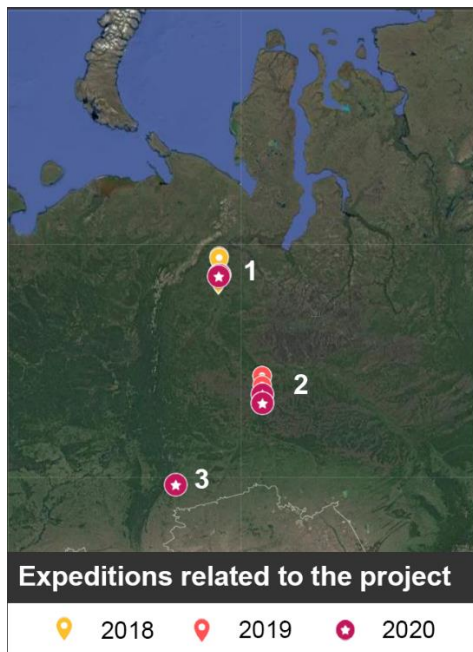




Expedition 2020 within the framework of the RFBR project №19-04-00966 a

**Biodiversity and gene pool of the Sub-Arctic faunas in Eurasia:  
global and regional determinants and perspectives on conservation**

Our project aims to investigate the response of the high latitude faunal biodiversity in the Northern Hemisphere (at taxonomic, genetic, and functional levels) to climate-driven cyclicality and regional geological circumstances over the actual, historical and geological timescales.



**Figure 1. Geography of the field works**

1 – The north of the West Siberian Plain; key localities of the quaternary faunas and floras situated at the southern border of the present-day Subarctic zone (expeditions to Yamal-Nenets Autonomous Area).

2 – The lower Irtysh River reaches in Western Siberia (expeditions to Khanty-Mansi Autonomous Area).

3 – The Southern Urals and Trans-Urals, the region of maximum advance of micromammal species, the modern representatives of which are strictly confined to the present-day Arctic and Sub-Arctic (expedition to Chelyabinsk Oblast').

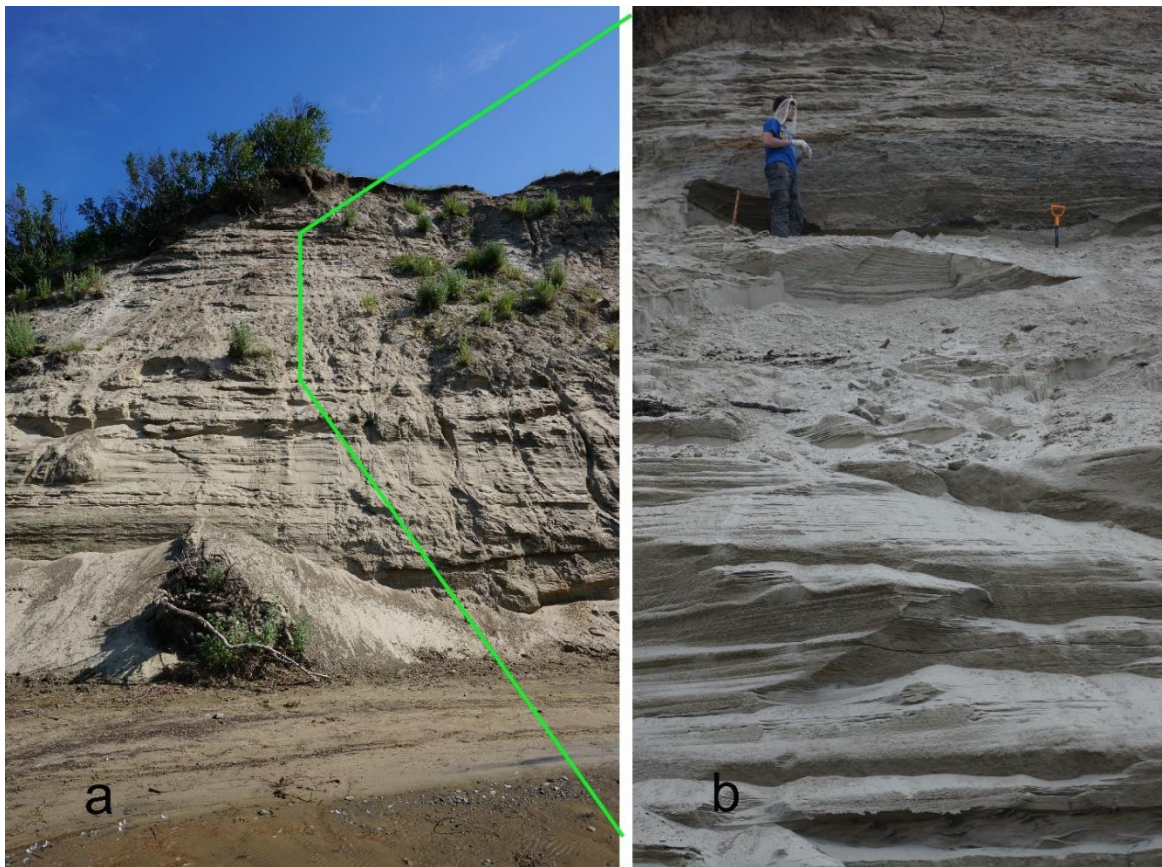
Because of coronavirus pandemic, the 2020 expeditions were organized in accordance with the instructions issued by federal and regional health authorities (Sverdlovsk Oblast', Yamal-Nenets Autonomous Area - YNAA, Khanty-Mansi Autonomous Area - KMAA, Chelyabinsk Oblast').



**Figure 2.**  
Departure from Ekaterinburg, Sverdlovsk Oblast' to the Yamal-Nenets Autonomous Area

1. Multi-proxy studies at the key sections of the Quaternary in the lower reaches of the River Ob' (Yamal-Nenets Autonomous Area)

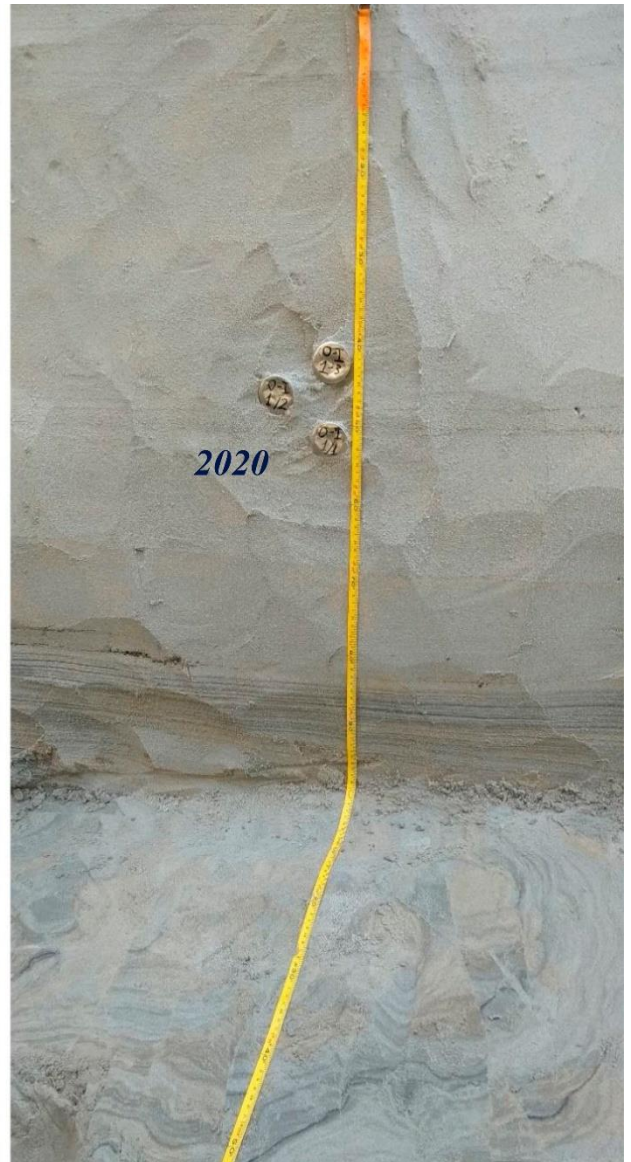
Multi-proxy investigation of a natural exposure along the left bank of the River Ob' upstream from the settlement *Panaevskiy* (YNAA, Yamal District, 66°45'16.31" N, 70° 4'16.71" E). Water screening was carried out to test for plant and animal remains and samples were taken for spores and pollen. Obliquely stratified inequigrained sands with lenses of clayey gravel, crystalline rock fragments and well-rounded pieces of wood represent the middle and upper parts of the section (Fig. 3). Water screening on hand sieves revealed neither vertebrates nor coleopterans. The layering of peaty and clayey silts with fine- and medium-grained sands represent the lower part of the section. Samples for plant macrofossils and insects were taken. Because of the initial signs of the river bank collapse, no samples for OSL dating were taken in 2020.



**Figure 3.** An exposure in the left bank of the River Ob' upstream from the Settlement Panaevskiy: general view (a) and sampling from the upper part of the section (b)

Re-examination of the sediments exposed in the right bank of the River Bolshaya Ob' upstream of Khashgort Settlement (YNAA, Shuryshkary District, locality *Bolshaya Ob'*) was carried out in order to obtain samples for cross-checking of the previously obtained OSL dating results. In 2020, the samples were taken from the same layers and in the same depths as the samples taken in 2018 and dated in the OSL dating laboratory of the Russian Geological Research Institute, VSEGEI. To find the places of previous sampling, we referred to the pieces of PVC pipes remained in the sediments after the bank collapse in 2018 (Fig. 4).

Re-examination of the key localities *430 km, 430 a km* (Smirnov et al., 1986) in the Late Pleistocene (the Late Zyryanka) terrace yielding micromammal assemblages was begun (Fig. 4-5). Because of low concentration of fossil remains in the sediments, the use of hydromonitor jet and water-sieving machine was planned for collecting micromammals in these localities.



**Figure 4.** Obtaining the data for geological cross-section of the “diagonal sands” in the outcrops of the right bank of the River Ob’ upstream of the Settlement Khashgort (locality Bolshaya Ob’) and the pieces of PVC pipes buried during a riverbank collapse incident in 2018



**Figure 5.** General view of the Late Pleistocene (Late Zyryanka) terrace, the right bank of the River Bolshaya Ob’ (locality 430 km)



**Figure 6.** The section of the Late Pleistocene (Late Zyryanka) terrace, the right bank of the River Bolshaya Ob' (locality 430 km)

2. Expeditions to Khanty-Mansi Autonomous Area: investigation of the quaternary deposits along the right bank of the Irtysh River between the settlements Bobrovka and Chembakchina (from the Early Pleistocene to the Holocene)

A complete geological description of the section **Gornopravdinsk 2019** and additional paleontological sampling were carried out. The samples for OSL dating were obtained from the micromammal-bearing layers (Fig. 8-9). A preliminary inspection of the Chembakchino outcrops was carried out. The accessibility of the stratotype section **Chembakchino 1981** (Smirnov et al., 1986) for re-examination and sampling was confirmed.



**Figure 7.** OSL sample collection from the Quaternary deposits on the right bank of the Lower Irtysh River near Gornopravdinsk Settlement



**Figure 8.** The lower micromammal-bearing layer in the locality Gornopravdinsk 2019 and the places of paleontological sampling in 2020 (the outcrops of the right bank of the Lower Irtysh River, KMAA)



**Figure 9.** Collecting micromammals and other fossils in the previously discovered locality Gornopravdinsk 2019: water screening using hand sieves and some findings from the lower micromammal-bearing layer

3. Assessment of the prospects for paleontological investigation of the quarries in the Emanzhelinsk District, Chelyabinsk Oblast' (the Southern Trans-Urals)

The quarries **Baturino** and **Emanzhelinsk** were inspected in order to compare the two quarries with respect to the prospects of comparative investigation of the sequences starting from the fluvial to lacustrine and subaerial phases of the sedimentation cycle. The bone-bearing layers of fluvial and lacustrine and fluvial origin are better developed in the quarry Baturino (Fig. 10).



**Figure 10.** Paleosols in the outcrop of the quaternary deposits in the eastern wall of the quarry Baturino

4. Neontological field work: surveying small mammals and insects

In 2020, trappings of small mammals were carried out in YNAA at the approximate southern border of the present-day Sub-Arctic zone (vicinities of paleontological locality 430 km, 100 trap nights) and in the vicinities of Gornopravdinsk 2019, KMAA (250 trap nights). The samples for morphological and DNA analyses were collected (Fig. 11). In the vicinities of Gornopravdinsk 2019, the study of herpetobiont insects was undertaken during 7 days along the gradient from the river bank to the upland (Fig. 12).



**Figure 11.** Taking samples for DNA and morphology in the field



**Figure 12.** General view of the slope of the right bank of the Irtysh River 2 km upstream from the Settlement Gornopravdinsk where the sampling for herpetobiont insects was carried out in 2020