterstorffi*. Lower half of opercle bright, with a dark dot above.



Am. Mus. 9653.

Fig. 3. *Gnathopogon similis*, type.

Other gudgeons abundantly represented in the Tsinan collection are *Pseudogobio rivularis* (Basilewski) and *Pseudogobio chinssuensis* Nichols, the last up to 43 mm. standard length. A *Sarcocheilichthys*, subgenus (*Chilogobio*), is also plentiful, identified as *S. nigripinnis sciistius* (Abbott).

XX.—AN UNDESCRIBED FORM OF *RHODEUS* FROM SHANTUNG

A considerable series of *Rhodeus* from Tsinan shows a tendency to deviate from the standard characters of *Rhodeus sinensis* Günther, but a great majority are clearly referable to that species, with a somewhat lower fin-ray count than is usual, dorsal branched rays 7 to 9, anal 8 to 9, in most cases 8 in the dorsal and 9 in the anal. This species ordinarily has 9 or 10 dorsal and 8 to 11 anal branched rays.

This tendency to few fin-rays is paralleled in a small series (9) of related *Pseudoperilampus ocellatus* Kner from the same locality, with

dorsal branched rays 10 to 11 (in most cases 11), anal 9 to 11 (in most cases 10), instead of being about 12 in both fins.

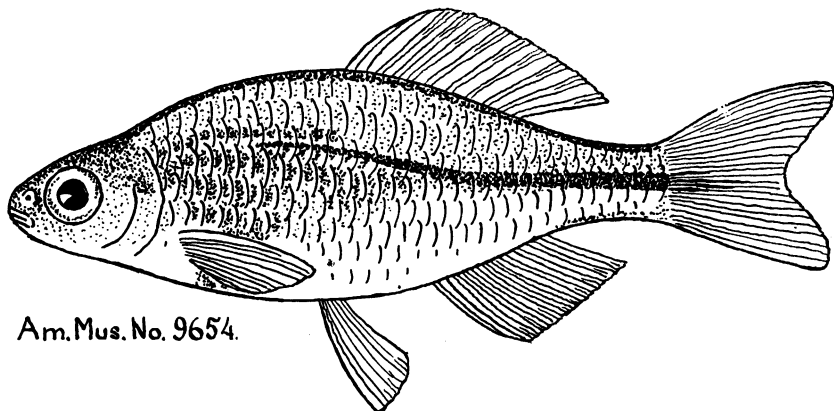
Occurring with the material referred to *Rhodeus sinensis* above, a number of small specimens are at once differentiable by being more slender, the black rhodein stripe bolder and carried forward to the head in a broader dusky shade from dark scale outlines. Closer examination shows that these have simple dorsal and anal rays more spinous, frequently rather well-developed spines with soft tips, and a ray or two more in the dorsal. Though this last character is normal for *sinensis* it helps to differentiate them from the particular *sinensis* with which they are associated, and the combination of characters seems to require their recognition as a new form. Though possibly an ecological subspecies, this is certainly not a geographic subspecies and is described as follows.

***Rhodeus notatus*, new species**

DESCRIPTION OF TYPE.—No. 9654, American Museum of Natural History, from Tsinan, Shantung, April–July, 1924, male.

Length to base of caudal, 33 mm. Depth in this length, 2.8; head, 4.4. Eye in head, 2.7; snout, 3.4; interorbital, 2.7; maxillary, 3.6; width of body, 2; depth of peduncle, 2.1; its length, 1.1; pectoral, 1.2; ventral, 1.4; longest dorsal ray, 1.2; longest anal ray, 1.4; caudal lobe, 0.9.

Dorsal, II, $9\frac{1}{2}$; anal II, $9\frac{1}{2}$. Scales 32 to 33.



Am. Mus. No. 9654.

Fig. 4. *Rhodeus notatus*, type.

Body compressed; its outlines evenly convex and the nape not appreciably elevated; vent at about five-eighths the distance from anal origin to ventral axil. Top of head slightly convex; mouth distinctly inferior, maxillary not quite reaching to under front of eye; gill-membranes attached to isthmus under middle of pre-

opercle. Last simple dorsal and anal rays weakly spinous almost throughout with soft tips. Dorsal origin equidistant from base of caudal and middle of snout, immediately behind base of ventrals; anal origin under middle of dorsal base; pectoral reaching about to ventral origin, ventral about to that of anal; caudal well forked. Scales with only faint concentric striæ noticeable; lateral line on first five scales.

A bold dark stripe in center of peduncle, continued backward with a narrow break in a dark mark on the middle caudal rays; forward this stripe bends upward, becomes narrower, and is appreciable almost to the head. An obscure dark blotch behind the upper angle of the gill cleft, dark stripe on the snout, and dark shade on the upper part of gill-cover, below which last there is a bright area. Scales on sides anteriorly with dark more or less vertical marks at their borders; breast and belly before the anal dark. Dorsal, anal and ventral fins dusky; the anterior dorsal rays pale distally; the anal pale submarginally, very narrowly black-tipped.

Measurements of additional specimens follow. The fin-count includes 2 simple more or less spinous rays in dorsal and anal.

The females have a black spot on the front of the dorsal fin; only one of the males has such a spot faintly indicated.

Standard Length	Depth	Head	Eye	Dorsal	Anal	Scales	Sex
23 mm.	2.6	3.9	2.7	11½	11	31	Male
26	2.9	4	2.7	12	11	32	Male
27	2.8	4	2.7	12	11	33	Male
27	2.6	4.1	2.6	11	11	32	Female
28	2.7	3.9	2.6	11	11	34	Female
30	2.7	3.9	2.9	11	10	32	Female
30	2.8	4	2.7	11	11	33	Male
30	2.9	4	2.7	11	11	About 30	Female

XXI. AN ANALYSIS OF MINNOWS OF THE GENUS *PSEUDORASBORA* FROM SHANTUNG

In 1925¹ and 1928² the writer recognized 5 species of *Pseudorasbora* from China, instead of referring Chinese material to one widely distributed form in eastern Asia with type locality Japan. Rendahl (1928)³ discredits this analysis as being based on slight variable characters and inadequate material. The material on which the writer's opinion was based, however, was not so inadequate as one might have been led to suppose. It indicates clearly enough that the variable fish widely known as *Pseudorasbora parva* occurs in several forms, recognizable though hard to define, which are more or less geographic and something more than individual variation. That they are sufficiently well

¹Nichols, 1925, Amer. Mus. Novitates, No. 182, pp. 4-6.

²Nichols, 1928, Bull. Amer. Mus. Nat. Hist., LVIII, pp. 19-20, Figs. 8-10.

³Rendahl, 1928, Arkiv. for Zool., 20A, No. 1, pp. 103-107.

marked to make their taxonomic recognition desirable is, on the other hand, not at all sure, and it will be best for the present to consider them subspecies of *P. parva*.

Examination of a considerable series of *Pseudorasbora* in the Tsinan, Shantung collection, complicates the problem in that there seem to be from this one locality three distinct forms, not at all difficult to pick out from a mixed lot of specimens. The great majority belong to a small short-bodied, broad-headed form, with more than usually heavily pigmented scales, which may be described as *Pseudorasbora parva parvula*, new subspecies.

***Pseudorasbora parva parvula*, new subspecies**

DESCRIPTION OF TYPE.—No. 9655, American Museum of Natural History, from Tsinan, Shantung, April–July, 1924.

Length to base of caudal, 55 mm. Depth in this length, 3.5; head, 3.9. Eye in head, 4.5; snout, 3.5; interorbital, 2; maxillary, 4; width of body, 1.7; depth of peduncle, 1.7; its length, 1.3; pectoral, 1.5; ventral, 1.5; longest dorsal ray, 1.2; longest anal ray, 1.8; caudal, 1.1.

Dorsal, 9; anal, 8. Scales, 35.

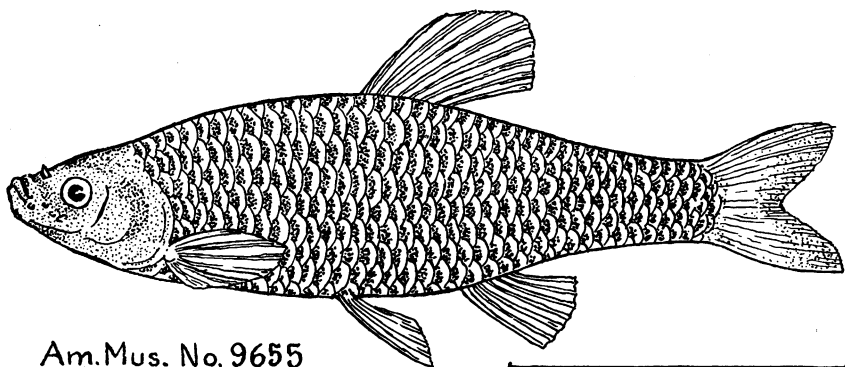


Fig. 5. *Pseudorasbora parva parvula*, type.

Body compressed; interorbital broad, very slightly convex; nape slightly elevated. Mouth small, transverse, almost vertical; lower jaw slightly projecting; maxillary not reaching half the distance to eye; no barbels; opercle with a membranous edge; gill membranes joined to breast slightly before middle of opercle; 2 pairs of horny warts on the chin, a row from maxillary back under eye. Dorsal and anal without spinous rays; dorsal origin equidistant from tip of snout and base of caudal, over ventral base; pectoral extending two-thirds the distance to ventral, ventral four-fifths to anal; caudal moderately forked; all fins rounded or bluntly pointed. Scales with inconspicuous radiating striae; lateral line complete, dropping slightly behind opercle, thence straight to caudal base in center of side.

A little darker colored above than below. Central part of each scale dusky. Fins dusky or grayish.

A representative series of specimens measure as follows.

Standard Length	Depth	Head	Eye	Dorsal	Anal	Scales	Inter-orbital	Longest Dorsal Ray
49 mm.	3.6	3.9	3.8	9	8	37	2.4	1.4
51	3.5	3.8	4	9	8	36	2.4	1.4
53	3.8	3.8	4.3	9	8½	36	2.1	1.2
53	3.7	3.8	4	9	8	37	2.1	1.6
54	3.6	4	4.6	9	8	37	2	1.4
55	3.9	3.9	4	9	8	36	2	1.4
56	3.6	4	4.2	9	8	37	2.1	1.3
57	3.5	3.9	3.9	9	8	37	2.1	1.2
59	3.5	4	4	9	8	37	2	1.4
73	3.4	4.2	4.5	9½	8	35	1.8	1.3

At a standard length of 50 to 55 mm. this form frequently has horny warts on the face which are relatively somewhat larger, especially those under the eye, than such warts in the following form at 65 to 70 mm. standard length.

***Pseudorasbora parva fowleri*, (Nichols)**

The second form of *Pseudorasbora*, of which a number of specimens are present in the Tsinan collection, seems to be the same as is common in the lower Yangtze Valley. It is usually paler than *parvula*, but sometimes equally dark, so that color is not a good criterion to separate it. The best character seems to be a narrower interorbital in the same-sized *fowleri*. The interorbital gets broader with age, so that there is considerable overlap if the size of the specimen is not taken into consideration. For purposes of comparison, a few Tsinan specimens of *fowleri* measure as follows.

Standard Length	Depth	Head	Eye	Dorsal	Anal	Scales	Inter-orbital	Longest Dorsal Ray
55 mm.	4.1	3.6	3.8	9	8	35	2.5	1.3
55	3.8	3.5	3.7	9	8	34	2.6	1.4
57	4	3.7	3.8	9	8	35	2.5	1.3
58	3.8	3.8	3.7	9	8	35	2.5	1.3
65	3.8	4.2	3.8	9	8	34	2.3	1.4

Pseudorasbora parva parva from Japan (not seen by the writer) seems to be very close to *fowleri* but with a higher scale count, and probably does not occur in China if these other subspecies be recognized.

***Pseudorasbora parva tenuis*, new subspecies**

The third form of *Pseudorasbora* in this collection is represented by several small specimens readily picked out from a considerable lot of *parvula*, and which also seem different from the young of *fowleri*, to which three or four other specimens in the same lot are referred. They are slender, large-eyed, interorbital broad, much as in *parvula*, dorsal high; and have a narrow black lengthwise stripe more or less developed. A practically identical color marking may, however, be present in the other forms. This would seem to be an ecological rather than a geographic subspecies.

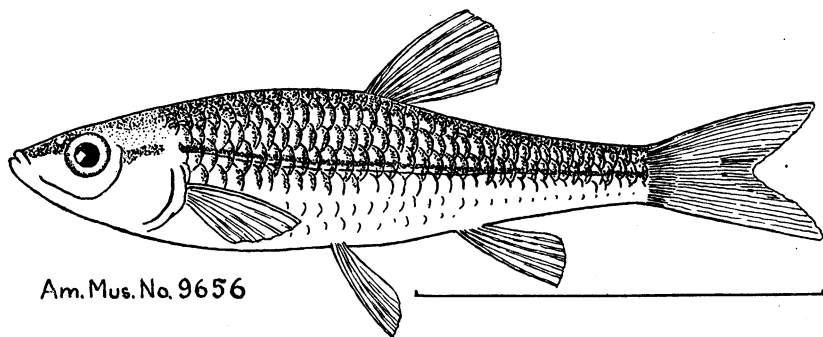


Fig. 6. *Pseudorasbora parva tenuis*, type.

DESCRIPTION OF TYPE.—No. 9656, American Museum of Natural History, from Tsinan, Shantung, summer of 1924.

Length to base of caudal, 41 mm. Depth in this length, 4.3; head, 3.8. Eye in head, 3.3; snout, 3; interorbital, 2.4; maxillary, 4; width of body, 2.2; depth of peduncle, 2.6; its length, 1.3; pectoral, 1.5; ventral, 1.5; longest dorsal ray, 1.1; longest anal ray, 1.6; caudal lobe, 0.9.

Dorsal, 9; anal, 8. Scales 34.

Nape very slightly elevated; snout pointed; mouth oblique; lower jaw slightly projecting; maxillary extending half the distance to under front of eye; gill membranes narrowly joined to breast well behind margin of preopercle. Dorsal and anal without spinous rays; dorsal origin equidistant from end of snout and base of caudal, over ventral base; pectoral reaching three-quarters the distance to ventral, ventral three-quarters to anal; caudal well forked. Scales with well-marked slightly radiating striae; lateral line complete in middle of side, rising slightly at shoulder.

Color darker along the back and paler below; a blackish streak from before eye to base of caudal.

Additional specimens measure as follows.

Standard Length	Depth	Head	Eye	Dorsal	Anal	Scales	Inter-orbital	Longest Dorsal Ray
31 mm.	4.5	3.7	3	9	8	35	2.4	1.2
32	4.5	3.6	3	9	8	33	2.3	1.1
36	4.5	3.9	3	9	8	33	2.4	1.1
37	4	3.7	3	9	8	35	2.4	1.2
40	4.3	4.1	3	9	8	34	2.3	1.1
40	4.3	3.7	3	9½	8	35	2.4	1.2

