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# Ushbulak—A New Stratified Upper Paleolithic Site in Northeastern Kazakhstan

*We present the findings of excavations at the stratified site of Ushbulak, discovered during a joint Russian-Kazakhstan research project in 2016. The site is located in the Shilikty Valley, northeastern Kazakhstan, at the junction of routes connecting southwestern Central Asia, southern Siberia, and northern China. On the basis of stratigraphy, chronology, and technological evidence, we identify three technological complexes, relating to the Metal Ages (stratum 1), Final Upper Paleolithic (strata 2–4), and Initial Upper Paleolithic (strata 5.2–7). Focusing on the principal markers of the Initial Upper Paleolithic in the region, we conclude that finds from strata 5.2–7 belong to the southern Siberian-Mongolian variant of the Initial Upper Paleolithic, as evidenced by the uni- and bidirectional parallel volumetric blade core reduction, tool types, and absolute chronology. The tool kit includes mostly endscrapers, heavily retouched blades, and truncated-facetted or notched implements. Particularly diagnostic types include waisted blade, blade with a ventrally retouched distal edge, beveled point, backed blade, stemmed implement with a sharp tip, stemmed endscraper, and burin-core. Two AMS-dates from stratum 6 date this layer to ca 36,180 ± 730 and 41,110 ± 302 BP. The closest known parallels to the industry of the lower strata of Ushbulak are finds from horizon UP2 of Kara-Bom in the Russian Altai. Our results suggest that Ushbulak strata 5.2–7 correlate with the Initial Upper Paleolithic industries of the Altai (Denisova Cave), northern China (Luotoshi), and Mongolia (Tolbor-4 and -21).*

Keywords: *Central Asia, Kazakhstan, Initial Upper Paleolithic, lithic industry, cores, blades, tool kit.*

## Introduction

Kazakhstan is located in a vast territory connecting several large historically and culturally significant regions: southwestern Central Asia to the south, Siberia to the north, northern China to the east, and Eastern Europe to the west. At the same time, Kazakhstan and southwestern Central Asia belong to the broader region of Central

Asia. This region is characterized by specific geographic conditions under which an extreme continental and arid climate favors erosion over the accumulation of sediments, which, in turn, makes the detection of stratigraphically intact Paleolithic archaeological sites very difficult. In Kazakhstan, such sites are thus very few and the period is mostly represented by surface finds. This scenario applies not only to the early stages of the Paleolithic, but also to the Upper Paleolithic, a period when population density increased sevenfold and humans settled in all regions of the continent, including the extreme North (Pitulko et al., 2012). Upper Paleolithic artifacts have been recorded *in situ* at several localities in Kazakhstan such as Maibulak and Chokan Valikhanov (Taimagambetov, Ozhereliev, 2008; Fitzsimmons et al., 2017), in southern Kazakhstan. In central and northern Kazakhstan, several stratified Upper Paleolithic sites (Batpak-7, Ekibastuz-15, and Ekibastuz-18) are known. However, these either remain in the early stages of excavation, or their stratigraphic position indicates cultural heterogeneity (Merz, 1990; Taimagambetov, Ozhereliev, 2009).

In the eastern part of Kazakhstan, despite its proximity to the Russian and Mongolian Altai (areas abundant in Paleolithic sites), stratified Upper Paleolithic assemblages were essentially unknown until recently. Over 20 localities containing archaeological remains attributable to the Late Middle and Upper Paleolithic (Zaisan-1–3, Bukhtarma-1–5, Kozybai-1–2, Espe-1–3, and others) are represented by surface assemblages of artifacts, whose number rarely exceeds 100 items (Derevianko, Petrin, Zenin, et al., 2003; Taimagambetov, Ozhereliev, 2009; Derevianko et al., 2016; Shunkov et al., 2016a). The exceptions to this rule are Shulbinka and Bystrukha-2 (Petrin, Taimagambetov, 2000; Derevianko, Petrin, Zenin, et al., 2003). However, in the representative assemblage from Shulbinka (4177 spec.), approximately one third of the finds were collected from the surface, while the rest of artifacts found in a stratified context are believed to be mixed. Typologically, the artifacts can be divided into three complexes: the Middle Paleolithic (Mousterian), Initial Upper Paleolithic, and Final Pleistocene/Holocene (Petrin, Taimagambetov, 2000; Taimagambetov, Ozhereliev, 2009). A small assemblage (14 spec.) from Bystrukha-2 was recovered from a clear stratigraphic context defined by AMS-date generated on bone sample—ca 29 ka BP. This site can be attributed to the Initial Upper Paleolithic (Derevianko, Petrin, Zenin, et al., 2003; Rybin, Nokhrina, Taimagambetov, 2014).

Reconnaissance conducted by the joint Russian-Kazakhstan Expedition in 2016 in the Shilikty Valley, northeastern Kazakhstan, revealed a new stratified site of Ushbulak, whose archaeological assemblages represent various stages of the Upper Paleolithic (Shunkov et al., 2016a, 2016b; Shunkov et al., 2017).

## Site description

The Ushbulak site is located in the eastern part of the Shilikty Valley (Zaisansky District of the Eastern Kazakhstan Region) (Fig. 1). The valley is approximately 80 km long and 30 km wide. The transverse profile of this intermontane depression is roughly symmetric, while the longitudinal profile is asymmetric. The valley is surrounded by mountain ridges: Manyrak to the north, Saur to the east, and Tarbagatai to the south and west.

In the course of reconnaissance conducted by the Russian-Kazakhstan Expedition in 2016 in Ushbulak, in the upstream area of Vostochny creek (1500 m asl), numerous Upper Paleolithic artifacts (approximately 1.5 thousand specimens) were collected from the waterway's channel. Excavations further revealed several

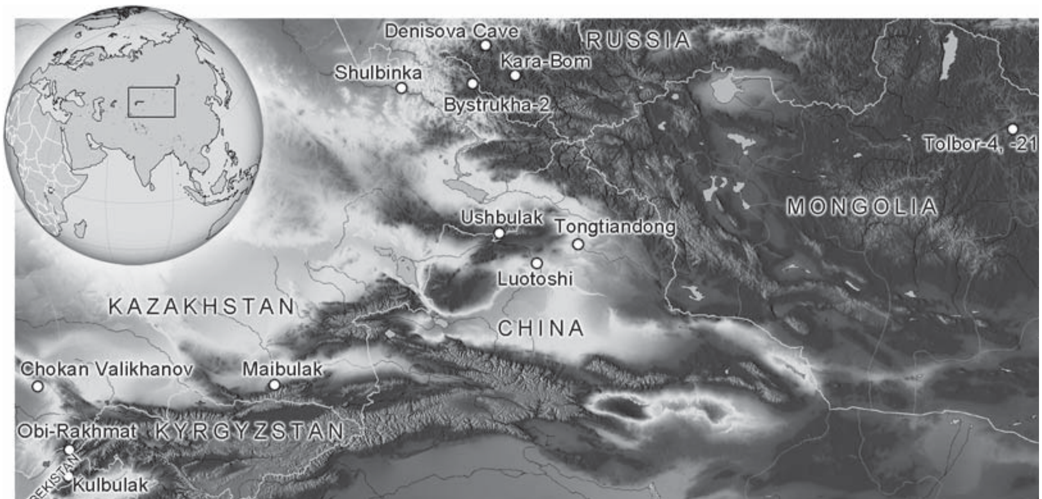


*Fig. 1*. Principal sites with Initial Upper Paleolithic features in northern Central Asia.

stratified archaeological complexes attributable to the Initial Upper Paleolithic through the Metal Ages.

In 2016, on the left bank of the Vostochny, near its source, a trench was laid down perpendicular to the slope, and several test pits were made on both banks downstream (Fig. 2) (Shunkov et al., 2016b, 2016c; Derevianko et al., 2017). In 2017, we conducted two excavations totaling 10.5 m$^2$ in the upper and lower portions of the trench (Anoikin et al., 2017; Pavlenok et al., 2017). Roughly eight lithological strata, including seven layers with cultural material, were identified in the sediment profile, with a total depth of approximately 7 m.

## Stratigraphy

The composite stratigraphic profile represents sequences recorded in excavations 1 and 2 (Fig. 3, *A*). Excavation 1 is located near a baulk on the left bank of Vostochny creek, its depth being 3.5 m (Fig. 3, *B*). Excavation 2 was laid down next to the narrow side of excavation 1, near the base of the left side, and was excavated to a depth of 2.7 m, 1.2 m below the water level (Fig. 3, *C*) (Pavlenok et al., 2017).

The following sediments were recorded in the section (from top down):

*Stratum 1.* A humic horizon of modern soil 0.15–0.20 m thick, with a horizon of blackish-brown sandy loam 0.20–0.25 m thick. Roughly ninety percent of the area is damaged by rodent activity.

*Stratum 2.* Light gray sandy loam abounding in grus (angular, coarse-grained fragments) and gravel. Roughly eighty percent of the area has been disturbed by rodent activity. The stratum is composed of three horizons corresponding to different dynamic phases of deluvial and proluvial processes. Thickness, 1.0–1.2 m.

*Stratum 3.* Light sandy and clay loams, pale yellow and grayish-brown in color, with grus and sand. The stratum is composed of three horizons corresponding to different dynamic phases of deluvial and proluvial processes. Thickness, 1.2–1.4 m.

*Stratum 4.* Fine-grained sand and ochroid and yellowish-brown sandy loam overlying a thin layer of fine gravel and grus mixed with sandy loam. The stratum contains two horizons of similar proluvial sediments formed by a temporary stream in the area of active sedimentation. Thickness, 0.2–0.5 m.

*Stratum 5.* Heavy light gray sandy loam abounding in grus, proluvial-slopewash. The stratum contains two horizons. The lower of the two distinguished by a significantly higher frequency of iron staining. Thickness, 0.4–0.6 m.

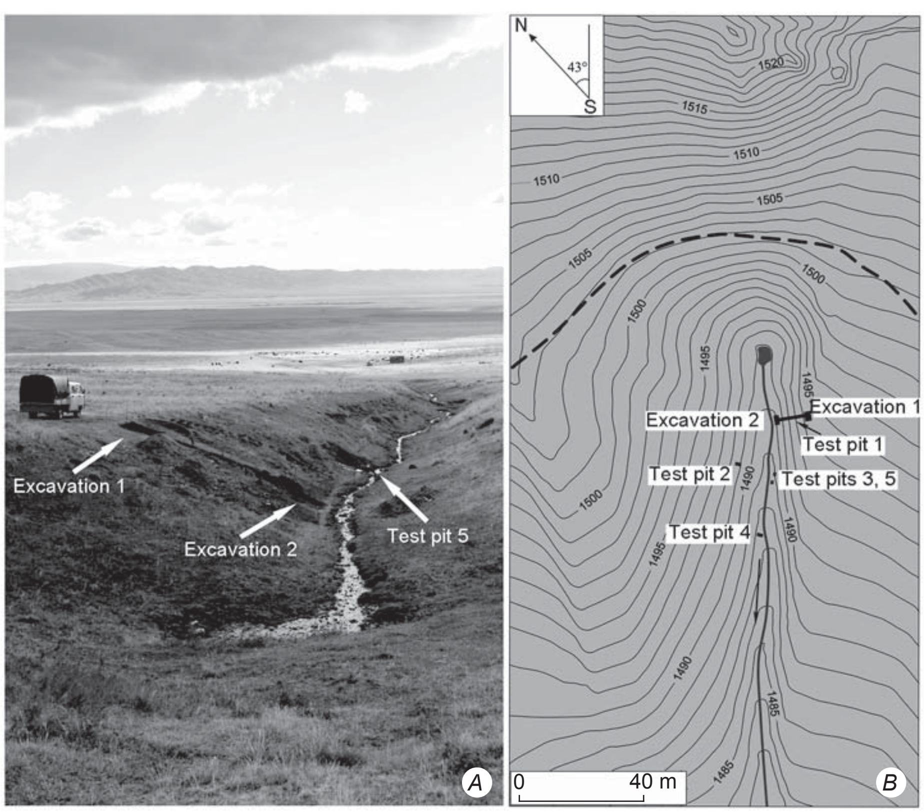


*Fig. 2*. Northeastern view of Ushbulak (*A*) and plan of the site (*B*).

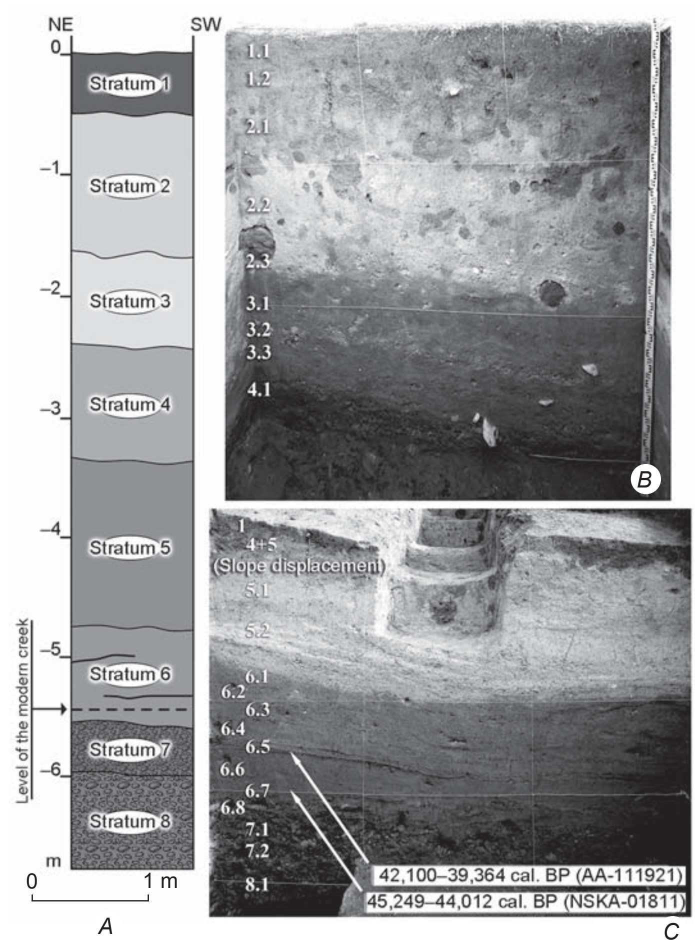


*Fig. 3*. Stratigraphic sequences of the main lithological strata at Ushbulak (*A*), and northeastern walls of excavations 1 (*B*) and 2 (*C*).

*Stratum 6*. On the basis of changes of lithology and the distribution of artifacts, this stratum was subdivided into eight horizons falling in two sequences. The upper sequence (horizons 6.1–6.5) consists mostly of proluvium/slopewash. It is composed of a heavy, gray sandy loam with admixture of grus. The lower portion of the sediment displays thin and short lens-like inclusions of light, humic clay loam, blackish-brown in color. The upper sequence is 0.4–0.5 m thick. The lower sequence (horizons 6.6–6.8) is formed by alluvial sediments from a shallow, slow-running stream with a relatively stable hydrological regime and low channel erosional activity. The sequence consists of gray clay loam, which becomes plastic when moist. Its lower portion contains lenses and thin layers of coarse-grained sand, reddish-ochroid in color. The lower sequence is 0.3–0.4 m thick.

*Strata 7 and 8* are represented by a sequence of coarse proluvial debris.

*Stratum 7*. Gravel and grus mixed with porous sand and clay loam infill, reddish and brown in color. The gravel particles are large or medium sized, randomly oriented, and both densely and regularly distributed. Based on changes in the clay-rich component in the infill and the larger size of gravel particles in the bottom section of the stratum, we established two horizons in this layer. Thickness, 0.3–0.5 m.

*Stratum 8*. Multicolored sediment composed of grus and gravel, with sporadic boulders and an infill of sand and clay loam. Coarse gravel prevails. Based on an increase of the clay component in matrix and a color change in this feature, the increase of gravel particle size, and the appearance of boulders towards the bottom of the layer, this stratum is separated into two horizons. Excavated thickness, 0.8 m.

## Scientific analyses

*AMS-dating.* Two radiocarbon dates are available for stratum 6. One of them is 36,180 ± 730 BP (AA-111921: 42,100–39,364 cal BP at 95.4 %; date modeled in OxCal v. 4.3.2, using IntCal13 atmospheric curve). This was generated on charcoal from the middle portion of the stratum (horizon 6.5) by the University of Arizona AMS Facility (Tucson, USA). The other one was released by the Center of Cenozoic Geochronology (Novosibirsk, Russia) on small bone fragments from the lower portion of the stratum, and is dated to 41,110 ± 302 BP (NSKA-01811: 45,249–44,012 cal BP at 95.4 %; date modeled in OxCal v. 4.3.2, using IntCal13 atmospheric curve) (Fig. 3, *C*).

*Petrographic analysis.* Judging by the analysis of artifacts from the upper complex (strata 1–4), tools were made of various rocks, mostly low-quality, from sources in the immediate vicinity of the site. These consisted of effusive rocks, slates, quartzite, granitoids, coarse-grained sandstone, and aleurite. Siliceous rocks form less than 30 % of the assemblage from these layers.

The petrographic analysis of artifacts indicates marked differences in the criteria used for selecting raw material between the early and later habitation stages. In the assemblage from the lower complex (strata 5.2–7), artifacts made of local siliceous rocks (chert) of high quality form the largest share of objects (95 %). In some cases, silicified alevrolite and tuff were also utilized. Judging by the cortical surfaces of artifacts, most of the items in this layer were fashioned from larger nodules or, less frequently, on pebbles. Modern exposures of similar siliceous rocks represented by large boulders are located 10 km from the site, in the Ak-Su River gorge, running along the southern slope of the Saur ridge. Siliceous pebbles can also be found in the channels of the Chagan-Obo and Uidene rivers, 8–10 km from the site.

*Fauna*. In 2016–2017, over 300 unidentifiable fragments of bones belonging to middle-sized ungulates (horse/argali size) were collected from various strata of the site. Most fragments are from 1–2 to 2–5 cm long. Rare identifiable remains, represented primarily by teeth or their fragments, were found in strata 2, 3, 6, and 7. Species composition is similar in all the strata. The assemblage includes argali (*Ovis ammon*), Siberian ibex (*Capra sibirica*), and kulan (*Equus hemionus*). Undifferentiated equid remains (*Equus* sp.) probably also belong to the kulan. No remains of small mammals were found (Shunkov et al., 2016c; Anoikin et al., 2017; Pavlenok et al., 2017).

*Table 1*. **Composition of lithic industries from Ushbulak, spec.**

| Category/group | Stratum | | | | | | | Total | Surface collection |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5.2 | 6 | 7 | | |
| Core-like: | – | 2 | 1 | 4 | – | 12 (0.5) | 33 (1.5) | 52 | 38 (2.9) |
| cores | – | – | 1 | 2 | – | 7 (58.3) | 25 (75.8) | 35 | 24 (63.2) |
| core-like shatters | – | – | – | 1 | – | 5 (41.7) | 7 (21.2) | 13 | 12 (31.6) |
| flaked pebbles/nodules | – | 2 | – | 1 | – | – | 1 (3.0) | 4 | 2 (5.3) |
| Byproducts of core trimming: | 2 | 7 | 4 | 18 | 3 | 560 (21.9) | 461 (20.7) | 1056 | 137 (10.5) |
| cortical flakes | – | – | 1 | 1 | – | 43 (7.7) | 27 (5.9) | 72 | 22 (16.1) |
| secondary flakes | 1 | – | – | 2 | 2 | 232 (41.4) | 89 (19.3) | 326 | 47 (3.6) |
| flakes from the core's hinge | – | – | – | – | – | 30 (5.4) | 14 (3.0) | 44 | – |
| flakes from the core's front | – | – | – | – | 1 | 13 (2.3) | 4 (0.9) | 18 | 9 (0.7) |
| ridged flakes | – | – | – | 1 | – | 11 (2.0) | 20 (4.3) | 32 | 4 (0.3) |
| half-ridged flakes | – | – | 1 | 1 | – | 111 (19.8) | 118 (25.6) | 232 | 23 (1.8) |
| natural lateral flakes | 1 | 1 | – | 2 | – | 34 (6.1) | 79 (17.1) | 121 | 4 (0.3) |
| lateral flakes | – | 4 | – | 7 | – | 57 (10.2) | 84 (18.2) | 152 | 19 (1.5) |
| rejuvenation core tablets | – | 2 | 2 | 4 | – | 25 (4.5) | 20 (4.3) | 49 | 7 (0.5) |
| plunging flakes | – | – | – | – | – | 4 (0.7) | 6 (1.3) | 10 | 2 (0.2) |
| Blades (width, mm): | 1 | 1 | – | 3 | 5 | 720 (28.1) | 713 (32.1) | 1443 | 575 (43.9) |
| ≥60 | – | – | – | – | – | – | 1 (0.1) | 1 | 2 (0.3) |
| 40–59 | 1 | – | – | – | – | 16 (2.2) | 38 (5.3) | 55 | 34 (5.9) |
| 20–39 | – | – | – | 1 | 3 | 429 (59.6) | 461 (64.7) | 894 | 387 (67.3) |
| 12–19 | – | 1 | – | 2 | 2 | 275 (38.2) | 213 (29.9) | 493 | 152 (26.4) |
| Bladelets and microblades | 2 | 9 | 2 | 3 | – | 169 (6.6) | 79 (3.6) | 264 | 8 (0.6) |
| Blade flakes (length, mm): | – | 2 | 1 | 3 | 1 | 89 (3.5) | 46 (2.1) | 141 | 62 (4.7) |
| large (≥50) | – | 1 | – | 1 | 1 | 38 (42.7) | 24 (52.2) | 65 | 39 (62.9) |
| medium (30–49) | – | 1 | – | 1 | – | 47 (52.8) | 18 (39.1) | 67 | 23 (37.1) |
| small (≤29) | – | – | 1 | 1 | – | 4 (4.5) | 4 (8.7) | 9 | – |
| Flakes (mm): | 7 | 14 | 4 | 23 | 6 | 1008 (39.4) | 891 (40.1) | 1953 | 489 (37.4) |
| large (≥50) | – | 1 | – | 4 | – | 39 (3.9) | 110 (12.3) | 154 | 105 (21.5) |
| medium (30–49) | 4 | 3 | – | 13 | 5 | 178 (17.7) | 253 (28.4) | 456 | 161 (32.9) |
| small (≤29) | 3 | 10 | 4 | 6 | 1 | 791 (78.5) | 528 (59.3) | 1343 | 223 (45.6) |
| Fragments and shatters | 16 | 14 | 6 | 28 | 4 | 1525 | 775 | 2368 | 168 |
| Chips | – | – | – | – | – | 949 | 104 | 1053 | – |
| *Total* | 28 | 49 | 18 | 82 | 19 | 5032 (100) | 3102 (100) | 8330 | 1477 (100) |

*Note*. Percentages, indicated in parentheses, were calculated only for assemblages represented by statistically significant samples. The share of each category is % from the total number of well-represented types (without fragments, shatters or chips). The share of each group within a category is % from the total number of artifacts of the respective category.

## Archaeological remains

Within the site's stratigraphic sequence, we identified two complexes of artifacts: the upper (strata 1–4) and lower (strata 5.2–7) assemblages (Fig. 3, *A*). Lithic artifacts from the upper portion total 177 specimens, including debitage pieces—fragments and shatters (Table 1). The majority of artifacts (8153 spec.) were found in the lower portion of the sequence (Table 1).

Stratum 1 contained 28 lithic artifacts, most of them debitage pieces (16 fragments and pieces of shatter, and 12 flakes), 12 potsherds dating to the Metal Ages (one of them bears incised horizontal lines), and 28 bones of Holocene animals. The lithic industry from strata 2 and 3 (49 and 18 spec., respectively) includes a narrow-fronted core for microblades and bladelets (Table 2). In terms of large detached products, flakes dominate the assemblage, while the proportion of blades is insignificant. The presence of microblades and bladelets is indicative of the Final Upper Paleolithic. Typological criteria (flake, blade with discontinuous lateral retouch, and flake with unifacial retouch) also support this attribution (Table 3). Lithic artifacts from stratum 4 (82 spec.) are concentrated mostly in the upper portion of the sediment. Cores consist of parallel cores with a wide flaking surface, and single-platform cores with one flaking surface for triangular products and bladelets (see Table 2). Flakes are most numerous among the category of detached pieces. The only tool found in the assemblage is a tablet-like implement with a pointed tip formed through discontinuous stepped retouch (see Table 3). Based on stratigraphic position, stratum 4 would appear to be earlier

*Table 2.* **Core-like pieces from Ushbulak, spec.**

| Group/type | Stratum | | | | Total | Surface collection |
|---|---|---|---|---|---|---|
| | 3 | 4 | 6 | 7 | | |
| Radial: | – | – | – | – | – | 2 |
| with two flaking surfaces | – | – | – | – | – | 2 |
| Parallel with a wide flaking surface: | – | 2 | 6 | 22 | 30 | 11 |
| single-platform with one flaking surface for blades | – | – | – | 3 | 3 | – |
| single-platform with one flaking surface for bladelets | – | 1 | – | – | 1 | – |
| single-platform with one flaking surface for flakes | – | 1 | – | 1 | 2 | 2 |
| double-platform bidirectional with one flaking surface for blades | – | – | 2 | 4 | 6 | 7 |
| double-platform bidirectional with one flaking surface for blades with displaced platforms | – | – | 4 | 12 | 16 | 2 |
| double-platform bidirectional with two flaking surfaces for blades | – | – | – | 1 | 1 | – |
| double-platform with two flaking surfaces and conjugate platforms for blades | – | – | – | 1 | 1 | – |
| Multidirectional for flakes | – | – | 1 | – | 1 | 2 |
| Parallel narrow-fronted: | 1 | – | – | 2 | 3 | 3 |
| single-platform with one flaking surface for blades | 1 | – | – | 1 | 2 | 1 |
| double-platform with one flaking surface for bladelets | – | – | – | 2 | 2 | 2 |
| Subprismatic | – | – | – | – | – | 1 |
| Burin-cores | – | – | – | 1 | 1 | 2 |
| Microcores: | – | – | – | – | – | 6 |
| narrow-fronted single-platform with one flaking surface | – | – | – | – | – | 2 |
| subprismatic | – | – | – | – | – | 1 |
| wedge-shaped (blanks) | – | – | – | – | – | 3 |
| Core-like fragments | – | – | 5 | 7 | 12 | 9 |
| Flaked pebbles/nodules | – | – | – | 2 | 2 | 2 |
| *Total* | 1 | 2 | 12 | 34 | 49 | 38 |

*Table 3.* **Tools from Ushbulak, spec.**

| Group/type | Stratum | | | | | Total | Surface collection |
|---|---|---|---|---|---|---|---|
| | 2 | 4 | 5.2 | 6 | 7 | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Sidescrapers: | – | – | – | 3 (7.7) | – | 3 | 2 (5.0) |
| single | – | – | – | 1 (2.6) | – | 1 | 1 (2.5) |
| transverse | – | – | – | 1 (2.6) | – | 1 | 1 (2.5) |
| diagonal | – | – | – | 1 (2.6) | – | 1 | – |
| Endscrapers: | – | – | – | 9 (23.1) | 28 (30.1) | 37 | 7 (17.5) |
| on blades | – | – | – | 8 (20.5) | 16 (16.5) | 24 | 4 (10.0) |
| double on blades | – | – | – | – | 2 (2.1) | 2 | – |
| carinated on blades | – | – | – | 1 (2.6) | 2 (2.1) | 3 | – |
| on blades with a trimmed base | – | – | – | – | 1 (1.0) | 1 | 1 (2.5) |
| on blade-flakes | – | – | – | – | 3 (3.1) | 3 | 2 (5.0) |
| angle | – | – | – | – | 3 (3.1) | 3 | – |
| ogival | – | – | – | – | 1 (1.0) | 1 | – |
| Beveled points with trimmed base | – | – | – | – | 1 (1.0) | 1 | – |
| Stemmed implements with a sharp tip | – | – | – | 1 (2.6) | – | 1 | – |
| Implements with a sharp retouched tip | – | – | 1 | 1 (2.6) | – | 2 | – |
| Chisel-like implements | – | – | – | 1 (2.6) | – | 1 | – |
| Truncated blades | – | – | – | 1 (2.6) | 9 (9.3) | 10 | 2 (5.0) |
| Truncated-facetted implements | – | – | – | – | 2 (2.1) | 2 | 1 (2.5) |
| Knives: | – | – | – | 1 (2.6) | – | 1 | 5 (12.5) |
| with retouched working edge | – | – | – | 1 (2.6) | – | 1 | 2 (5.0) |
| with utilization retouch | – | – | – | – | – | – | 3 (7.5) |
| Burins: | – | – | – | 3 (7.7) | 1 (1.0) | 4 | 3 (7.5) |
| angle | – | – | – | 1 (2.6) | 1 (1.0) | 2 | 2 (5.0) |
| angle retouched | – | – | – | 1 (2.6) | – | 1 | – |
| transverse | – | – | – | 1 (2.6) | – | 1 | 1 (2.5) |
| Bifacially worked implements | – | – | – | – | – | – | 3 (7.5) |
| Planes | – | – | – | – | – | – | 1 (2.5) |
| Perforators/borers | – | – | – | 1 (2.6) | 2 (2.1) | 3 | 1 (2.5) |
| Spur-like implements | – | – | – | 4 (10.3) | 5 (5.2) | 9 | – |
| Notched implements: | – | – | – | 3 (7.7) | 14 (14.4) | 17 | 2 (5.0) |
| with retouched encoches | – | – | – | 3 (7.7) | 14 (14.4) | 17 | 2 (5.0) |
| Denticulates | – | – | – | 1 (2.6) | 1 (1.0) | 2 | 2 (5.0) |
| Combination implements: | – | – | – | – | 3 (3.1) | 3 | 1 (2.5) |
| sidescraper + knife | – | – | – | – | – | – | 1 (2.5) |
| sidescraper + retouched encoche | – | – | – | – | – | – | – |
| endscraper + retouched encoche | – | – | – | – | 1 (1.0) | 1 | – |
| bec + retouched encoche | – | – | – | – | 1 (1.0) | 1 | – |
| truncated flake + retouched encoche | – | – | – | – | 1 (1.0) | 1 | – |
| Stemmed implements | – | – | – | – | 3 (3.1) | 3 | – |
| Waisted blades | – | – | – | – | 1 (1.0) | 1 | – |
| Blades with trimmed distal part | – | – | – | 2 (5.1) | – | 2 | 3 (7.5) |

*Table 3 (end)*

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| Backed bladelets | – | – | – | – | 2 (2.1) | 2 | – |
| Flakes with ventral trimming | – | – | – | – | – | – | 2 (5.0) |
| Blades with heavy retouch | – | – | – | 8 (20.5) | 21 (21.6) | 29 | 5 (12.5) |
| Blades with irregular retouch | 1 | – | – | 12 | 51 | 63 | 8 |
| Flakes with regular retouch | – | – | – | 5 | 23 | 28 | – |
| Flakes with irregular retouch | 2 | 1 | – | 5 | 35 | 43 | 8 |
| Hammerstones | – | 1 | – | – | – | 1 | – |
| Fragments of implements | – | – | 1 | 2 | 1 | 4 | 2 (3.4) |
| *Total* | 3 | 2 | 2 | 63 (100) | 203 (100) | 272 | 58 (100) |

*Note.* Percentages, indicated in parentheses, were calculated only for assemblages represented by statistically significant samples. The share of each category and group is % from the total number of typologically distinct items.

than strata 2 and 3; however, owing to the paucity of finds in this level, it is impossible to assess their chronological attribution with higher precision.

The Paleolithic assemblage from strata 5.2–7 is represented by materials spanning the complete technological cycle of flint knapping, including tested nodules, cores, blanks, core-trimming elements, waste, and finished tools (see Table 1).

The principal reduction technique employed in this assemblage was the detachment of blades from parallel and subparallel bidirectional volumetric cores. Two-thirds of cores are of this type (see Table 2). This category consist of double-platform, subprismatic nuclei with one flaking surface for bidirectional reduction (Fig. 4, *1–3*, *5*), including those with a wide flaking surface and opposing striking-platforms oriented at different angles (semi-tourné). Some single-platform and single-fronted cores in the final stage of reduction could also have been used for bidirectional knapping at earlier stages. Three morphologically distinct cores exhibit knapping from the narrow face. All display the same reduction technique, which included shaping and rejuvenation of striking-platforms from the flaking surface. This normally resulted in ridged or half-ridged flakes, which ensured regularity, convexity of the flaking surface, and standardization of cores. Some rejected cores were used as hammerstones, as evidenced by zones of microflaking on their lateral sides.

Blades, including bladelets and microblades, constitute the most representative category of artifacts among the detached pieces (see Table 1). Microblades were probably removed from small cores or core-burins. However, most microblades in the assemblage represent unintended debitage that, most likely, resulted from preparation of working edges of cores. About 80 % of elongated flakes demonstrate traces of longitudinal and bilongitudinal faceting of dorsal surfaces (in equal proportions).

Blades are characterized by planar striking-platforms (57 %) and thoroughly prepared flaking zones (69 %). The following techniques of preparation can be observed on flaking zones: direct (32 %) or indirect (20 %) reduction of the striking-platform, employed separately or jointly (11 %); overhang reduction (17 %) and pecking, applied separately (11 %) or in combination with reduction (6 %).

Most flakes have longitudinal faceting on dorsal faces (52 %) and plane striking-platforms (56 %). Half of the recovered flakes show no traces of preparation on the flaking zones, while the other half were prepared using the same techniques employed for detachment of blades. Correlation analysis of cores suggests that most flakes were byproducts of core trimming, i.e., preparation and rejuvenation of striking-platforms, lateral or initial ridges. The fact that flakes with some remnant cortex on their dorsal surfaces are more numerous than blades with a similar feature, also underscores the technical character of the former.

Byproducts of core trimming in this assemblage (see Table 1) include cortical and secondary flakes, as well as ridged and half-ridged flakes. A small series of rejuvenation core tablets were also found. Plunging flakes, which are the outcomes of unsuccessful reduction whereby the core base was lost (usually together with the opposite platform), can also be tentatively attributed to the category of byproducts. The lack of large cortical flakes suggests that most cores were reduced elsewhere, i.e. outside the excavated portion of the site.

Comparison between striking-platforms on blades and on flakes provides important information. Frequencies of platform overhang and striking point in blades (22 % and 15 %, respectively) and in flakes (24 % and 17 %, respectively) are virtually the same. Byproducts of core trimming and tool blanks were possibly detached using the same technique, and with similar hammerstones. Without experimentation using local raw material, it is difficult to identify the type of hammerstone used in production. However, in experiments reproducing the

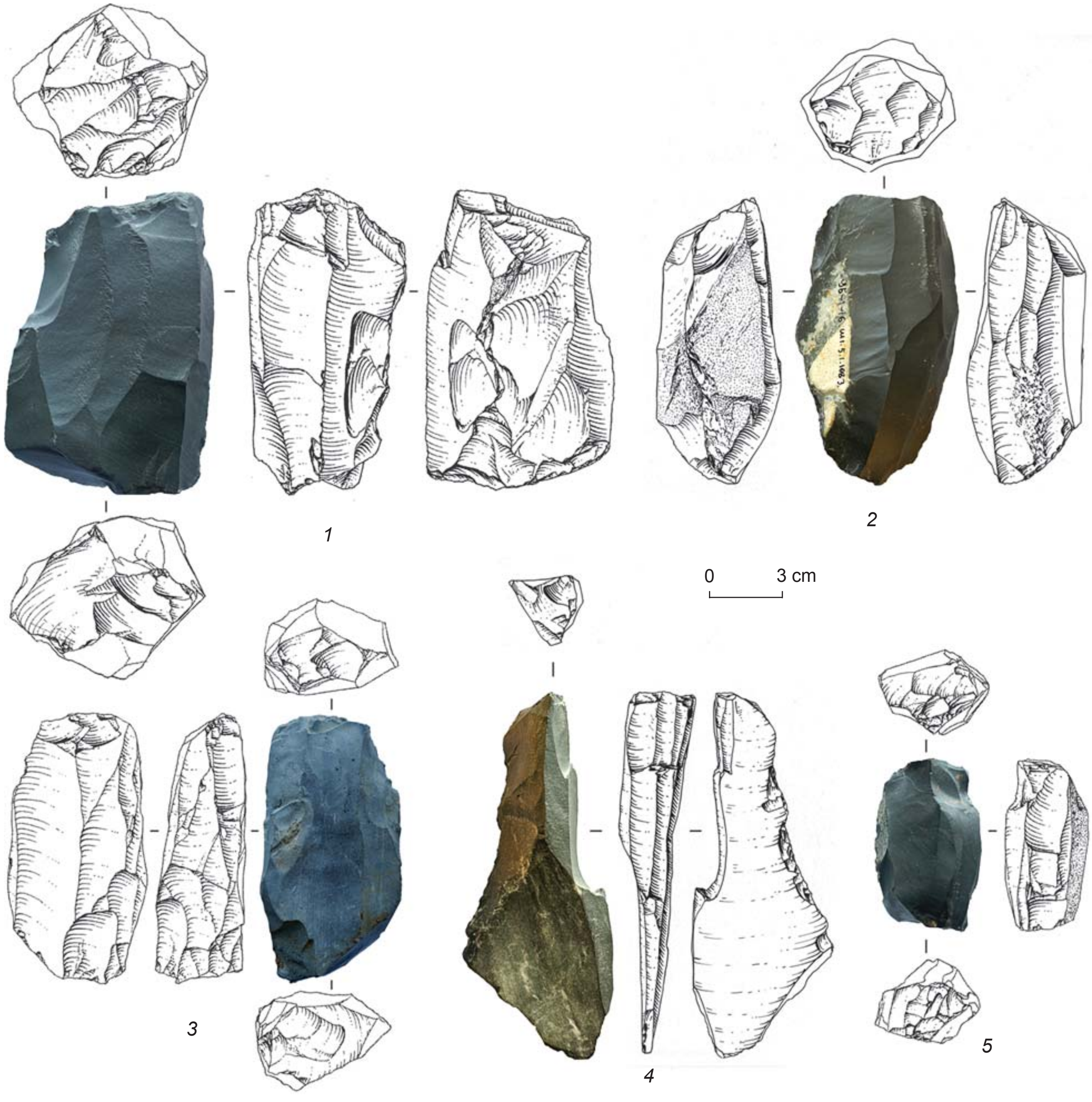


*Fig. 4*. Cores from the Ushbulak lower strata.

Initial Upper Paleolithic tools from Mongolia (Tolbor-15, horizons 5–7), similar frequencies resulted from using a hammerstone whose hardness was close to that of the raw material (Kharevich et al., 2017).

The tool kit from strata 5–7 includes 268 implements, most of them flakes exhibiting irregular or semi-irregular retouch (50 % of all tools) (see Table 3). Typologically distinct tools (133 spec.) demonstrate the developed Upper Paleolithic component (see Table 3). Endscrapers constitute the most numerous category of implements (28 %, hereinafter, percent of all typologically distinct tools). The most frequent are endscrapers on large blades (Fig. 5, *1*, *4*, *5*), including carinated endscrapers and an endscraper with a trimmed base (Fig. 5, *5*), as well as double endscrapers on narrow, medium-sized blades (Fig. 5, *7*). Intensively retouched blades (22 %) and implements with retouched notches (13 %) are common finds. Truncated and truncated-facetted implements (9 %) (Fig. 5, *2*), perforators, and large spur-like tools (9 %) also form a distinct group. Burins with transverse and angular forms are few in number. On angular burins, removal of the burin spall was prepared through retouching of the blank's longitudinal edge (Fig. 5, *10*). The assemblage also contains weakly retouched points (Fig. 5, *8*).

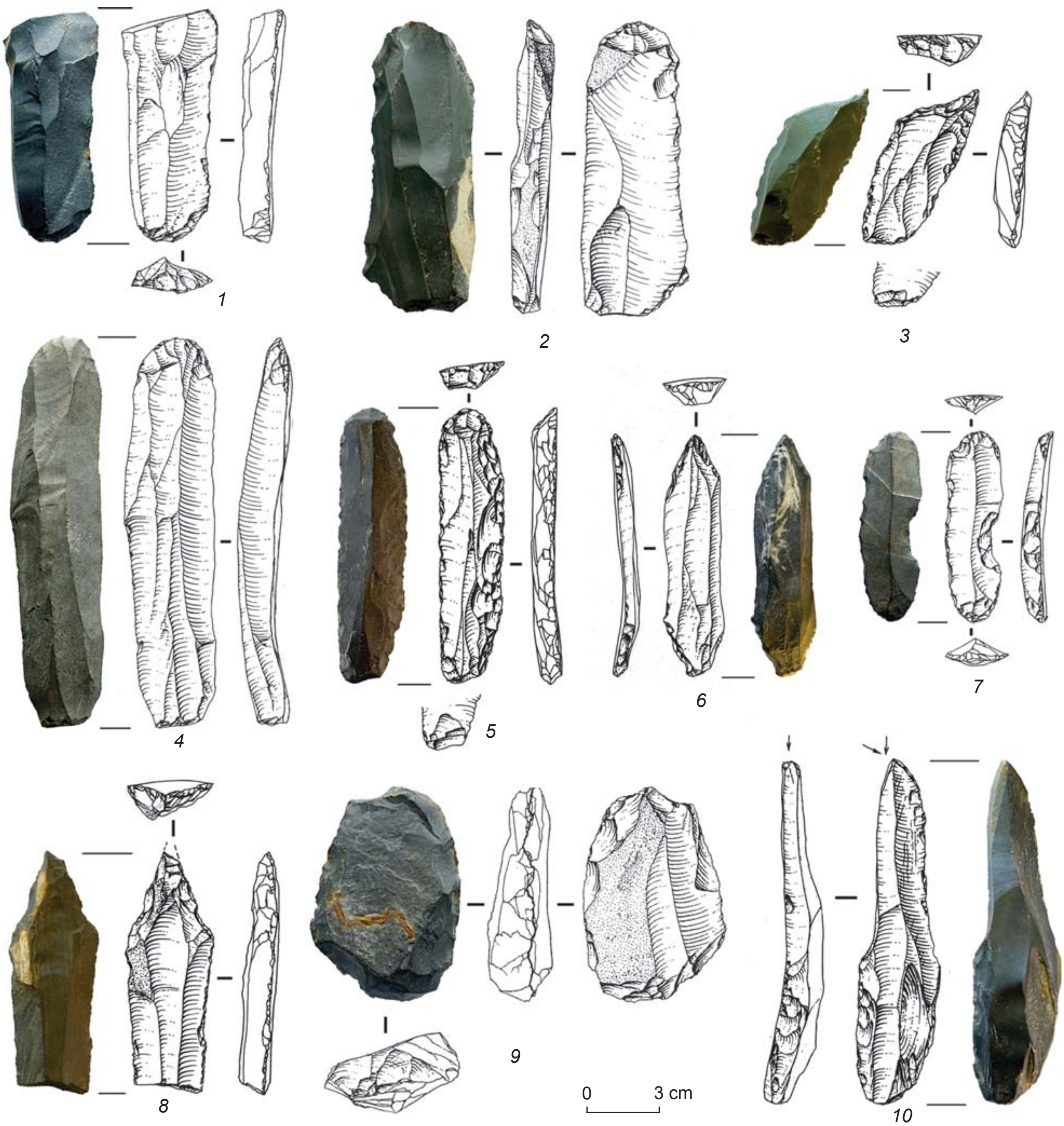


*Fig. 5*. Tools from the Ushbulak lower strata.

Sidescrapers are scarce and indistinct, and one of these demonstrates bifacial retouch (Fig. 5, *9*).

Solitary diagnostic artifacts form an important element of the tool kit. This group of tools includes one waisted blade, several implements with ventrally retouched proximal edge including a beveled, heavily retouched point (Fig. 5, *3*), an endscraper (Fig. 5, *5*), an implement with a sharp tip (Fig. 5, *6*), a stemmed endscraper, blades with ventrally retouched distal sections, and blades with distal ends blunted through retouch. The assemblage from stratum 7 contains a burin-core. Two more burin-cores were collected from the surface in close proximity to the excavated area (Fig. 4, *4*). Stratum 6 contained a small talc tablet with traces of artificial polishing in some places (Shunkov et al., 2019).

The presence of the above mentioned diagnostic tool types and characteristic features of the primary reduction process (such as the absolute predominance of double-platform blade cores for bipolar reduction; the prevalence of blades, including those whose length exceeds 20 cm;

and the wide use of pecking for preparation of flaking surface) makes it possible to correlate the lower complex with the Initial Upper Paleolithic.

Nearly all artifacts collected from the surface can probably be also attributed to this period (see Tables 1–3). Ninety-nine percent of these objects were recovered from within the stream channel. Their nearly-identical technique, tool types, and raw material link them reliably with strata 6 and 7. Additionally, analysis of geomorphological situation nearby the site has demonstrated that the Vostochny in its upper reaches is actively eroding precisely these strata.

## Discussion

Finds from the upper strata of Ushbulak are few, so their interpretation and chronological attribution must remain tentative. The assemblage from Holocene sediments of stratum 1 contains a potsherd decorated with incised horizontal lines, which likely dates to the Metal Ages. Based on the presence of microblades and bladelets, strata 2–4 most likely correlate with the late stages of the Upper Paleolithic.

Within Kazakhstan, the Final Paleolithic industries of Ushbulak have the closest parallels in the late complex of Shulbinka (Petrin, Taimagambetov, 2000) and in the upper complex of Angrensor-2 (Taimagambetov, Ozhereliev, 2009). In the Russian Altai, analogs can be found in Late Upper Paleolithic assemblages from Kaminnaya and Iskra caves, as well as from the open-air sites of Ust-Karakol, Ust-Sema, Srostki, and others (Derevianko, Petrin, Zenin et al., 2003; Markin, 2007).

Archaeological remains from the lower strata of Ushbulak are chronologically and typologically related to industries of the Initial Upper Paleolithic. In western Central Asia, the Middle to Upper Paleolithic transition is best represented by the Obi-Rakhmat sequence, which shows an evolving tradition spanning the period 80–35 ka BP (Krivoshapkin, Kuzmin, Jull, 2010; Vandenberghe et al., 2014). In these industries, primary reduction is characterized by mass production of blade blanks, including microblades. The tool kit at Obi-Rakhmat is dominated by retouched blades (including a pointed variant) and sidescrapers. Diagnostic tools include burin-cores, truncated-facetted implements, and small, heavily retouched points. Burins and endscrapers are relatively rare (Derevianko et al., 2001; Krivoshapkin, 2012).

In the Russian Altai, the formation of the Upper Paleolithic traditions began ca 50 ka BP (Derevianko, 2011; Derevianko, Shunkov, 2004). The earliest manifestation of these traditions was recorded at Denisova Cave. In strata 11.1 and 11.2 in the Eastern Gallery and in the lower portion of stratum 11 in the Central Hall dating to 50–45 ka BP (Douka et al., 2019), semi-volumetric blade cores and Levallois cores were found in association with tools bearing traces of ventral trimming on the proximal ends, beveled points, and numerous personal ornaments made of organic materials and semiprecious stones (Prirodnaya sreda…, 2003; Derevianko, Shunkov, Markin, 2014).

However, the closest parallels to the lower strata of Ushbulak are finds from horizon UP2 of Kara-Bom (44–43 ka BP) (Derevianko et al., 1998; Rybin, 2014). These materials closely match Ushbulak from all relevant criteria, from the raw material and primary reduction technique to the composition of tool kit (which includes highly diagnostic tools) (Rybin, 2014). The main distinction between these two sites is the absence of Levallois technique in Ushbulak assemblage—although some flakes from the lower portion of stratum 7 and from those recovered in surface collection demonstrate certain "Levallois"-like features. The absence of evidence of Levallois technology at Ushbulak can probably be explained by the relatively small size of the excavated area (4.5 m$^2$).

In northern Mongolia, similar industries, dating to 43–35 ka BP, belong to the southern Siberian-Mongolian variant of the Initial Upper Paleolithic (Tolbor-4 and -21, and others) (Derevianko et al., 2007; Rybin, 2014, 2015). In these assemblages, primary reduction is characterized by the prevalence of volumetric and semi-volumetric flaking, combined with sporadic use of Levallois technique. In such contexts, mass production of large blades was based on the use of subprismatic double-platform cores with single flaking surfaces and parallel flaking. Uni- and bidirectional flat and narrow-fronted cores were less important for blade creation. Upper Paleolithic implements dominate these tool kits, with endscrapers on blades being most numerous. Another important feature in Siberian-Mongolian assemblages is the presence of several diagnostic artifacts, such as burin-cores, beveled points, points with thinned bases, backed point-bladelets, implements with traces of ventral retouching on the distal edge, bifaces, stemmed tools, and personal ornaments (Rybin, 2014).

The channel for the initial eastward spread of Upper Paleolithic traditions to Mongolia and Trans-Baikal region, ca 45 ka BP, was apparently the Russian Altai (Derevianko, Shunkov, Markin, 2014; Rybin, 2014). This dissemination is believed to have followed several routes, one of which passed via the Mongolian Altai and Dzungaria, along the northern boundary of the Gobi Altai and the Great Lakes Depression to the Selenga basin (Rybin, 2014).

In the Dzungarian Basin in northwestern China, Initial Upper Paleolithic elements are known so far only from one artifact assemblage, a surface-collected assemblage from the site of Luotoshi. This material is characterized by combination of Levallois flake production and subprismatic blade technology with utilization of double-platform bipolar and narrow-fronted cores. The tool kit at Luotoshi consists of numerous retouched blades, spur-like implements, sidescrapers, endscrapers, and denticulate and notched tools. It also includes bifaces, beveled points, points with a thinned transverse edge, implements with ventrally retouched distal end, and burin-cores (Derevianko et al., 2012). Finally, this assemblage contains many radial cores, which, alongside diagnostic Middle Paleolithic forms such as sidescrapers and notched-denticulates, suggests a considerable share of Final Middle Paleolithic elements. The presence of Middle Paleolithic sites in this area is further evidenced by finds from Tongtiandong Cave, situated 200 km southeast of Luotoshi. The industry from the lower cultural horizon of the cave, AMS-dated to ca 45 ka BP, contains Levallois and radial cores, heavily retouched sidescrapers, and elongated points, including those of the Mousterian variety. This assemblage corresponds to the late stages of the Middle Paleolithic (Xinjiang…, 2018).

## Conclusions

Ushbulak, situated between the Russian Altai and Dzungaria, is a stratified Initial Upper Paleolithic site of the southern Siberian-Mongolian variant. Key sites from this period in the Altai (Denisova Cave and Kara-Bom) are situated 400–450 km north of Ushbulak, and the Chinese site of Luotoshi lies 100 km to the southeast. Other known stratified Upper Paleolithic sites in Kazakhstan, dating to 40–30 ka BP (Maibulak and Chokan Valikhanov), are located in the piedmont of the Tian Shan, 800–900 km southwest of Ushbulak. Geographically and typologically, these assemblages resemble those of Kulbulak and Shugnou, and are usually considered to belong with the Upper Paleolithic industries of western Central Asia (Taimagambetov, Ozhereliev, 2009; Ranov, Kolobova, Krivoshapkin, 2012).

The fact that Ushbulak is stratified and its lower units have yielded a rather large samples of lithics makes it the most significant Upper Paleolithic site in eastern Kazakhstan. Future excavations, detailed analysis, and interpretation of finds will allow us to reconstruct the principal trends in the evolution of the local Upper Paleolithic, to evaluate and assess its links with specific human populations, and to trace their migration routes across Kazakhstan and Central Asia.

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