

The most enigmatic archaeological period in the ice age Europe started, when the first modern humans arrived 46 thousand years ago to the continent and process that resulted in the extinction of the native European Neanderthal population started. Genetic evidence showed that the first modern humans and the local Neanderthals were able to have progeny, as evidenced by the presence of 2–9% of Neanderthal genes in the current population of Europeans. This period between 46 and 36 thousand years ago is called transitional period that links the Middle Palaeolithic (300,000–45,000 years ago) and the Upper Palaeolithic (45,000–12,000 years ago). Middle Palaeolithic humans in Europe were exclusively Neanderthals while Upper Palaeolithic people were modern humans. Generally, tools of the Neanderthals were made of large flakes while modern humans made their tools from blade-shaped flint products and organic materials (bones, antler, ivory). However, in the transitional period, there are cultures that include both types of tools. If Neanderthals made the stone tools of the transitional period, they might have learned the technology of blade making from the modern humans. If modern humans made the transitional cultures, then they might have been influenced by the Neanderthals to make Middle Palaeolithic tool types. It is impossible to decide from the current archaeological evidence which human species was responsible for the transitional cultures because human remains never were found together with transitional artifacts.

Why did Neanderthals and modern humans make different types of tools? The answer lies in the know-how of survival tactics, which is mainly about hunting wild animals. Since the performance of a specific job requires the use of different tools, based on the presence of different types of tools at the site, it is possible to determine what activities were done there, e.g. hunting, leather processing or food preparation. However, for archaeology, the most valuable will be hunting tools, because the size and shape of which will strongly depend on the prey species. Since both Neanderthal and modern humans functioned in the same environment, the presence of different points of throwing weapons used during hunting may indeed indicate the use of different methods of hunting or the choice of a different prey. Therefore, to explain why human tools were shaped differently, we need to understand how humans used their environment as well as plant and animal food resources.

The best evidences of the survival tactics are in the layers of caves, where animal bones, burnt wood, pollen, and human DNA can be preserved. In the transitional period of Eastern Central Europe there are three human cultures: the Bohunician, the Szeletian, and the Jerzmanowician. But only the latter two were found in caves and thus are apt to reveal humans' survival strategies. There are only two cave sites where Szeletian and Jerzmanowician layers can be explored: Szeleta cave in Hungary and Nietoperzowa cave in Poland. We intend to excavate these two sites to obtain all sort of finds and samples that will be subjected to radiocarbon dating to precise chronology, stable $\delta^{13}\text{C}$, $\delta^{15}\text{N}$, $\delta^{18}\text{O}$, and $^{87/86}\text{Sr}$ studies to reveal animal and human diet, climate, to find botanical remains to reconstruct vegetation, and sediment DNA analysis to find the human that made the transitional artifacts. If the research successfully finds all the evidences needed, then this will be the first time in the archaeological research of Eastern Central Europe when we can understand how Neanderthals and modern humans met, lived by each other or together, and how the modern human population grew over the Neanderthals. Our research will be able to describe and explain the survival tactics of the transitional human cultures, to define if those are related to modern humans or Neanderthals, to reveal if Neanderthals learned the survival tactics of modern humans or the other way around, to understand the stone tool variability, and eventually to contribute to the understanding of the rapid spread of modern humans onto Europe and the extinction of Neanderthals.