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**Author:** Zwyns, Nicolas

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## English Summary – Laminar technology and the onset of the Upper Paleolithic in the Altai, Siberia

In the scenarios of hominin dispersals across Central and Northeast Asia, the Altai region stands as the gate to Siberia. It has yielded a cluster of Middle and Upper Paleolithic stratified sites that have been recently excavated using a multidisciplinary approach. These sequences provide key-evidences illustrating changes in material culture corresponding to the transition from the Middle to the Upper Paleolithic. In Europe, this phenomenon is associated with the replacement of Neandertals by anatomically modern humans. Based on this data set, researchers have put forward different scenarios regarding the transition processes, ranging from hypotheses of local evolution to migrations. The most popular model proposes a parallel development of two distinct Upper Paleolithic traditions that both emerged from a local Middle Paleolithic background. The Upper Paleolithic strata from at the open-air site of Kara-Bom thus show a locally-developed levalloisian blade-based Upper Paleolithic tradition. Simultaneously, the Ust-Karakol tradition would testify to a different path leading to the Upper Paleolithic, with some techno-typological similarities with the European Early Upper Paleolithic. In addition, the Sibiryachinski tradition would represent an intrusive late Mousterian facies, overlapping chronologically with the first occurrence of the Upper Paleolithic in the area.

Questions remain regarding who was responsible for making these tool technologies. Recent developments in ancient DNA studies have shown that Neandertals were present in the Altai mountains around 40 ka <sup>14</sup>CBP (with the Sibiryachinsky tradition). However, a previously unknown genome was sequenced, demonstrating the presence of another type of hominin in the region, the so-called ‘Denisovans’. The presence of anatomically modern humans is confirmed since at least 28 ka <sup>14</sup>CBP in Siberia.

Three main research questions are formulated in order to test the model of local evolution:

- Are there two different variant of UP in the region?
- Is there a chronological overlap between the two variants?
- What is the geographical distribution of the variants?

To address these questions, the present study focuses on laminar technology based on a sample of lithic material from open-air sites following a three-tiered approach. First, the integrity of the sample is assessed based on a taphonomic analysis. Second, an attribute analysis of the lithic material is used to quantify technological features and their variability. This data set is used to support a reconstruction of the laminar reduction sequences and more generally, of the technical systems. Third, technical traditions are identified through the use of a theoretical framework used to differentiate cultural transmission from strict ecological responses.

The results confirm the existence of two distinct techno-typological variants at the beginning of the Upper Paleolithic. The first variant (Kara-Bom variant) is assigned to an Initial Upper Paleolithic (IUP) blade based industry that shows a standardized sub-volumetric and volumetric blade production but also a specific technology oriented toward the production of small laminar blanks. The latter is defined here as the burin-core technology. The second variant (Ust-Karakol variant) is assigned to the Early Upper Paleolithic (EUP) and is characterized by a fully developed volumetric blade technology associated with a microblade production from narrow-faced cores and carinated endscrapers. The chronological overlap between the variants, however, could not be confirmed. Based on a taphonomic revision of the Ust-Karakol 1 (UK1-1) (sector 1) sequence, a relative chronology has been established with an

occurrence of the IUP followed by the EUP. The IUP occurs first at the beginning of oxygen isotope stage 3, likely during a warm phase that corresponds to the glacial interstadial 12. It appears to overlap with the time range of the regional Mousterian and both techno-complexes seem to disappear from the region prior to the Heinrich 4 cold event. The EUP appears quickly thereafter and does not seem to overlap significantly with Mousterian and IUP human occupations.

Comparisons with the neighboring regions support the existence of an IUP techno-complex present in the Altai, in the Cis-Baikal region, in the Trans-Baikal region and in northern Mongolia. By redefining the UP variants, the present study narrows

the variability between assemblages, suggesting a quick and long-range dispersal of a homogenous techno-complex contemporaneous with the first indisputable evidence for MH in Southeast Asia. Some assemblages indicate that beside the lithic technology, bone technology and ornaments can be considered as part of the IUP behavioral package.

Thus, according to the obtained results, the current data set is not consistent with the idea of a local development for either of the UP variants. Instead, it is suggested that the human occupation in the Altai may illustrate multiple incursions of human groups during the Late Pleistocene, probably originating from Central Asia.