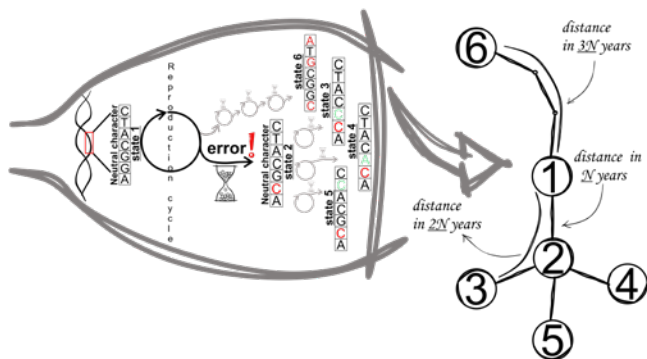


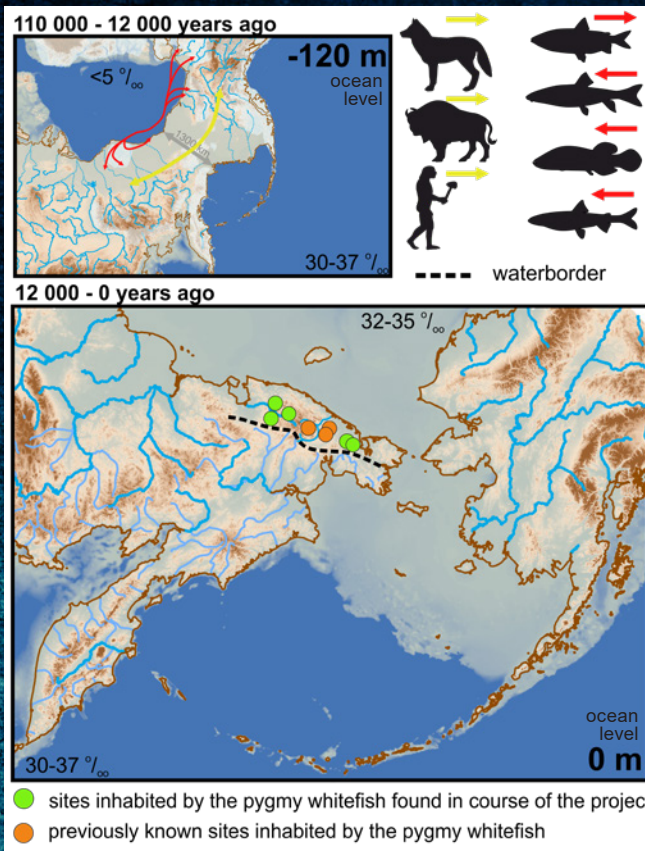
Genetic evidence suggests that the Pygmy whitefish has spread to Asia from the Yukon River Basin at least twice – at the beginning and the end of the last glaciation. The first wave reached the Palavaam River basin, while the second has not cut across the eastern part of the Chukotka Peninsula.



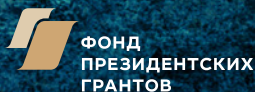
DIRECTIONS FOR FURTHER STUDY

There are numerous water bodies with a potentially peculiar geological and climatic history in the northeast of Eurasia, which are difficult to reach so far. This region still shrouds many zoogeographic secrets that are to be unveiled by scientists. The upper reaches of the Anadyr River, the largest water basin in the region, which remained unfrozen over all the ice ages of the Pleistocene, is completely unexplored. A number of lakes in the Chersky Range have never been studied. The Kuril Islands, which were temporarily linked with the Japanese archipelago in the south and Kamchatka in the north during Glacial Periods, remain largely obscure in terms of the fish fauna formation and evolution.

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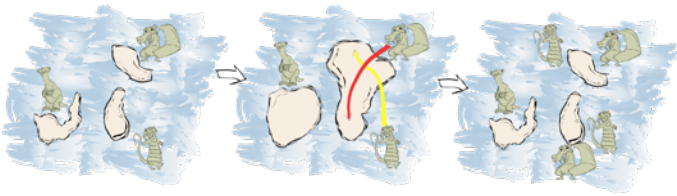
KRONOTSKY
RESERVE



THE PYGMY WHITEFISH:
ONE SETTLEMENT STORY

THE AGE OF GLOBAL MIGRATION

For the last 5 mln years, periods of global cooling and warming have followed each other intermittently. During the prolonged cold periods huge areas in the mountains as well as in the high latitudes were covered with glaciers. Once the gargantuan ice amount has been terrain-accumulated the sea levels fell by 80-120 m, and land-bridges between the islands and continents were formed. Those times allowed the cold-loving species, such as some large mammals, to spread to Japan, Sakhalin, Wrangel Island and British Isles through the dried routes.

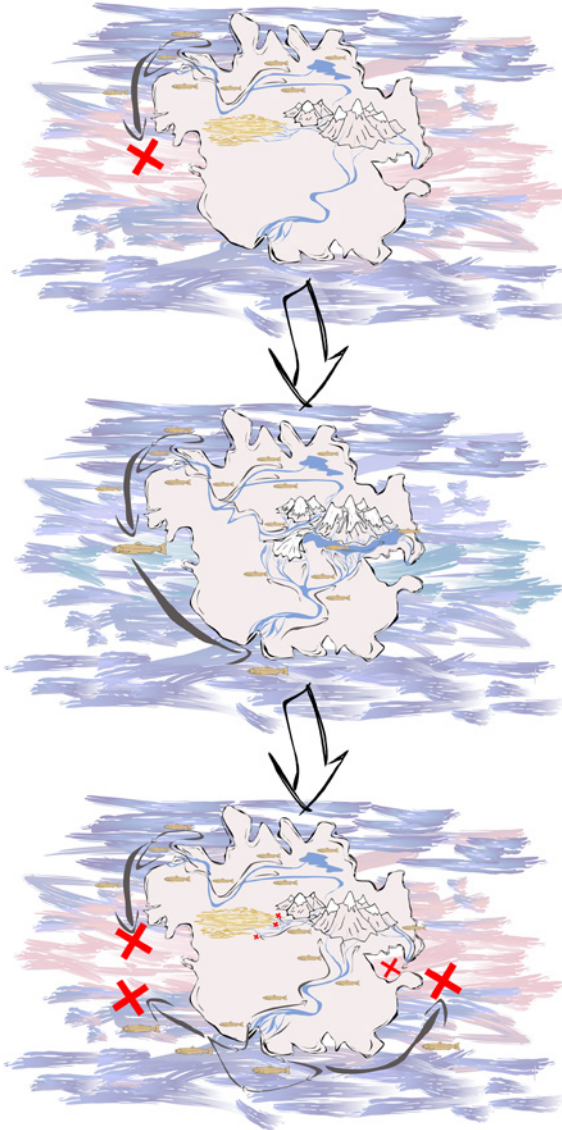


Freshwater fish enjoyed similar migration opportunities as far as rivers on the dried continental shelf have been forced to merge into extensive channel networks; the periglacial lakes formed along the ice sheets edges; the ridges become overpassable through the temporary water passes in the times of the massive ice-melting.

BERINGIA, OR THERE AND BACK AGAIN

Beringia including an ancient land bridge now lying beneath the Bering Strait has played a pivotal role in the biodiversity formation of fauna in Eurasia and America. Drying up repeatedly in the Plio-Pleistocene, it allowed the wolf, the bison, the mammoth and, finally, the humans to migrate from Asia to North America, and the beaver to move the other way. At the days the Beringian Bridge existed the Anadyr River merged with the Yukon River in its lower reaches, similar to the rivers of Arctic Chukotka and the Brooks Range. That globally scaled river basins allowed the Alaska blackfish and the Longnose sucker (now found in the Kolyma River) to spread to Asia, while the Siberian whitefish and the grayling to America.

In Alaskan rivers the latter formed a new subspecies, which eventually settled in Chukotka and came into secondary contact with the Siberian subspecies. However, some migrations of this kind have not been sufficiently studied yet, and neither the timing nor the settlement patterns are currently elucidated.



CURRENT RESEARCH INTO ONE MIGRATION MYSTERY

The Pygmy whitefish (*Prosopium coulteri*, subfamily Coregonidae) is one of the least studied species that have spread from America to Chukotka. A few individuals of this species were first found out in 1992 in three lakes in the Amguema River basin by a team of ichthyologists headed by I.A. Chereshnev. Although the whitefish is listed in the federal Red Book, its range and population size have not been characterised. In its original North American habitat; this small silvery fish is common to rivers and coldwater lakes; it lives up to 8-9 years, measuring up to 15 cm and weighing around 15 g.



According to the recent research conducted by the scientists from the Kronotsky Nature Reserve, this species can be found in mountain lakes within the Arctic Ocean drainage throughout Chukotka, though completely absent in the Asian-Pacific region. The Pygmy whitefish is a solitary fish, which dwells the near-bottom water layers and feeds on benthic crustaceans, further serving as prey for piscivorous salmonids.

The following cornerstone questions emerged: 1) how did the Pygmy whitefish invade Eurasia; 2) was there a single or a series of colonisation events that occurred during the several Ice Ages; 3) can any ecological and genetic shifts be detected in the freshly-colored sites? These questions could be successfully addressed by molecular phylogenetics. Since Motoo Kimura's discovery of the constant neutral mutation rate in the 1970s, non-coding genome regions have been used to estimate the age of population divergence through a 'molecular clock' approach. Moreover, genetic distances thus derived may allow to reconstruct the ages and number of the colonization events for the particular animal group that settled the new areas.

