



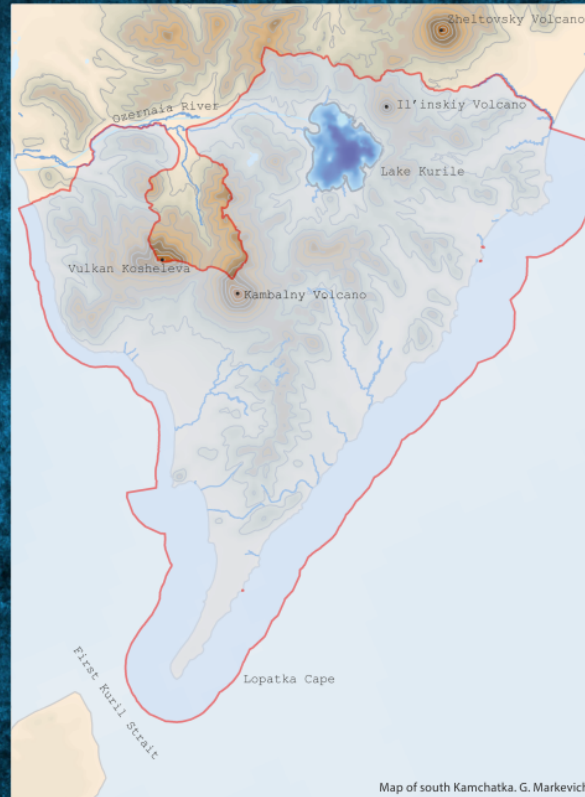
Lake Kurile in spring. G. Markevich

tain peculiarities of lipid metabolism and its hormonal regulation have been previously noticed in similar morphs from Scandinavian and North American lakes. This specific metabolism doubles the longevity of the deepwater charrs compared to the shallow water ones.

WHAT THE ABYSS STILL HIDES

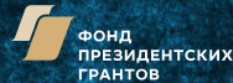
The deep dark depths of Lake Kurile still have the stories to tell, the objects to be brought to light, the laws of nature waiting to be unveiled. For example, while studying the feeding habits of deepwater charrs scientists found a previously undescribed amphipod (a large bottom-dwelling crustacean) in the stomach of a charr. Further exploration of the deepwater zone of the lake may considerably enrich our knowledge of its faunal diversity and lead to many unexpected discoveries in the future.

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Map of south Kamchatka. G. Markevich

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КРОНОЦКИЙ
ЗАПОВЕДНИК



EVOLUTION IN THE ABYSS. DEEPWATER
DOLLY VARDEN OF LAKE KURILE



Entry of sockeye salmon into the lake. I. Shpilenok

THE GEM OF KAMCHATKA

Lake Kurile is the second largest and the deepest (316 meters) throughout the peninsular. Surrounded by volcanoes, this unique natural site is included in UNESCO World Heritage List and is under special protection by South Kamchatka Federal Sanctuary named after T.I. Shpilenok.

The lake serves as a spawning ground of the largest population of sockeye salmon in Eurasia. Every year from 10 to 20 million of fish come for spawning. About 85-90% is caught, the remaining 1.5-2.5 million of fish eventually enter the lake being counted by the fishery science specialists. This area abounds in animals, such as bears, foxes, wolverines and predator birds owing to this incredible amount of fish serving as prey. Similarly to other Pacific salmonids, sockeye salmon dies just after spawning nourishing the succeeding generations with the organic matter from their decaying bodies.

The tributaries of the lake are also shared by another anadromous salmonid fish – Dolly Varden (genus *Salvelinus*). It runs from the sea following the Ozernaya River in September concentrating below the major spawning sites of the sockeye salmon. The orphaned eggs falling beyond the redds and flowing downstream end up in the stomachs of pre-spawning Dolly Varden.

THE EVOLUTION IN THE ABYSS

The Lake Kurile emerged about 8000 years ago when dramatic geological processes took place and the caldera collapsed forming the abyss lying far beneath the sea bottom. This shaped the steep shores of the lake going steeply down with the average depth approximating 200 m. The thermal capacity of huge water mass prevents the ice cover formation in winter time. As a result the food resources at the littoral and cooled away making the shallow waters a poor place for foraging. The juveniles of sockeye salmon migrate from the coastline to the open waters, while Dolly Varden has to move to the lake tributaries. The vast deepwater part has long been considered to be devoid of any life forms, and the rich fauna is distributed only across the shoal zone surrounding the lake. Surprisingly, two morphs of Dolly Varden have recently been discovered in the depths. These morphs owe its origin to exploiting the resources available at various depths. The fast-growing morph (reaching the size of 30 cm and 200 g) dwells in the lake slope, its depth ranging between 30 and 50 m. The more numerous slow-growing morph (up to 20 cm and 80 g respectively) concentrates in the profundal zone at the depth more than 100 m. Its entire life cycle takes place in deep water below the border of light penetration. Spawning here is notably prolonged and shifted from autumn to summer. A range of specific deepwater adaptations have emerged as well, such



Anadromous Dolly Varden

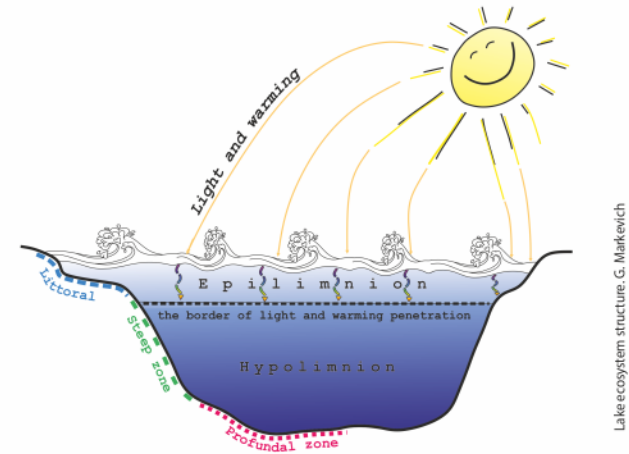


Fast-growing lacustrine morph



Slow-growing deepwater morph

E. Esin



as large eyes, long pectoral fins, ash-grey colouration and several peculiar anatomic traits. The deepwater morph stops growing immediately after maturation.

THE FACTORS OF THE EVOLUTIONARY PROCESS

Eggs and carcass fragments of sockeye salmon form the most vital nutrient sources for deepwater charrs. The vast biomass brought in by salmon from the sea ends up at the bottom and slowly decomposes in the cold water all year long, providing endemic morphs with a permanent food source. Their food supply and eventual survival thoroughly depend on the migration of sockeye salmon. Dolly Varden specialization is the result of the unique characteristics of Lake Kurile ecosystem.

FURTHER RESEARCH

Kronotsky Nature Reserve supervises the cutting edge research of unique charrs dwelling in the lake. The researchers from still have to establish the degree of genetic isolation between the morphs as well as their possible reproductive relationship with Dolly Varden, which dwells in the shallows along the shore. Physiological adaptations in lacustrine deepwater fishes also require further research; for instance, cer