

A REVISION OF THE COTTOID FISHES OF THE GENUS ARTEDIELLUS

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During the last 20 years there were described by different authors, American and Russian, many Pacific species of the genus *Artediellus* Jordan, a group in which species are very difficult to distinguish. It would perhaps not be superfluous to give a revision of this genus from the large collection of the zoological museum of the Russian Academy of Sciences in Leningrad, where all known species of this genus, Pacific and Atlantic, are now represented by many specimens and from different localities. Especially valuable is the collection of the Hydrographical Expedition of the Pacific Ocean made during the years 1908–1920 by many cruises of the steamship *Okhotsk* and other vessels of the Russian Navy, working on the survey of the coasts along Bering, Okhotsk, and the North Japanese Seas. From a study of the Cottidae of this collection and comparing these specimens with those of other collections of the museum, I am able to present the following short revision of the genus *Artediellus* Jordan. A more detailed study will be published later in the Russian language.

Family COTTIDAE

Genus ARTEDIELLUS Jordan

Teeth on vomer and palatines. Upper praeopercular spine strongly curved and hooked upward, sometimes with a small denticle. No slit behind last gill. Gill membranes forming a broad fold across the isthmus. Skin naked and smooth or partly covered by cutaneous prickles. No developed anal papilla.

ANALYSIS OF SPECIES OF ARTEDIELLUS

*a*¹. Skin completely naked and smooth.

*b*¹. Nasal spines obsolete; skin soft and smooth, loosely attached to the body; pores on upper sides of head few and inconspicuous.

miacanthus.

*b*³. Nasal spines present.

*c*¹. Occiput without bony tubercles, slightly concave.

*d*¹. Lateral line with 22 to 26 pores; maxillary barbel sometimes branched ----- *pacificus*.

*d*². Lateral line with more than 26 pores.

*e*¹. Lateral line with 27 to 33 pores; maxillary barbel always simple; a round black spot on front of dorsal in male.

ochotensis.

*e*². Lateral line with 31 to 34 pores; cirri on head reduced; no round black spot on front of dorsal in male.

(*ochotensis*) *camchaticus*.

*c*². Occiput with bony tubercles.

*d*¹. Bony tubercles on occiput, round, directed upward.

*d*². Bony tubercles on occiput, elongate, triangular in shape, spine-like or ridge-like, directed backward.

*e*¹. Bony tubercles on occiput two in number ----- *dydymovi*.

*e*². Bony tubercles on occiput four ----- *schmidti*.

*f*¹. Lateral line with 27 to 30 pores; cross bands on dorsal fin of male formed by row of round white spots.

uncinatus.

*f*². Lateral line with 20 to 23 pores; white cross bands on dorsal fin of male continuous ----- *europaeus*.

*a*¹. Skin more or less beset with cutaneous prickles.

*b*¹. Prickles on head, occiput back and over lateral line; cirri almost completely absent ----- *scaber*.

*b*². Prickles on head, occiput and below the first dorsal; cirri well developed, present in two rows upon first third of lateral line.

(*scaber*) *beringianus*.

ARTEDIELLUS PACIFICUS Gilbert (1893)

D. VII-VIII, 12-13; *A.* 11-12; *P.* 22-24; *V.* I, 3; *L. lat.* 22-26.

This first described Pacific species differs chiefly from all the Atlantic and Arctic species known by the absence of the blunt bony protuberances on the occiput, and from other Pacific species described later by the smaller number of pores of the lateral line. This number varies according to Gilbert and Jordan and Evermann¹ from 22 to 26 pores and is more often 24 pores. Our single specimen (Russian Academy of Science No. 13695 from the United States National Museum Cat. No. 48657, *Albatross* station 3279, 56° 25' N., 162° 39' W.) has 25 pores. The number of pores on the top of the head is small and the pores are inconspicuous. The cutaneous cirri in our specimen are not much developed and the maxillary barbel is short and simple. According to American authors this barbel is sometimes large and compound, furnished with 1-4 short lateral branches. This seems never to occur in other Pacific species.

Geographical distribution.—This species seems to be confined to the eastern part of the North Pacific. It is found on the coasts of

¹ Bull. U. S. Nat. Mus., No. 47, Fish. North and Middle Amer., pt. 2, 1898, p. 1906.

Alaska, in Bristol Bay, south of Sannak Island, north of Unalaska, and off St. Paul Island. According to Gilbert² it was found also off Povorotnaya (Cape Povorotny on the east coast of Kamchatka) in 100 and 96 fathoms, but this must be revised, as probably the specimens from these localities belong to other later described species, especially as Gilbert says, that "some of these specimens * * * show the head with more pores than could be distinguished in the type."³

ARTEDIELLUS OCHOTENSIS Gilbert and Burke (1912)

D. VII-VIII, 12-14; A. 12-13; P. 21-23; L. lat. 27-33.

This species is closely allied to the eastern form *Artediellus pacificus* Gilbert, but differs chiefly in having more pores in the lateral line. In our large collection (71 specimen) the variation of the number of pores is as follows:

Pores	27	28	29	30	31	32	33
Specimens.....	3	26	19	12	8	3	0

No specimen in our collection has fewer than 27 pores, and, therefore, this species must not be regarded as a subspecies of *A. pacificus* Gilbert.

Artediellus ochotensis has also well-developed and conspicuous pores on the top of the head and on the occiput and many well-developed cirri. There are occipital and supraorbital cirri, one cirrus on the praeoperculum, one on the operculum, and a row of 3-5 cirri between the occiput and the third or fourth pore of the lateral line.

The coloration of this species is also very typical. On the first dorsal of the male there is nearly always a round black spot on the hinder edge. The dark crossbands on the dorsal, pectoral, and caudal fins are very conspicuous.

The length of the body of the full-grown specimens is 70-80 mm., but some of our specimens have the length of 102.2 mm.

Geographical distribution.—This species is widely distributed in the western part of the North Pacific. In the Bering Sea it is recorded from St. Paul Bay (61° 8' N., 172° 7' E.), Archamton Bay (59° 27' N., 158° 7' E.), Karaginskaya Guba (58° 50' N., 168° 13' E.), from Avatcha Bay, and from some other points of the east coast of Kamchatka. In the Okhotsk Sea it is found in the northern part of the sea (Tauiskaya Guba, Erineiskaya Guba, Shantarsky Islands); on the west coast of Kamchatka (52° 38' N., 155° 40' E.); and off Sakhalin in Terpenya Bay, in Shamoff Bay,

² Fish. Bering Sea, 1899, p. 454.

³ Attention is called to the fact that Gilbert and Burke, in describing *A. ochotensis*, expressly stated (Bull. Bur. Fish., vol. 30, 1912, p. 46) that the Robben Island, Okhotsk Sea, specimens had been confused with *A. pacificus*.—L. S.

off Cap Notoro, off Cap Seniavino. In the North Japanese Sea it is found in the Tartar Straits, in De Castries Bay, in $51^{\circ} 26.5' N.$, $141^{\circ} 29.5' E.$, in $50^{\circ} 58' N.$, $141^{\circ} 4' E.$, and off Moneron Island (Todomosiri near Laperouse Strait).

ARTEDIELLUS OCHOTENSIS morpha *CAMCHATICUS* Gilbert and Burke (1912)

Artediellus camchaticus GILBERT and BURKE, Bull. Bur. Fish., vol. 30, 1910, (1912) p. 46, fig. 6.

This form is nearly allied to *Artediellus ochotensis* Gilbert and Burke and can not be separated, either as a distinct species nor as a subspecies.

The variation of the number of pores in the lateral line is nearly the same, as is shown by the following figures:

Pores-----	28	29	30	31	32	33	34
Specimens-----	3	5	3	2	2	0	1

The difference lies principally in the lower development of the cutaneous cirri and of the pores on the top of the head and on the occiput. But both these features are also highly variable in *A. ochotensis* Gilbert and Burke, so that one can not trace a distinct line between these two forms. The coloration is also very variable in both forms; but in *A. ochotensis* morpha *camchaticus* the crossbars on the dorsals, pectorals, and caudal fins are not so continuous and are formed mostly by separate brown spots. No distinct black round spot on the upper part of the first dorsal is seen, but sometimes a dark blotch.

This form can not be regarded as a subspecies of *Artediellus ochotensis* Gilbert, as it has not a separate geographical range. Such forms connected with the typical species by continuous variation and having the same geographical distribution as this species, I regard, as do many Russian entomologists, ornithologists, and ichthyologists⁴ as *morphae* (forms).

Geographical distribution.—The *Albatross* dredged this form at stations 4794, 4795, and 4796, off Avatcha Bay, Kamchatka. According to our collectors it is widely distributed in Okhotsk Sea and found in its northern part ($59^{\circ} 15' N.$, $144^{\circ} 15' 5'' E.$), off the west coast of Kamchatka (near Yavino and Oserkovsky) and in its southern part (Aniva Bay, Sakhalin). In North Japanese Sea the distribution of this form is also nearly parallel to the distribution of the typical *A. ochotensis*, but it goes farther to the south, and was found near to Peter the Great Bay ($43^{\circ} 45' N.$, $135^{\circ} 35' E.$ in 90 fath.).

⁴ A. P. Semenov-Tian-Shansky, Mém. Acad. Imp., St. Pétersbourg, ser. 8, vol. 30, No. 1. L. Berg, Biologic, Journal (Russian), 1910, No. 3. L. Berg, Les poissons des eaux douces de la Russie, 1916, p. xvii. V. L. Bianchi, Russ. Zool. Journ., vol. 1916.

ARTEDIELLUS MIACANTHUS Gilbert and Burke (1912)

Artediellus miacanthus GILBERT and BURKE, Bull. Bur. Fish., vol. 30, 1910, (1912) p. 47, fig. 7.

Artediellus aporosus SOLDATOV, Ann. Mus. Zool. St. Pétersbourg, vol. 23, 1920, pp. 323-324.

D. VII-VIII, 12-14; A. 11-12; P. 20-24; L. lat. 17-24.

This species can be easily distinguished from all other Pacific forms by the smooth and loosely attached skin, absence of the nasal spines, small number of in the lateral line and small number of pores on the top of the head. It is well described by American authors.

In our large collection, containing 47 specimens, the variation of the number of the pores is as follows:

Pores -----	17	18	19	20	21	22	23	24
Specimens ----	4	5	13	11	6	2	0	0

The variation in the number of the pectoral rays is as follows:

Rays-----	20	21	22	23	24
Specimens-----	2	4	17	17	7

Prof. V. K. Soldatov (Moscow) has described as a new species, *Artediellus aporosus*, a form nearly allied to *A. miacanthus*, but differing by the presence of "very small nasal spines wholly concealed beneath integument," in the absence of pores on the top of the head and in the smaller number of pectoral rays. But all these peculiarities are in my opinion insufficient for separating this form as a new species.

The nasal spines are completely concealed in the skin and not at all developed as spines; only by removing the skin can one detect sometimes blunt bony tubercles on the nasal bones, and the development of these tubercles varies.

The absence of pores on the top of the head is not especially mentioned by Gilbert and Burke, but the precision with which they describe "three pores in a cross series immediately behind the orbits, the middle one sometimes a little advanced" convince me that they have observed no additional pores on the top of the head.

The variation in the number of the pectoral rays given by V. K. Soldatov for *A. aporosus* is also the same as for *A. miacanthus*:

Rays -----	19	21	22	23
Specimens -----	1	1	5	2

Therefore after minute investigation of the specimens of *A. aporosus* I can not recognize this form as a separate species.

Geographical distribution—*A. miacanthus* is confined exclusively to the Okhotsk Sea and especially to its northern part. It was found in the Penshinskaya and in the Tauiskaya Guba and extends south to 50° 3' N.

ARTEDEIELLUS DYDYMOWI Soldatov (1915)

Arteidiellus dydymovi SOLDATOV, Ann. Mus. Zool. St. Pétersbourg, vol. 20, 1915, pp. 157-161, fig. 1.

D. VII-VIII, 11-13; A. 11-12; P. 19-24; L. lat. 26-33.

This species was described by Professor Soldatov and can be easily distinguished by the slender body, the presence of four praeopercular spines and of two large round bony tubercles on the occiput directed upwards.

Only one specimen has been added to our collection since this species was described. It is 74.3 mm. long and differs by having 26 pores in the lateral line and by a lower development of pores and of cutaneous cirri on the top of the head. It may perhaps constitute a special Bering Sea subspecies as it was found in this sea ($57^{\circ} 31' N.$, $163^{\circ} 17.5' E.$, 54 fathoms).

Geographical distribution.—*Arteidiellus dydymovi* is widely distributed in the North Japanese Sea from the Peter the Great Bay to the Nevelskoy Strait and the mouth of the Amoor River. In the Okhotsk Sea it is also distributed from the Aniva Bay in the south to Ayan in the northern part of this sea. Our specimen shows that it is found also in the western part of Bering Sea.

ARTEDEIELLUS SCHMIDTI Soldatov (1915)

Arteidiellus pacificus (part) SCHMIDT, Pisces Mar. Orient. Imp. Ross., 1904, pp. 101-103.

Arteidiellus schmidti SOLDATOV, Ann. Mus. Zool. St. Pétersbourg, vol. 20, 1915, pp. 160-161, fig. 2.

D. VII-VIII, 11-13; A. 10-12; P. 20-23; L. lat. 25-30.

This species can be distinguished from *A. dydymovi* Soldatov by the presence of 4 round bony tubercles on the occiput, of 4 well-developed praeopercular spines and of a more or less developed denticle on the upper praeopercular spine. But, if we take into consideration that the first pair of tubercles is developed from the enlarged supraocular rims and that in some specimens of *Arteidiellus dydymovi* we find the traces of such enlarged bony ridges fused to a kind of tubercle, it will be seen that the difference between both very nearly allied species is not considerable. It is possible that this species may be regarded only as a southern subspecies of *Arteidiellus dydymovi* Soldatov, but we have not yet material enough to settle this question.

Geographical distribution.—This species is now known only from the Aniva Bay (South Sakhalin).

ARTEDIELLUS SCABER Knipovitsch (1907)

Artediellus scaber KNIPOVITSCH, Mém. Acad. Imp. Sci. Pétersbourg, ser. 8, vol. 18, No. 5, 1907, pp. 15-29, figs. 7-12.

D. VIII-IX, 12-14; A. 10-13; P. 18-22; L. lat. 25-31.

This Arctic species described by Prof. N. M. Knipovitsch is well represented in our collection, as we have 25 specimens in addition to the 80 studied by him. Having thoroughly studied this material, I can add some new observations.

The nasal spines of this species are obsolete or developed as small tubercles hidden in the skin. The pores on the head are not developed; there are only 6-7 subocular pores and one pore between the eyes on the line connecting their hinder margins. These peculiarities show us that this species is nearly allied to *Artediellus miacanthus* Gilbert and Burke and is also connected with this Pacific species by our new subspecies *beringianus* described on page 8.

The cutaneous prickles, characteristic of this species, are distributed mostly in the following manner. They cover the dorsal side of the body before the first dorsal and on both sides of this fin, but behind them they form two bands or sometimes only two rows, one along the basis of the second dorsal and the other over the lateral line; these bands go to the base of the caudal.

Some of the specimens have very small cutaneous cirri over the eyes and on the occipital prominences.

Three specimens in the collection studied by N. M. Knipovitsch have a very peculiar coloration not described by this author. The male (No. 14205) (length of the body 64.5 mm.) has behind the occipital prominences a broad milk-white band, reaching on the sides to the lateral line and extending to the base of the caudal fin. The white color can be observed also on the front part of dorsal fin. A milk-white spot can be seen on the nasal part of the head and small white spots on the upper lip, on the praeopercle, and on the base of the pectoral. In the hinder upper edge of the first dorsal is a round black spot. On the dorsal, caudal, and pectoral fins are dark-brown crossbands, and not so dark bands are on the anal.

A female (No. 14205) (length of the body 61.7 mm.) has a milk-white spot before the first dorsal, but it splits in two narrow white bands, one extending over the lateral line and the other along the bases of the first and the second dorsal fins. A small white spot is on the praeopercle.

The other female (No. 14205) (length of the body 58.5 mm.) has only a milk-white spot on the nose and a small white spot before the first dorsal fin.

One specimen in our new collection (No. 21298, length of the body 46.5 mm.) has also a milk-white spot on the nose.

Geographical distribution.—According to the collection of the Zoological Museum, this species is largely distributed in the Arctic Ocean near the Siberian coasts from 44° E. to 173° 24' W. (near Bering Strait) and was found in Barents Sea in 79° 45' N., in Kara Sea in 76° 59' 30'' N., and in Nordenskjöld Sea (Siberian Arctic Ocean) in 75° 38' N. It is a true Arctic species.

ARTEDIELLUS SCABER BERINGIANUS, new subspecies

D. VIII, 13; *A.* 10–11; *P.* 20–23; *L. lat.* 24–27.

The structure of the head and of the body is entirely similar to that of *Artediellus scaber* (typical). The head, the operculum, the praeoperculum, and the occiput are covered with small cutaneous prickles; a narrow band of these prickles go also along the base of the first dorsal fin, but no more prickles on the body are observed. Supraocular and occipital cirri are long; shorter cutaneous cirri, evidently originated from elongated prickles, form a row along the base of the first dorsal fin. One of the two specimens (70.5 mm.) has only 4 such cirri in this row, the other (55 mm.) has 3 longer and 6–8 shorter cirri along the base of dorsal fin. Maxillary barbels are short. Three cutaneous cirri are placed over the lateral line, forming a second short row. Three other cutaneous cirri are on the praeoperculum and one on the operculum. There are 6–7 subocular pores, 2 small pores before, and 3 pores behind each eye.

Coloration is light brown with small dark brown spots, not forming regular bands. Behind the eyes is a broad white (not milky) band to the margin of the praeopercle. A white spot on the base of the first dorsal. On the first and the second dorsal, on pectoral and caudal fins are dark cross bands.

From the typical form of *Artediellus scaber* Knipovitsch this form differs chiefly in the smaller development of the cutaneous prickles and by two rows of cutaneous cirri. But these cirri are sometimes developed also by many specimens of the Arctic Ocean (as by No. 21305, Zool. Mus. Leningrad). The presence of the well-developed cirri on the head brings this form in near connection with *Artediellus ochotensis* Gilbert and Burke and other Pacific species.

Geographical distribution.—Both specimens were found in Tkatchen Bay (64° 25' N., 172° 48' 3 W.) in the northern part of the Bering Sea.

ARTEIELLUS UNCINATUS Reinhardt (1837)

Cottus uncinatus REINHARDT, Dansk. Vid. Selsk., Nat. Math. Afh. 1837, p. liv; 1838, pp. 117, 118.

Centridermichthys uncinatus SMITT, Scand. Fishes, pt. 1, 1892, p. 163.

Artediellus atlanticus JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, Fish. North and Middle Amer., pt. 2, 1898, p. 1906.

Artediellus uncinatus KNIPOVITSCH, Mém. Acad. Imp. Sci. St. Pétersbourg, p. liv; 1838, pp. 117, 118.

This species described first by Reinhardt from Greenland, differs, as shown by Knipovitsch, from the European form. Having compared now some of our specimens from the Davis Strait (from the collections of United States National Museum in Washington) with other specimens of our Leningrad collections from Spitsbergen and Barents Sea I agree completely with this opinion. The incorrect drawing of Collett⁵ with bony protuberances provided with radiating ridges, has led Jordan and Evermann to describe a new species *Artediellus atlanticus*, differing chiefly in having "blunt protuberances on the occiput." But the bony tubercles are completely alike in both forms, American and European. They are blunt, triangular in shape from the side, directed backward and developed in different degree.

This species differs from *Artediellus europaeus* Knipovitsch, in having 27-30 pores in the lateral line instead of 20-23 pores, and curiously enough it is the same difference that we find between the eastern and western species in the Pacific Ocean, namely, between *Artediellus pacificus* and *A. ochotensis*, as shown in the following table:

	Eastern part	Western part
ATLANTIC OCEAN		
<i>Artediellus uncinatus</i> -----	<i>Pores</i>	<i>Pores</i>
<i>Artediellus europaeus</i> -----	20-23	27-30
PACIFIC OCEAN		
<i>Artediellus ochotensis</i> -----		27-33
<i>Artediellus pacificus</i> -----	22-26	

The coloration of the American species seems also to be very peculiar, as on the dorsal and on the pectoral fins we find rows of round white spots, not connected to continuous crossbands, as in the European form.

Our material is not large enough for establishing these two species with full certainty, but as we have no forms with intermediate num-

⁵ Norske Nordhavs Exped., vol. 3, 1880, Fishes, pl. 1, fig. 7.

ber of pores in the lateral line, we must still consider them as two different species.

Geographical distribution.—This species is known from Greenland, Davis Strait, and the east coast of North America from Labrador southward to Cape Cod.

ARTEDIELLUS EUROPÆUS Knipovitsch, 1907

Artediellus uncinatus (part), SMITT, Scand. Fishes, pt. 1, 1892, p. 163.

Artediellus uncinatus JORDAN and EVERMANN, Bull. U. S. Nat. Mus. No. 47, Fish. North and Middle Amer., pt. 2, 1898, p. 1905.

Artediellus europæus KNIPOVITSCH, Mém. Acad. Imp. St. Pétersbourg, ser. 8, vol. 18, No. 5, 1907, p. 17.

This form confused by other authors with the American form, the true *Artediellus uncinatus* Reinhardt was separated by Knipovitsch as a different species.

The number of pores in the lateral line is 27–30. On the dorsal and pectoral fins the white crossbands on the dark brown ground are continuous and not formed by rows of round white spots. The length of the pectoral fins is given by Knipovitsch as 22–24.9 of the length of the body, but in this respect there is a very small difference between this species and the *Artediellus uncinatus* Reinhardt, as this last species has the fins of 22.7–26.7% of the length of the body. The length of the body (measured with caudal fin) can, according to specimens in the Leningrad collection, reach 133.5 mm.

Geographical distribution.—This species is distributed in the eastern part of the Atlantic Ocean. It is known from Spitsbergen, west coast of Norway, and the Murman coast (Barents Sea).

