

## THE PALAEOLITHIC ROCKSHELTER OF ORTVALE KLDE, IMERETI REGION, THE GEORGIAN REPUBLIC

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### Introduction

The following report presents preliminary results obtained by an interdisciplinary research team during excavations and analyses undertaken between 1973 and 1992 at the Palaeolithic rockshelter of Ortvale Klde. This research was conducted under the auspices of the Georgian Academy of Science and has provided valuable information on Late Pleistocene subsistence, land-use and settlement patterns, as well as data on climatic and environmental fluctuations in western Transcaucasia. Combined with data collected from other caves and rockshelters in the region over the last four decades, a clearer understanding of the Palaeolithic record is beginning to emerge as is an appreciation of this region's potential contributions to broader archaeological and palaeontological debates. Continued research at Ortvale Klde and other neighboring sites will allow for more refined regional observations as well as increased access to data from a geographically critical area of the Old World.

### Regional overview and history of research

The Georgian Republic borders Turkey, Armenia and Azerbaijan to the south and the Commonwealth of Independent States to the north (fig. 1). This northern border is dominated by the Caucasus mountain range which separates Georgia from the wide Russian steppes. To the west lies the Black sea while to the east semi-arid steppes extend into Azerbaijan. Georgia is divided climatically into two zones : a warm, humid zone to the west, and a drier, more continental zone to the east. The total area of the country is ca. 70, 000 km<sup>2</sup> and it provides a wide variety of geographical, environmental and topographical settings. Due to mild climatic conditions, rich floral and faunal resources, numerous rockshelters and caves, and an abundance of high quality raw materials, this region was intensively occupied during the

Pleistocene and Holocene.

Several Lower Palaeolithic cave and open-air sites have been discovered and excavated in Georgia (e.g. Kudaro I, Kudaro III, Tsona, and Dmanisi), however the frequency of Middle Palaeolithic sites in the region is much higher (>200). It appears that during the Mousterian much of Georgia was occupied, especially the Imereti region where natural caves and rockshelters containing large assemblages of lithic and faunal material attest to their intensity and duration of use. Of the five Middle Palaeolithic cultural variants recognized in Georgia (Tsopi, Djruchula-Kudaro, Tsutskhvati, Tskhinvali, and Tskaltsitela) all but the Tsopi variant are found in this particular region (Tushabramishvili 1978 and 1984; Liubin 1977; Nioradze 1994). The focus of this paper is the stratified rockshelter of Ortvale Klde, located in western Georgia (Chiatura province), and its Middle and Upper Palaeolithic assemblages.

Ortvale Klde ("Two Eyes Rockshelter") is located outside the town of Chiatura, on the west bank of the Cherula River, approximately 35 meters above the channel (530m a.s.l.) (fig. 1). This river flows into the Kvirila which in turn empties into the Black Sea via the Rioni River. The site was first investigated in 1973 by the late Dr. David Tushabramishvili, with subsequent excavations being led by the senior author. It is a karstic rockshelter of Cretaceous origin and is comprised of two chambers opening to the east (~300m<sup>2</sup>) (fig. 2). The northern chamber is approximately 35 meters long, 14.5 meters deep and has a maximum height of 7 meters. Aside from two small 4x2 meter test excavations, this portion of the site remains largely unexplored. The southern chamber, which is much smaller, has received considerable attention, with over 40m<sup>2</sup> having been excavated within the shelter and on the slope (fig. 3). The majority of the following observations are derived from this portion of the rockshelter. A

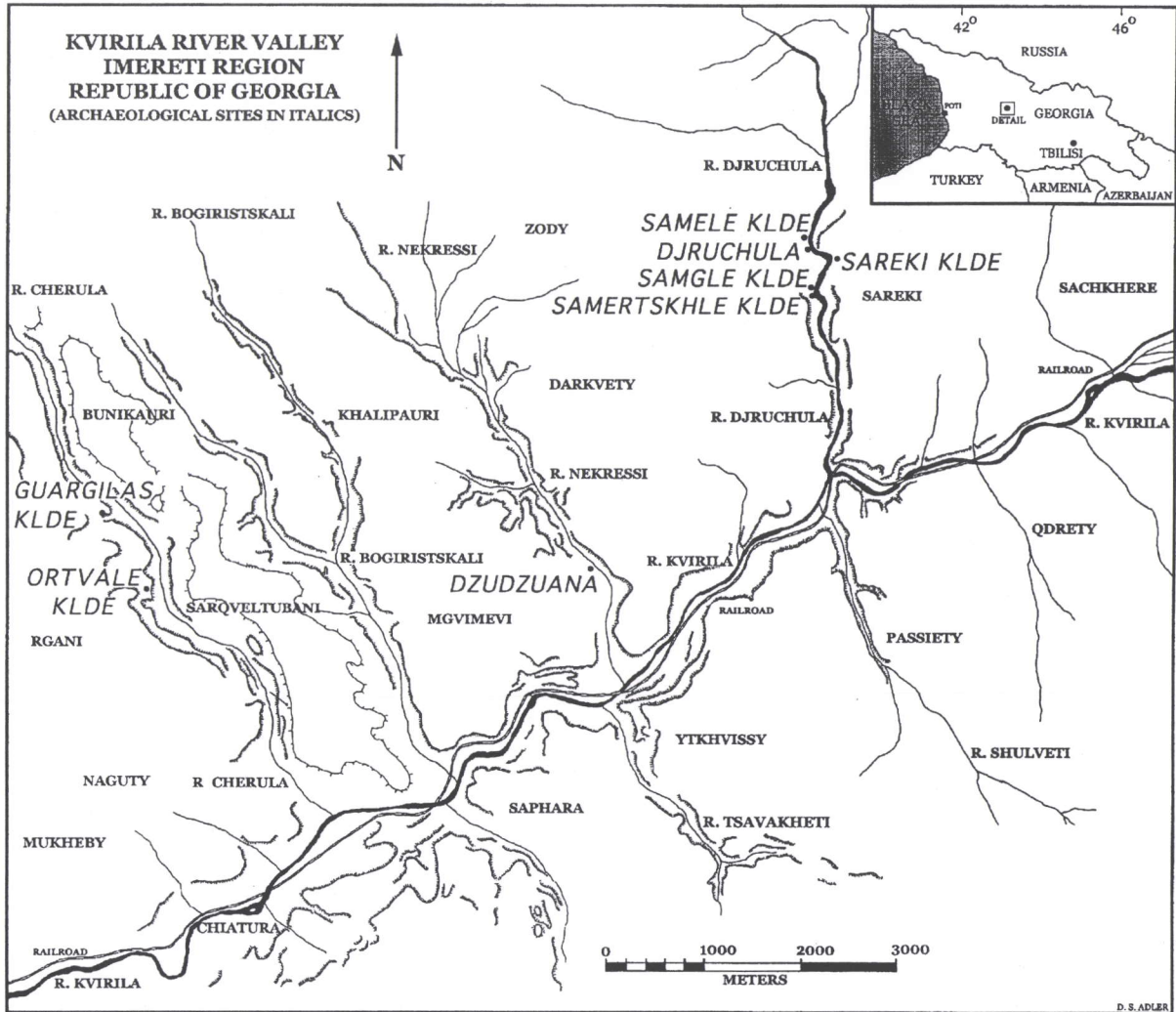


Figure 1. The Georgian Republic with detail of the Kvirila River Valley.

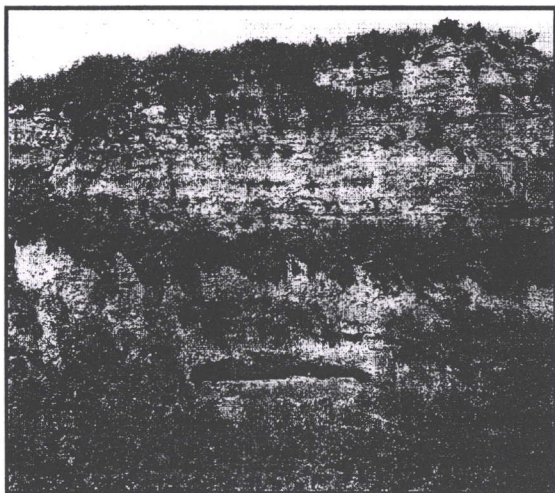


Figure 2. Western view of the Cherula River Valley with Ortvale Klde in the foreground and the village of Rgani above, to the right.

joint Georgian-American-Israeli research team began a reinvestigation of the site in 1997 and plans to continue excavations here and at other sites in the region for several more years.

### Stratigraphy and environment

Excavations in the southern chamber revealed a series of 11 lithostratigraphic layers of which two were assigned to the Upper Palaeolithic and seven to the Middle Palaeolithic (fig. 4, table 1). These horizons are rich in both lithic and faunal remains, and human remains were discovered in the 5th Middle Palaeolithic horizon. The following is a brief description of the layers and their contents.

### Palynology

Palynological analyses have revealed important data on past climatic conditions in the Chiatura region during the times Ortvale Klde was occupied. This study has identified four pollen

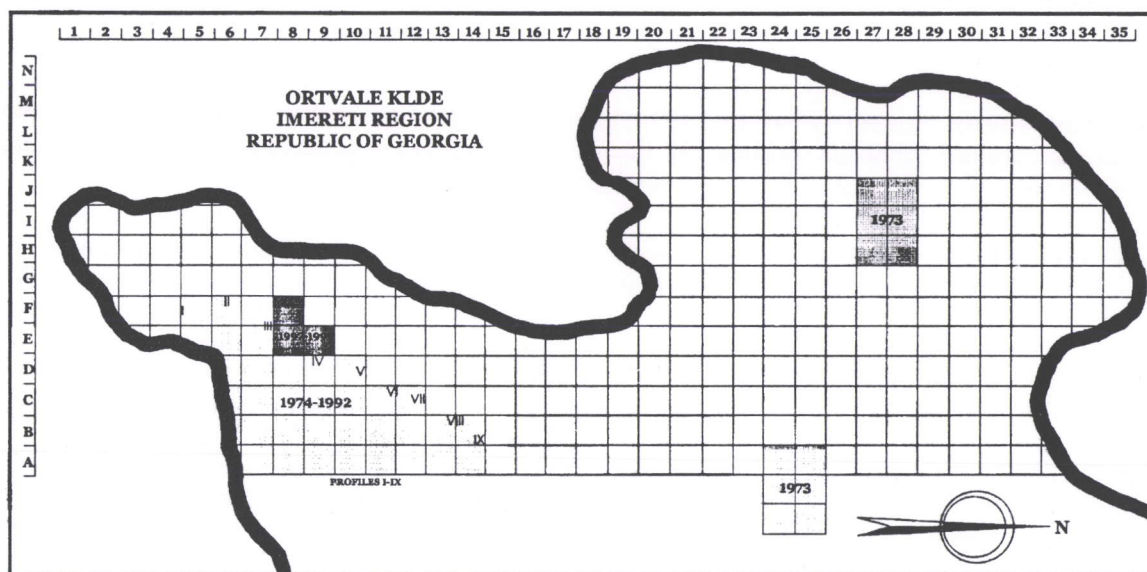


Figure 3. Site plan indicating documented sections and seasons and areas of excavation.

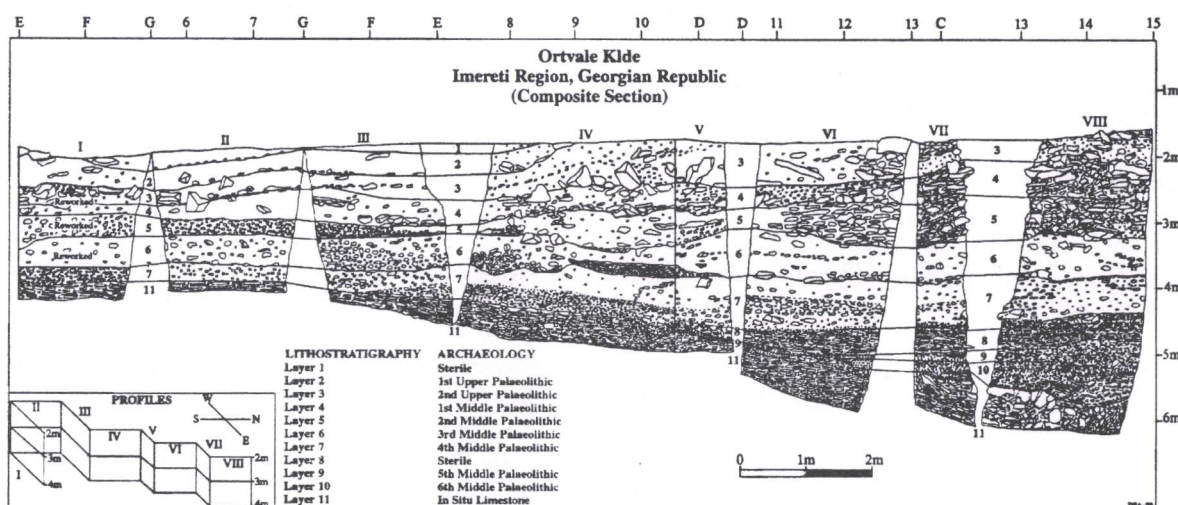


Figure 4. Composite section from the southern chamber. Sub-layers not indicated.

zones which indicate several shifts in climate and vegetation (table 2).

This study indicates that during the earliest phases of occupation (Layers XI-VIII) the region surrounding Ortvale Klde was dominated by coniferous forests with average temperatures below those of today. Layers VII and VI document the gradual shift towards more thermophilic species with the occasional, temporary return of more cold adapted species (e.g. *Betula*). A reemergence of coniferous species during the occupation of Layers V-III marks a cooling of the climate and a lowering of the vegetational belt.

Finally, the upper most zone, represented by Layer II, contains a spectrum very similar to that observed in a surface sample. Because only one sample from Layer II was analyzed, it is assumed that the observed similarity between spectra is the result of mixing.

These observations suggest a correlation with the main part of the last glaciation, possibly beginning at oxygen isotope stage 4 (ca. 75-64 ka). During the initial cold phase there was a vertical shift in the vegetational belt caused by the reglaciation of the Great Caucasus to the north. This shift has been documented at several sites in Georgia, with

the total magnitude of the shift varying according to site elevation (e.g. 800-1000m at Ortvale Klde Layer VII; 1400m at Kudaro I Layer 4; 1200-1500m at Kepchinskia Cave Layer 3) (Levkovskaya 1980; Liubin 1980 and 1989; Lordkipanidze 1992). Although the age of this cold phase has not been established at Ortvale Klde, a date from Layer 3a at Kudaro I suggests an age in excess of 44,150 years and a U/Th reading from Layer 4 at Kudaro I indicates an age of 60,000 years (Liubin 1989).

A warming period followed as indicated by a rise in the sub-clayish material in Ortvale Klde. The vegetational belts migrate upslope to a position similar to that of today. This change is represented in Layers VII-VI, with *Quercus* and *Caprinus betulus* being the most typical arboreal elements. There also appears to have been short-lived temperature inversions, which help to explain the introduction of *Betula* into the lower altitudes. This period corresponds with the accumulation of Layer 3 in Kudaro I. The final vegetational shift recorded at Ortvale Klde is found in Layers V-III, as evidenced by the expansion of boxwood, and signals another cooling event and a lowering of the vegetational belt (200-400m).

#### Faunal remains

The faunal remains excavated over the many years of work at Ortvale Klde have been classified by A. Vekua. Of the 19,372 specimens recovered between 1973 and 1992, 2,404 (12.4%) specimens have been identified to 11 species. In general the faunal composition does not change drastically from layer to layer.

As Table 3 demonstrates the bones of *Capra caucasica*, *Bison priscus*, and *Cervus elaphus* appear in all of the layers. *Capra caucasica* is the most common taxon, representing 85% of the total identified sample. Second in frequency are the remains of *Bison priscus*, comprising 10% of the identified specimens, followed by remains of carnivores (3%). Remains of *Ursus spelaeus*, *Ursus arctos*, *Canis lupus*, *Vulpes vulpes*, *Cervus elaphus*, *Bos primigenius*, *Sus scrofa* and *Capreolus capreolus* were also recovered but in very small numbers.

The Rodentia were studied by C. Buachitze, with some later additions made by A. Markova. In general, the taxa listed below document the presence of coniferous forests (high altitude, sub-Alpine habitats) and broad-leaf forests. A study of the microfauna recovered since 1997, now being conducted by A. Muskhelishvili, will augment the

following list compiled by previous researchers: *Microtus nivalis*, *Microtus arvalis*, *Microtus agrestis*, *Apodemus silvaticus*, *Apodemus mystacinus*, *Mesocricetus* sp., *Prometheomys schaposchnikovi*, *Arvicola terrestris*, *Clethrionomys glareolus*, *Pitymys majori* Thom, *Chionomys gud* Sat.

Identifying climatic changes in Transcaucasia with the help of faunal data is problematic. In this region the climatic changes were not equal in magnitude to those recorded in more northern latitudes. This being the case, there were no great changes in the composition of the faunal assemblages from Ortvale Klde. The remains of large mammals can at best serve as general environmental indicators. While more information can be obtained by studying the rodents, the rather small sample size obtained thus far from western Transcaucasia does not permit a detailed palaeoclimatic or palaeogeographic reconstruction.

The animal species recovered from Ortvale Klde indicate a variety of landscapes in the Chiatura region. Mountain goat, and several species of Rodentia (e.g. *Prometheomys* and *Chionomys*) point to high altitude, sub-Alpine habitats. The wood mouse, roe and red deer, wolf and fox, and boar all indicate forest biotypes, while *Bison priscus* was well adapted to both forest as well as open habitats. Taken as a whole the faunal assemblage, like the rodents from Ortvale Klde is of a forest-mountainous character.

Several patterns within the identified portion of the faunal assemblage are of particular interest. The percentage of the carnivore specimens identified at Ortvale Klde is only 3%, the lowest percentage known so far from any Middle Palaeolithic site in the Caucasus where carnivores usually outnumber herbivores (Vekua 1991). This discrepancy has been interpreted by some researchers as an indicator of different hunting practices (Vekua *ibid.*) but most likely represents alternating patterns of site use by humans and carnivores (e.g. *Ursus spelaeus*).

The dominance of mountain goat at Ortvale Klde is also significant. This species had a very wide distribution during the middle and late Pleistocene (Vereshchagin & Baryshnikov 1980) but is poorly represented at Middle Palaeolithic sites in the Caucasus (Hoffecker *et al.* 1991; Baryshnikov & Hoffecker 1994; Baryshnikov *et al.* 1996). As at Ortvale Klde, Upper Palaeolithic deposits at neighboring sites such as Dzudzuan, Okumi and Gvardzilas Klde contain rich assemblages of mountain goat (Vereshchagin 1959; Bendukidze

1978), but thus far Ortvale Klde is the first and only Middle Palaeolithic site in the Caucasus with large amounts of this species. Barakaevskaja Cave, located several hundred kilometers to the west in Goubs Canyon (Northern Caucasus), contains a faunal assemblage with one of the highest percentages of *Capra* (28.2%) (Liubin 1998). The dominance of *Capra* has been observed at Mousterian site in Spain (e.g. Zafarraya and Akclor) (Altuna 1989; Straus 1986 and 1992; Barrozo-Ruiz & Hublin 1994) and southern France (e.g. Hortus and Crousade) (DeLumley 1972; Gerber 1972).

In sum, the faunal assemblage from Ortvale Klde is clearly dominated by mountain goat, a species that occupied this part of Transcaucasia during the various climatic fluctuations evident from the pollen record. Although other species of herbivores and ungulates are present in the assemblage, their frequencies never approach that of mountain goat (85%). Carnivores, the group which dominates other Middle Palaeolithic assemblages in Transcaucasia, are even more poorly represented. Together these observations suggest that the occupants of Ortvale Klde engaged in hunting practices focused primarily on the procurement of mountain goat, apparently to the exclusion of other prey species.

### Palaeoanthropology

In the 5th Middle Palaeolithic layer, at a depth of 4 meters, a 2nd lower left molar of a hominine was recovered. This find has been studied and described in detail elsewhere (Gabunia & Vekua 1991). The molar is very worn but is quite well preserved, with only slight damage to the lingual side of the crown. The dimensions of the tooth are rather large (mesio-distal = 12.1 mm, bucco-lingual = 11.1 mm, weight = 134.3g). Although the occlusal surface is heavily worn, 4 cuspids can be distinguished (protoconid, metaconid, hypoconid and entoconid). The roots are massive, flattened mesio-distally, and exhibit features consistent with taurodontism. This tooth is quite similar morphologically to material recovered from the Sakajia Cave where Gabunia has attributed the remains to a Neanderthal. (Gabunia *et. al.* 1978; Gabunia & Vekua 1991).

### Raw material procurement and exploitation

During both the Middle and Upper Palaeolithic of Ortvale Klde the raw material of choice was a high-quality Cenomanian-Turonian flint located near the site (e.g. the villages of Rgani, Chilovanni, Katskhi, Chanchaxi Mountain) (fig.

1). On rare occasions silicified chalk, basalt and andesite were also utilized. These materials are immediately available in the gravels of the Cherala river which drains the Racha Range where primary sources of these materials are located in deposits of Middle Jurassic age (Favre 1876; Tvalcherlidze pers. com. 1992).

Besides flint and the volcanic materials mentioned above, obsidian artifacts are also present at the site. The closest source of this material is the Javakheti region located approximately 100 km to the southeast. This material was transported to Ortvale Klde by migrating people or through well-established exchange networks. In the Middle Palaeolithic layers the vast majority of the obsidian items appear as retouched artifacts, while in the Upper Palaeolithic layers cores, debitage and tools are common among the finds. This observation suggests that the *in situ* reduction of obsidian cores and tool production took place during the Upper Palaeolithic at Ortvale Klde. Such a pattern differs markedly from that observed in the Middle Palaeolithic layers where the few obsidian finds appear only in the form of small-retouched pieces, pointing to exchange, transport, or curation.

### The lithic assemblages

Nine Palaeolithic layers were identified in Ortvale Klde (fig. 4) and lithic artifacts were recovered from all of these. Although each Middle Palaeolithic horizon differs slightly from the others, they can all be characterized as Typical Mousterian enriched with Charentian elements (i.e., non-Levallois, non-faceted, and non-laminar) (Tushabramishvili 1994) (table 4, fig. 5). Study of the lithic material was conducted using the methodologies outlined by Bordes (1961). This study produced the following observations.

#### Layers XI and X (7th and 6th Middle Palaeolithic)

In Layer XI 35 artifacts were excavated, but due to the small size of this sample no conclusions concerning typology or technology can be forwarded. The assemblage from Layer X contains 2865 artifacts, 140 of which are cores. The majority of these are heavily reduced discoidal cores, with approximately half exhibiting single platforms and the other half multiple platforms. Approximately 1852 pieces of debitage were also recovered.

Technologically, the assemblage from Layer X is decidedly non-Levallois and represents a Typical Mousterian industry enriched with Charentian elements (fig. 6). Of the 412 tools recovered and

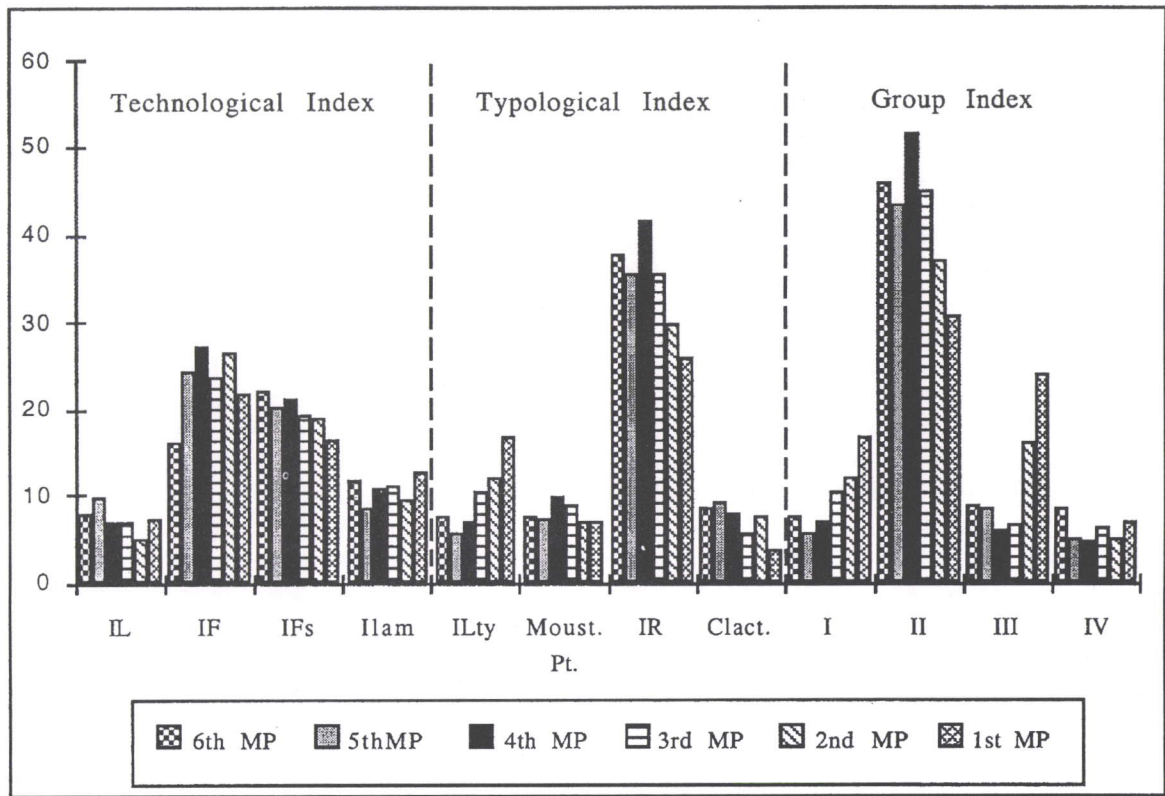


Figure 5. Recorded lithic indices. Reference this figure with table 4.

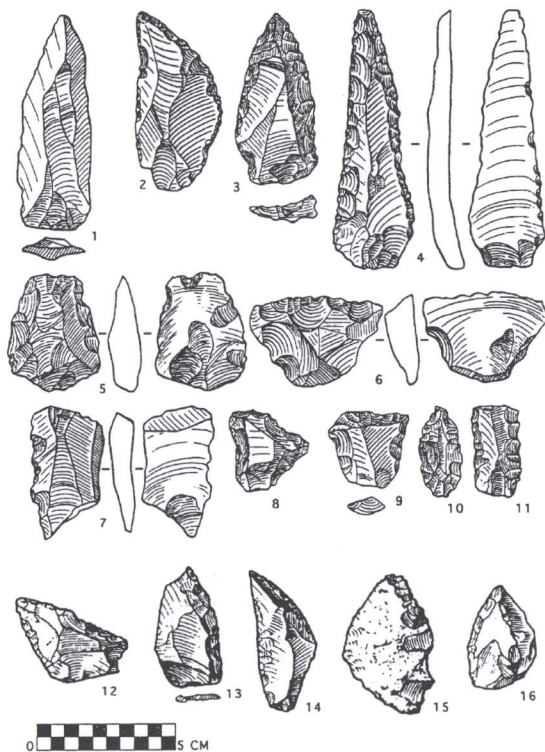


Figure 6. Artifacts from the 6<sup>th</sup> Middle Palaeolithic (1-11) and the 5<sup>th</sup> Middle Palaeolithic (12-16).

classified, 135 are broken, with 52 of these exhibiting intentional breakage patterns (longitudinal and transversal). In this respect the industry is similar to those from Erivan, Erlaburg and Voronzov (Liubin 1989). These breakage patterns as well as the resharpening and recycling of tools are believed to reflect prolonged or repeated occupation of the site (Liubin *ibid.*). This lithic assemblage is quite similar to those recovered from the other Middle Palaeolithic layers at the site.

#### Layer IX (5th Middle Palaeolithic)

Approximately 9030 artifacts were excavated from Layer IX. While the industry from this layer resembles closely that described for Layer X, there are some additions (fig. 6). In particular the presence of scrapers with thinned backs (n=10), ventral retouch (n=3) and alternate retouch (n=6), bifacial scrapers (n=4), a Tayacian point, disks (n=5); a chopping tool and small bifaces (n=4) are noteworthy. Small bifaces similar to those described here have also been found at Tsopi (Grigolia 1963) as well as at the sites ascribed to the Tskhinvali group (Liubin 1977).

Layer VII (4th Middle Palaeolithic)

The 4th Middle Palaeolithic layer contains 8875 items and again is similar to the industry described in Layer X (fig. 7). Interestingly, several small points have been recovered that exhibit a form of basal modification similar to that found on Emireh points. Other items of interest in this industry are semi-Quina scrapers (n=6), shouldered items (n=2), a chopper, Upper Palaeolithic scrapers (n=2), and Levallois points modified by inverse retouch (n=2). Since shouldered items are typical of the Aterian culture it is worth noting that a few specimens have been recovered in Georgia (e.g. Monachenskaya and Bronze Cave) (Liubin 1977; Tushabramishvili 1978).

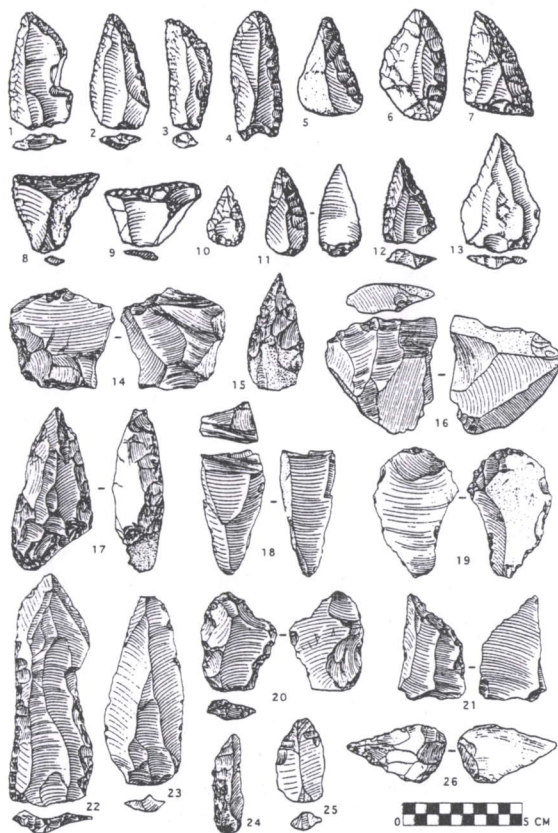


Figure 7. Artifacts from the 4<sup>th</sup> Middle Palaeolithic (1-13) and the 3<sup>rd</sup> Middle Palaeolithic (14-26).

Layer VI (3rd Middle Palaeolithic)

The 3rd Middle Palaeolithic layer produced 5081 artifacts that represent a Typical Mousterian Industry (fig. 7). Among the tools there are tranchants (n=3), a Quina scraper, a bifacial scraper, and double scrapers with sharp, unretouched distal edges. This last artifact type is well-documented in the Mousterian inventories of Taglarski, Monachenski, Tsopi, Kudaro I, and Djruchula in particular (Liubin 1977).

Layer V (2nd Middle Palaeolithic)

The 2nd Mousterian layer contains 4389 artifacts (fig. 8). Among the tools there are numerous scrapers, and one Tyacian point. Within this layer there is a marked increase in the Group III index and a decline in the Group II index. The Charentian index, as well as the numbers of déjeté, transverse and convergent scrapers also drops.

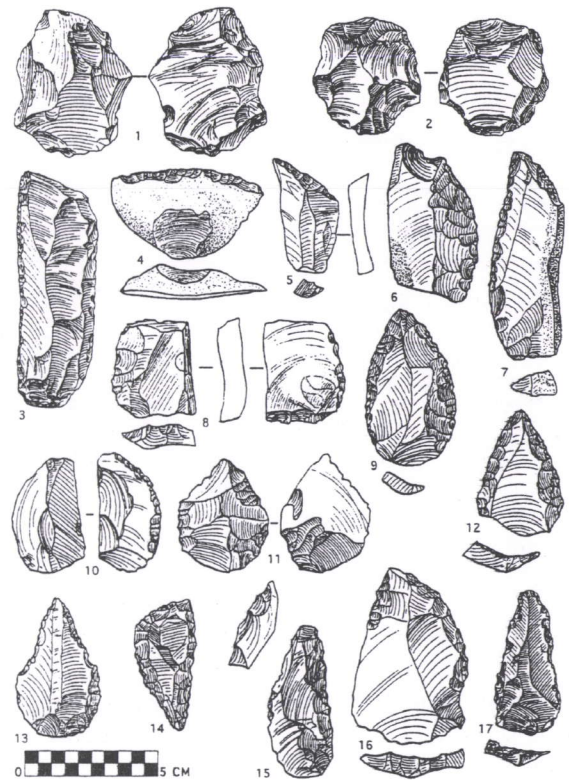


Figure 8. Artifacts from the 2<sup>nd</sup> Middle Palaeolithic (1-17).

Layer IV (1st Middle Palaeolithic)

The 1st Middle Palaeolithic layer produced 789 artifacts (fig. 9). Of the 12 cores recovered, 9 exhibit two striking platforms and 1 is a discoid. The industry is non-Levallois with numerous blades and, unlike the previous layers, no ventral or bifacial retouch was observed. One Emireh point, a unique find in Georgia, was recovered as were end scrapers and burins. Once again the Group III index rises sharply at the expense of Group II. The majority of the tools, including the Upper Palaeolithic varieties, were produced on Mousterian blanks.

Layers III and II (2nd and 1st Upper Palaeolithic)

The assemblages from the two Upper Palaeolithic layers in Ortvale Klde contain 1284 artifacts (fig. 10 & 11). Many of these are Middle Palaeolithic forms (e.g. scrapers, Mousterian points, knives, denticulates, notches and burins). There are also

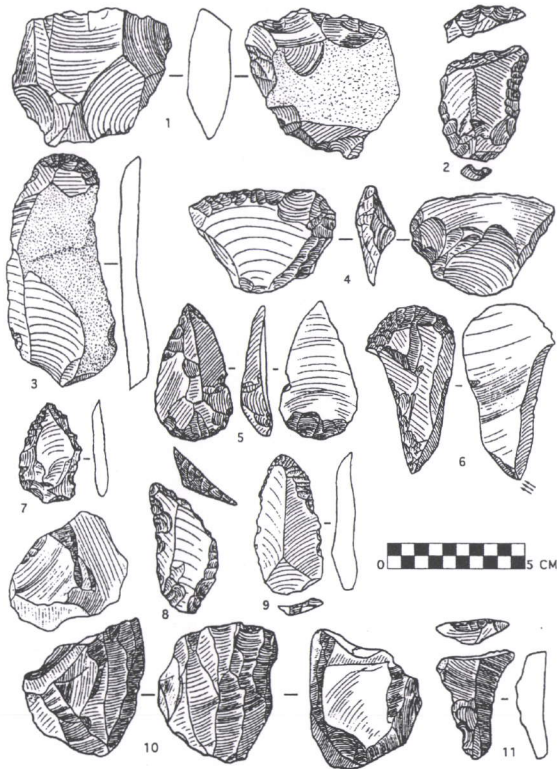


Figure 9. Artifacts from the 1<sup>st</sup> Middle Palaeolithic (1-11).

Upper Palaeolithic artifacts shaped on Mousterian blanks as well as Mousterian tools prepared on what we consider Upper Palaeolithic blanks (i.e., side scrapers and Mousterian points). Many of the former are typologically and morphologically similar to early Aurignacian types such as oval, rounded side and endscrapers, busque burins, dihedral and polyhedral nucleiform burins, and Dufour bladelets. A bone point was also recovered. Thus this assemblage appears to exhibit both Middle and Upper Palaeolithic characteristics. No Châtelpéronian points or Gravettian points were recovered. There are no geometric microliths in Ortvale Klde, which in the Caucasus do not become common until the middle part of the Upper Palaeolithic (Bader 1965).

Regional Interpretation of Mousterian Layers

Apart from several unique features, Ortvale Klde exhibits similarities with the other five local Mousterian variants. The presence of Charentian elements in many of the layers link Ortvale Klde with the Tsopi variant, while certain Levalloisian elements suggest an association with the Djrichula-Kudaro group and the sites of the Tskaltsitela Valley. The Typical Mousterian industries documented in most layers are similar to those described at the Tsutskhvati sites (Tushabramishvili 1978), while certain typological

elements (e.g. side scrapers and denticulates) as well as the existence of intentional fragmentation point to links with the Tskhinvali group.

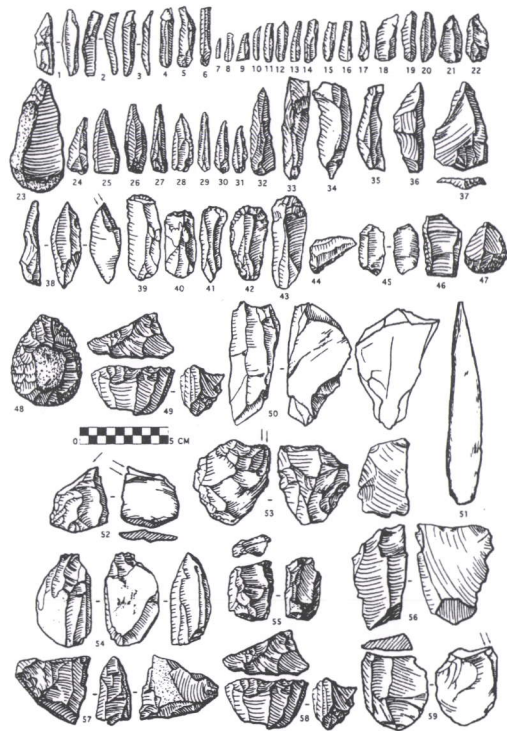


Figure 10. Artifacts from the 2<sup>nd</sup> Upper Palaeolithic (1-59).

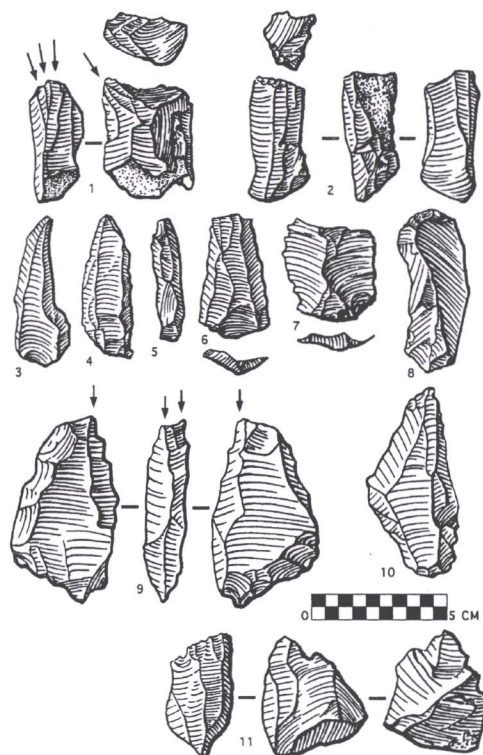


Figure 11. Artifacts from the 1<sup>st</sup> Upper Palaeolithic (1-11).

The Ortvale Klde assemblage is also similar to assemblages from neighboring regions in Transcaucasia. The Armenian sites of Yerivan Cave, Voronzov Cave and Yerlabur also exhibit a high percentage of intentional fragmentation. Yerivan and Taglar Caves also contain small limaces. Like Ortvale Klde, Taglar, Voronzov and Monachenski Caves contain double side scrapers with sharp distal edges and points with thinned butts (Liubin 1977 and 1989).

The high percentage of convergent scrapers typical of most Mousterian layers at Ortvale Klde mirrors the pattern identified among sites in the Zagros (e.g. Kunji Cave, Warwasi and Karain Cave) (Korobkov 1966; Dibble 1993; Dibble & Holdaway 1990 and 1993; Baumler & Speth 1993; Yalçinkaya *et al.* 1992). The presence at Ortvale Klde of features such as a non-Levalloisian technique, discoidal cores, Mousterian points and scrapers (mainly convex ones), single limaces, end-scrapers, burins, and numerous knives with natural backs link this site with Anatolian sites (Ranov & Davis 1979).

The fact that the Ortvale Klde industry presents a mixture of characteristics attributed to the various Mousterian groups recognized in Georgia suggests a hybrid nature. This is partly because of adaptation to changing local conditions as well as outside cultural influences. The latter could be explained partly by diffusion, small scale migrations, or convergence. We believe that the specific lithic characteristics attributed to the various regions and local cultural groups are indicators of such small scale migrations. This is supported by the presence of obsidian in Ortvale Klde. Perhaps Ortvale Klde occupied a migration route often traversed by Mousterian humans.

It is possible that the 1st Middle Palaeolithic layer indeed represents a "transitional layer". This is supported by the fact that, although there is a high percentage of Upper Palaeolithic tool types, there remains a high percentage of Middle Palaeolithic elements (e.g. secondary modification common to the Typical Mousterian, scalar retouch, and nearly equal numbers of Upper and Middle Palaeolithic tools). These data suggest that, as in the Near East, the transition from the Middle to Upper Palaeolithic at Ortvale Klde occurred gradually, with the slow replacement of items produced using Mousterian methods by Upper Palaeolithic technologies (Marks 1983 and 1987).

## Conclusions

The rockshelter of Ortvale Klde contains nine

archaeological layers that document the intensive use of the site by Middle and Upper Palaeolithic groups within a sub-Alpine, mountainous region. Palynological, mineralogical, and micromammalian data point to an initial occupation beginning with the main part of the last glaciation (ca. OIS 4, 75-64 ka). These data also record three palaeoenvironmental shifts in and around the Chiatura region that are linked closely to the expansion and retraction of glaciers in the Great Caucasus to the north. Pleistocene climatic changes seem to have been less dramatic here than in more northern latitudes of Eurasia. This pattern allowed the maintenance of many floral and faunal communities familiar to hominines throughout much of this period. This observation appears to be supported by the archaeology where lithic data demonstrate clear similarities in material culture between the different occupants of Ortvale Klde and those groups occupying neighboring sites and regions. Perhaps most intriguing are the zooarchaeological data which illustrate the intensive exploitation of *Capra caucasica* in all layers (85% of identified sample), and the rare occurrence of carnivore remains in the faunal assemblage. This pattern of faunal exploitation and site use has yet to be documented elsewhere in Transcaucasia. Finally, analyses of the lithic assemblages conducted by the senior author suggest the *in situ* transition from the Middle to the Upper Palaeolithic. It is hoped that the current Georgian-American-Israeli research project will help identify these and other behavioral patterns at Ortvale Klde and place these observations within a firm chronometric framework.

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Lithostrat.	Archaeology	Description
Layer XI	7th Middle Palaeolithic	<i>In situ</i> , weathered limestone with very little material filling fissures and sharp contacts. Average thickness 25 cm.
Layer X	6th Middle Palaeolithic	Limestone debris with sharp contacts and little material filling fissures. Average thickness 25 cm.
Layer IX	5th Middle Palaeolithic	Cemented limestone debris with sharp contacts and little material filling fissures. Average thickness 25 cm.
Layer VIII	Sterile	<i>In situ</i> , angular limestone blocks with very little material filling fissures. Average thickness 40 cm.
Layer VII	4th Middle Palaeolithic	Dark gray clay/humus with some limestone inclusions (1-10 cm). With sub-layer. Average thickness 41 cm.
Layer VI	3rd Middle Palaeolithic	Dark gray clay with some limestone inclusions (1-15 cm). With sub-layer. Average thickness 25 cm.
Layer V	2nd Middle Palaeolithic	Brown clay with numerous angular limestone inclusions 5-10 cm in size. Average thickness 75 cm.
Layer IV	1st Middle Palaeolithic	Dark brown, compact clay with numerous limestone inclusions of various size (0.5- 50 cm). Cemented carbonate material comprises 30-40% of the total volume. Average thickness 21 cm.
Layer III	2nd Upper Palaeolithic	Yellowish clay with angular limestone inclusions as large as 30 cm and cemented carbonate aggregates. Average thickness 35-40 cm.
Layer II	1st Upper Palaeolithic	Loose, yellowish clay with a moderate number of limestone inclusions (5-6 cm) and occasional limestone blocks measuring 60-80 cm. The sediment is composed of cemented carbonate aggregates (60-65% of total volume) in which are imbedded sporadic gray lenses 3-5 cm thick. Average thickness 55 cm.
Layer I	Sterile	Upper most humic level. Completely removed.

Table 1. Stratigraphic sequence recorded at Ortvale Klde. Please reference this table with figure 4.

Zone	Layers	Characteristics	Environment
A	XI-VIII	Dominated by arboreal elements such as <i>Abies</i> , <i>Picea</i> and <i>Betula</i> , with much lower percentages of <i>Pinus</i> , <i>Corylus</i> and <i>Tilia</i> . Non-arboreal species including <i>Cichoriaceae</i> , <i>Asteraceae</i> , <i>Polygonaceae</i> , <i>Gramineae</i> , <i>Caryophyllaceae</i> , <i>Cruciferae</i> and <i>Lilaceae</i> are present in very small amounts.	Dark Coniferous forest composed primarily of yew and spruces. The presence of <i>Populus beroza</i> in Layer 8 indicates the site's proximity to the sub-Alpine belt which occupies a position 800-1000m lower than today. Average temperatures were lower than today but precipitation was similar.
B	VII-VI	Arboreal and non-arboreal species are evenly represented. <i>Quercus</i> , <i>Corylus</i> and <i>Caprinus betulus</i> are the dominant arboreal species, with lesser amounts of <i>Caprinus orientalis</i> , <i>Alnus</i> , <i>Ulmus</i> and <i>Ostrya</i> . Percentages of <i>Betula</i> drop sharply. Non-arboreal species include <i>Apiaceae</i> , <i>Fabaceae</i> and <i>Plantaginaceae</i>	Gradual replacement of coniferous species by broad-leaved, more thermophilic species resulting at times in a mixed forest. Climatic amelioration with periods of inversion (i.e., <i>Betula</i> ) characterize this period and the vegetational belt moved upwards.
C	V-III	<i>Fagus</i> , <i>Betula</i> , <i>Corylus</i> , <i>Dryopteris phegopteris</i> , and <i>Dryopteris pumila</i> .	Broad-leaved species continue to dominate but coniferous species increase due to a cooling of the climate and the lowering of the vegetational belt.
D	II	Dominant arboreal species are <i>Corylus</i> , <i>Alnus</i> , and <i>Pinus</i> . <i>Cichoriaceae</i> is the most common non-arboreal species. <i>Polypodium serintum</i> .	Mixture of old and modern pollen.

Table 2. Vegetational and climatic data from Ortvale Klde.

Species (common name)	XI	X	IX	VII	VI	V	IV	III	II
<i>Capra caucasica</i> (mountain goat)	x	x	x	x	x	x	x	x	x
<i>Capreolus capreolus</i> (roe deer)					x	x	x	x	
<i>Cervus elaphus</i> (red deer)	x	x	x	x	x	x	x	x	x
<i>Bison priscus</i> (bison)	x	x	x	x	x	x	x	x	x
<i>Bos primigenius</i> (aurochs)					x		x		
<i>Sus scrofa</i> (wild boar)		x			x	x			
<i>Ursus spelaeus</i> (cave bear)	x		x	x	x	x	x		
<i>Ursus arctos</i> (brown bear)								x	x
<i>Canis lupus</i> (wolf)								x	
<i>Vulpes vulpes</i> (fox)						x		x	
<i>Lepus</i> sp. (hare)					x				x

Table 3. Fauna identified at Ortvale Klde.

ORTVALE KLDE LITHIC INDICES	7th MP (n=35)	6th MP (n=2865)	5th MP (n=9034)	4th MP (n=8875)	3rd MP (n=5081)	2nd MP (n=4389)	1st MP (n=789)
<b>TECHNOLOGICAL INDEX</b>							
LEVALLOIS (IL)	-	7.8	9.8	7.0	7.1	5.0	7.4
FACETING (IF)	-	16.2	24.5	27.3	23.8	26.7	21.9
STRICT FACETING (IFs)	-	22.1	20.3	21.3	19.4	19.0	16.5
BLADE (Ilam)	-	11.6	8.6	10.7	11.0	9.4	12.7
<b>TYPOLOGICAL INDEX</b>							
TYPOLOGICAL LEVALLOIS (ILty)	-	7.7	5.7	6.9	10.3	11.9	16.9
MOUSTERIAN POINT	-	7.5	7.4	9.9	8.9	7.1	7.0
SCRAPER (IR) (DEJETE)	-	37.8 (3.8)	35.6 (15.8)	41.6 (4.7)	35.6 (4.7)	29.8 (2.9)	25.9 (2.8)
CLACTONIAN	-	8.5	9.2	8.0	5.7	7.6	3.9
<b>GROUP INDEX</b>							
GROUP I (Levallois)	-	7.7	5.7	6.9	10.3	11.9	16.9
GROUP II (Mousterian)	-	45.8	43.3	51.6	44.9	37.1	30.8
GROUP III (Upper Palaeolithic)	-	8.9	8.5	5.9	6.6	16.1	23.9
GROUP IV (Denticulate)	-	8.4	5.0	4.9	6.2	5.1	7.0

Table 4. Recorded lithic indices. Please reference this table with figure 5.

