

Physiological adjustments have presumably played a major role in maintaining fish life under the ice cover. Further study of local endemics will be required to clarify fundamental aspects of evolution in subglacial ecosystems of the Arctic, the Antarctic and Greenland. Other, previously unknown relict species might be discovered in Arctic lakes similar to El'gygytyn, which are currently being revealed as glaciers melt due to global warming.



*Boganoda charr,  
deep-water morph*



*Boganoda charr,  
shallow-water morph*



*Long-finned paliya*



*Smallmouth charr*

Photo E. Esin

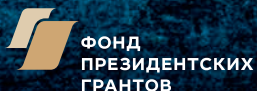
## ECOSYSTEM PROTECTION

Since Lake El'gygytyn lies in a remote area off the beaten tourist track, there are no imminent threats to wildlife. Fish stocks have recovered since commercial fishing stopped in the 1980s. However, the litter and scrap metal left behind by fishermen, geologists and reindeer herders still need removing. Additionally, the permanent inhabited cordon should be organized on the base of Nature park to monitor the tourists movement.

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KRONOTSKY  
RESERVE

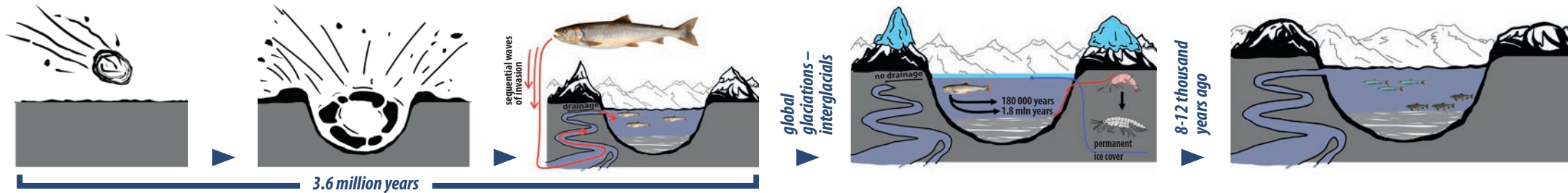


EL'GYGYTYN: A UNIQUE LAKE  
ABOVE THE ARCTIC CIRCLE

Photo E. Esin

## THE BAIKAL OF THE ARCTIC

Lying in the midst of the Anadyr Plateau, 200 km away from the nearest settlement, Lake El'gygytyn is ice-covered for most part of the year, and its surface temperature stays below 3 °C even in warmer months. In the Chukchi language its name translates as 'white (i.e. permanently frozen) lake', reflecting harsh weather conditions. The lake basin was formed by a meteorite impact in prehistoric times.



Silt deposits provide evidence of a local ecosystem already present more than 3 mln years ago. Having survived the dramatic climate drops of the Pleistocene, with the lake surface glaciated for thousands of years, its ancient Arctic species successfully adapted to thrive in extreme conditions as well as to withstand the interglacial invasions. The present-day endemic fauna – a product of multiple climate cycles repeated - is comparable only to that of Lake Baikal in its uniqueness.

varying in appearance and behaviour; the most notable of them is a relict deepwater species called 'the long-finned paliya'. With its short head and exceptionally long fins, the long-finned paliya bears some resemblance to the grayling. Its evolutionary age indicates that its ancestors must have settled in the lake soon after the initial flooding of the crater. The long-finned paliya's diet consists of crustaceans, particularly the endemic deep-water amphipods. Another peculiar species is 'the small-mouth charr' - a nondescript little fish with large eyes, which feeds on tiny midwater crustaceans. Its ancestors first arrived in the lake during the warm period before the last ice age. The third ancestral charr group to settle in eventually gave rise to two predatory species known as 'Boganida charrs'. The larger one weighs up to 10-12 kilos. The first piscivorous group inhabits the coastal and slope waters, while the second one, which features an oblong head with a huge mouth, prefers deep water. The juveniles of Boganida charrs feed on benthos before switching to prey on Arctic charrs.

## EVOLUTION IN THE ICY ABYSS

Multiple adaptations are required to survive and reproduce at extremely low temperatures under the everlasting ice shield. In long-finned paliya these include the use of mostly lipids instead of carbohydrates for cellular respiration, along with higher hemoglobin levels and an elevated antioxidant capacity of blood. These features are essential for survival in anaerobic

conditions near the lake bottom under perennial ice cover. Reduced metabolism and hormone activity of smallmouth charr combined with inactive lifestyle have enabled it to save energy despite low food supply in the water column. Piscivorous Boganida charrs, on the contrary, have increased their metabolic rate. High-calorie omega-6 fatty acids accumulated in the muscle tissue provide energy for fast swimming as well as protection against hypothermia. This, in turn, increases locomotor activity required for hunting other fish.

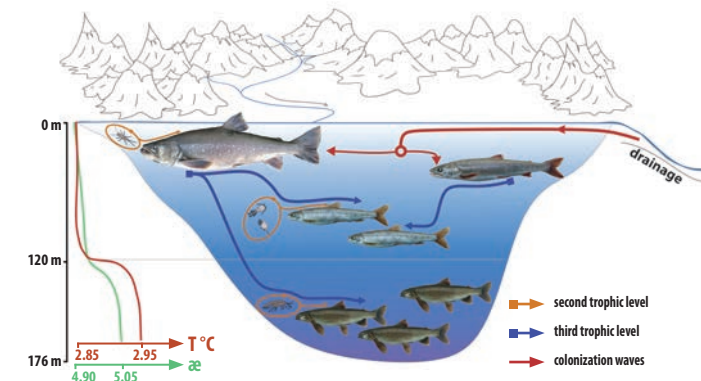


Photo: E. Esin

