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**LAST 1000 YEARS PALAEOECOLOGICAL HISTORY
OF THE KETTLE-HOLE PEATLAND IN THE SERTEYA
REGION (RESEARCH PROJECT)**

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*Палеоэкологическая история последних 1000 лет торфянико-
вой котловины в Сертейском регионе (представление проек-
та)***

В Сертейском регионе (Верхнее Подвинье) известны памятники от мезолита до средневековья. Наиболее изученными являются стоянки неолитического времени. В последнее время здесь был исследован одиночный курган у дер. Сертея, который содержит материалы раннего неолита, позднего неолита — бронзового века, средневековья. В бассейне р. Западная Двина также известны как раннесредневековые курганы, так и поселения средневекового времени. В 2015 г. была пробурена 8-метровая скважина в центральной части торфяника, расположенной на флювиогляциальной равнине поблизости от исследованного одиночного кургана. Скважина включает 3 м сфагнового торфа и около 5 м сапропеля в нижней части. Были изучены отложения верхней части этой скважины, которые позволяют реконструировать историю окружающей среды за последние 1000 лет. Был применен широкий спектр различных естественно-научных методов: палинологические и геохимические (XRF) анализы, изучение макроостатков, диатомовый анализ, изучение изменчивости состава кладоцер, жестокрылых жуков, комаров-дергунов, изучение микро- и макроостатков углей. Хронология основывается на 10 АМС датировках и находках вулканического пепла.

Восточно-Европейская равнина находилась под влиянием континентальных воздушных масс и была крайне чувствительна к климатическим изменениям. Однако для территории Смоленского региона на настоящий момент климатические условия и человеческая активность последних 1000 лет известны недостаточно. В дальнейшем будут проведены мультидисциплинарные исследования всей толщи голоценовых отложений.

The Serteya region is situated in the recently glaciated area of the Valday (Weichselian, Vistulian) Glaciation. The region is characterized by a mosaic of landscapes of glacial (moraine plains and hills) and glaciofluvial (glaciofluvial plains, subglacial channels) origin with lakes, peats and closed depressions and with poorly developed valleys of small rivers. The present-day Serteyka River (left-bank tributary of the Western Dvina River) valley itself occupies a subglacial channel, where at least two generations of water bodies existed — the 1st Late Glacial ice-melting lakes and the 2nd Holocene postglacial lakes. The Serteyka River presumably was draining, as an effect of headward erosion, subsequent water bodies during the Holocene, as was confirmed by the radiocarbon data set of the biogenic deposits (Kalicki et al., 2015; Kittel et al., 2016).

Over the last 30 years, numerous archaeological relics of camp sites and settlements from the Prehistory have been discovered in the lower course of the Serteyka River valley. The Serteya region of the Upper Dvina Basin was settled periodically from the Mesolithic to the Middle Ages and more/less permanent occupation of the area started from the Modern Period. Archaeological sites have been widely studied and many of them are dated to the Neolithic Period. The long-standing archaeological research, including underwater surveys, resulted in documentation of seasonal and permanent Mesolithic and Neolithic settlements. The prehistoric sites are situated both on mineral basement and within organic deposits of biogenic plains developed in the area of a few post-lake basins and simultaneously both within the subglacial channel and on uplands. Mesolithic and Early Neolithic communities were hunters-gatherers, while the Middle and Late-Neolithic communities introduced agriculture and production (Mazurkevich et al., 2009a, b; 2012). A barrow from the 3th mil. BC with some Neolithic artefacts and Modern Time transformations, situated on the glaciofluvial plain, was excavated in 2014–2015. Early medieval barrows are also documented and numerous sites from the Middle Ages were surveyed in the Western Dvina valley. In the late 14th century, the area was a part of the Grand Duchy of Lithuania. It became part of the Grand Duchy of Moscow and the Tsardom of Russia in 16th cent. and belonged to the Polish–Lithuanian Commonwealth from 1582 to 1772 AD. From 1772 AD, the Serteya region is a part of Russia.

As the archaeological remains have been intensively studied, palaeoenvironmental analyses remain scarce. It is important to become acquainted with the prehistoric and historic communities: their settlement conditions, economic systems, available environmental resources, as well as the scale and the directions of human impact. For this propose, it is necessary to conduct multidisciplinary palaeoenvironmental reconstructions, including an extensive set of high-resolution palaeoecological analyses based on cores of organic deposits. The archive coring records and the geological mapping conducted in 2013–2016 reveal that post-lake basins within the present-day Serteyka River valley are filled with organic deposits (mostly lake deposits — gyttja) up to 8 meters thick. The radiocarbon data set and the results of a preliminary pollen analysis prove that the sediments hold the record of the Late Vistulian and the Holocene (Kul’kova et al., 2001; Mazurkevich et al., 2009a, b; 2012). A presence of short-term episodes of lake regressions in Holocene is confirmed by the geological context of archaeological layers (Mazurkevich et al., 2011; Kul’kova et al., 2015a, b). New projects are focused to the detailed study of organic deposits cores collected from the successive post-lake basins within the present-day Serteyka River valley. Research will be based on high-resolution multi-proxy palaeoecological analyses supported by radiocarbon dating.

In order to identified and separate global, regional and local (e.g. artificial or caused by beavers activities) environmental changes, the parallel detailed palaeoecological study of an object situated on the upland are needed. In 2016, a 8 m core of organic deposits was collected from the central part of the kettle-hole peatland situated on the glaciofluvial outwash plain in the immediate vicinity of the Bronze Age barrow. The core stratigraphy is composed of two main sedimentological units, with ca. 3,0 m of Sphagnum peat in the upper part and ca. 5,0 m of gyttja in the lower part. At this stage of research, we know that the upper meter encompasses a millennium of environmental history. Following biotic proxies will be use: pollen grains, non-pollen palynomorphs, plant macro-remains, testate amoebae, Cladocera, Chironomids and abiotic: geochemistry — μ XRF. The primarily study of the upper 1 m of the core documented only a few samples of Cladocera and Chironmidae appear in peat deposits. Chydorus

sphaericus dominates among Cladocera. This species exist in a peat bog with minimum of water level and acidification, what is confirmed also by Chironomidae species. The low pH and desiccated peatland didn't allow to development rich of species Chironomidae and Claodocera. For the purpose of examination local and regional fire's history, micro and macro charcoal will by analyse also. Chronology will be based on 10 AMS c 14 date and micro tephra finding (if any).

Eastern part of Europe, particularly Western Russia, is characterized by a continental climate, it can by however influenced by oceanic air masses, which makes this region sensitive to climate change. Climate variability and human activity of the last millennium are poorly known in this part of Europe. Palaeoecological analyses might shed light on environmental condition and complete knowledge about climate changes in Eastern Europe. Palaeoenvironmental background would give new information about interaction between people, environment and climate during the Middle Ages and the Modern Period. In the second stage of research, the study will cover the whole Holocene (and the Late Weichselian if exists) sequence. Thus, new detailed reconstructions of climate changes based on a variant independent proxy and detailed geochronometrical determinations of studied deposits cores are important to explain cultural and demographic changes in the region during the Late Weichselian and the Holocene. The results of research must by base on. The natural environment changes and human-environment relationships will be reconstructed in detail based on high-resolution and multidisciplinary palaeoecological analyses. The results of the research will broaden the knowledge about the large scale, regional and local environment evolution in the Late Weichselian and the Holocene in the Eastern Europe.

The objectives of the research are:

- 1) A quantitative reconstruction of the climate elements' changes;
- 2) A quantitative reconstruction of peatland and palaeolake hydrological dynamics;
- 3) A qualitative and quantitative reconstruction of human-environment relationships;
- 4) A precise reconstruction of the age, duration and intensity occupation in the subsequent phase.

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