Celebrating limnology in Siberia: commemorating the 90th anniversary of the Limnological Institute in Irkutsk, Russia

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September, 2018 marked the 90th anniversary of one of the longest functioning limnological research institutes in the world—the Limnological Institute (LIN) of the Siberian Branch of the Russian Academy of Sciences located in Irkutsk, Russia. Originating in 1928 as the Baikal Limnological Station on the southwest shore of Lake Baikal, the institute distinguished itself quickly for its remarkable productivity. Between 1928 and 1940, a period of great hardship for Soviet scientists, 250 papers were published by the institute's mere handful of scientists on such diverse topics as the hydrological regime of the Angara River (Lake Baikal's sole outlet), the biology of the lake's commercially important whitefish, and the coastal geomorphology of the lake. Today, this thriving institute, with a research fleet of 4 vessels and a research diving team, is the workplace of more than 130 freshwater scientists including biologists, chemists, physicists, and geologists who have collaborated with international scientists from 28 different countries between 2013 and 2018.

Recent key findings of LIN's scientists illustrate both the breadth of their research and the uniqueness of Lake Baikal. For example, LIN scientists, often with international colleagues, elucidated the drivers of Lake Baikal's enigmatic deep-water ventilation process (Wüest et al. 2005; Schmid et al. 2008), described coastal and pelagic upwelling events (Shimaraev et al. 2012; Troitskaya et al. 2015) and reconstructed paleoclimates for eastern Siberia using sediments

extracted from local lakes (Stepanova et al. 2019) and the extraordinarily deep, 7 km-thick layer comprising the floor of Lake Baikal (BDP-99 Drilling Project Members 2005). In addition, LIN scientists, since 2000, have discovered more than 50 methane hydrate accumulations, previously thought to be restricted to marine habitats, on the bottom of Lake Baikal (Khlystov et al. 2018), and they described the world's only freshwater macroinvertebrate communities associated with the lake's hydrothermal vents and cold seeps (Zemskaya et al. 2012). Other unusual communities described by LIN scientists include the cryophilic community composed of phytoplankton, ciliates, and rotifers living in the lake's ice (Obolkina et al. 2000; Bondarenko et al. 2012) and the surprising diversity and abundance of organisms inhabiting the splash zone (Timoshkin 2018), a habitat that has received almost no attention in other lakes. Of course, Lake Baikal's many endemic species and its 25 million year history make it an ideal natural laboratory for pursuing questions regarding the evolutionary origins and history of Lake Baikal's fauna with current work suggesting that many faunal groups have recently radiated rapidly (Sherbakov 1999; Stelbrink et al. 2015). Water chemistry research too has been central to LIN's research on Lake Baikal and the surrounding region, with recent work showing that nutrient concentrations have increased in the lake's littoral zone while concentrations offshore have remained stable (Khodzher et al. 2017, 2018). Sadly, anthropogenic nutrient loading from untreated sewage and contaminated groundwater has led recently to the massive growth of benthic algae in localized areas of Lake Baikal's coastal zone (Timoshkin et al. 2018), and the spectacular, endemic sponge forests of the littoral zone (Kozhova and Izmet'eva 1998) appear to be suffering from the action of opportunistic pathogens (Belikov et al. 2019).

Nearly all of the topics noted above and more were represented at the celebration of the institute's 90th birthday in 2018, which consisted of a stimulating five-day scientific

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conference, titled “Freshwater Ecosystems - Key Problems”. At this conference, scientists from Russia, Japan, Europe, North America, and Africa presented papers focusing on fundamental and applied topics of limnology. Five of these papers, all addressing different aspects of biological limnology, are presented in this special issue of *Limnology*. Four of the papers use molecular biology techniques to explore aspects of biodiversity or phylogenetic relationships of organisms from L. Baikal (Kulakova et al. 2019; Naganawa et al. 2019; Protasov et al. 2019; Yakhnenko and Itskovich 2019) while the fifth paper describes trends in zoobenthic community structure in 49 lakes situated across three terrestrial biomes (steppe, forest-steppe, and taiga) in southwestern Siberia (Bezmaternykh and Vdovina 2019). Additional papers from the conference have been or will be published in *Quaternary International*, *Journal of Great Lakes Research*, *Russian Journal of Ecology*, and *Geography and Natural Resources*.

We hope the papers presented here and in the journals mentioned above will help stimulate future research on Siberian inland waters, and we thank each of the reviewers whose generous insights and helpful suggestions improved these papers.

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