

VI. NOTES ON A COLLECTION OF FISHES MADE BY
JAMES FRANCIS ABBOTT AT IRKUTSK, SIBERIA.

BY DAVID STARR JORDAN AND WILLIAM FRANCIS THOMPSON.

In the year 1904 a collection of fishes was made by Mr. James Francis Abbott, then Professor in the Japanese Naval Academy at Etajima, at Irkutsk in Siberia, in the Rivers Angara and Irkutsk, the outlets of Lake Baikal.

In the collection are eleven species, none of them new, but some of special interest. We present here an annotated list. The drawings are by William Sackston Atkinson. The specimens in question are in the Museum of Stanford University, in the Carnegie Museum, and in the United States National Museum.

Family SALMONIDÆ.

1. *Brachymystax lenok* (Pallas). (Plate XX.)

Salmo lenok PALLAS, Reise, II, Appendix, 1776, 716 (mountain torrents of the Altai).

Salmo coregonoides PALLAS, Zoogr. Ross.-As., III, 1811, 362 (Rivers of Irtes, Yenesei, Angara, Seleuka, Lena, Witem, Kovyma; Lake Baikal).

Brachymystax coregonoides GÜNTHER, Cat., VI, 1866, 163.

Ten specimens, 14 to 350 mm. in length.

Head $4\frac{1}{2}$ in body without caudal; depth 5; eye 6 in head; 2 in interorbital space, $1\frac{1}{2}$ in snout. B. 10-12. D. 12 or 13 (developed rays). A. 10 or 11. V. 10 or 11. P. 14 to 17. Pyloric cæca about 90. Gill-rakers 23 to 25. Scales 34-146 to 156-21.

Body somewhat compressed, its breadth about one-half its depth, stout, convex on the ventral side and on the dorsal anterior third. Head somewhat conical, arched dorsally from the snout; snout broad, rounded, and of moderate length; lower jaw, measuring from the articulation with the quadrate, one-ninth shorter than the upper; maxillaries broad, 2 to $2\frac{1}{2}$ in their length, extending to below the anterior third of the eye; lower limb of preoperculum long. Dentition is rather feeble, but complete, the teeth on the tongue, in two rows of 4 to 5 each, stronger than the remainder; vomer with teeth anteriorly only; gill rakers numerous, moderately long and stiff; dorsal fin low, truncate, the last ray one-half length of first, its base $7\frac{1}{2}$ to 8 in body length; adipose fin large, its base opposite



to that of anal; anal short, its base 11 in body, its height equal to that of dorsal; caudal deeply emarginate; the ventrals behind the middle of the dorsal, and as long as its height. Lateral line straight, ascending anteriorly, and slightly dorsal in position. Scales are small, their breadth about one-fourth the eye diameter; oval anteriorly but becoming much elongated, 2 to $2\frac{1}{2}$ times their breadth, posteriorly; very small between the pectorals and largest dorsally. Body dark above, light below, with numerous dark brown or black spots, 4 or 5 scales in extent, above and on the sides a little below the lateral line. Dorsal, anal, and ventral fins dusky on the distal half, the caudal edged with dark, the adipose with 4 to 7 spots similar to those on the body, and the pectorals uncolored.

According to Pallas, this singular fish, intermediate between a Whitefish and a Trout, reaches the weight of 60 to 80 pounds.

Stenodus leucichthys (Güldenstädt). (*Salmo nelma* Pallas.)
(Plate XXI.)

This Siberian species was not taken at Irkutsk by Professor Abbott, but specimens were obtained from the Volga River at Sammara in Russia. In view of the interest attaching to this interesting fish, intermediate between the Trout and the Vendace or Lake Herring, we here present a figure of it.

2. **Coregonus pidschian** (Pallas). (Plate XXII.)

Salmo pidschian PALLAS, Reise, III, 1776, 705 (River Obi).—GMELIN, Syst. Nat., 1788, 1377 (after Pallas).

Salmo shokur GMELIN, Syst. Nat. 1788, 1378 (River Obi).

Salmo polcur PALLAS, Zoogr. Ross.-As., III, 1811, 400 (River Obi).

Coregonus polcur GÜNTHER, Cat., VI, 1866, 178 (after Pallas).—SMITH, Salmoniden, 1886, 271, Tab. XVIII, no. 412, 428, fig. 99-100 (Yenesei R. to Nikandrovei and Mirna; good figures of head).

One specimen 315 mm. in length without caudal.

Head $5\frac{1}{2}$ in length, without caudal; depth 4, at base of caudal $2\frac{1}{2}$ in head. Eye $4\frac{1}{2}$ in head, $1\frac{1}{3}$ in snout, $1\frac{1}{2}$ in interorbital space. B. 10. D. 12 (developed rays). A. 14. Scales 11-90-9; gill-rakers 22.

Body compressed, the ventral outline convex, the dorsal less so. Head small, strongly arched between snout and interorbital space, the latter rounded from eye to eye. Snout slightly narrowed, projecting a third of its length beyond the very small ventral mouth, measuring it from the posterior edge of the adipose eyelid to its tip. Premaxillaries forming a flat, obliquely-placed spiral plate, a little broader than high, between the

tip of the snout and the mouth. Maxillaries short, over half as broad as long, and extending to center of adipose eyelid. Supplementaries ovate and two-thirds the breadth of maxillaries; mandible articulating with quadrate below posterior edge of pupil, slightly longer than the snout and contained $3\frac{1}{3}$ in the head. Seventh or eighth developed ray of the dorsal midway between the snout and base of the caudal. The longest ray is nearly length of head, and when supine extends beyond tip of last ray; edge of fin concave; base two-thirds length of the ray. Adipose fin small, above the center of anal fin. Caudal is as long as head, deeply emarginate. Base of anal three-fifths length of head, its longest ray slightly longer than its base, its shortest one-sixth the head, and its edge concave; ventrals slightly longer than pectorals, which are two-thirds the length of the longest dorsal ray. Lateral line, slightly curved ventrally from both ends, is nearer the dorsal. Scales rather large, about half the diameter of the eye, and as broad as long. Color is light, olive-silvery, darker above, the dorsal and caudal fins edged with black, the others clear.

Family THYMALLIDÆ.

3. *Thymallus arcticus* (Pallas). *Siberian Grayling*. (Plate XXIII.)

Salmo arcticus PALLAS, Reise, III, 1776, 35, 70 (Sob, Kobyma, Obi Rivers).

Thymallus arcticus SMITH, Salmoniden, 1886, 199, tab. VIII, no. 27-28 (Yenisei River).—BERG, Ann. Mus. Zool. Petersb., XII, 1907, 507 (west Siberia, Kobdo River, northwestern Mongolia).

Salmo digitalis BLOCK & SCHNEIDER, Syst. Ichth., 1901, 421 (after Pallas).

Thymallus pallasi CUVIER & VALENCIENNES, Hist. Nat. Poiss., XXI, 1848, 449 (after Pallas).—GÜNTHER, Cat., VI, 1866, 201 (after Pallas).—BERG, Ann. Mus. Petersburg, XII, 1907, 509 (Kolyma, Jana River).—DYBOWSKI, Verh. Ges. Wien, XIX, 1869, 509 (Kolyma, Jana River).

Thymallus grubei DYBOWSKI, Verh. Ges. Wien, XIX, 1869, 955, tab. XVIII, fig. 9 (Ohon, Ingoda, Amur Rivers).—BERG, Assn. Mus. Zool. St. Petersburg, XII, 1907, 509 (Amur Basin).

Thymallus grubeii var. *baicalensis* DYBOWSKI, Verh. Ges. Wien, XXIV, 1874, 391 (Lake Baikal).

Thymallus baicalensis GRATIANOW, (Russian publication), Moskow, No. 3, 1902, 58.

Thymallus arcticus baicalensis BERG, Wiss. Erg. Baikalsee, Exp. Lief., III, Cataphracti, St. Petersburg, 1907, 67 (Lake Baikal).—BERG, Ann. Mus. Zool. Patent 1907, 507 (Lake Baikal, Amgun River).

Thymallus baicalensis DYBOWSKI, Verh. Ges. Wien, XIX, 1869, 509 (Lake Baikal, Amgun River).

Thymallus microstoma HERZENSTEIN, (Russian publication), 1883, 244 (Koschagatsch, Tschuja River, Altai, upper course of the Obi; name only).

Thymallus nikolskyi KASCHCHENKO, (Russian publication at Tomsk), 1899, 131 (Altai, Tscharysch River, Katun River, Tom River, at Kusnatz).

Thymallus nikolskyi var. *ongudajensis* KASCHCHENKO, *ibid.*, 134 (Altai, Urusul River).

Thymallus sellatus KASCHCHENKO, *ibid.*, 135, tab. II, fig. 6 (Altai, Tongo River, Urusul River).

Fifty-seven specimens.

Among these great variation was shown, leaving it highly probable that there is but one species of grayling in the basin of Lake Baikal, and that the grayling of the Amur is not distinct from it. It seems necessary to unite with *Thymallus arcticus* Pallas the forms called *T. arcticus baicalensis* Dybowski, *T. pallasii* Valenciennes, and (probably) *T. grubei* Dybowski also. The two former are said to be distinguished from the two latter by the dorsal length being more than 22.5 per cent of the body length, and the distance of the snout from the dorsal not less than 34 per cent, the dorsal length being not less than 23.5 per cent and the dorsal from the snout not more than 32.5 per cent in *T. pallasii* and *T. grubei*. These distinctions are given by Dr. Leo Berg in his paper "Provisional Notes on the Eurasian Salmon," published in the *Annuaire of the Zoological Museum of the St. Petersburg Academy of Sciences*, T. XII, 1907.

In the present collection there is shown not only every variation between these nominal species, but there is little correlation between the two sets of measurements. Some specimens show both the shorter dorsal fin and the shorter distance from the snout to the dorsal. The number of scales is held to separate *T. baicalensis* from *T. arcticus*, *baicalensis* having more than 90 scales in the lateral line and *arcticus* less than 90. Such a division is evidently entirely artificial, as shown by the accompanying table. *Thymallus grubei* of the Amur is probably synonymous with *Thymallus arcticus*, but there are some grounds for believing it a distinct species. None of our specimens have so small a number of scales (83-87 in the lateral line) as is ascribed by Berg to *Thymallus grubei*, and the species is from a different water basin. The jaws are said to be subequal, and the maxillary extending farther back than in *Thymallus arcticus*.

Measurements were made of all our specimens (57), from 133 mm. to 325 mm. in length. In the attached table only those above 210 mm. in length are given. The remainder fully conform to these measurements. No other distinguishing characters set off the specimens representing the extremes of this species.

The male specimens are much darker in color than the females, the spots in both becoming obscure with age. The dorsal fin is much higher

in the males, as usual among graylings. The length of the dorsal is greatest, and in the sexually mature males the last anal ray is thickened.

Number.	Dorsal Rays. ¹	Anal Rays. ¹	Scales l. lat.	Percent Dorsal in Body.	Percent Dorsal to Snout in Body.	Height Dorsal.	Sex.	Max. in Head.	Length of Body.	Gill-rakers.	Classification by L. Berg.
5232	19	12	88	18	36	10.6	?	25	282	16	<i>arcticus.</i>
5236	18	12	95	18	34	11.9	♀	27	295	19	<i>baicalensis.</i>
5250	19	12	94	18.2	35.8	12.6	♀	28	285	18	<i>baicalensis.</i>
5249	19	12	98	18.2	35.8	11.2	♀	27.5	285	18	<i>baicalensis.</i>
5252	20	12	98	18.7	33.7	8.0	?	27	255	15	<i>baicalensis.</i>
5245	18	12	92	18.9	33.9	13.0	?	28.2	265	18	<i>baicalensis.</i>
5233	19	12	91	19.1	36.6	10.0	♀	27.5	240	17	<i>baicalensis.</i>
5234	19	12	98	19.2	34.3	18.8	♀	25.5	280	17	<i>baicalensis.</i>
5242	20	12	99	19.2	34.7	5.0	♀	28.5	260	17	<i>baicalensis.</i>
5243	19	13	99	19.2	34.6	9.5	♀	27	265	17	<i>baicalensis.</i>
5238	20	12	91	20.0	34.4	10.4	♀	28.7	250	18	<i>baicalensis.</i>
5248	20	13	95	20.2	33.1	16.0	♂	27.5	296	18	<i>baicalensis.</i>
5251	20	12	92	20.3	34.0	15.9	♂	24.5	265	19	<i>baicalensis</i> or <i>pallasi</i> ?
5141	18	13	96	20.8	33.0	16.5	?	28	257	17	{ <i>baicalensis</i> or <i>pallasi</i> ?
5222	20	12	98	21.5	36.0	9.8	♀	28.5	255	18	<i>baicalensis.</i>
5239	20	12	95	21.8	32.2	14.2	♂	29	270	17	{ <i>baicalensis</i> or <i>pallasi</i> ?
5244	20	12	93	21.8	33.2	15.7	♂	31	280	18	<i>baicalensis.</i>
5235	19	12	92	21.9	34.5	16.4	?	26.5	275	18	<i>baicalensis.</i>
5223	20	13	90	21.9	35.7	16.6	?	26	210	16	<i>baicalensis.</i>
5230	19	12	87	22.0	32.0	19.0	♂	28.3	265	18	{ <i>arcticus</i> or <i>grubei.</i>
5226	20	13	97	22.3	34.2	10.4	♀	30	260	18	<i>baicalensis.</i>
5228	20	13	97	22.4	32.9	16.6	♂	30	325	17	{ <i>baicalensis</i> or <i>pallasi</i> ?
5136	20	12	92	22.7	35.0	16.3	♂	28.5	265	17	{ <i>baicalensis</i> or <i>pallasi</i> ?
5237	20	13	93	23.9	31.7	18.7	♂	28.5	315	19	<i>pallasi.</i>
5241	22	13	95	24.8	33.0	15.4	♂	29.2	266	19	<i>pallasi.</i>

Family CYPRINIDÆ.

4. *Carassius carassius* (Linnæus).

One specimen, evidently belonging to this species, but varying much from the ordinary Crucian Carp of Europe.

Head $3\frac{1}{2}$ in body without caudal, depth $2\frac{1}{2}$. A. I, 5. P. 13. V. 9.

¹ Counting rudiments.

Scales 7-30-6. The body is compressed less strongly, and is more elongate, than in European examples; ventrals inserted before first ray of dorsal.

5. *Gobio gobio* (Linnæus).

Many large specimens not clearly different from the ordinary Gudgeon of Europe, with which the Russian naturalists have identified it.

6. *Leuciscus leuciscus* (Linnæus).

Numerous specimens, not different from this common European species.

7. *Rutilus rutilus* (Linnæus).

Cyprinus lacustris PALLAS, Zoog. Ross.-As., III, 1811, 314 (all Siberia, Lena River).

S. 12. W. 4. A. 12. W. 4. V. 10. Scales 8-40 to 44-5½.

Numerous specimens, corresponding to *Rutilus lacustris* of Pallas. Most Russian authorities regard *lacustris* as identical with the Common Roach of Europe, *Rutilus rutilus*, and we see no reason to question this determination. The American species called *Rutilus* seem hardly congeneric with it. These should probably stand as *Myloleucus* Cope.

Family LUCIIDÆ.

8. *Lucius lucius* (Linnæus).

Esox reicherti var. *baicalensis* DYBOWSKI, Verh. Ges. Wien, XXIV, 1874, 391 (Lake Baikal).

Nine specimens from 280 to 440 mm. in length.

Head $3\frac{1}{8}$ to $3\frac{1}{4}$; depth $5\frac{1}{2}$ to 6; eye 7 to 9 in head. B. 14 or 15. D. 20 or 21. A. 17 to 19. Scales 122 to 137.

We see no reason to question the identity of this species, "*baicalensis*," with the Common Pike of Europe, *Lucius lucius*; nor can we separate the Northern Pike of America, *Lucius estor* (Le Sueur), from either. In these Siberian examples, the dark bar under the eye is a shade more distinct than usual, and the pale spots on the sides show a greater tendency to array themselves in pale cross-bands, especially on the tail. The anal rays are 17 in 4 specimens, 18 in 3, and 19 in 2.

In the description of *Esox baicalensis* the vertical fins are described as unspotted, which is not the case in our examples, nor in any other specimens of *Lucius lucius*. The lesser diameter of the eye is said to be 10 to 15 times in the head in a specimen a meter in length.

Lucius reicherti of the Amur River is said to be spotted with dark. It is probably therefore a species of the Maskinongé group, to which the subgeneric name of *Mascalongus* has been applied.

MEASUREMENTS OF EXAMPLES FROM IRKUTSK.

	Branch.	D	A	P	V	Scales in l. iat.	Head in Body.	Depth.	Eye in Head.	Eye in Snout.	Length.
1.	14	IV 17	III 14	15	II	125	3½	6	8	3½	440 mm.
2.	15	IV 18	III 16	15	II	126	3½	6	8½	4	400 mm.
3.	14	IV 17	III 15	15	II	137	3¼	6	7	3½	280 mm.
4.	15	IV 19	III 16	16	II	122	3¼	6	7	3	290 mm.
5.	15	IV 17	III 15	15	II	125	3⅞	6	7	3	260 mm.
6.	15	IV 17	III 14	16	II	136	3¼	5½	7	3½	330 mm.
7.	15	IV 16	III 15	15	II	136	3¼	5½	9	4	400 mm.
8.	15	IV 17	III 14	16	II	129	3⅞	5½	8	3½	320 mm.
9.	15	IV 17	III 14	15	II	121	3⅞	5½	7½	3½	280 mm.

Specimens from Lake Erie show:

B. 15. D. IV, 18. A. III, 15. P. 14. V, 11. Scales 118. Head 3½ X. Eye 3 in snout, 7 in head. Brownish vertical suborbital band less distinct. Maxillary of same relative length, but extending a very little farther back.

Family PERCIDÆ.

9. *Perca fluviatilis* (Linnæus).

Many specimens, not evidently different from the Common Perch of Europe, with which the Russian authors identify the species.

Family COTTIDÆ.

10. *Cottus kneri* (Dybowski).

Cottus kneri DYBOWSKI, Verh. Ges. Wien, XXIV, 1874, 385 (Lake Baikal).

Thirteen specimens, agreeing well with Dybowski's account.

11. *Cottus sibiricus* (Kessler).

Cottus sibiricus KESSLER, WARPACHOWSKI, Ann. Mus. Petersburg, 1897, 249, tab. XI, fig. 6.

Cottus haitej DYBOWSKI, Verh. Ges. Wien, XIX, 1869, 949, tab. XIV, fig. 2 (Amur Basin).

One specimen, 87 in. long, referred with some doubt to this species (Onon, Ingda, Amur).

Head 3 in body, without caudal; depth at operculum 6; eye 5 in head, 1½ in interorbital space. P. 7—17. A. 12. V. I, 4. P. 15.

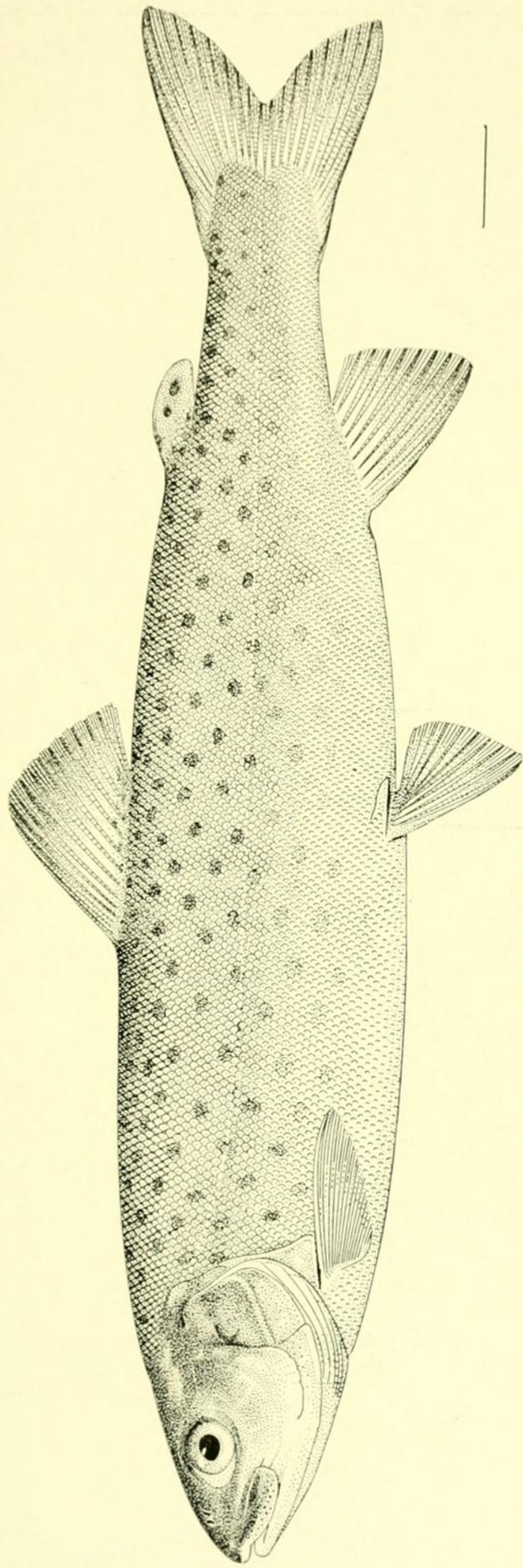
Body flattened, greatly at the head, but cylindrical at the anus. Skin smooth except above the lateral line, on the flanks, where it is thickly beset with small spicules. The maxillary extends to below the anterior margin of the eye-orbit. Four spines are present on the opercular bones,

covered by the skin. The largest is in length equal to the diameter of the eye, strongly recurved dorsally and posteriorly, and situated on the posterior and outward angle of the preoperculum. At the anterior base of this is a much smaller sharp spine pointing outward. The others are on the inter- and sub-opercular bones respectively, and so situated near the junction that they point toward each other. They are moderate in size, sharp and curved. The first dorsal is low, one-half the height of the second and the anal, which are equal and twice the height of the caudal peduncle. The pectorals are large, extending to beyond the second dorsal, while the ventrals extend to the vent, which is midway between the snout and base of the caudal. The latter is narrow and rounded, the rays branched. The lateral line is well developed and extends to the base of the caudal, with about 35 large pores.

We have not seen Kessler's original description of this species.

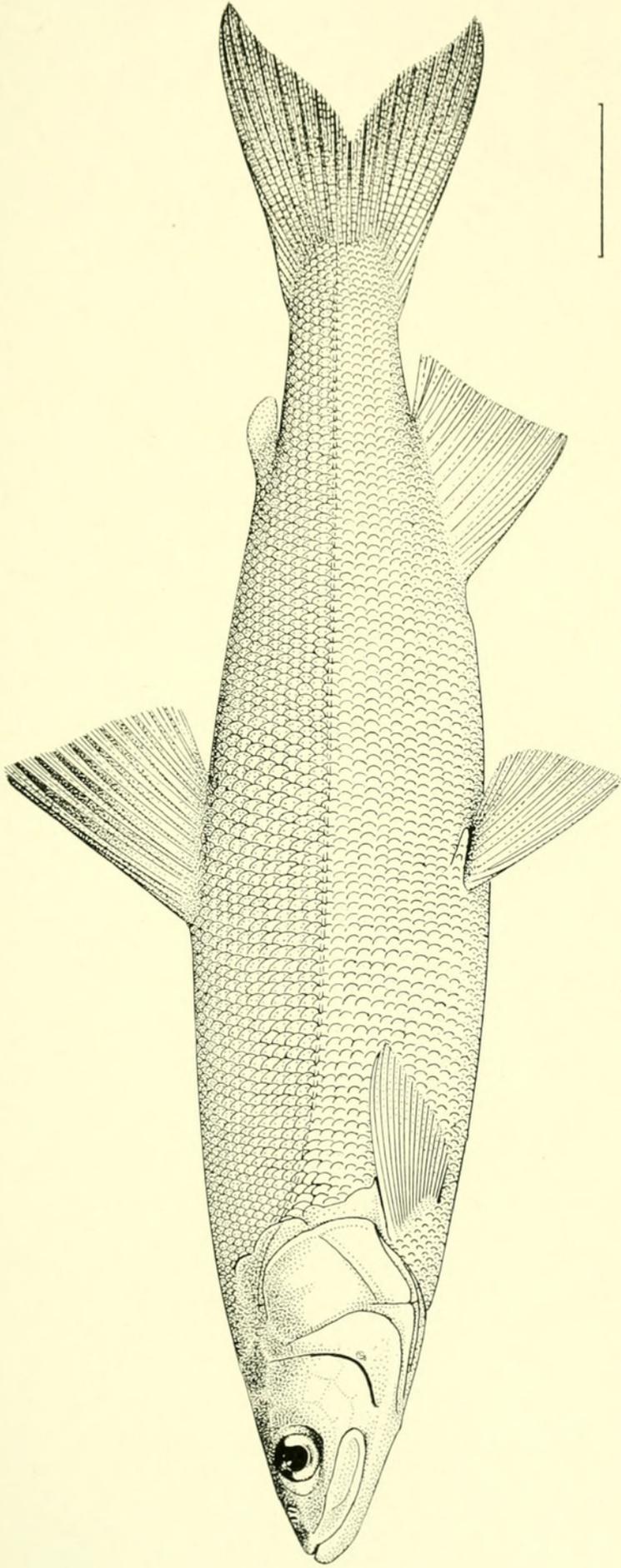
Our specimen agrees with the scanty account of *Cottus sibiricus* given by Warpachowski. Warpachowski makes no reference to the form of the preopercular spine, but in his figure the species is essentially as in our specimen. He ascribes to the species D. VIII, 17; A. 12, VI, 4; P. 14. Head about 3 in length; depth about 5, upper parts with minute rough prickles; ventrals reaching vent.

Dybowski's account of *Cottus haitej* from the Amur is more complete, but the preopercular spine is merely noted as turned upwards, "sursum." In the short anal these nominal species agree with each other and with our specimen.



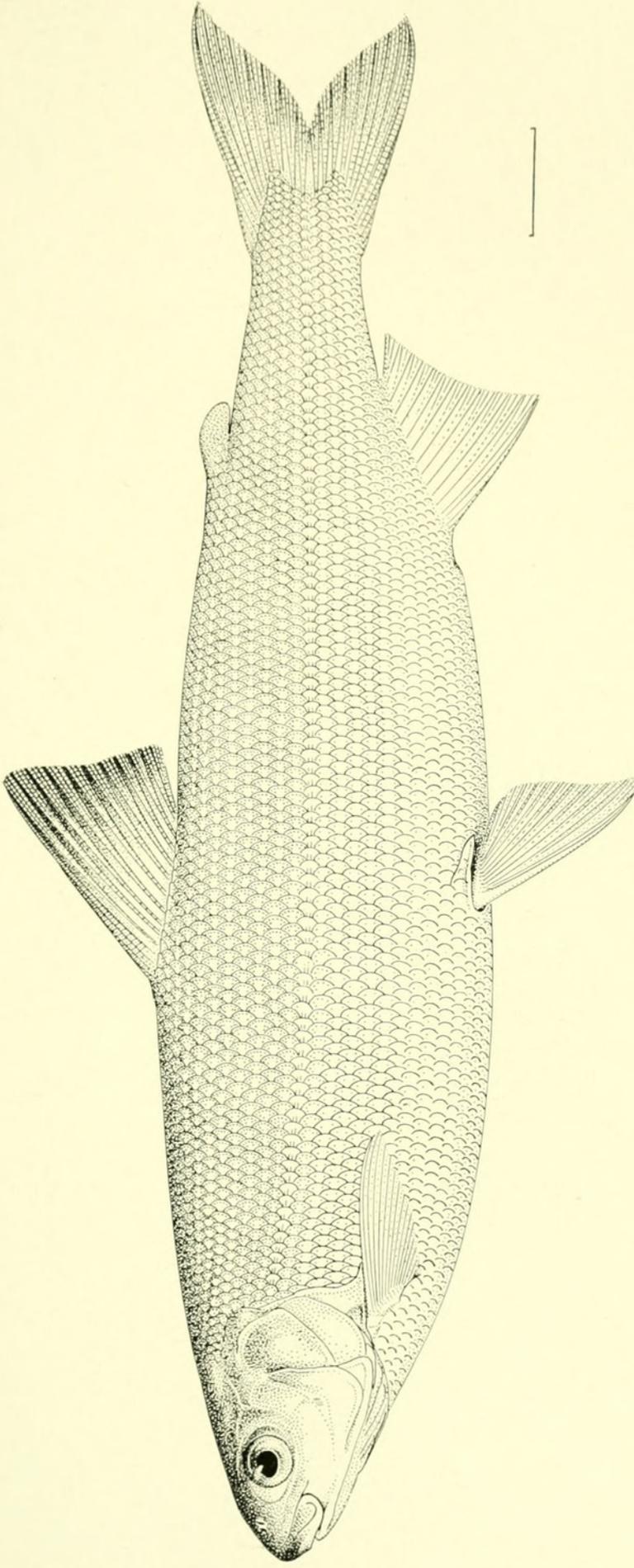
Brachymystax lenok (Pallas).

From Angara River, Irkutsk, Siberia. James Francis Abbott, collector.



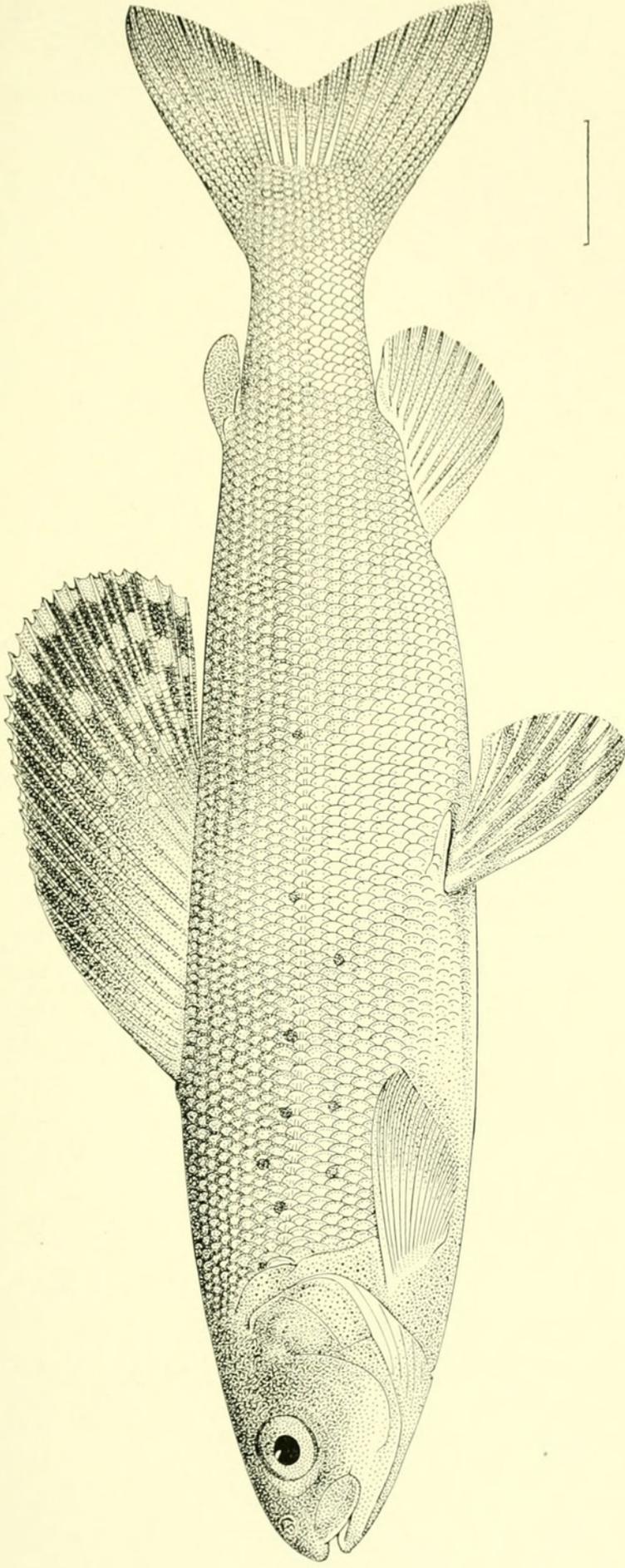
Stenodus leucichthys (Güldenstädt).

From the Volga River, Sammara, Russia. James Francis Abbott, collector.



Coregonus pidschian (Pallas).

From the Angara River, Irkutsk, Siberia. James Francis Abbott, collector.



Thymallus arcticus (Pallas).

From the Angara River, Irkutsk, Siberia. ♂ James Francis Abbott, collector.



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