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The Salmonid fishes of Lake Baikal and its adjacent water systems: annotated checklist with new taxa description

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ABSTRACT. The updated list of Salmonid fishes of Lake Baikal and its adjacent basins is presented with data on nomenclature, diagnostic characters and distribution, systematics notes and illustrations. At present, 20 species of salmon-like fish belonging to eight genera and three families (Coregonidae, Salmonidae and Thymallidae) have been indicated in the Baikal region. The validity of the species *Coregonus skrjabini* Karasjov, 1987; *Coregonus sajanensis* Gundriser, 1978 and *Brachymystax czerskii* Kirillov, 1979 has been restored. A new replacement name *Coregonus karasjovi* Bogdanov (nom. nov.) has been established for Baunt cisco-liked whitefish. A new species of grayling *Thymallus lenensis* Knizhin (sp. nov.) has been described.

Keywords: Salmoniformes, systematics, distribution areas, diagnostic characters, Lake Baikal, Baikal region

1. Introduction

Faunal studies are important both in theoretical and applied aspects as they serve as the basis for subsequent work in the field of zoogeography, ecology, nature conservation, etc. The compilation and correction of lists of regional faunas including information on valid scientific names, distribution and life history of species is an ongoing process. On the one hand, this is due to changes in the species composition, the boundaries of the ranges and the numbers of species. On the other hand, it is caused by changes in ideas of the systematics of animals as new scientific knowledge about them is accumulated.

Salmonids are the most studied fish of the Baikal region including in terms of taxonomy. Nevertheless, there are a lot of discrepancies, both with the use of scientific names, and with the number and rank of taxa. This problem is related to the fact that in salmonids along with "good" species, complexes of forms are formed in the process of microevolution. Such complexes consist of allopatric or sympatric derivatives, biologically equivalent to species, but related by close genetic affinity and/or external similarity as populations of the same species. This enables to interpret the differences between them both as interspecific and as interpopulation depending on the researcher's commitment to a particular taxonomic concept.

This article aimed to provide an overview of the salmonids fauna of Lake Baikal and the Baikal region in the context of new data on the taxonomy, phylogeny and distribution of these fish.

2. Materials and methods

The site of research includes lake-river systems of the Baikal Rift Zone and associated river basins including Lake Baikal, its catchment basin, the basin of the water-heads of the Angara and the Oka-Sayanskaya (Ak-Khem), water bodies of the Darkhat depression in Mongolia (Upper Yenisei basin); the water-head of the Lena and its tributaries up to the Olekma (Fig. 1).

Materials. The study uses the material collected by the authors in the period from 1985 to 2022 and published data including those posted on Internet resources: Internet archive (https://archive.org), Biodiversity Heritage Library (https://www.biodiversitylibrary.org), Catalog of fishes (Eschmeyer's Catalog..., 2022), Electronic Library of Russian Geographical Society (https://elib.rgo.ru), Electronic Library of Tomsk State University (https://vital.lib.tsu.ru/), National Library of the Republic of Sakha-Yakutia (https://new.nlrs.ru/) and Electronic Biological Library Zoomet.Ru (https://zoomet.ru/).

The nomenclature data are shown in accordance with the international code of zoological nomenclature

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(International code of zoological nomenclature, 1999), hereafter "Code". Information on each species is given according to the following scheme: scientific and common names; nomenclature data; systematics note; description; distribution; examined material; references guide.

Species concept. The species is the main taxonomic unit and the main subject of discussion in zoological systematics. There is currently no universal concept of the species, and it is unlikely that it will appear in the future. There are reasons for this, both objective and subjective, due to the specifics of speciation and the traditions of classification of animals in different taxonomic groups. Nowadays, three competing concepts of the species (biological, phylogenetic and evolutionary) are usually used in taxonomic practice. These concepts differ in relation to the taxonomic volume (i.e. inclusivity) of the species, but they have the basic understanding of the species as an independently evolving population system, the belonging of individuals to which is diagnosed by exterior traits and (or) genetic markers (Mayr, 1969; Kottelat, 1997; Bogutskaya and Naseka, 2004). In this study, the category "species" is used in the above-mentioned meaning.

The "traditional" taxonomy of fish is based on the biological concept of the species. This concept, unlike the other two, assumes the existence of not only monotypic species, but also polytypic species and superspecies.

Polytypical species consist of two or more subspecies. Subspecies are groups of phenotypically similar populations that are located in the species range, have taxonomically significant differences and, as a rule, were previously described as separate species. Since the substantiation of the subspecies rank of a taxon is laborious from the practical and controversial from the theoretical side, subspecies and polytypical species have become extremely unpopular in modern taxonomy.

A superspecies is an auxiliary taxonomic category that serves to designate groups of monophyletic, vicarious (allopatric, less often parapatric) species that are phenotypically and phylogenetically similar to each other and separate from other species of the genus or subgenus. The taxonomic category "superspecies" is used in this study as an alternative to such categories as "polytypical species", "group of species" and "complex of species". To indicate that closely related species belong to the same subspecies, its name is given in parentheses between generic and specific names, the nominative species is indicated by the Principle of Priority (by article 6.2 of the Code).

Abbreviations of museums:

- BM ISC - Baikal Museum of the Irkutsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences, Russia;
- BMNH - Natural History Museum, London;
- MNHN - Muséum National d'Histoire Naturelle, Paris;

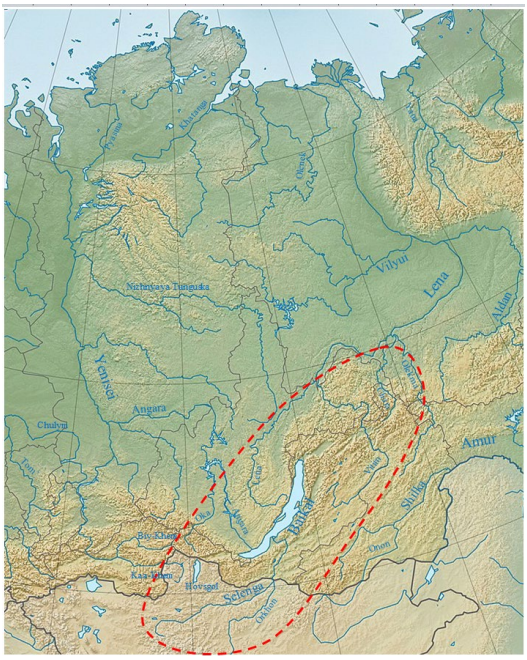

Fig.1. Location of the Baikal region on the map.

- ZISP - Zoological Institute RAS, St.-Petersburg, Russia;
- ZMB - Humboldt-Universität, Museum für Naturkunde, Zoologisches Museum, Vertebraten (Wirbekltiere), Ichthyologie, Berlin;
- ZMISU - Zoological Museum of Irkutsk State University, Russia.
- ZMMSU - Zoological Museum of Moscow State University, Russia.

Abbreviations of diagnostic characters: *TL* - absolute length; *D*, *P*, *A*, - number of rays in dorsal, pectoral and anal fins; *sp.br.* - number of gill rakers; *l.l.* - number of scales in the lateral line.

Authorship of the images. When preparing the illustrations, the authors photo materials were used as well as drawings and photographs of fish, the authors of which are N.A. Bochkarev (Institute of Systematics and Ecology of Animals SB RAS, Novosibirsk, Russia), S.N. Safronov (Sakhalin State University, Yuzhno-Sakhalinsk, Russia), P.E. Reddish (Grayling Society, UK) and C. Rashtan (TB Zauner, Engelhartszell, Austria).

3. Results and discussion

Family Coregonidae – Whitefishes

Genus *Coregonus* Linnaeus, 1758 Whitefishes

Coregonus Linnaeus, 1758: 310. Masc., as subgroup of genus *Salmo*; type *Salmo lavaretus* Linnaeus, 1758, by subsequent designation.

Systematics note. For whitefish of the genus *Coregonus*, the number (less often the shape) of the gill rakers, scales in the lateral line, the position of the mouth and rostral plate, the shape of the snout, the highest body height and the ratio of the smallest body height to the length of the lower jaw are usually used as distinguishing characters. These characters usually expressed discretely in sympatric forms, but are subject

to intergradation in allopatric forms. Since individual species and intraspecific forms differ in the same categories of traits, their diagnosis and classification are significantly difficult. This circumstance led to the unification of a large number of visually similar species and unclear forms into one "supertaxon" *Coregonus lavaretus* complex (Berg, 1948; Reshetnikov, 1980; Reshetnikov et al., 2003). Molecular studies have shown that the existing classifications do not correspond to phylogenetic relationships (Bochkarev et al., 2011; 2013; Sukhanova et al., 2012; et al.). This enables to restore the validity of a number of species living in the Baikal region, previously considered subspecies of *C. lavaretus* (*C. baicalensis and C. baunti* whitefish), or a manifestation of the geographical variability of *C. lavaretus pidschian* (*C. sajanensis and C. skrjabini*).

***Coregonus baicalensis* Dybowski, 1874 – Baikal Whitefish** (Fig. 2)

Coregonus baicalensis Dybowski 1874: 389, Pl. 7, fig. 1-3; syntypes (4) whereabouts unknown; Baikal, Maloye More strait.

Description. Length (FL) reaches 80 cm, weight is 8 kg, but usually less. *D* IV 10, *A* IV 10-13, *P* I 15, *V* II 10-11, *l.l.* 80-110; *sp.br.* 25-33. Shape of body is herring-liked. The mouth position is hemi-inferior, the upper jaw protrudes significantly above the lower one. The snout is elongated. The rostral plate is almost horizontally sloped downwards. Its height is equal to or slightly less than its width. The body coloration is silvery, dark from the back and light from the ventral side. The dorsal and caudal fins are grey; the pectoral, ventral and anal fins are pinkish.

Distribution. It is lacustrine endemic of Lake Baikal. There are three populations that breed in Maloye More strait, Chivyrkuysky bay and Selenginskoe shallow waters.

References: (Dybowski, 1874; 1876; Berg, 1948; Egorov, 1985; Smirnov et al., 2009).

***Coregonus baunti* (Muchomediarov, 1948) – Baunt Whitefish** (Fig. 3)

Coregonus sardinella baunti Mukhomediarov [Muchomediarov], 1948: 270; syntypes (95) whereabouts unknown; lakes Tretiyakovskoe, Bolshoye Kapylyushi, Maloye Kapylyushi, in the basin of the Vitim River.

Fig.2. Baikal Whitefish, *Coregonus baicalensis*: lateral view and head shape [image by B.E. Bogdanov].

Coregonus ludoga oronensis Kalashnikov, 1968: 643; syntypes (46) whereabouts unknown; lake Oron-Vitimsky in the basin of the Vitim River.

Coregonus vernus Karasev [Karasjov], 1987: 47; an unjustified new replacement name for *Coregonus sardinella baunti*.

Systematics note. Two forms of medium-rakered whitefish have been described in the lakes of the Vitim River basin: spring-spawning in the Baunt lakes by Mukhomediarov (1948) and autumn-spawning in Lake Oron-Vitimsky by Kalashnikov (1968). Their conspecificity has been established by molecular methods (Sukhanova et al., 2012; Bochkarev et al., 2013).

Description. Length (FL) reaches 25-35 cm, weight is up to 400-450 g. *D* III-V 8-12, *A* III-V 9-13, *P* I 11-17, *V* I-II 9-12, *l.l.* 76-104, *sp.br.* 28-42. Shape of body is herring-like, moderately elongated. The

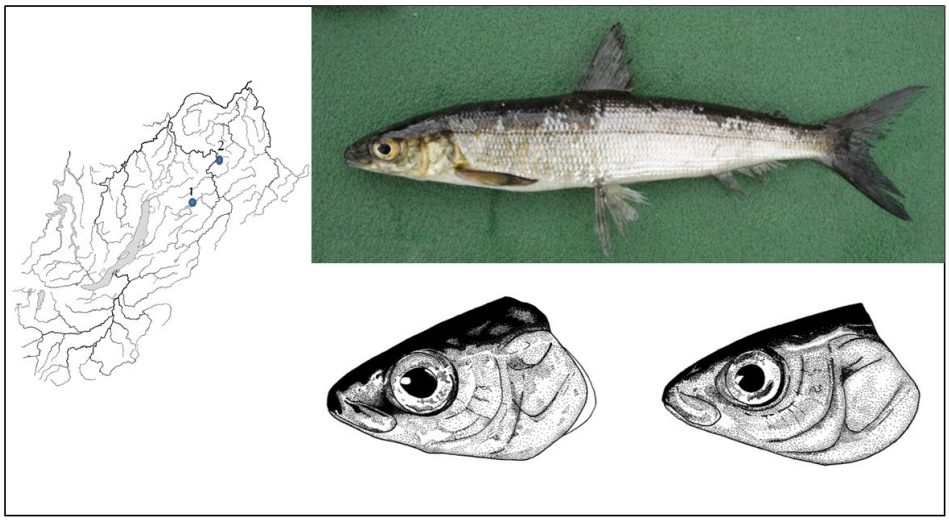

Fig.3. Baunt Whitefish, *Coregonus baunti*: lateral view and head shape variability [images by N.A. Bochkarev]. The points on the map indicate the habitats of the Baunt Whitefish: 1 – Baunt lakes group, 2 – lake Oron.

mouth position is terminal or hemi-inferior. The snout is conical; the rostral plate is low, located vertically or slightly sloped upwards. The body coloration is silvery, dark from the back and light from the ventral side. The dorsal and caudal fins are black or dark grey, the pectoral, ventral and anal fins are grey with yellow.

Distribution. It is endemic to lakes of the middle reaches of the Vitim River. It lives in the lakes Tretiyakovskoe, Bolshoye Kapylushi, Maloye Kapylushi and Dorong of the Tsipa River basin. The population of Lake Oron-Vitimsky is currently considered extinct.

References: (Mukhomediarov, 1948; Kalashnikov, 1968; 1978; Skryabin, 1977; 1979; Karasev, 1987; Sukhanova et al., 2012; Bochkarev et al., 2013).

***Coregonus fluviatilis* Isaczenko, 1925 - Yenisei (Hump-snout) Whitefish** (Fig. 4, Fig. 5)

Coregonus fluviatilis Isachenko [Isaczenko], 1925: 3, fig. 1-3; syntypes (8) whereabouts unknown; the Yenisei River near Yeniseisk and Krasnoyarsk.

Description. Length (FL) reaches 50-60 cm, weight is up to 2-3 kg. *D* IV-V 10-12, *A* III-IV 10-12, *P* I 16-17, *V* II 10-12, *l.l.* 78-100, *sp.br.* 17-26. Shape of the body is herring-liked. The body is elongated and compressed from the sides. The mouth position is inferior. The upper jaw protrudes significantly above the lower one. The snout is bluntly rounded and has a hump in front of the eye. The rostral plate is strongly sloped down, up to a horizontal position. Its height is much less than its width. The body coloration is silvery, dark from the back and light from the ventral side. The dorsal, caudal and anal fins are black or dark grey, the pectoral and ventral fins are grey with yellow.

Distribution. The area occupies most of the Yenisei basin with the exception of the estuary and upper reaches within Mongolia and the Republic of Tyva. In the Baikal region: lacustrine-riverine populations inhabit the Bratsk reservoir with its tributaries and the coastal zone of Lake Baikal, the near-shore sections of large tributaries of the Selenga, Barguzin and Verkhnyaya Angara that rise to spawn. Riverine populations live in the Selenga River and its tributaries.

References: (Isachenko, 1925; Dulmaa et al., 1983; Baasanzhav et al., 1985; Egorov, 1985).

***Coregonus karasjovi* Boganov, nomen novum – Karasev's (Cisco-like) Whitefish** (Fig. 6)

Coregonus baunti Karasev [Karasjov], 1987: 54; syntypes (49): BM ISC 28/362–28/366 (5); other 44 specimens whereabouts unknown; lake Baunt in the Tsipa and Vitim river system;

Systematics note. Originally, this taxon was described by A.G. Skryabin (1977) as a relict population of the European Cisco, *C. albula*. Later, based on Skryabin's data, it was redescribed by G.L. Karasev (1987) as a separate species *Coregonus baunti*. This name is available in accordance with Article 13.1 of the Code, but is invalid name as a junior homonym of *C. sardinella baunti* Muchomediarov, 1948. A new replacement name: *Coregonus karasjovi* n.n. is established for this species in accordance with Article 60.3 of the Code. Its status is confirmed by molecular data (Sukhanova et al., 2012; Bochkarev et al., 2013).

Fig.4. Yenisei (Hump-nosed) Whitefish *Coregonus fluviatilis*, short-snouted form: lateral view and head shape [image by B.E. Bogdanov].

Fig.5. Yenisei (Hump-nosed) Whitefish *Coregonus fluviatilis*, long-snouted form: lateral view [image by I.B. Knizhin] and head shape [image by N.A. Bochkarev].

Etymology. The new replacement species name is established in honor of G.L. Karasev who was the first to substantiate the species status and relict nature of these fish.

Description. Length (FL) reaches 11-14 cm, weight is up to 20-30 g. *D* IV 7-10, *A* IV 10-15, *P* I

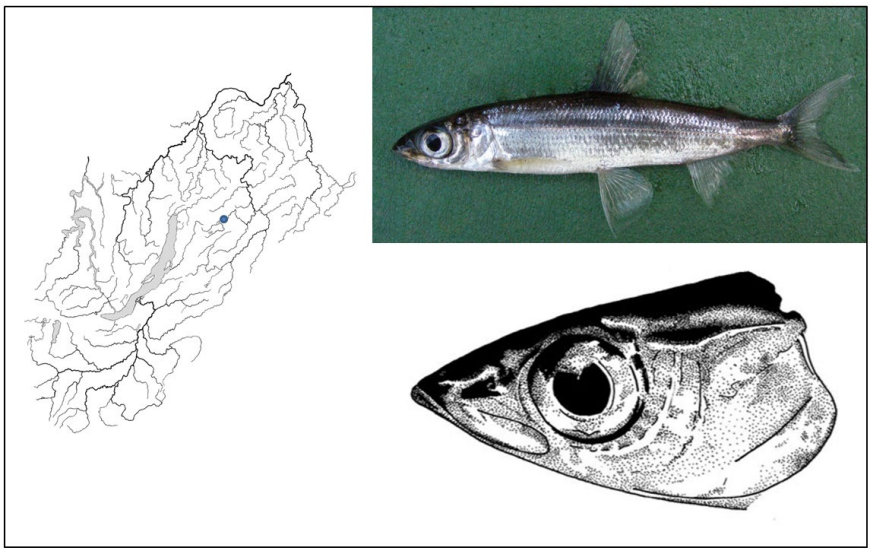

Fig.6. Baunt cisco-like Whitefish, *Coregonus karasjovi* nom. nov.: lateral view and head shape [images by N.A. Bochkarev]. The map shows the Lake Baunt habitat of the Baunt cisco-like Whitefish.

14-19, *V* II 9-12, *l.l.* 72-96, *sp.br.* 40-48. Shape of the body is herring-liked, moderately elongated. The mouth position is hemi-superior. The snout is elongated and sharpened. The rostral plate is not expressed. The posterior edge of the upper jaw slightly goes beyond the vertical of the anterior edge of the eye. The body coloration is silvery, dark from the back and light from the ventral side. The coloration of fins is grey; the pectoral fins are grey with yellow.

Distribution. It is a local endemic of Baunt Lake in the middle reaches of the Vitim River.

References: (Skryabin, 1977; Karasev, 1987; Sukhanova et al., 2012; Bochkarev et al., 2013).

***Coregonus migratorius* (Georgi, 1775) – Baikal Omul** (Fig. 7)

Salmo migratorius Georgi, 1775: 182; no type known; Lake Baikal, the Verkhnyaya Angara, the Barguzin, the Selenga.

Description. Length (FL) reaches 35-45 cm, weight is up to 500-1250 g. in different populations. *D* III-V 8-13, *A* II-IV 8-13, *P* I 15-17, *V* II 11-12, *l.l.* 78-109, *sp.br.* 32-55. Shape of the body is herring-liked, moderately elongated. The mouth position is terminal ore hemi-superior. The snout is elongated and sharpened. The rostral plate is low, located vertically or slightly sloped upwards. The body coloration is silvery, dark from the back and light from the ventral side. The dorsal and caudal fins are grey; the pectoral, ventral and anal fins are grey with yellow.

Distribution. Omul is a lacustrine-riverine endemic of Lake Baikal. The refugial population inhabit Kulinda Lake, located in the upper reaches of the Kichera River (Northern Baikal). It was introduced into the Bratsk reservoir, Lake Hovsgol and same lakes of Southern Transbaikalia. Information about naturalization in new habitats is contradictory.

Systematics note. It is traditionally accepted that the Baikal omul forms three groups of populations (morpho-ecological races) differing in definitive size, body shape, and the number of gill stamens; coastal (FL 24-34 cm; *sp.br.* 38-47), pelagic (FL 31-37 cm; *sp.br.* 44-55) and deep-water (FL 44-46 cm; *sp.br.* 32-45). Since these "races" have a complex population structure and are internally polymorphic, the differences between them are not obvious. The populations breeding in the Barguzin and Selenga Rivers are the most phenetically heterogeneous. There are two alternative hypotheses explaining this phenomenon. According to the first, individuals of three morpho-ecological races breed in these rivers. According to the second, this is a consequence of intra-population polymorphism.

Fig.7. Baikal omul, *Coregonus migratorius*, lateral view of coastal form (in top) [image by I.B. Knizhin]; pelagic form (in middle) and deep-water form (in bottom) [image by B.E. Bogdanov].

References: (Georgi, 1775; Skryabin, 1979; Afanasyev et al., 1981; Pronin et al., 2007; Smirnov et al., 2009; Dulmaa, 2015).

***Coregonus peled* (Gmelin, 1789) – Peled** (Fig. 8)

Salmo peled Gmelin, 1789: 1379; Holotype (unique): ZMB 23555 Svetovidov, 1978: 22; river Yenisei.

Description. It is a polymorphic species, which constitutes riverine, lacustrine-riverine and lacustrine (large and dwarf) forms in the range area. The length (FL) in different populations reaches up to 20-60 cm and a weight is up to 100-1300 g. *D* III-V 7-13, *A* III-V 9-17, *P* I 11-19, *V* II 9-14, *ll* 76-104, *sb.* 40-69, *rb.* 8-13; *vert.* 51-64. The body is high, strongly compressed from the sides. The position of the mouth is terminal. The rostral plate is located with an upward slope. The upper jaw protrudes slightly above the lower one. The body coloration is silvery, dark from the back and light from the ventral side. The coloration of fins is grey; the pectoral fins are pinkish-grey.

Distribution. The natural range area occupied the Arctic lake-river systems from the Mezen' to the Kolyma. Peled is a popular object of aquaculture. Because of artificial settlement of the lake form, the range of the species has significantly expanded in the southern and western direction to the reservoirs of Central Asia and Eastern Europe. In the Baikal region: it is introduced into the Bratsk reservoir, Gusino-Ubukunskaya and Yeravninskaya lake systems, where the number of species is maintained artificially. It is acclimatized in the drainless lakes of the Naimyn-Nur group in Mongolian part of the Selenga basin. The current state of the populations is unknown.

References: (Gmelin, 1789; Kirillov, 1972; Svetovidov, 1978; Reshetnikov, 1980; Dulmaa et al., 1983; Baasanzhav et al., 1985; Egorov, 1985; Karasev, 1987; Pronin et al., 2007; Dulmaa, 2015).

***Coregonus sajanensis* Gundriser, 1978 – Sayan Whitefish** (Fig. 9, Fig. 10)

? *Coregonus lavaretus pidschian* natio *karakolensis* Johansen [Ioganzen], Moiseev, 1955: 26; Lake Karakol in the Abakan and Yenisei river systems. Name is not available as infrasubspecific.

Coregonus lavaretus pidschian natio *lacustris* Gundrizer [Gundriser], 1966: 99; Kadysh and Azas Lakes, the Todzha depression in Tyva. Name is not available as infrasubspecific.

Coregonus lavaretus pidschian natio *sajanensis* Gundrizer [Gundriser], 1966: 99; Borze-Khol Lake, the Todzha depression in Tyva; Name is not available as infrasubspecific.

Coregonus lavaretus pidschian natio *sajanensis* morpha *fluviatilis* Gundrizer [Gundriser], 1966: 100; rivers of the Todzha depression in Tyva; Name is not available as infrasubspecific.

Coregonus lavaretus sajanensis Gundrizer [Gundriser], 1978: 20 (not seen, cited by Gundrizer and Popkov, 2019: 139); syntypes (80) whereabouts unknown; water bodies of the Todzha depression in Tyva.

Description. It is a polymorphic species, it constitutes riverine, lacustrine-riverine and lacustrine forms in the range area. The length (FL) in different populations reaches up to 40-50 cm and a weight is up

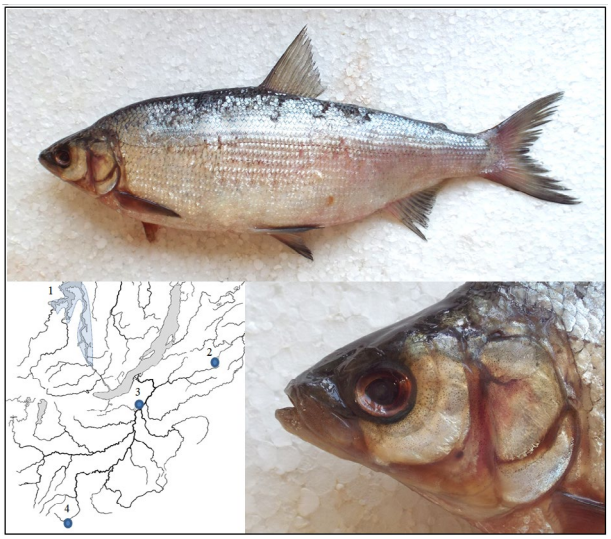

Fig.8. Peled *Coregonus peled*: lateral view and head shape [images by B.E. Bogdanov]; the map shows the sites of introduction: 1 – Bratsk reservoir, 2 – Yeravninskaya lake system, 3 – Gusino-Ubukunskaya lake system, 4 – Naimyn-Nur lake system.

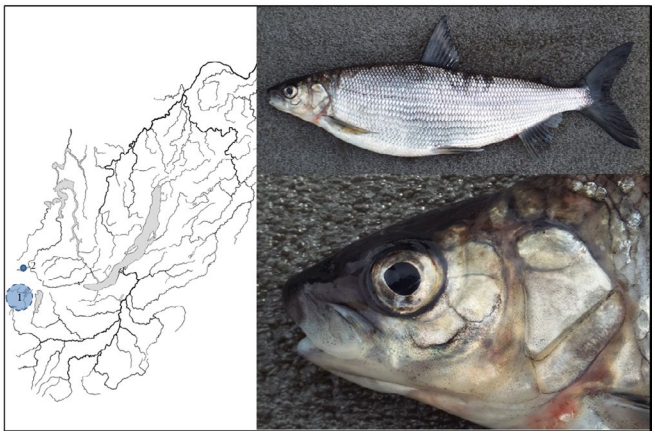

Fig.9. Sayan Whitefish, *Coregonus sajanensis*. On the left, the map shows the habitats of the Sayan Whitefish in the Baikal region: 1 – reservoirs of the Darkhat depression; 2 – lakes Shutkhalai-Nuur and Dozor-Nuur, the Okinskoye plateau. On the right, lacustrine form, lateral view and head shape [image by B.E. Bogdanov].

Fig.10. Sayan Whitefish, *Coregonus sajanensis*: lacustrine-riverine form, lateral view and head shape [image by B.E. Bogdanov].

to 600-1800 g. *D* III-VI, 9-12; *A* III-V, 11-15; *P* I 14-17, *V* II 10-12, *l.l.* 86-102, *sp.br.* 20-26. The body is high, strongly compressed from the sides. The mouth position is inferior. The upper jaw protrudes significantly above the lower one. The snout is elongated or bluntly rounded and has a hump in front of the eye. The rostral plate is strongly sloped down, up to a horizontal position. Its height is much less than its width. The body coloration is silvery, dark from the back and light from the ventral side. The dorsal and caudal fins are black or dark grey, the pectoral, ventral and anal fins are grey with yellow or pinkish.

Distibution. It is endemic of the upper reaches of the Yenisei. The main territory of the habitat is located in reservoirs of the Todzha depression In the Baikal region: the lake-river systems of the Darkhat depression and lakes Shutkhalai-Nur and Dozor-Nur in the upper reaches of the Oka River.

References: (Johansen and Moiseev, 1955; Gundrizer, 1966; 1978; Dulmaa et al., 1983; Baasanzhav et al., 1985; Bochkarev et al., 2011; Dulmaa, 2015; Gundrizer and Popkov, 2019).

***Coregonus skrjabini* Karasjov, 1987 – Lena Whitefish** (Fig. 11 – Fig. 13)

Coregonus skrjabini Karasev, 1987: 36; no type known; Baunt Lake in the Vitim River basin.

Systematics note. The taxon is based on the description of the lacustrine form of the small-tipped whitefish from Lake Baunt, published in: Skryabin, 1977. This name is available in accordance with Article 13.1. of the Code. The status of the lake whitefish from Lake Baunt as a species separate from the "Lena pydschjan", was established by Karasev (1987) on the basis of data on the spring spawning of this population. Later, the conspecificity of all lacustrine, riverine and lacustrine-riverine forms of sparsely-rakered whitefish from the Lena basin including this form was proved by molecular data (Sukhanova et al., 2012; Bochkarev et al., 2013).

Description. Polymorphic species constitutes local lacustrine-riverine and lacustrine forms deviating from the original riverine form by biological and phenotypic characteristics. The specimens of riverine and lacustrine-riverine populations reach 45-50 cm (FL), and weight is up to 1-1.5 kg. The specimens of small lacustrine form reach 30-35 cm, and weight is up to 300-400 g. *D* III-VI, 10-13; *A* III-IV, 11-13; *P* I, 14-15; *V* I, 10-13; *l.l.* 70-106, modal values form a continuous series from 79 to 97.5; *sp.br.* 15-28, modal values in different populations form a continuous series from 18 to 22.5; *rb.* 7-9, *vert.* 53-56. The mouth position is hemi-inferior. The snout is conical or bluntly rounded and has a hump in front of the eye. The rostral plate is moderately sloped downwards. The body coloration is silvery, dark from the back and light from the ventral side. The dorsal, caudal and anal fins are black or dark grey; the pectoral and ventral fins are grey with yellow.

Distribution. It inhabits rivers and lake-river systems of the Lena basin.

References: (Kirillov, 1972; Skryabin, 1977; 1979; Karasev, 1987; Knizhin, 1996; Knizhin et al., 2001; Sukhanova et al., 2012; Bochkarev et al., 2013).

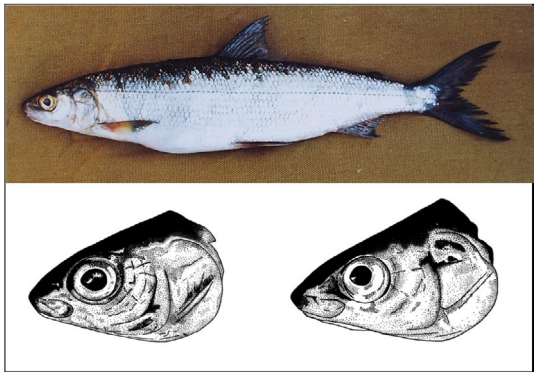

Fig.11. Lena Whitefish, C*oregonus skrjabini*, lacustrine form: lateral view (Leprindo lakes) [image by I.B. Knizhin] and head shape variability; lakes Baunt and Dorong [image by N.A. Bochkarev].

Fig.12. Lena Whitefish, *Coregonus skrjabini*, long-snout (lacustrine-riverine) form: lateral view and head shape [image by B.E. Bogdanov].

Fig.13. Lena Whitefish, *Coregonus skrjabini*, hump-snout (riverine) form: lateral view [image by I.B. Knizhin] and head shape [image by B.E. Bogdanov].

***Coregonus tugun* (Pallas, 1814) – Tugun** (Fig. 14)

Salmo tugun Pallas, 1814: 414 No types known; the rivers Yenisei, Lena, Tunguska [?Angara], Khatanga.

Description. Length (FL) reaches 20 cm, weight is up to 80-100 g. *D* III-VI 8-11, *A* III-V 10-14, *P* I 13-16, *V* II 8-10, *l.l.* 53-80, *sp.br.* 21-39. Shape of the body is herring-liked, moderately elongated. The mouth position is terminal; the snout is pointed, the rostral plate is narrow, located vertically; the upper and lower jaws are of equal length. The body coloration is silvery, dark from the back and light from the ventral side. The dorsal and caudal fins are black or dark grey, the pectoral, ventral and anal fins are grey with yellow or pinkish.

Distribution. It inhabits the rivers of the Arctic basin from the Ob to the Yana. In the Baikal region: the lower reaches of the Oka and Belaya rivers, the Lena and its tributaries with the exception of the upper reaches.

References: (Pallas, 1814; Kirillov, 1972; Egorov, 1985; Karasev, 1987; Knizhin, 1994a).

Genus *Prosopium* Milner, 1880 – Round Whitefishes

Prosopium Milner in Jordan, 1880: 361. Neut.; type: *Coregonus quadrilateralis* Richardson, 1823.

***Prosopium cilindraceum* (Gmelin, 1784) – Round Whitefish** (Fig. 15)

Salmo cylindraceus Gmelin in Pennant, 1784: 103 [ciii] No types known; the Lena, Kolyma, Indigirka rivers.

Coregonus mongolicus Warpachowski, 1900: 424, Tab. XIII, fig. 2; holotype ZIN 11477; (the upper reaches of the Yenisei River).

Description. Length (FL) reaches 50 cm, weight is up to 2 kg, but usually less. *D* III-VI 10-15, *A* III-IV 8-11, *P* I 14-16, *V* II 8-11, *l.l.* 85-106, *sp.br.* 16-22. The body is elongated and rounded in cross-section. The mouth position is hemi-inferior. The snout is narrow, conical. The rostral plate is wide, sloping down. The body coloration is silvery, dark from the back and light from the ventral side. The dorsal and caudal fins are dark grey, the pectoral, ventral and anal fins are grey with yellow.

Distribution. The range area is from the Yenisei to the Atlantic coast of North America. In the Baikal region: the foothill part of the Lena tributaries.

References: (Pennant, 1784; Jordan, 1880; Warpachowski, 1900; Egorov, 1985; Karasev, 1987; Knizhin, 1994b).

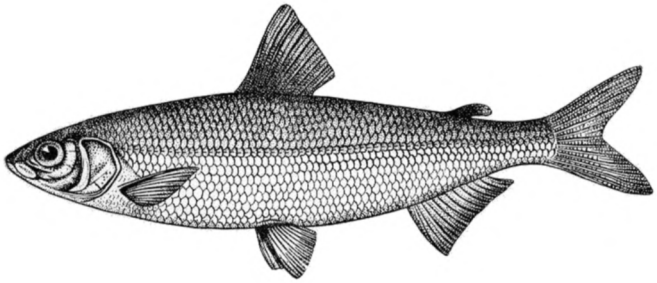

Fig.14. Tugun, *Coregonus tugun* (source: Kirillov, 1972).

Family Salmonidae – Salmons

Genus *Brachymystax* Gunter, 1866 – Lenoks

Brachymystax Günther 1866: 162. Masc.; type: *Salmo coregonoides* Pallas, 1814 by monotypy.

Systematics note. Traditionally, the genus included either one polymorphic species (Günther 1866; Berg, 1948; Mina, 1986; Reshetnikov et al., 2003), or two species: the sharp-snouted lenok, *B. lenok* and the blunt-snouted lenok, *B. tumensis* (Shedko, 2003; Kottelat, 2006; Bogutskaya et al., 2008). Molecular studies have shown the paraphyletic nature of these taxa (Froufe et al., 2008; Xing et al., 2015 and others). Thus, the sharp-snouted lenoks included two species: Siberian lenok, *B. lenok* and Markakol lenok, *B. savinovi*. The blant-snouted lenoks included five species: Cherski's lenok, *B. czerskii*; Korean lenok, *B. tumensis*; Qinling lenok, *B. tsinlingensis* as well as West Siberian and Amur lenoks, which do not have scientific names. Two species inhabit the Baikal region: Siberian lenok and Cherski's lenok.

***Brachymystax czerskii* Kirillov, 1979 – Cherski's Lenok** (Fig. 16)

Brachymystax lenok czerskii Kirillov in Kirillov et al., 1979: 165; syntypes (66) whereabouts unknown; river Undulung (right tributary of the Lena River), Yakutiya.

Description. The length (FL) reaches 50-65 cm, weight is up to 1.5-2 kg. *D* III-V 9-12; *A* III-*V* 9-11; *P* I 13-16; *V* I 9-10; *l.l.* 132-175; *sp.br.* 18-23. The body is high and compressed from the sides. The mouth is located terminally. The snout is rounded, does not form a rostrum. The posterior edge of the upper jaw reaches the vertical of the posterior edge of the eye, but does not go beyond it. The color changes from silver to dark brown during life. There are numerous small, vertically elongated, dark spots on the head, back and sides. There are spots of the same color, but smaller, on the dorsal and adipose fins. The caudal and anal fins of the fish are maroon. The belly is white.

Fig.15. Round Whitefish, *Prosopium cilindraceum* [image by I.B. Knizhin].

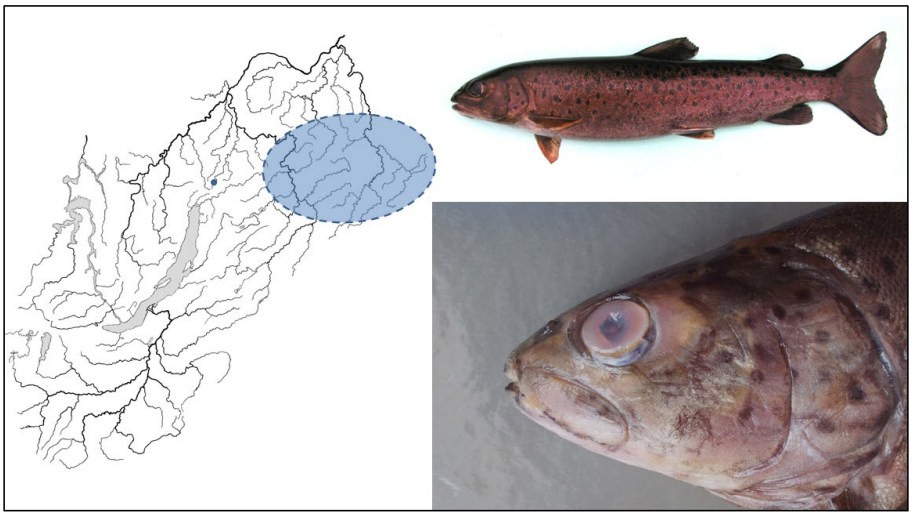

Fig.16. Chersky's Lenok, *Brachymystax czerskii*: lateral view [image by S.N. Safronov] and head shape [image by B.E. Bogdanov]. The map shows the distribution area of Chersky's Lenok in the Baikal region, the point indicates the refugial population of the lake Soly (in the Levaya Mama – Vitim rivers system).

Distribution. The range area includes the rivers of Northern Sakhalin, the mountain tributaries of the Lena and Amur Rivers and associated lakes. In the Baikal region: the foothill and mountain parts of rivers and lakes of the Olekma and middle reaches of the Vitim basins. The refugial population inhabits Soli Lake, the upper reaches of the Levaya Mama River.

References: (Kirillov et al., 1979; Alekseyev and Kirillov, 1985; Alekseyev et al., 2003; Froufe et al., 2008; Antonov, 2009).

***Brachymystax lenok* (Pallas, 1773) – Siberian Lenok** (Fig. 17)

Salmo lenok Pallas 1773: 716; syntypes ZMB 23546, 23560 Svetovidov, 1978: 22; Yenisey.

Description. The length reaches up to 60-70 cm, weight is up to 3-3.5 kg. *D* III-V 9-12; *A* III-*V* 9-11; *P* I 13-16; *V* I 9-10; *l.l.* 132-175; *sp.br.* 22-30. The body is elongated, compressed from the sides. The mouth is wide, located subterminally. The snout is elongated into a rostrum overhanging the mouth. The posterior edge of the upper jaw reaches the vertical of the middle of the eye. The color changes with age from silver to dark brown. There are numerous small dark spots on the head, back and sides. There are spots of the same color, but smaller, on the dorsal and adipose fins. Mature individuals have one or more large copper-red spots of irregular shape on their sides. The caudal and anal fins of the fish are maroon. The belly is white.

Distribution. The range area covers the river basins of Siberia from the Yenisei to the Kolyma and the Amur basin. In the Baikal region: the foothill and mountain parts of rivers and lakes, Baikal coastal shallow waters and all its large tributaries.

References: (Pallas, 1773; Svetovidov, 1978; Egorov, 1985; Karasev, 1987; Alekseyev et al., 2003).

Fig.17. Sharp-snout lenok, *Brachymystax lenok*: lateral view and head shape [image by B.E. Bogdanov].

Genus *Hucho* Gunter, 1866 – Taimens

Hucho Günter, 1866: 125, as subgenus of genus *Salmo*; Masc.; type: *Salmo hucho* Linneus, 1758, by monotypy.

***Hucho taimen* (Pallas, 1773) – Siberian Taimen** (Fig. 18)

Fig.18. Siberian Taimen, *Hucho taimen*: lateral view [image by I.B. Knizhin] and head shape [image by B.E. Bogdanov].

Salmo taimen Pallas, 1773: 716; lectotype ZMB 23561 Svetovidov, 1978: 21; Siberian rivers.

Description. The length reaches 1.5 m and the weight is up to 30 kg. *D* III-V 9-11; *A* III-V 8-10; *P* I 14-16; *V* I 9-10; *l.l.* 193-242; *sp.br.* 9-12. The body is torpedo-shaped. The head is slightly flattened. The end of the upper jaw goes beyond the vertical of the posterior edge of the eye. In large fish, the lower jaw protrudes slightly forward. The coloration of young individuals is silver-grey, sometimes with slightly noticeable 3-4 dark transverse stripes, with age it acquires a greenish hue, the back is dark, the belly is white; during the spawning period it acquires a crimson hue. On the sides, small dark spots, the number of which gradually decreases from the head to the tail. The fins are maroon-red. The anterior part of the pectoral, ventral and anal fins is white.

Distribution. The area ranges from the Kama and Pechora basins in the west to the Khroma and the Amur in the east. In the Baikal region: the foothill and mountain parts of rivers and lakes**,** Baikal coastal shallow waters and all its large tributaries.

References: (Pallas, 1773; Günter, 1866; Svetovidov, 1978; Egorov, 1985; Karasev, 1987; Knizhin, 2004).

Genus *Oncorhynchus* Suckley, 1861 – Pacific-ocean Salmons

Oncorhynchus Suckley 1861:313, as subgenus of genus *Salmo*. Masc.; type: *Salmo scouleri* Richardson, 1837, by original designation.

***Oncorhynchus mykiss* (Walbaum, 1792) – Rainbow Trout** (Fig. 19)

Salmo mykiss Walbaum, 1792: 59; No types known. Kamchatka, Russia.

Description. The length (FL) reaches 40-50 cm, weight is up to 1.5 kg. *D* III-IV 9-12; *A* III-IV 8-10; *P* I 11-14; *V* I 8-10; *l.l.* 110-144; *sp.br.* 16-22. The body is short and thick. The head is rounded. The end of the upper jaw goes beyond the vertical of the posterior edge of the eye. The color of the sides is silver-grey with a pinkish tint, the back is dark, the belly is white. The fins are brown. There are small dark spots on the sides, back and fins.

Distribution. The natural range area includes freshwater reservoirs and brackish waters of the Northern Pacific. As an object of aquaculture it is widely distributed in the reservoirs of the world. In the Baikal region: the Angara River on the section from the Irkutsk hydroelectric dam to the Bratsk reservoir. It has not naturalized, the population is supported by self-settlement of juveniles from fish farms.

References: (Walbaum, 1792; Suckley, 1861; Reshetnikov et al., 2003).

Genus *Salvelinus* Richardson, 1836 Chars

Salvelinus Richardson, 1836: 169. Masc.; as subgenus of genus *Salmo*; type *Salmo alipes* Richardson, 1835, by monotypy.

Superspecies *Salvelinus alpinus* (Linnaeus, 1758) – Arctic chars

Salmo alpinus Linnaeus, 1758: 309; No types known; Lapland and England.

Systematics note. Arctic chars *S. alpinus* (sensu lato) inhabit the Arctic regions of Europe, Asia and America, the Alps region and Northern Transbaikalia. They are a supraspecific complex, which includes up to 50 nominal taxa. The Davatchan-char inhabit the Baikal region, it is usually considered either a subspecies or denied any taxonomic status of this group of Arctic char populations (Glubokovsky, 1995; Kottelat, 1997; Reshetnikov et al., 2003; Bogutskaya and Naseka, 2004; Eschmeyer's Catalog..., 2022). We consider it as a species in the *S. alpinus* superspecies.

***Salvelinus (alpinus) erythrinus* (Georgi, 1775) – Davatchan Char** (Fig. 20)

Salmo erythrinus Georgi, 1775: 186, Pl. 1, Fig. 1; Holotype (unique): ZMB 23553 Svetovidov, 1978: 18; lake Frolikha.

Description. It usually forms three sympatric forms, which are classified as dwarfs (FL less than 20

Fig.19. Rainbow trout, *Oncorhynchus mykiss*, Angara river [image by B.E. Bogdanov].

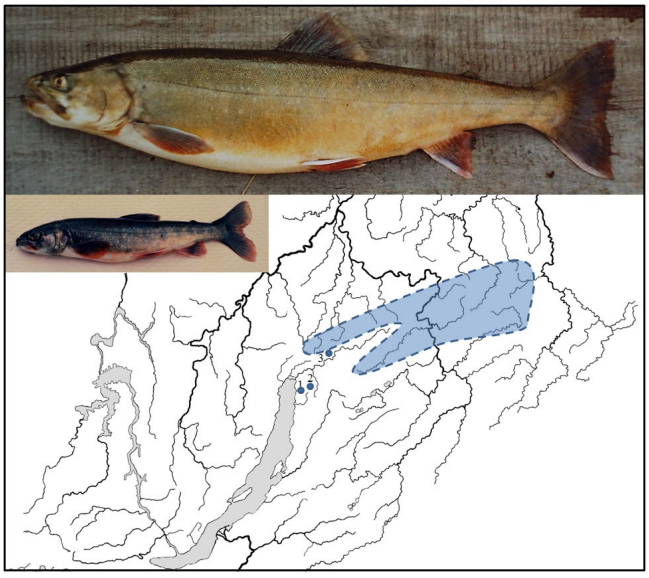

Fig.20. Arctic Char - Davatchan, ***Salvelinus (alpinus) erythrinus***: large and dwarf forms [images by B.E. Bogdanov and I.B. Knizhin]. The map shows the range of the Arctic Char - Davatchan and the refugial populations in Baikal basin: 1– Frolikha Lake, 2 – unnamed lakes in the upper reaches of the Svetlaya River, 3 – Amut Lake in the Verkhnyaya Angara basin.

cm), small (FL 20-33 cm), and large (FL more than 33 cm). The length (FL) of large form specimens can reach 60-65 cm, weight is up to 3.2 kg. *D* III-IV 9-11; *A* III-IV 8-10; *P* I 12-14; *V* II 7-10; *l.l.* 124-138; *sp.br.* 28-39. Body is elongated and slightly compressed from the sides. The upper jaw reaches the vertical of the posterior edge of the eye, or goes beyond it. The mouth is finite or semi-finite. The color of the body changes with age from silver to grey with a greenish or bronze tint. The back is dark, the belly is light. There are small rounded light spots on the sides. The pectoral, ventral and anal fins are red with a white border in the front. The dwarf form retains vertical dark stripes on the sides, characteristic of smolts throughout its life.

Distribution. Davatchan is endemic to the lakes of Northern Transbaikalia. It inhabites the mountain lakes from the Upper Angara Ridge in the west (the upper reaches of the Chaya and Mama rivers) to the upper reaches of the left tributaries of the Olekma in the east. There are three known habitats in the Baikal basin: Lake Amut; unnamed lakes in the upper reaches of the Svetlaya River (in the basin of the Angara River) and Lake Frolikha.

References: (Linnaeus, 1758; Georgi, 1775; Richardson, 1836; Svetovidov, 1978; Egorov, 1985; Alekseyev et al., 2002; Samusenok et al., 2006; Gordeeva et al., 2015; 2018).

Family Thymallidae – Graylings

Genus *Thymallus* Cuvier, 1829 Graylings

Thymallus Cuvier, 1829: 306; Masc., *Salmo thymallus* Linnaeus, 1758, type by absolute tautonymy.

***Thymallus baicalensis* Dybowski, 1874 – Baikal Grayling**

Thymallus grubii var. *baicalensis* Dybowski 1874: 391, Pl. 8, fig. 1: syntypes: BMNH 1871.7.19.3 (1), BMNH 1897.7.5.20 (1), ZMB 7929 (1); Baikal, the Selenga and Angara.

Thymallus arcticus var. *brevipinnis* Svetovidov, 1931: 85; no type known; Baikal Lake.

Thymallus arcticus nigrescens Dorogostaisky, 1923: 76; no type known; Hovsgol Lake.

Description. All forms of the Baikal grayling have similarities in the general pattern of dorsal fin coloration, habitual and meristic features (with the exception of the number of gill rakers). *D* VI-X 10-15; *P* I 13-17; *V* II 8-11; *A* III-VI 7-11; *ll* 80-110; *sp.br.* 7-11. The body is elongated. The snout is rounded. The mouth position is terminal. The posterior edge of the upper jaw does not go beyond the vertical of the middle of the eye. The dorsal fin does not reach the adipose fin when folded. There are from three to five rows of spots of different sizes of purple or scarlet color with an emerald tint on the dorsal fin. A narrow scarlet border runs along the upper edge of the fin. It merges with the spots of the upper row in the posterior upper part of the fin. there are several spots forming an ascending row in the anterior part of the fin.

Distribution. The Baikal grayling inhabits a wide range area including almost the entire Baikal-Yenisei basin with the exception of the upper reaches and the estuary section of the Yenisei.

Systematics note. In its range it forms many sympatric and allopatric forms, three of which can be considered as satellite species in the subspecies *Thymallus baicalensis* (sensu lato): Black Baikal Grayling, *Th. (baicalensis) baicalensis*; White Baikal Grayling, *Th. (baicalensis) brevipinnis* and Hovsgol Grayling, *Th. (baicalensis) nigrescens*.

References: (Cuvier, 1829; Dybowski, 1874; Dorogostaisky, 1923; Svetovidov, 1931; Tugarina, 1981; Knizhin et al., 2006a).

***Thymallus* (*baicalensis*) *baicalensis* Dybowski, 1874 – Black Baikal Grayling** (Fig. 21 – Fig. 23)

Diagnostic features. Length (FL) reaches 40-45 cm. Weight is up to 700-850 g. The specimens of small lacustrine form reach 18.5-19.5 cm, and weight is up to 60-100 g. The body color varies from silver-grey to

Fig.21. Black Baikal Grayling *Thymallus (baicalensis) baicalensis*, Baikal Lake form: female (in top) and male (in bottom) [images by I.B. Knizhin].

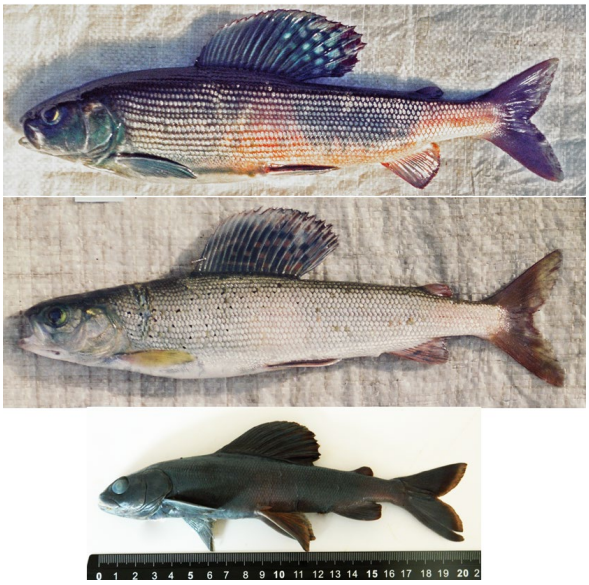

Fig.22. Lacustrine forms of Black Baikal Grayling *Thymallus (baicalensis) baicalensis*, large-form males from lake Urunge-Nur, Okinskoe plateau (in top) and from lake Sobolinoye, Hamar-Daban ridge, Sothern Baikal (in middle) and small-form male, lake Gitara, Baikalsky ridge, Northern Baikal (in bottom) [images by B.E. Bogdanov].

black. There are a few small zigzag and oval black spots on the sides. There are two parallel bands of dark grey with a slight yellowish tinge from the end of the pectoral fins to the base of the ventral fins. Above the ventral fins there is a large spot of different with indistinct outlines, red in color, the shades and intensity of the color of which vary. The caudal peduncle, anal, caudal and adipose fins are of the same color. The posterior edge of the dorsal fin is deep and wide in males. Its general background is dark. Along the top edge from the middle to the last rays runs a gradually expanding fringe of red claret. Spots are mainly concentrated in the posterior part. Here the fringe fuses with the upper row of spots forming broad and short bands with uneven outline. The number of gill rakers is 14-23, with an average of 20.

Distribution. It inhabits the rivers and mountain lakes of the Baikal-Yenisei basin with the exception of the upper reaches of the Yenisei and Selenga and the estuary section of the Yenisei. Outside the main range: the mountain tributaries of the upper reaches of the Tom' and Chulym in the Ob' basin.

References: (Knizhin et al., 2006a; 2006b; Knizhin, 2011; Petukhov et al., 2016).

***Thymallus* (*baicalensis*) *brevipinnis* Svetovidov, 1931 – White Baikal Grayling** (Fig. 24)

Diagnostic features. Length (FL) reaches 60 cm, weight is up to 2 kg. The body coloration is grey-silver. Dorsal fin is small, it does not extend to the adipose fin in a lowered state. Its posterior edge is not deeper than its anterior part. Its general background is light grey. The anterior part of the fin has no pattern. In the posterior part, there are three to four rows of pale-red claret color, often with uneven outline. A narrow crimson border runs along its upper edge from the middle of the fin along its upper edge. The entire space between the branched ends of rays of its posterior part is of the same coloration. The number of gill rakers is 14-21, with an average of 20.

Distribution. It is lacustrine-riverine endemic of Lake Baikal. It inhabits Lake Baikal and its major tributaries: the Selenga, Barguzin and Verkhnyaya Angara.

References: (Knizhin et al., 2006a).

***Thymallus* (*baicalensis*) *nigrescens* Dorogostaisky, 1923 – Hovsgol Grailing (Fig. 25)**

Diagnostic features. It is polymorphic species. It forms lacustrine and lacustrinr-riverine forms. Length (FL) reaches 35 cm, weight is up to 330 g. The tail peduncle is thin and elongated. The body color is dark grey or black. Dorsal fin is small. Its posterior edge not deeper than its anterior part and does not extend to the adipose fin. Its general background is dark. Spots located in the posterior part, red claret, oval with uneven edges. Number of spots rows is three or four. The fringe fusing with upper spots forms broad protrusions continuing inward, the fin up to the middle of rays and lower. The number of gill rakers is 21-34, with an average of 30 in lacustrine form and 25 in lacustrine-riverine form.

Fig.23. Riverine forms of the Black Baikal Grayling *Thymallus (baicalensis) baicalensis*: large-form male, river Tisa (in top) and small-form male, river Korolok (in bottom) [images by B.E. Bogdanov].

Fig.24. White Baikal Grayling *Thymallus (baicalensis) brevirostris* [images by B.E. Bogdanov].

Fig.25. Khovsgol Grayling **Thym***allus (baicalensis) nigrescens* [images by P. Reddish].

Distribution. It is lacustrine-riverine endemic of Lake Hovsgol.

References: (Dulmaa et al., 1983; Baasanzhav et al., 1985; Knizhin et al., 2006a; Dulmaa, 2015; Olson et al., 2019).

***Thymallus lenensis* Knizhin, sp. nov. – Lena Grayling** (Fig. 26)

? *Thymallus arcticus baicalolenensis* Matveev et al., 2005 [cited by Dyldin et al., 2017]; presumably, name is not available as *nomen nudum*, since the name-bearing types are fixed in a way not provided by the Code (Articles: 16.4., 72.10.). Collections ZMISU V-19 'holotype' and ZMISU V-16-18, V-20-41 'paratypes' indicated by Dyldin et al. (2017) are never existed in museum. There is reason to believe that the name-bearing specimens were lost even before the publication of the work.

Thymallus arcticus lenensis Weiss et al., 2006 is not available as *nomen nudum*, proposed as a "preliminary" name.

Systematics note. Two forms of grayling inhabit the Lena River basin under conditions of partial sympatry (parapatry). One form inhabits the coastal area and the upper reaches of some right tributaries of the Lena, the second one inhabits the rest of the Lena basin. We have established that these forms have a complex of phenotypic features that allow them to be easily distinguished. Both forms are diagnosed by body coloration and pattern on the dorsal fin. The lower Lena form is genetically identical to the Siberian grayling *Th. arcticus*, and the upper Lena form can be considered as an independent taxon of species rank with the name *Thymallus lenensis* (sp. nov.).

Etymology. The species name *lenensis* is an adjective derived from the geographical name "Lena River", the main habitat of the described species.

Holotype: MNHN 2007-1702, Markha R., 28 km below the confluence of the Olekma and Lena rivers, 10.04.2007, collector A.F. Kirillov. Fork length 221.5 mm; *D* IX 13, *P* I 15; *V* II 9; *A* IV 9; *l.l.* 87; *sp.br.* 19.

Paratype: MNHN 2007-1703, Fork length 212.0 mm, 28 km below the confluence of the Olekma and Lena rivers, 10.04.2007, collector A.F. Kirillov.

Additional material: ZMMSU P-21673, Lena river near Ust-Ilga village, September, 2006, collector - T.V. Sverdlova; ZMMSU P-21674, Lena river near Ust-Ilga village, September, 2006, collector - T.V. Sverdlova; ZMISU P-8, 11 specimens, Aldan river., 2001, collector A.F. Kirillov; ZMISU P-9, 9 specimens, Sakhandzha river, 2001, collector A.F. Kirillov; ZMISU P-10, 32 specimens, Yakchiy's lakes, Verkhnyaya Angara river bassin., August, 2001, collectors: I.B. Knizhin, S.J. Weiss, B.E. Bogdanov.

Description. Length (FL) reaches 36 cm, weight is up to 500 g. The specimens of small lacustrine form reach 18.5 cm, and weight is up to 96.5 g. *D* VI-XI 10-16; *P* I 12-17; *V* II 8-10; *A* III-V; *l.l.* 78-104; *sp.br.* 15-22. The body is elongated. The mouth position is terminal. The snout is rounded. The posterior edge of the upper jaw almost reaches the middle of the eye. The folded-back dorsal fin reaches the adipose fin in large males. Its back part is higher than the front and has a pointed shape. The body color is brown-silver with a brown-golden hue. A black oval spot just below the beginning of the lateral line at the border of the operculum and sub-operculum. Black jagged lines, formed from v or w-shaped spots occur between rows of scales scattered along the entire body. Two parallel yellow-brown stripes run from the end of the pectoral fins to the base of the ventral fins. Top edge of dorsal fin exhibits a 2-3 mm wide claret-red band. Spots of the same color appear in two to four parallel rows on the dorsal fin. The uppermost row of spots on the dorsal is usually not incorporated with the anterior or dorsal fin edges, and consists of the largest and somewhat horizontally extended spots.

Fig.26. Lena Grayling *Thymallus lenensis* sp. nov.: holotype: MNHN 2007-1702, the Markha river (in top) and specimen of small form: ZMISU P-10, lake Yakchey (in bottom) [image by I.B. Knizhin].

Distribution. It inhabits the Lena River basin with the exception of the delta and near-delta tributaries. Outside of the main range: the upper reaches of the mountain tributaries of the upper and middle sections of the Amur basin, the upper reaches of the Maya River (the Uda-Okhotskaya River basin), the northern and northeastern tributaries of Lake Baikal (the Tiya, Kholodnaya, Verkhnyaya Angara and Barguzin).

References: (Froufe et al., 2005; Knizhin et al., 2006c; 2006d; 2008; Weiss et al., 2006; Antonov and Knizhin, 2014; Dyldin at al., 2017).

***Thymallus svetovidovi* Knizhin et Weiss, 2009 – Gold-tailed Grayling** (Fig. 27)

Thymallus svetovidovi Knizhin, Weiss, 2009: 6, Fig. 2a, b; holotype ZMMSU P-21992, paratypes ZMMSU P-21993 (2), additional material (26); river Sharga-Gol in Darkhat depression, Mongolia.

Description. Length (FL) reaches 40 cm, weight is up to 870 g. *D* VII-IX 12-15; *P* I 13-16; *V* II 9-11; *A* III-V 8-10; *l.l.* 73-87; *sp.br.* 17-23.The body is high, moderately compressed from the sides. The mouth position is terminal. The snout is rounded. The end of the upper jaw does not go beyond the middle of the eye. The posterior edge of the dorsal fin in large individuals when folded reaches the adipose fin. The body color is dark grey with a turquoise tint. There is a black oval spot on the lower jaw. The caudal peduncle and the base of the caudal fin are of bright golden-orange color. Dorsal fin pattern consists of several series of red-crimson spots of different shape. Spots of the upper row are the largest, of an irregular shape, vertically and horizontally extended. Their margins extend to

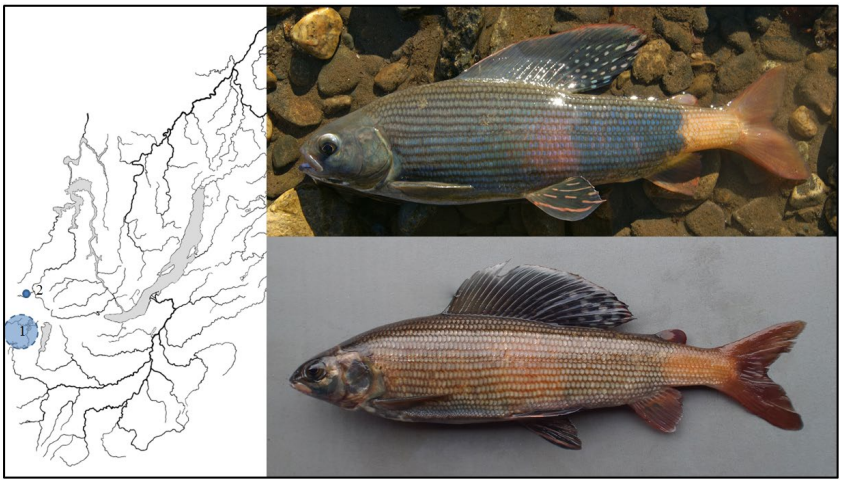

Fig.27. Gold-tailed (Upper-Yenisei) Grayling *Thymallus svetovidovi*: high-bodied form, the Sharga-Gol river, the Darkhat depression (in top) [image by C. Raschtan]; low-bodied form, Shutkhalai-Nur lake, Okinskoe plateau (in bottom) [image by B.E. Bogdanov]. The map shows: 1 – water bodies of the Darkhat depression; 2 – lakes Shutkhalai-Nur and Dozor-Nur, Okinskoe plateau.

neighboring interradial membranes, sometimes fusing with the margin, forming a kind of a continuous wide tortuous stripe. Rows located lower are formed of oval spots of a smaller size with a narrow dull framing.

Distribution. It is endemic of the upper reaches of the Yenisei. The main territory of the habitat is located in the basin of the Kaa-Khem River (included the lake-river systems of the Darkhat depression). Outside of the main range: isolated populations are known in mountain lakes of the Katun' and Chulyshman river basins in the Upper Ob' basin and the Tisza River system (right tributary of the Oka, Okinskoye plateau).

References: (Golubtsov and Malkov, 2007; Knizhin and Weiss, 2009; Knizhin, 2011).

4. Conclusions

At present, 20 species of Salmonid fishes belonging to eight genera and three families have been indicated in the Baikal region: Whitefishes (10 species), Salmons and Graylings (five species each). Nine of them are species widely distributed in Northern Asia: (Yenisei and Lena whitefishes, tugun, round whitefish, Siberian and Chersky's lenoks, taimen, Baikal and Lena graylings). Seven species are endemic to separate lake and lake-river systems of the Baikal region: Baikal whitefish, Baikal omul and White grayling to Baikal Lake; Davatchan to lakes of Northern Transbaikalia; Baunt whitefish and Baunt cisco-liked whitefish for lakes of the middle reaches of Vitim; Hovsgol grayling to Hovsgol Lake. In addition, two species (Sayan whitefish and Gold-tailed grayling) are endemic to the adjacent Altai-Sayan region and in the Baikal region are represented by marginal and refugial populations in the reservoirs of the Eastern Sayan Mountains. Two alien species (Peled and Rainbow trout) are objects of aquaculture and their populations exist with the support of human activity.

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Conflict of interest

The authors declare no conflict of interest.

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