

# *Le Sungirien*

Saint-Pétersbourg 2016

# *КУЛТУРА СУНГИРЬЯ*

Санкт-Петербург 2016

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## Preface

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The complex problems of the cultural developments of the Early Upper Paleolithic in Europe connected with the dispersal of the early Homo Sapiens have always been a focus of the International Union of Prehistoric and Protohistoric Sciences (UISPP). On 8-9 February 2016 a meeting of Commission No. 8 of the UISPP was held at the Palaeolithic Department of the Institute for the History of Material Culture (IIMK), St. Petersburg, on the topic of The Sungirian and Streletskian in the context of the Eastern European Early Upper Palaeolithic, which gathered prominent Palaeolithic scholars from various institutions in European Russia and abroad. It is worth mentioning that this conference was the first meeting of the Commission held in Russia, undoubtedly reflecting our colleagues' deep interest in the question of the Upper Palaeolithic of the Russian plain. The workshop was opened by talks from the Director of IIMK, St. Petersburg, V.A. Lapshin, the Head of the Paleolithic Department, IIMK, S.A. Vasilyev and the President of Commission No. 8, Professor M. Otte.

Introductory papers presented by M. Otte (University of Liège) and G. Bosinski (Dobbertin, Germany) were devoted to an overview of Streletskian-Sungirian sites, paying particular attention to the qualitatively new way of thinking expressed in the unique religious and ritual/funerary activity of the inhabitants of Sungir. The theoretical problems of the definition of the Initial Upper Paleolithic in Eurasia were highlighted in the report by N. Zwyns and S. Kuhn (University of California, Davis). A.A. Sinitsyn (IIMK, St. Petersburg) provided a review of the Streletskian sites of Eastern Europe and the modern state of the problem of their spatial distribution and chronology. The paper by E.Yu. Girya (IIMK, St. Petersburg) and P.Yu. Pavlov (Institute of Language, Literature and History of the Komi Division of the Russian Academy of Sciences, Syktyvkar) considered the technological criteria for differentiating Middle and Upper Paleolithic bifacial tool production. In the speakers' opinion, the main criteria for distinguishing the production of thin bifaces in the Upper Paleolithic are the presence of multiphase reduction and the particular method of platform preparation during thinning.

Two papers were devoted to the origin of the Streletskian. G. Bataille (University of Tübingen) presented a detailed reconstruction of leaf-point production at Kostenki 12 (Layer III) and Buran-Kaya III (Layer C), which enabled him to draw conclusions about similarities in the adaptive systems of the sites' inhabitants. A.K. Ocherednoi (IIMK, St.Petersburg) and co-authors presented a new series of AMS radiocarbon dates for the site of Betovo and examined the argument for a Streletskian origin in the Middle Paleolithic of the Desna River basin in Central Russia, as advanced by L.M. Tarasov.

Next came a series of papers on Sungir. In a report about the taxonomic position of Sungir, K.N. Gavrilov (Institute of Archaeology, Moscow) concluded that the site, and all other Streletskian settlements, belong to an Eastern European variant of the Final Szeletian. The paper by N. Reynolds (University of Bordeaux) and colleagues discussed general questions of radiocarbon dating using the example of the new series of AMS dates for Sungir obtained in the Oxford laboratory (ORAU). A group of authors led by K.N. Gavrilov and S.Yu. Lev (Institute of Archaeology, Moscow) presented the preliminary results of the new excavations at Sungir in 2015. A.B. Seleznev (Institute of Archaeology, Moscow) presented the results of an analysis of the spatial distribution of primary knapping products within the limits of the second and third "dwellings" at Sungir. The reports by T.E. Soldatova and V.S. Zhitenev (Moscow State University) considered the bone industry and mobiliary art objects from Sungir in the context of the Early Upper Paleolithic record of Eastern and Central Europe.

The question of Streletskian assemblages at Kostenki was the subject of several papers. A.E. Dudin and A.M. Rodionov (Kostenki Museum, Voronezh) concentrated on the problem of the stratigraphy of the lowermost cultural layers in different excavation areas at Kostenki 1. The talk by P. Haesaerts (Institut Royal des Sciences Naturelles, Brussels) and co-authors continued the focus on Kostenki, and discussed new radiocarbon dates for the lowermost cultural layers of Kostenki 1, which could attest to a "long chronology" of Streletskian existence at Kostenki. The question of Kostenki 11(III)'s association with the Streletskian and its possible late radiocarbon age were discussed in the paper by R. Dinnis (University of Oxford), A.A. Bessudnov (IIMK, St.Petersburg) and colleagues. S.N. Lisitsyn (IIMK, St.Petersburg) and co-authors communicated preliminary results of the 2015 fieldwork at Kostenki 12, which is thought to be a key site for the understanding of the Streletskian question.

Several papers were devoted to comparative analysis of assemblages showing similarities to the Streletskian and located in different areas of Central and Eastern Europe. In a report on the technology of Szeletian foliated bifaces in Moravia, Z. Nerudova (Moravian Museum, Brno) noted the similarity of the bifacial thinning technique in the Czech Early Szeletian and the Streletskian of the Russian plain. The paper by M. Oliva (Moravian Museum, Brno) was devoted to a special type of triangular bifacial point found at several sites of the late Szeletian of Moravia. The similarities and differences in ornaments from Aurignacian sites in Swabia and Streletskian-Sungirian sites were discussed by C. Neugebauer-Maresch (Institute for Oriental and European Archaeology, Vienna). A.P. Zakharikov (Lower Volga Archaeological Society, Saratov) reported on a Late Middle/Early Upper Paleolithic industry with characteristic bifacial points found at the Nepriakhino site in the Volga River basin.

After the presentations the participants of the symposium had an opportunity to examine the collections of lithics, bone and antler tools from sites including Kostenki 1, 6 and 14, Biryuchya Balka 2, and Nepriakhino. The new materials from the 2015 excavations of Sungir and Kostenki 12 were of particular interest. The meeting ended with an extended open discussion during which the main questions of current research into the Streletskian in the context of the Early Upper Paleolithic of Europe were considered.

## La Civilisation du Sungirien.

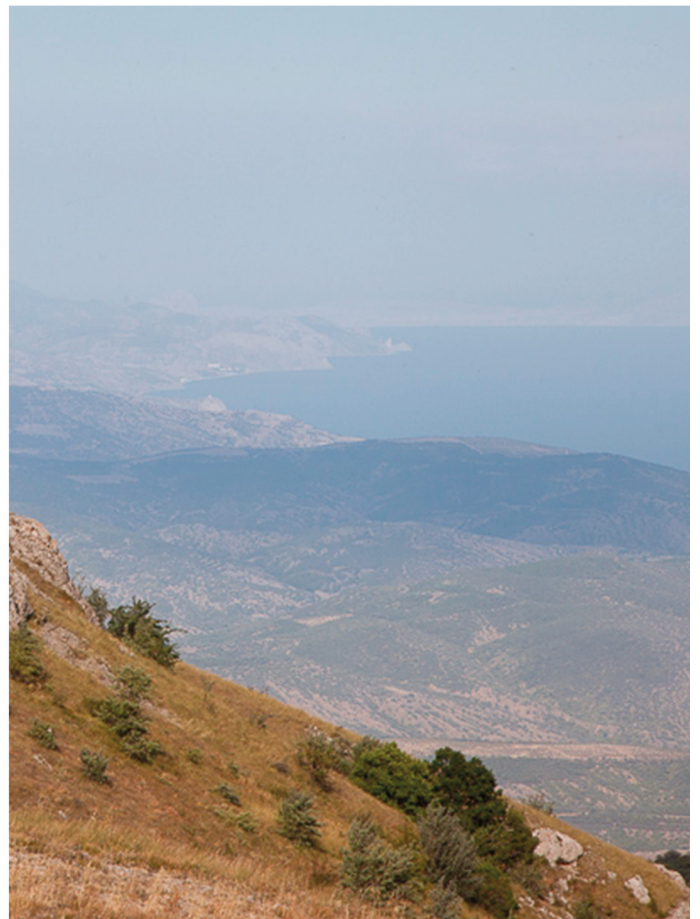
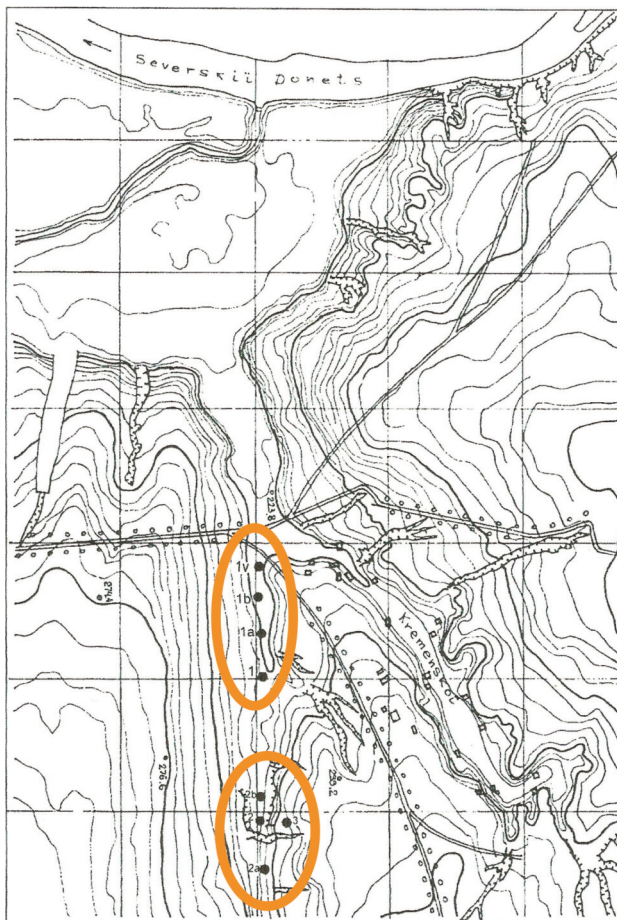
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Les somptueuses découvertes réalisées par Otto Bader ont impressionné tous les chercheurs : une nécropole d'une richesse extraordinaire présentait des agencements décoratifs, symboliques et techniques, combinés et explicites (Bader, 1998). Elles ouvraient une voie nouvelle à la connaissance d'une superbe civilisation paléolithique, totalement inconnue jusqu'alors. Toutefois, son interprétation culturelle et chronologique a souvent donné lieu à d'étranges spéculations, car cette tradition est restée par ailleurs très mal comprise dans la préhistoire européenne. Elle possède pourtant une solide authenticité, une histoire propre et des critères anatomiques fondamentaux quant aux origines des populations modernes en Europe. En effet, cette filiation traditionnelle plonge ses racines dans le sud de l'Europe orientale : en Crimée et en Ukraine, dans les ensembles définis comme « Akkaiens » (Kolosov, 1986; Demindenko, 2014). Par la combinaison des sépultures et des styles techniques, il est possible d'en tracer une estimation raisonnable, et très distincte de l'Aurignacien et du Gravettien, également présents dans ces régions mais d'origine et d'extension extérieures.

Sur le plan technique, comme dans la décoration personnelle et les expressions rituelles, le Sungirien manifeste

un extrême raffinement (Fig.1; 2) et une délicatesse qui ont perduré durant plusieurs milliers d'années dans l'immensité de la plaine russe (Fig. 3; 4). La tendance géographique générale de cette civilisation s'oriente en un déplacement vers le nord, où Garchi (carte, Fig. 7) constitue à la fois un point d'extension extrême et une étape récente de cette civilisation (28.000 BP, Bosinski, 2015). Nous avons spécialement étudié un des sites principaux dans la genèse du Sungirien, au sud de la Russie à Beryuchya Balka (Otte, Matioukine et Flas, 2006 ; Matioukine, 1999; 2012; Fig.1). Dans ce vallon, de nombreuses couches successives contiennent différents emplacements et différents stades de cette superbe industrie (Fig.2 à 5). La seule recherche de cette excellente matière première locale démontre le soin apporté à la maîtrise des techniques appliquées à la pierre. En assemblant les différentes datations C14, on s'aperçoit que toutes ces installations furent globalement synchrones, et étalées entre 41 et 31 ky cal BP. L'illusion d'une évolution régionale est issue de la confrontation entre les pièces ébauchées avec celles finement achevées, bien que chacune découverte dans le même milieu sédimentaire (Fig.6). Sur le plan des méthodes d'affinement, la marque d'une éven-



**Figure 1:** Situation du « ravin des louveteaux », vue sur la plaine, et emplacements des sites fouillés par Matioukhine, mon ami.

tuelle évolution n'apparaît pas, au moins dans les stades ultimes de la mise en forme des pointes et sauf à la base de la séquence, très nettement marquée par des tendances « moustériennes » (Fig.5). Nous avons néanmoins suivi et respecté la superposition stratigraphique, afin de présenter les planches et les outillages selon leur ordre réellement observé sur le terrain, et répartis ici en « phases ». Dans les domaines distincts des pointes triangulaires bifaciales si caractéristiques, il pourrait apparaître des tendances évolutives, par exemple en ce qui concerne les supports d'autres outils : la « laminarité » s'impose de toute évidence dans le prolongement des éclats allongés et fins, utilisés antérieurement dans les sites de Crimée : Buran Kaya et Akkaiia par exemple (Marks, Monigal, 2004; Kolosov, 1986; Fig.9). Incidemment, si cette filiation culturelle semble avérée, elle impliquerait un phénomène transitionnel rapide sur le plan anatomique également, car les sépultures de Zaskalnaya (Crimée) appartiennent clairement à un stade anatomique « paléolithique », sinon néandertalien !

Cette notion transitionnelle s'impose tout de même avec force lorsque on compare certains niveaux de Beryuchya Balka (site 2/CA) à ceux de l'Akkaiien de Crimée, clairement d'époque et de style moustériens (Fig.10). La plus élémentaire observation stratigraphique démontre déjà l'antériorité du Sungirien sur les autres cultures du paléolithique supérieur : à Kostienki I, il se place à la base des niveaux aurignaciens et gravettiens locaux et n'en présente aucune trace de contact, ni sédimentaire, ni culturel, comme M. Anikovich (2005) l'avait déjà clairement démontré (Fig.8). Aucune acculturation ne semble non plus affecter ces trois traditions clairement distinctes dans toutes leurs composantes (Hoffecker *et al.* 2016 ; Levkovskaya *et al.* 2015 ; Marom *et al.* 2012). En rassemblant les dates C14 disponibles (ici calibrées !), il est clair que le groupe de Sungir, le plus connu, est aussi le plus récent (Fig.11) : entre 35 et 30 mille ans. Inversement, les stades anciens et moyens (de 45 à 35 ky) appartiennent aux sites plus méridionaux : Buran Kaya et Beryuchya Balka.

Les sépultures offrent une majestueuse gamme d'informations rituelles et esthétiques. Au moins au nombre de trois bien conservées et rigoureusement organisées, elles furent manifestement associées dans un dispositif funéraire conçu intégralement. Un homme adulte d'une quarantaine d'années, décoré de milliers de perles en ivoire, est inhumé tout en longueur, pétris d'ocre rouge. Sa mort fut criminelle : un reste de pointe est fiché dans une vertèbre lombaire (Trinkaus *et al.* 2012). Sa décoration, véritablement extraordinaire (Fig.14), a permis de reconstituer son costume avec une assez grande précision (Scheer, 1984; Fig.19). Et son statut, si rarement exprimé

avec une telle emphase, a été attribué à un homme de pouvoir, tel un chamane au rôle si fondamental dans ces sociétés en harmonie avec la nature (Eliade, 1951).

Dans un axe perpendiculaire à celui-là, deux autres sépultures furent installées, strictement organisées, tête contre tête (Fig.13). Il s'agit de jeunes adolescents, une fille et un garçon, dont tout indique qu'ils furent les enfants de l'adulte tout proche (présent colloque). Leur mobilier funéraire est surabondant et amplement coloré en rouge (Fig.15). En particulier, de longues sagaies furent réalisées à partir de défenses de mammoths dépliées dans un trempage à l'eau (Fig.12; Klopachev et Girya, 2010). Là aussi, furent découverts une silhouette de cheval découpée et ponctué, selon les mêmes codes que ceux portés par le bâton perforé, tel un symbole, un signe ou un assortiment rituel (Fig.16, 17; Bosinski, 2013, 2015). La rouelle à huit branches, découpée dans une plaquette osseuse, établit précisément la relation avec les huit directions cosmiques, comme dans toutes les pensées religieuses orientales ou méditerranéennes (Fig.18). Le poinçon, les étuis, les coiffes, les couleurs manifestent tous l'intention cérémonielle, ostentatoire, tel un costume rituel confectionné et élaboré, précisément dans le but de la perpétuité, via la sépulture (Fig.19, 21). Comme si ce moment éphémère devait lutter pour sa prolongation éternelle au même titre que les arts mythographiques des cavernes, eux aussi en défi contre le temps.

Dans son élégance et sa sacralité, cette civilisation sungirienne a régné durant des millénaires dans les plaines ukraino-russes. Ses techniques, ses armes et ses arts sont perceptibles au premier coup d'œil. Aucun apport extérieur à l'Europe n'y est perceptible. Symétriquement, elle a pu diffuser des pratiques funéraires et décoratives, par exemple aux gravettiens. Son anatomie est nettement moderne, et apparemment la plus ancienne et la plus nette qui soit en Europe, et pourtant si largement oubliée. Curieusement, ses antécédents plongent dans le Moustérien et le Néandertalien de Crimée, toutefois sans claire garantie. Le plus ancien paléolithique supérieur d'Europe est là, avec son anatomie et son comportement clairement « modernes », si puissamment exprimés qu'ils ne laissent subsister aucun doute. Concentré aux portes asiatiques, le Sungirien, une fois de plus, démontre l'importance de cet immense réservoir démographique et culturel constitué par les steppes orientales, aux sources de toutes les populations européennes successives. Outre les évidences habituelles (anatomiques et comportementales), les données paléo-génétiques en apportent aujourd'hui une preuve supplémentaire (Chaux *et al.* 2008 ; Fig. 20).



Biruchaya Balka - Phase 1

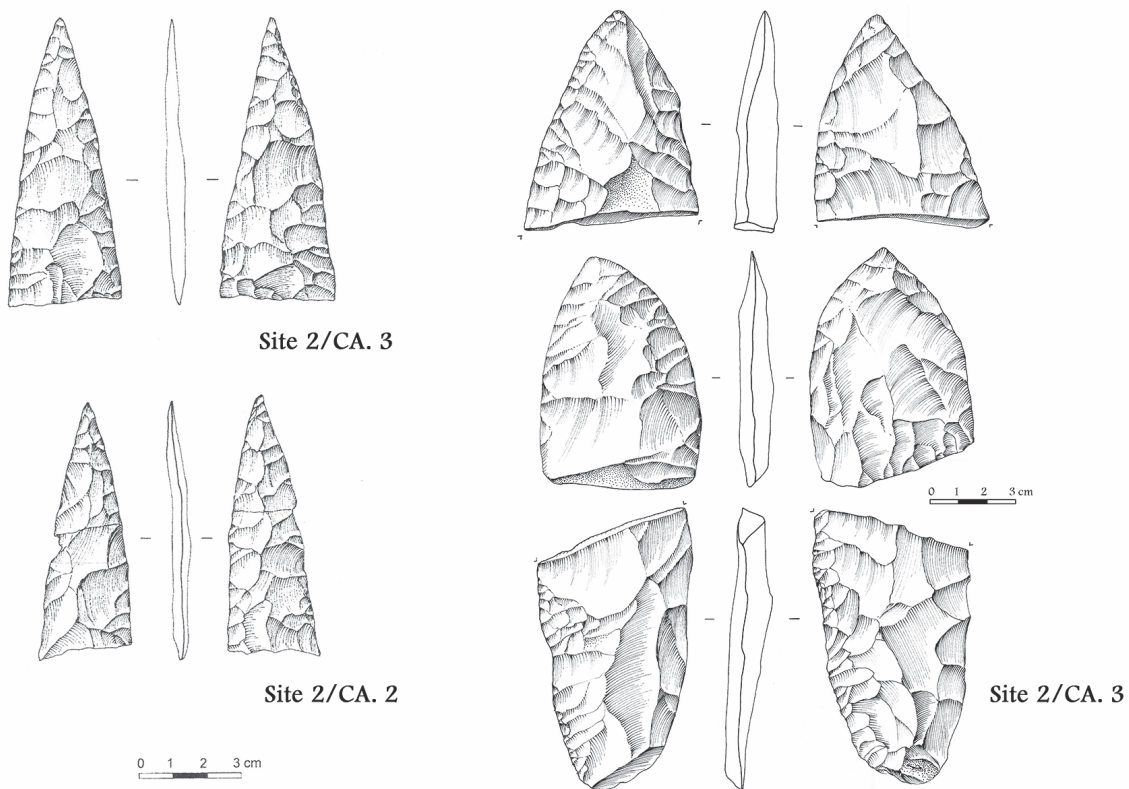


Figure 2: Phase une à Biryoutchia Valka (débute à partir du haut), à droite il s'agit d'ébauches, des pièces de gauche. Négliger cette analogie conduit à créer des « étapes techniques » artificielles.

Site 1A/CA. 3

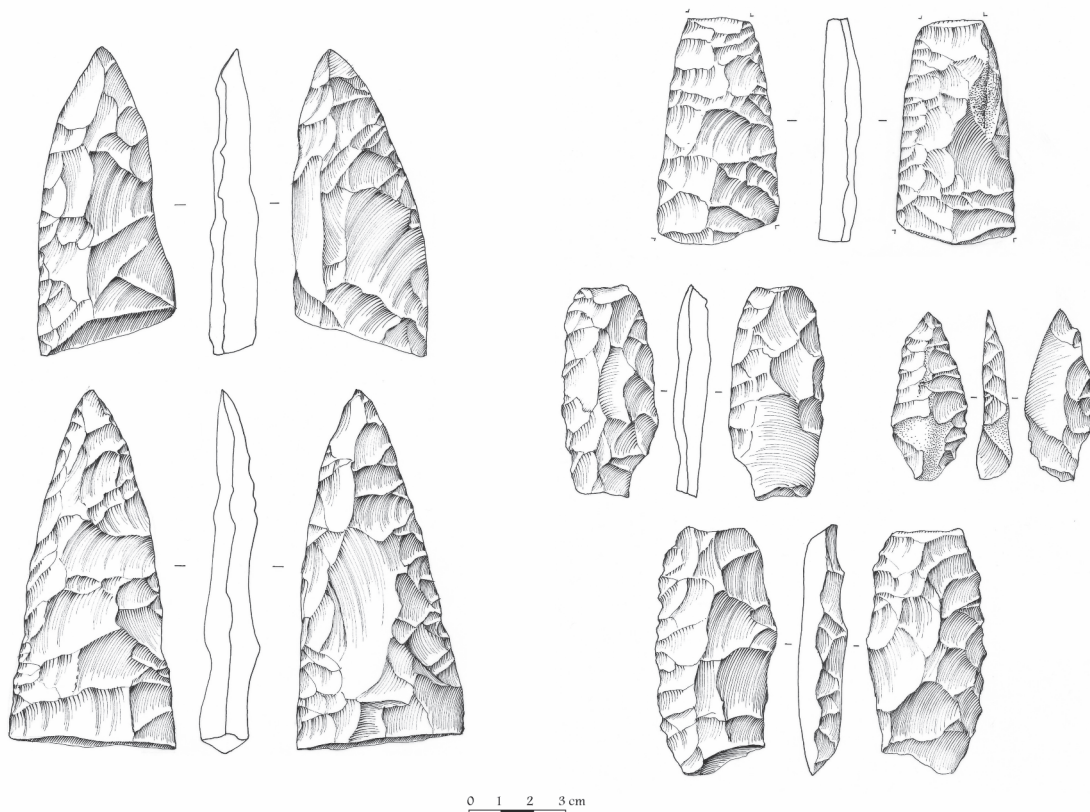


Figure 3: Phase 3, ébauches et pointes terminées. L'installation prend place sur un gîte de silex d'excellente qualité.

Biruchaya Balka - Phase 4

4. Site 1B/CA. 3B

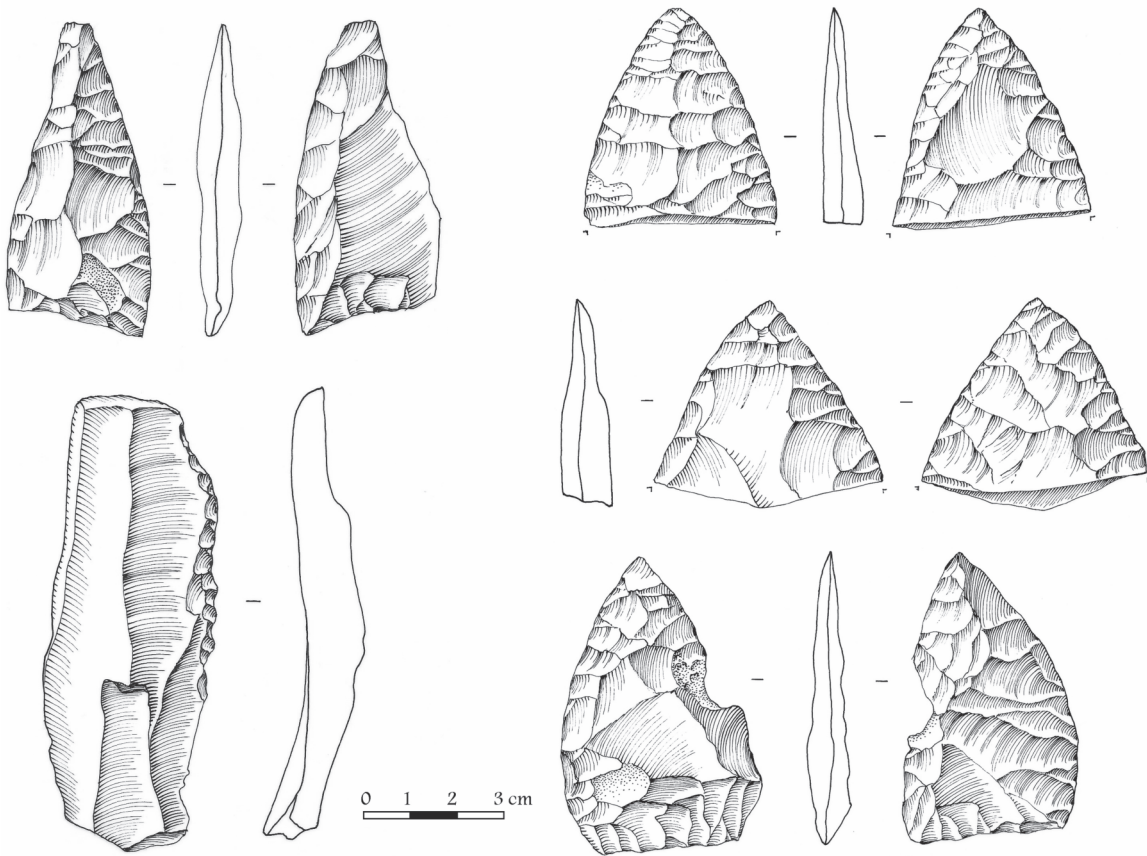


Figure 4: Phase 4, Les tendances laminaires épaisses accompagnent les premières pointes foliacées plates.

Site 2/CA. 5

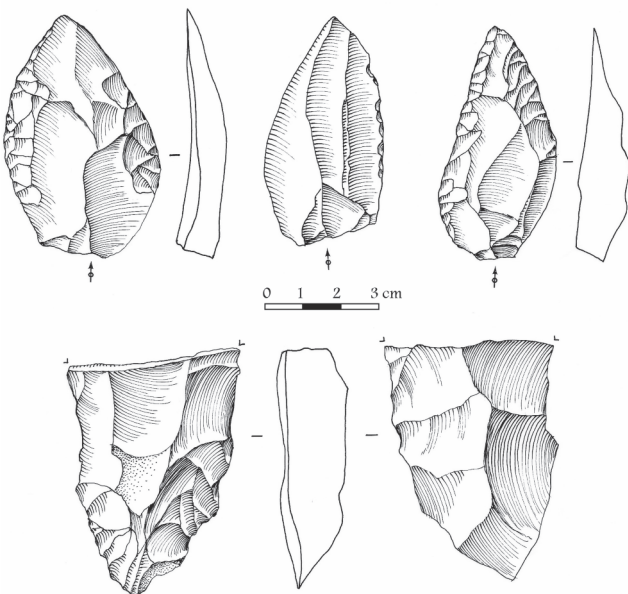


Figure 5: Phase 5. Les tendances centripètes subsistent à la base de la séquence, avec des pointes ébauchées, massives et bifaciales.



Figure 7: Répartition des principaux sites Sungiriens, étalés du sud vers le nord, selon un gradient temporel (Gerhard Bosinski, 2015 ; carte modifiée par David Deñoÿ d'après <http://www.world-mapsonline.com/Satellite-Image-Maps.htm>, consulté le 14 février 2017).

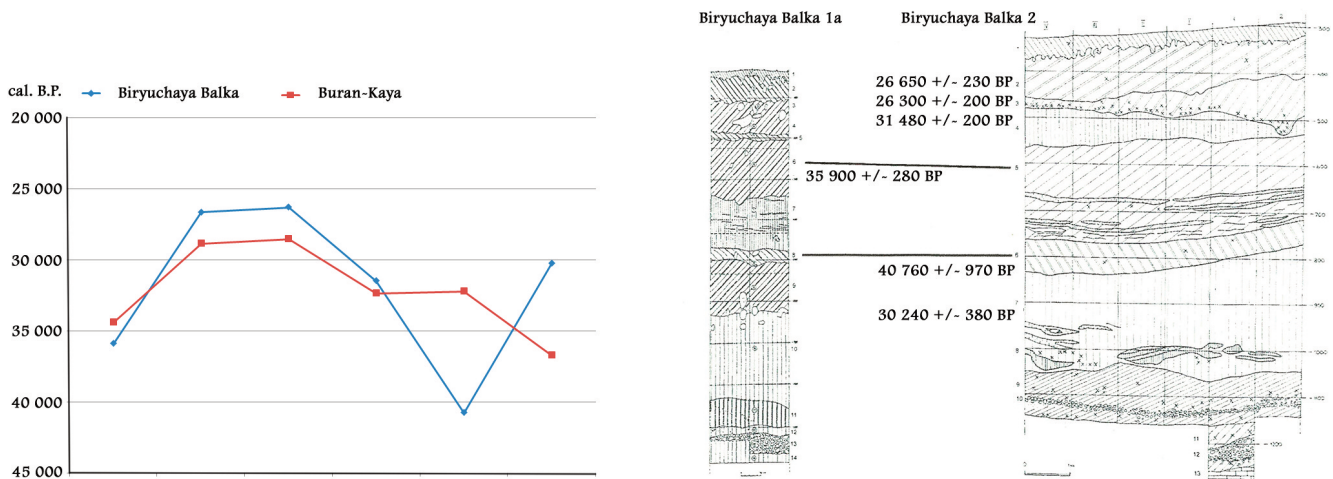


Figure 6: Les deux sites évoluent en même temps : Buran Kaya en Crimée et Biryoutchia Valka en Russie.

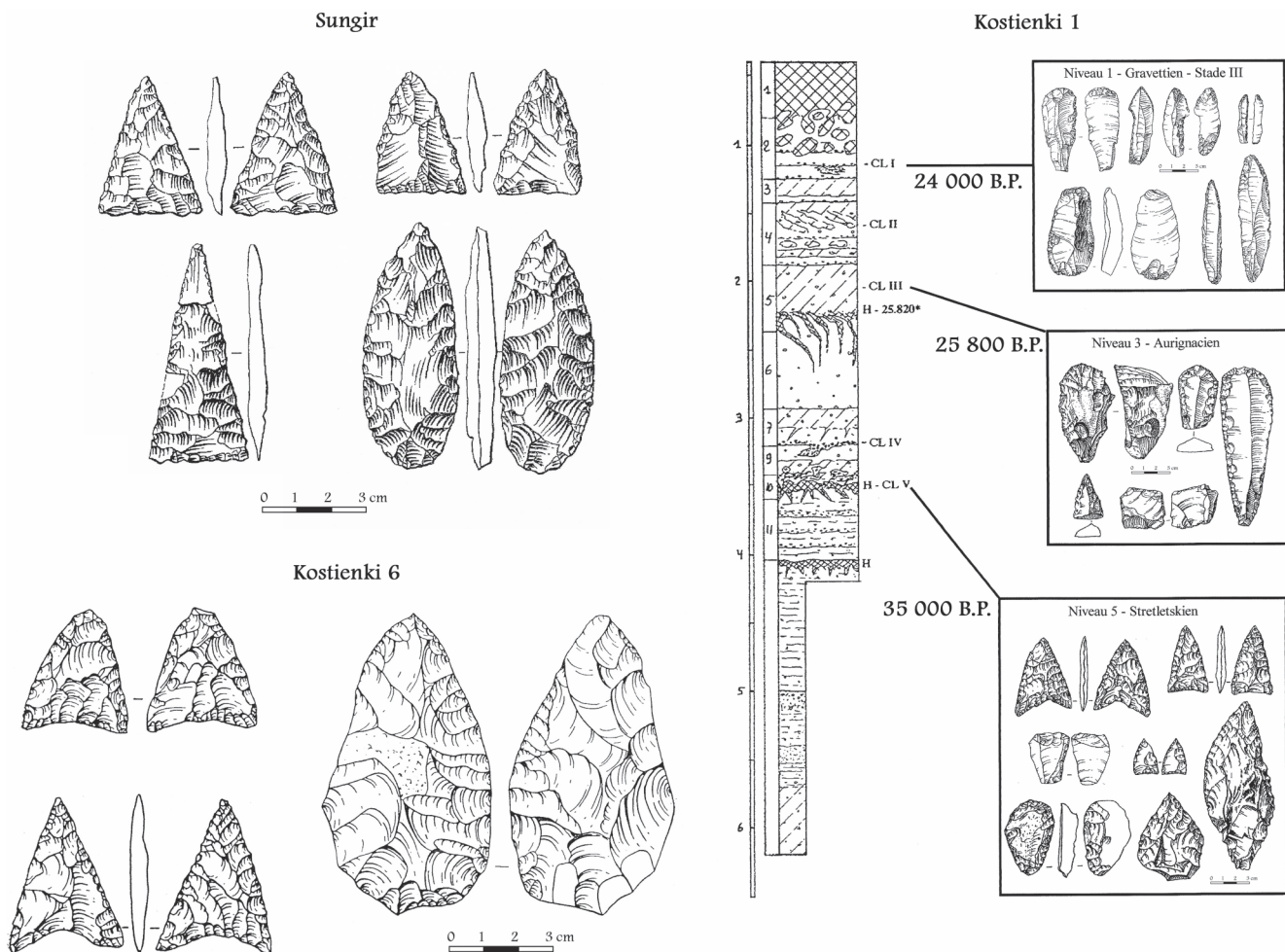
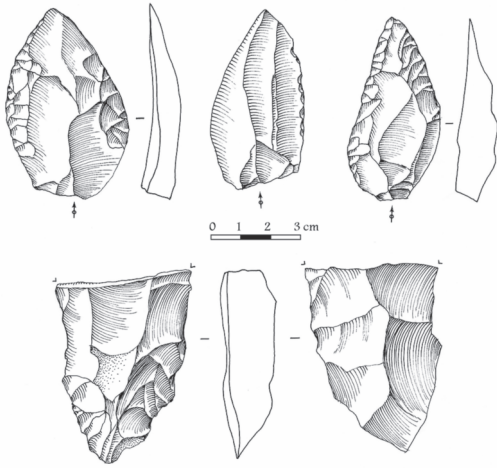


Figure 8: Sungirien à Kostienki, radicalement en position stratigraphique sous-jacente à l'Aurignacien et au Gravettien. Une évolution formelle semble s'y dessiner, analogue à celle suivie à Biryoutchia Valka ; Toutefois, les sites plus septentrionaux ont une date plus récente, comme l'intrusion de ces deux traditions extérieures avait fait reculer celle-ci, originale et locale.

Biruchaya Balka - Phase 5



Crimée

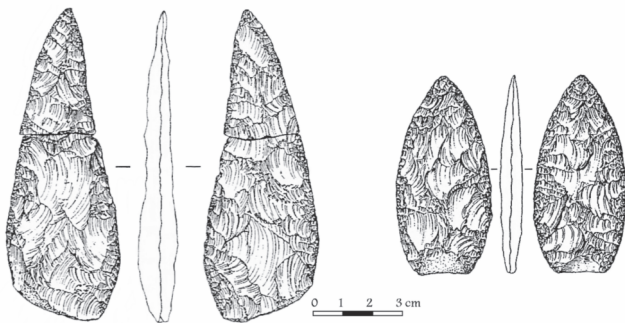
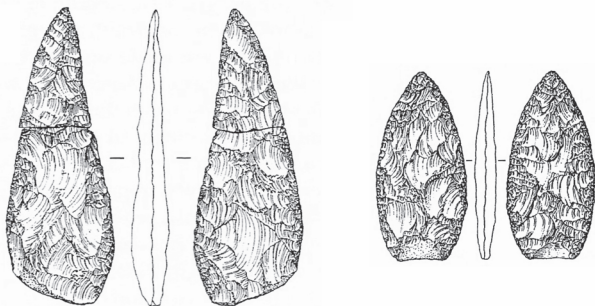


Figure 9: Racines vraisemblables des traditions du Sungirien, dans les sites « Akkaiens » de Crimée (fouilles Kolossov).

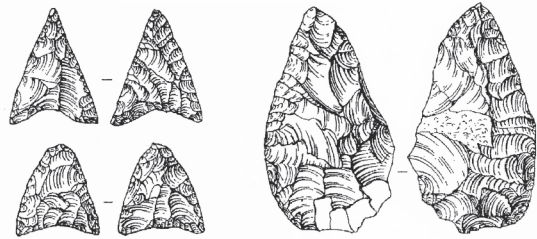
Crimée



0 3 cm



Kostienki



Kostienki 6  
45.000 - 35.000 B.P.

Kostienki 12, niveau 3  
45.000 - 35.000 B.P.

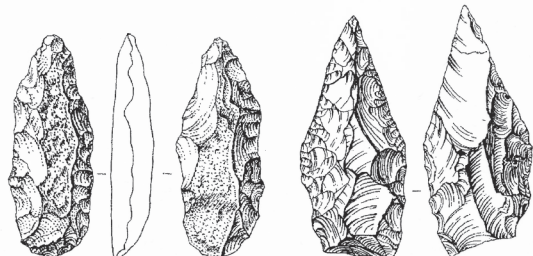
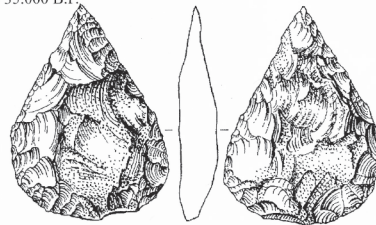
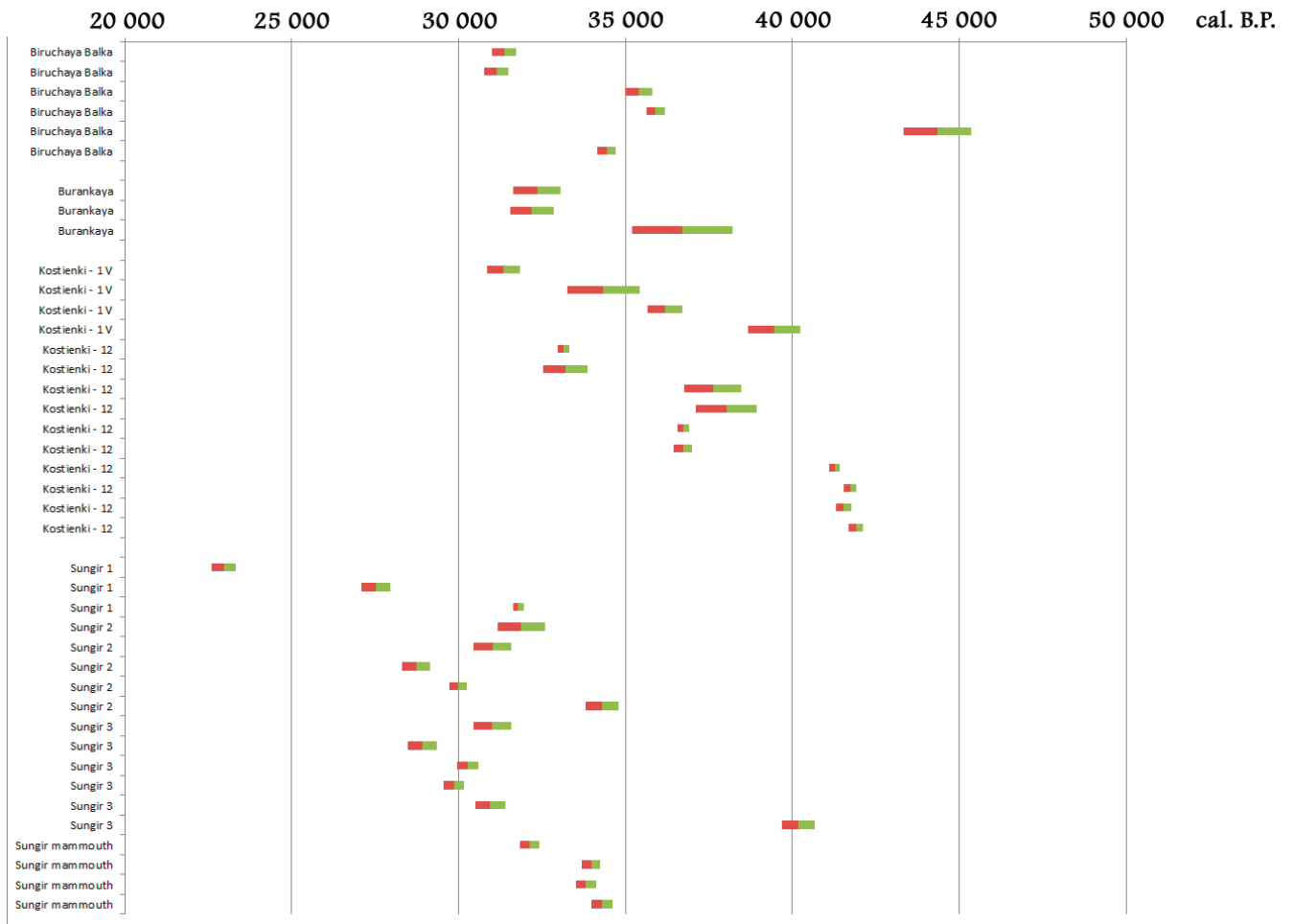
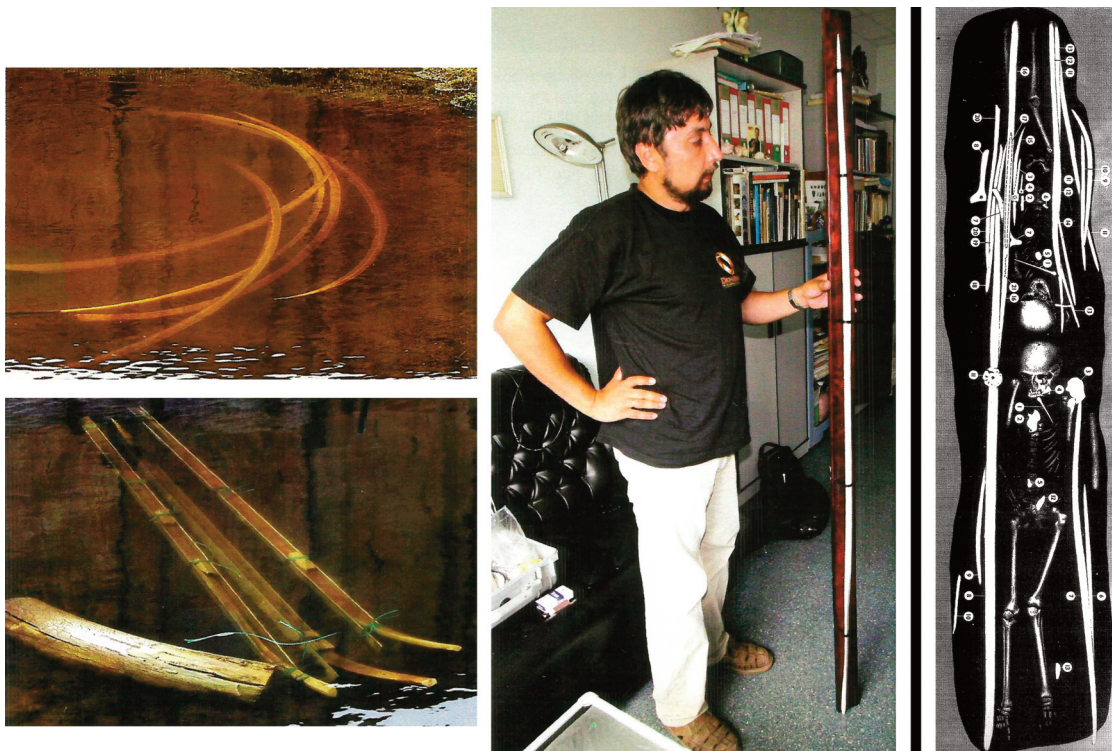


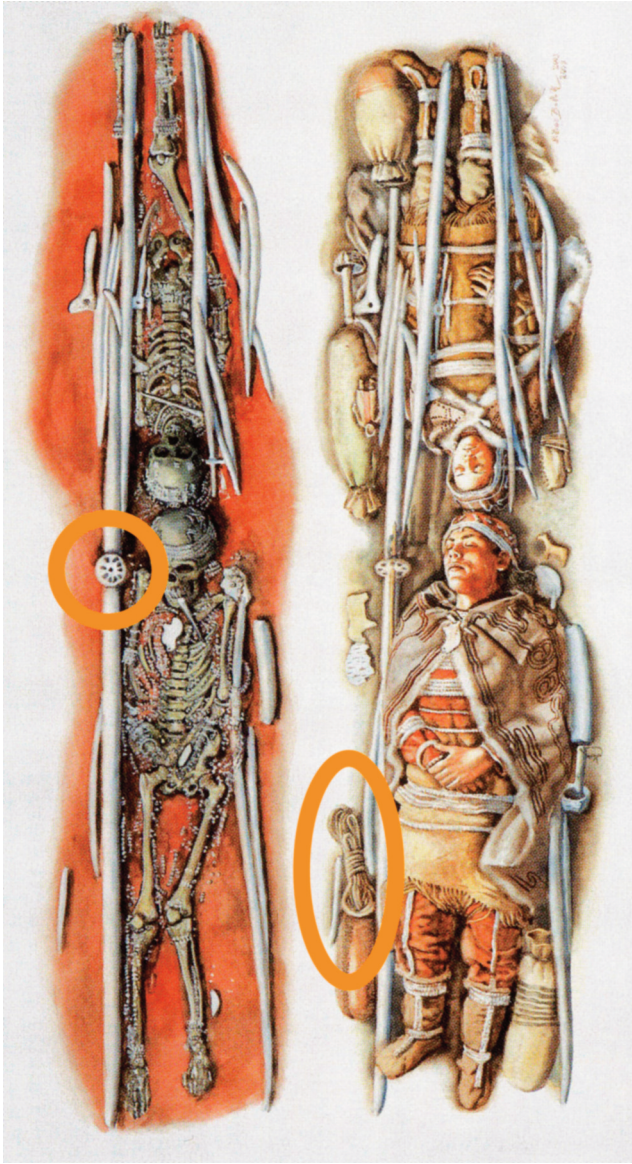
Figure 10: Comparaison des rythmes évolutifs entre la Crimée et la Russie méridionale. Leurs analogies et leurs homogénéités soutiennent l'unité générale de la tradition du Sungirien.



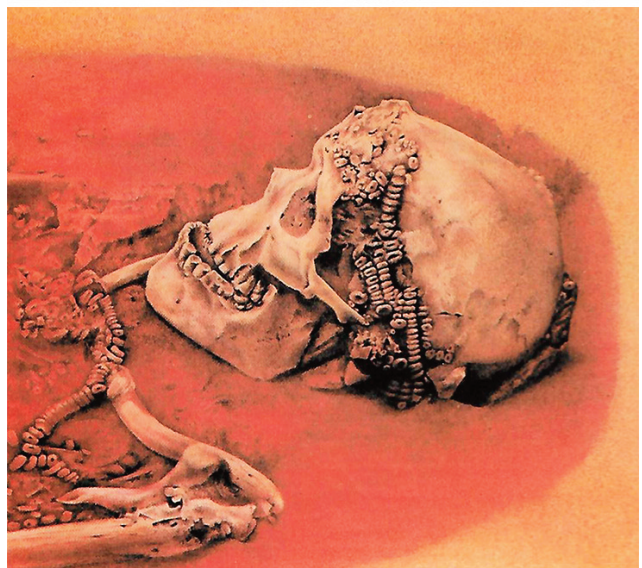
**Figure 11:** Répartition des dates calibrées (BP) du Sungirien, selon les sites et les régions. Une tendance nette se dessine vers le nord de la plaine russe. L'auteur répugne l'usage des dates calibrées de cette façon, mais de nombreuses d'entre elles ne peuvent être « ramenées » en BP classiques ; les comparaisons imposent donc de toutes les exprimer sous cette forme, illogique à mes yeux (tableau réalisé par David Delnoy). L'expression en « BC cal » serait la seule cohérente, car elle se rattache aux périodes historiques, mais curieusement totalement absentes des publications sur cette période.



**Figure 12:** Les longues sagaies en ivoire de mammoth furent reconstituées avec succès par trempage et redressement forcé (Khlopachev et al, 2010)



**Figure 13:** Fouilles et reconstitutions des sépultures des deux jeunes adolescents de Sungir. Les dépôts funéraires, très élaborés, illustrent par exemple l'usage de cordes tressées auquel se lie le bâton percé) et les rouelles à huit rayons, à valeur symbolique universelle (Eliade, 1951).



**Figure 15:** L'emploi de la couleur rouge, ajoutée par un pigment minéral, apparaît aussi comme une pratique corporelle universelle, régulièrement associée aux termes de passages, telle l'adolescence ou le décès.

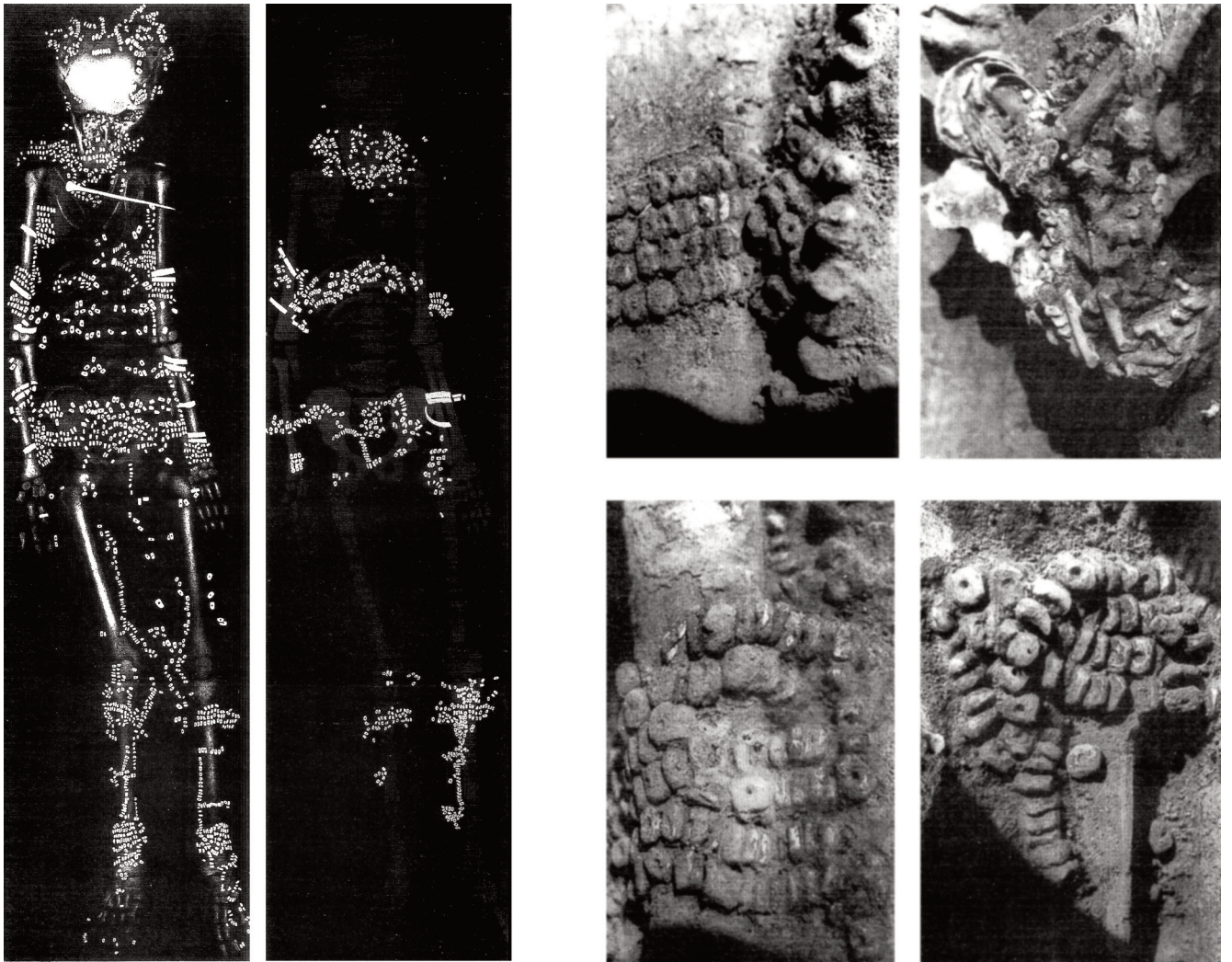


Figure 14: L'extrême richesse des parures, décorations et ustensiles se trouve bien illustrée ici par cette vue « radiographique » (Bader, 1998)

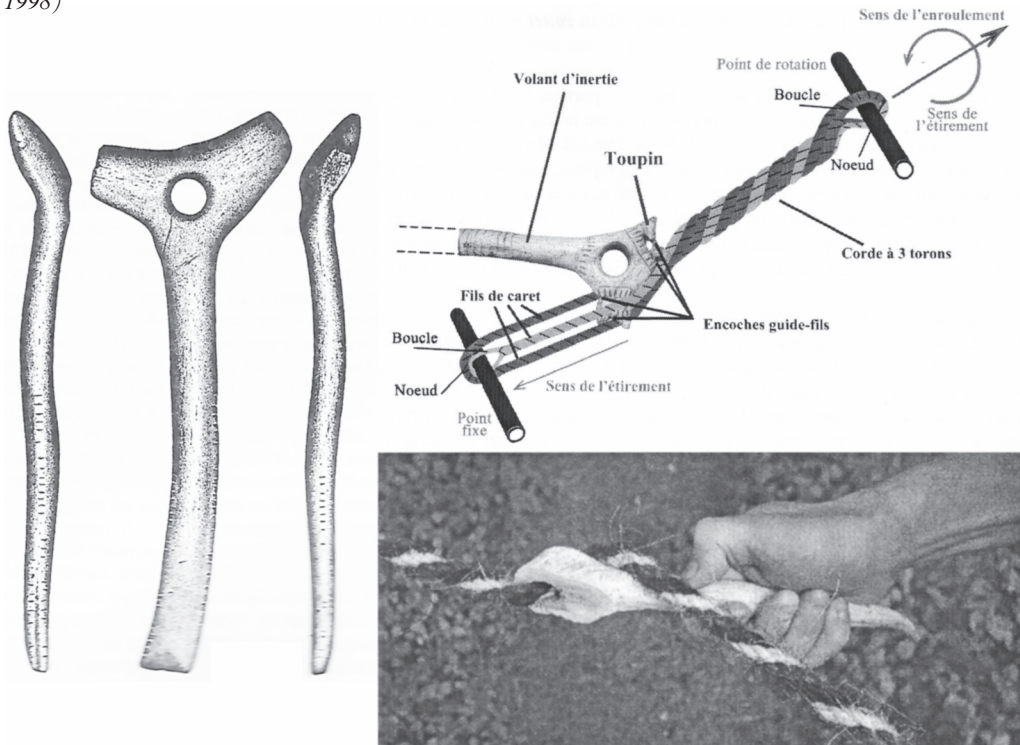
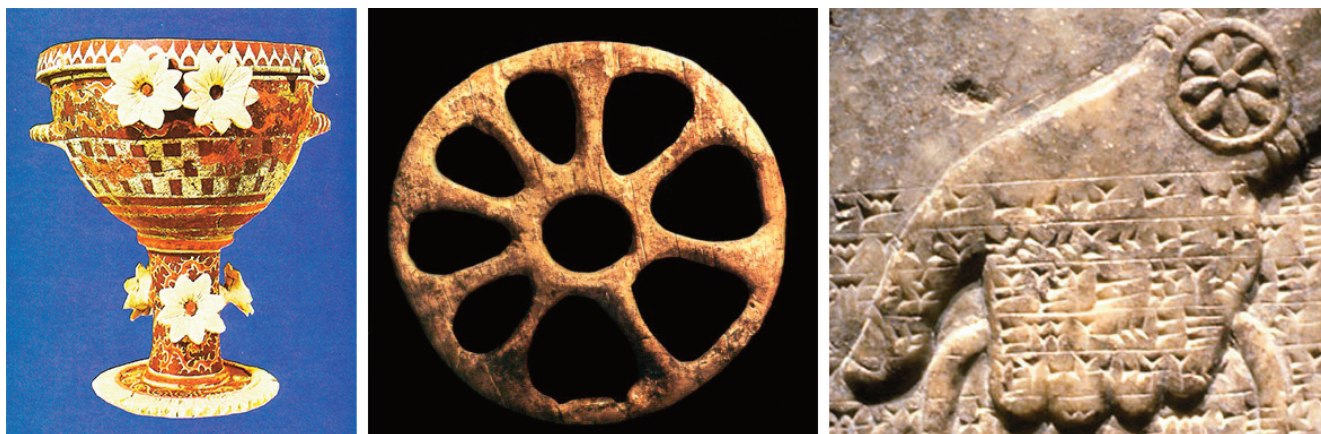


Figure 16: Les bâtons perforés semblent avoir connu un usage dans le tordage des cordes en crin, telles les expériences actuelles fondées sur les pratiques des cow-boys texans (Kilger et al, 2014). Toutefois, placés dans une sépulture aussi élaborée, leur disposition n'a pu être que symbolique, et à notre avis, liée à la maîtrise, au domptage et à la monte des chevaux. Déjà, cette pratique disposait d'un prestige social, signalé matériellement à intention identitaire perpétuelle.



**Figure 17:** Trois signes magiques se trouvent assemblés : la silhouette de cheval, le symbole du tordage, donc de l'équitation, et la rouelle à huit branches, rayonnante en toutes directions.



**Figure 18:** Des analogies universelles imposent le fonctionnement des rouelles à huit branches en diverses civilisations et à diverses périodes. Toujours, ce chiffre sacré possède une puissante force suggestive, impliquant la maîtrise totale sur le monde alentours (réalisation David Delnoy).



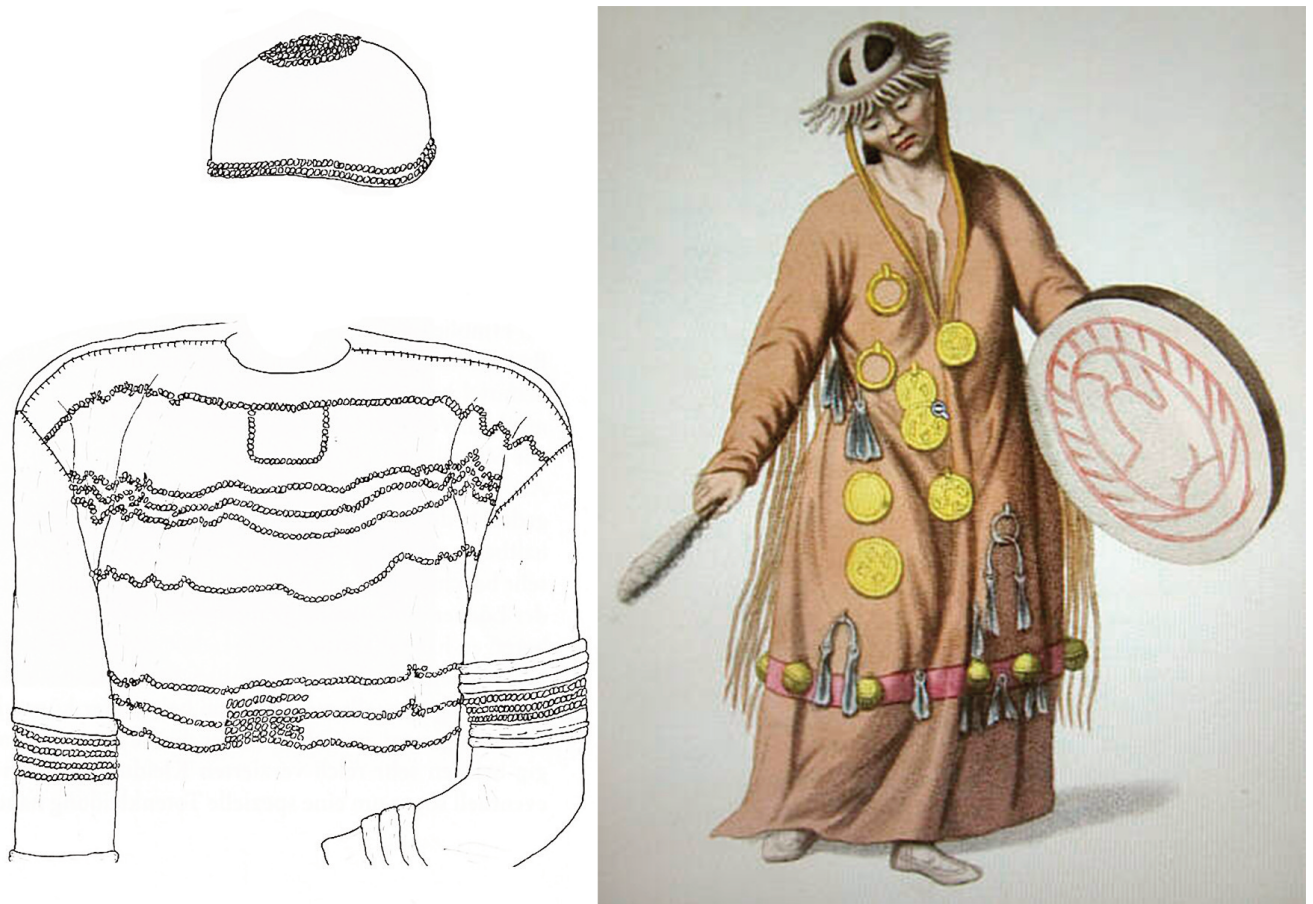


Figure 19: Reconstitution d'un vêtement à Sungir d'après les décorations cousues (Scheer, 1984). L'usage du bonnet présente une particulière importance dans les pratiques chamaniques, il protège des forces maléfiques lancées par le cosmos au moment où l'officiant se tourne vers sa puissance afin de l'infléchir.

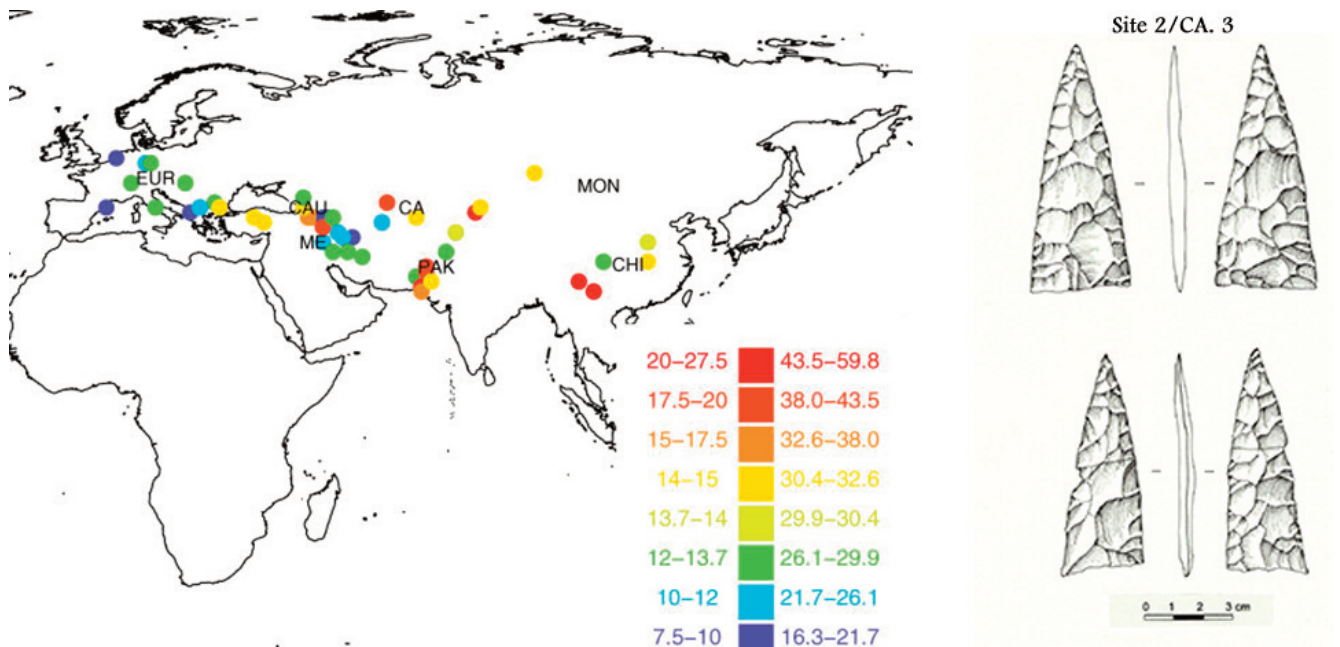


Figure 20: Carte des répartitions de ADN fossiles en Eurasie paléolithique (Chaix et al, 2008). Les échelles chronologiques centrales fournissent deux estimations suggérées selon les méthodes utilisées. L'extrême finesse présentée par ces pointes (droite) impose l'idée d'une civilisation originale et restée intacte, culturellement et génétiquement.



**Figure 21:** Reconstitution de la sépulture d'adulte, et analogie chamanique subactuelle (Bader, 1998). L'extrême décoration, les objets associés et la forte coloration rouge démontrent l'importance du personnage ainsi honoré. Mais ils suggèrent aussi une société structurée selon la prééminence de ces fonctions à forte organisation des valeurs fondées sur un profond sentiment mystique.

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## **Le Sungir-Streleckien. Le début du Paléolithique supérieur en Europe orientale.**

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### **Résumé**

Le Sungir-Streleckien est la plus ancienne culture du Paléolithique supérieur en Europe orientale. Les sites se trouvent dans la partie supérieure d'un sol et sont le plus souvent perturbés par la solifluxion et la cryoturbation. Les structures d'occupation ne sont conservées qu'à Garzi I.

Dans la région de Kostenki, ce sol correspond à la zone de l'humus inférieur et est surmonté par les cendres d'une éruption volcanique à ignimbrite dans la région campanienne de Naples datant d'environ 39 000 ans (37 000 av. J-C). Beaucoup de dates 14C pour les gisements situés sous ces cendres sont trop récentes. C'est vraisemblablement le cas également pour les dates 14C des sites des autres régions qui sont dépourvus de l'horizon-repère des cendres du volcan campanien.

À Kostenki 1 (Poljakov) et Kostenki 14 (Markina Gora), l'Aurignacien se situe nettement au-dessus du Sungir-Streleckien.

La technologie et la typologie des outils lithiques montrent des relations nettes avec la phase récente du Paléolithique moyen de la région. C'est le cas des nucléus à éclats, des pointes foliacées, et des Keilmesser (couteaux à dos bifaciaux) incluant les couteaux de Volgograd à Kostenki 1-V (Poliakov) et Kostenki 14-IVb (Markina Gora), ainsi que des raclours simples.

Les pointes triangulaires de Sungir à retouches plates bifaciales, marqueurs chrono-culturels du faciès Sungir-Strelecka, s'enracinent aussi dans le Paléolithique moyen.

Les éléments du Paléolithique supérieur sont des nucléus à lames, des lames à crête, des burins qui sont vraisemblablement des nucléus à lamelles, et des grattoirs courts.

Les objets en os, en bois animal et en ivoire proviennent seulement de Kostenki 14-IVb (Markina Gora) et surtout de Sungir. Les lances et armatures en ivoire et les autres objets en ivoire des tombes de Sungir sont uniques. Il en va de même pour les quelque 15 000 perles en ivoire, qui ornaient initialement des vêtements.

Des galets de schiste percés, qui étaient peut-être peints à l'origine, ont été trouvés à Sungir. L'importance de ces galets réside dans le fait que chacun d'eux se trouvait dans les tombes de l'homme et des deux enfants.

La représentation d'une tête humaine en ivoire provient de Kostenki 14-IVb.

En outre il y a à Sungir quatre statuettes d'animaux en ivoire, avec des contours assez peu précis, qui pourraient préfigurer les statuettes aurignaciennes souabes.

### **Резюме**

Памятники Сунгирско-Стрелецкого типа являются древнейшими для верхнего палеолита Восточной Европы. Находки залегают в верхней части одного из почвенных образований и в большинстве своём смещены в ходе криотурбации или солифлюкционных процессов. Жилые структуры сохранились только на стоянке Гарчи.

В районе Костёнок это почвенное образование относится к нижнему гумусу, оно перекрыто прослойкой вулканического пепла с Флегрейских полей близ Неаполя (извержение датируется 39000 лет т.н. (37000 до н.э.)). Многие радиоуглеродные даты для культурных слоёв, залегающих под этим прослоем пепла, омоложены. То же можно сказать и о радиоуглеродных датах стоянок без слоя вулканического пепла.

Ориньяк в Костёнках 1 и 14 залегают значительно выше Сунгирско-Стрелецких слоёв.

Формы и технология изготовления каменных орудий отчётливо демонстрируют их связи с местными индустриями конца среднего палеолита. Это касается нуклеусов для отщепов, листовидных острий и Keilmesser (двустороннеобработанные ножи), в частности ножей Волгоградского типа из Костёнок 1-V (стоянка Полякова) и Костёнок 14-IVb (Маркина Гора), а также простых скребел. Среднепалеолитические корни имеют и подтреугольные двусторонне обработанные наконечники Сунгирского типа, специфический тип Сунгирско-Стрелецких индустрий.

Верхнепалеолитическими элементами являются нуклеусы для пластин, реберчатые пластины, нуклеусы для микропластинок, часто напоминающие многофасеточные резцы, а также короткие скребки.

Речь идёт в данном случае об очень гомогенном, почти монотонном Typenspektrum.

Предметы из кости, рога и бивня мамонта сохранились в первую очередь в Сунгире, а кроме него, только в Костёнках 14-IVb. Копья из бивня мамонта и другие предметы из бивня, найденные в погребениях Сунгирия, совершенно уникальны, как и находка приблизительно 15000 бусин, предположительно служивших нашивками на одежду.

Из Сунгирия происходят просверленные сланцевые гальки, по предположению исследователей они могли быть раскрашены в древности. О значении этих предметов говорит факт их нахождения среди погребального инвентаря в могиле мужчины и обоих детей.

В Костёнках 14-IVb было найдено изображение человеческой головы, изготовленное из бивня мамонта. Кроме того, среди сунгирских материалов есть четыре фигурки животных из бивня мамонта, возможно, предтечи швабских ориньякских бивневых статуэток.

Перевод Марии Желтовой (Прасловой).

## Summary

The Sungir'-Streleckian represents the earliest Upper Palaeolithic of Eastern Europe. The finds come from the upper part of a humus level and are mostly reworked by solifluction and cryoturbation. Settlement structures are known only from Garči I.

In the Kostenki region the finds are from the Lower Humus which is overlain by ash layers of the Campanian Ignimbrite volcanic eruption in the Naples region about

Le Sungir-Streleckien – aussi connu comme Culture de Kostenki-Sungir (O. N. Bader 1978 ; G. Bosinski 1990), Culture de Strelecka-Sungir (K. N. Gavrilov 2004), ou Strélétskien (A. Sinitsyn 2015a), ... - présente une Formengruppe (assemblage de types) du début du Paléolithique supérieur en Europe orientale (Fig. 1).

## Stratigraphie

Les trouvailles se situent au sommet d'un sol d'interstade (zone d'humus) largement affecté par la solifluction et la cryoturbation, qui ont presque partout détruit les structures d'habitat. Seulement à Garči I on a observé quelques structures d'occupation (P. Ju. Pavlov 2010). A Sungir il y a quelques foyers en fosse et bien sûr les sépultures creusées en-dessous de ce sol.

A Sungir (N. O. Bader et L. A. Michajlova 1998) et dans la région de Kostenki (N. D. Praslov et A. N. Rogačev 1982) on observe au-dessus de ce sol (humus in-

39 000 years ago (37 000 BC). The 14C-dates for the sites below these volcanic ashes are often too young. This will be also the case for the 14C-dates of the sites in other regions without the volcanic marker horizon.

At Kostenki 1 (Poljakov) and Kostenki 14 (Markina Gora) the Aurignacian is placed above the Sungir'-Streleckian.

The working-technique and the typology of the stone artifacts are closely related to the Late Middle Palaeolithic of this region. This applies to flake cores, leaf points and Keilmesser (bifacially shaped knives) including Volgograd knives from Kostenki 1-V (Poljakov) and Kostenki 14-IVb (Markina Gora), and side scrapers. The triangular, bifacially worked Sungir' points, a Leitform of the Sungir'-Streleckian, also have Middle Palaeolithic roots.

Upper Palaeolithic elements are blade cores and crested blades, bladelet cores often in burin-technique, and short end scrapers. This Typenspektrum is very uniform, almost monotonous.

Artifacts of bone, antler, and ivory are only preserved at Kostenki 14-IVb (Markina Gora) and Sungir'. The ivory lances and spears and other ivory items from the Sungir' burials are unique. This is also the case with the approximately 15 000 ivory beads from Sungir' which originally ornamented the clothing.

Perforated slate-pebbles from Sungir' were perhaps originally painted. Their importance is underlined by the presence of one such perforated pebble in the man's and each of the two children graves.

From Kostenki 14-IVb (Markina Gora) comes a representation of a human head made of ivory. Four ivory animal figurines with wavy outlines from Sungir' could be the precursors of the ivory figurines of the Swabian Aurignacian.

férieur) un deuxième sol (humus supérieur) (Fig. 2). Dans la région de Kostenki ces deux sols sont séparés par les cendres d'une éruption volcanique à ignimbrite de la région de Naples, qui sont datés par  $^{40}\text{Ar}/^{39}\text{Ar}$  vers 39000 cal BP (D. M. Pyle, G. D. Ricketts et al. 2006).

A Kostenki 1 (Poljakov) et à Kostenki 14 (Markina Gora) le Sungir-Streleckien est surmonté par une couche aurignacienne (Kostenki 1-III ; Kostenki 14-III ; Fig. 2 ; 13). Au dessus se trouve un niveau de la Culture de Kostenki-Avdееvo (Kostenkien) (Kostenki 1-I ; Kostenki 14-I) qui est célèbre pour les grandes structures d'habitat et les statuettes féminines de Kostenki 1 (P.P.Efimenco 1958).

## Industrie lithique

L'industrie lithique du Sungir-Streleckien se caractérise par de nettes traditions du Paléolithique moyen (A.N. Rogačev et M.V.Anikovič 1984). Cela concerne les nucléus à éclats (Fig. 3), les racloirs simples (Fig. 4), et

surtout les outils à retouche bifaciale comme les bifaces de Kostenki 1-V (Poljakov) et Kostenki 6 (Streletska) (Fig. 9,7 ; 10, 10), les Keilmesser (couteaux à retouche bifaciale) de type Volgograd de Kostenki 1-V (Poljakov) et de Kostenki 14-IVb (Markina Gora) (Fig. 9, 6 ; Fig. 14, 2) ou les Blattspitzen (pointes foliacées) de Sungir et Kostenki 12-III (Volkov) (Fig. 5, 12-13; 12,14). Les pointes triangulaires bifaciales ont aussi leur racines dans le Paléolithique moyen (A.N.Rogačev 1968 ; O.N. Bader 1978, 226 ; B. A. Bradley, M. Anikovich et E. Giria 1996). Elles sont de véritables marqueurs chrono-culturels du Sungir-Streleckien, et j'aimerais les nommer pointes de Sungir. Elles se trouvent sur tous les sites – Sungir (Fig. 5), Kostenki 1-V (Poljakov) (Fig. 9, 1-2, 4-5), Kostenki 6 (Streletska) (Fig. 10, 1-3), Kostenki 11-V (Anosovka 2) (Fig. 11, 1-2), Kostenki 12-III (Volkov) (Fig. 12, 7-8), Garči I (Fig. 16), Birjuč'ja Balka 2 (Fig. 17, 6-19), Vis (Fig. 18, 1. 6. 8) et manquent (encore) seulement à Kostenki 14-IVb (Markina Gora).

M. V. Anicovič (2005) a proposé une subdivision du Sungir-Streleckien basée sur les pointes de Sungir (Fig. 19). Au début (phase IV) il y a des pointes de grandeur moyenne avec une base concave. Les sites concernés sont Kostenki 6 (Streletska) et Kostenki 12-III (Volkov).

La phase suivante (III) présente des pointes de type et dimensions différentes sur les sites Kostenki 1-V (Poljakov), Kostenki 11-V (Anosovka 2) et Garči I.

La phase postérieure (II) est caractérisée par des pointes allongées avec une base droite et se trouve seulement à Birjuč'ja Balka.

Dans la dernière phase (I) on trouve les mêmes pointes à base concave qu'au début (phase IV) et aussi des pointes allongées à base droite comme dans la phase II. Ces pièces se rencontrent à Sungir.

Aujourd'hui il semble difficile d'accepter cette subdivision. P. Ju. Pavlov (2010, 28) a déjà parlé de l'impossibilité de placer l'industrie lithique de Garči I dans ce système parce que tous les types de pointes y coexistent.

En réalité la subdivision des pointes de Sungir par M. V. Anikovič n'est pas du tout basée sur la typologie des pointes mais sur les dates 14C (M. V. Anicovič 2005, tab. p. 40). S'il y a des nouvelles dates il faut changer le système. Une nouvelle date de 45561±969 place maintenant Kostenki 1-V (Poljakov) au début (phase IV)

et des dates autour de 30 000 BP placent Sungir et Birjuč'ja Balka dans la phase II. En conséquence la phase finale (I) n'existe plus.

Les éléments du Paléolithique supérieur consistent en quelques nucléus à lames et lames à crête (Fig. 6). On note également des burins, surtout d'angle sur cassure, qui sont vraisemblablement des nucléus à lamelles (Fig. 7, 2-13) et des grattoirs courts (Fig. 8) qui sont aussi caractéristiques du début du Paléolithique supérieur en Europe centrale.

Il s'agit d'une gamme de types homogène, presque monotone.

Une particularité de Sungir réside dans de petits éclats spécialement fabriqués pour servir de crochets (barbelures) sur les parties distales des lances en ivoire ou en bois végétal (Fig. 7, 1). Pour ces petits éclats il faut de petits nucléus spéciaux.

A noter que dans le Sungir-Streleckien les outils du Paléolithique supérieur moyen comme les lamelles à dos, les pointes de La Gravette ou les pointes à cran sont complètement absentes. Pourtant quelques auteurs parlent pour Sungir du Mid Upper Palaeolithic (Eastern Gravettian) (!) sur la base de dates 14C.

## Les sépultures de Sungir'

A Sungir il y a deux fosses de sépultures qui sont si profondes qu'elles traversent

le sol interstadaire. Les squelettes humains et les éléments osseux qui les accompagnent se trouvent dans un limon calcaire et sont donc bien conservés.

D'après l'étude anthropologique (T. I. Alekseeva et N. O. Bader 2000 ; E. Trinkaus, A. P. Buzhilova et al. 2014) il s'agit dans la tombe 1 d'un homme de 35-45 ans (Fig. 20,1). Physiquement robuste, il mesurait 1,80 m (G.F. Debec 2000 ; A. P. Bužilova, M. V. Kozlovskaya et M. B. Mednikova 2000).

L'enfant le plus âgé de la deuxième tombe était un garçon de 11-13 ans (Fig. 20, 2), l'enfant le plus jeune (Fig. 20, 3) avait un âge de 9-10 ans et était peut-être une fillette (A. A. Zubov 2000 ; M. B. Mednikova, A. P. Bužilova et M. V. Kozlovskaya 2000).

Dans la partie supérieure de la fosse de la deuxième sépulture se trouvait une quatrième tombe, d'un adulte, cette fois dans le sol (zone d'humus) et très mal préservée (G. Bosinski 2015).

En plus il y a des os humains isolés (E. Trinkaus, A. P. Buzhilova et al. 2014).

L'équipement des sépultures était différent. À côté des enfants il y a des lances et des javelots en ivoire, os et bois végétal (O. N. Bader 1998). La tombe de l'homme ne comportait pas d'armes, et deux massues en bois de renne proviennent de la quatrième tombe, au-dessus des enfants..

L'homme et les deux enfants des tombes de Sungir se rapportaient à l'Homo sapiens ancien. Le fragment de couronne dentaire de Kostenki 14-IV (Markina Gora) appartenait aussi à cette forme humaine (A.A.Sinicyn 2015b).

## Industrie osseuse

En raison des conditions de préservation l'industrie osseuse se rencontre essentiellement à Sungir et surtout dans les fosses des sépultures. Il y a quelques autres exemples à Kostenki 14-IV b (Markina Gora).

D'abord il faut parler du travail de l'ivoire. Les deux grandes lances à côté des deux enfants témoignent d'un

savoir-faire impressionnant pour extraire et redresser des baguettes d'ivoire (G.A.Chlopačev 2006; G.A. Chlopačev et E. Ju. Girja 2010). La lance à côté du garçon a une longueur de 2,42 m et était sûrement trop lourde pour un enfant de 11-13 ans.

La lance à côté de fillette de 9-11 ans a une longueur 1,66 m et elle ne pouvait pas non plus l'utiliser.

A part les lances et les javelots il faut aussi mentionner des « poignards », des bâtons percés, des anneaux, des pendentifs et aussi des œuvres d'art (statuettes) en ivoire.

Le bois de renne est moins travaillé. Dans la tombe au-dessus de la sépulture des enfants il y a deux massues (haches de Lyngby) en bois de renne (G. Bosinski 2015).

A mentionner sur les ramures l'absence d'extraction de baguettes par rainurage si caractéristique pour le Paléolithique supérieur moyen et récent.

Dans la sépulture des enfants se trouvent quelques sa-gaies et un javelot en os.

## Parure et art

La parure est représentée par des coquilles (*Gryphaea*) perforées, des bélemnites, des canines de renard polaire et de loup. Plus de 15 000 perles en ivoire ornaient principalement des vêtements (O. N. Bader 1998 ; R. White 1999).

Une vingtaine de galets plats en schiste portent une perforation, qui se trouve souvent à côté de l'axe de symétrie de la pièce. Ces galets étaient peut-être peints à l'origine. L'importance de ces objets est soulignée par leur présence dans les tombes. Un tel galet se trouve dans chaque sépulture, celle de l'homme, celle du garçon et celle de la fillette (Fig. 20).

A Kostenki 14-IVb (Markina Gora) on a trouvé une tête humaine en ivoire (A.A.Sinitsyn 2012).

De Sungir proviennent quatre statuettes en ivoire représentant deux chevaux (?), un bovidé et un mammoth (Fig. 21). Avec leur contours imprécis et des rangées de cupules sur un « cheval » ils semblent les précurseurs des statuettes aurignaciennes du Jura Souabe (G. Bosinski 2013 ; sous presse).

## Datation

Les sites du Sungir-Streleckien se placent partout au sommet d'un sol interstadaire (zone d'humus). Vu l'unité de trouvailles et une gamme de types identique, ce sol doit être toujours le même.

Dans la région de Kostenki au-dessus de cette zone d'humus (inférieure) il y a un horizon de cendres volcaniques daté vers 39000 cal BP. Cela signifie que le sol en-dessous s'est formé dans le grand interstade weichselien (IS 12 – 14) et le Sungir-Streleckien date peut-être du IS 12 (Hengelo) (Fig. 22). Dans une publication récente on parle même de Glinde et Moershoofd (IS 14 et 16 ?) (G.M.Levkovskaya, L.S.Shumilovskikh et al. 2015).

Cette période se trouve à la limite des possibilités des datations 14C. Cela explique vraisemblablement la diversité des dates 14C, qui sont quelques fois plus jeunes que les cendres volcaniques au-dessus. C'est la même situation comme avec les dates 14C pour la fin du Paléolithique moyen et l'Aurignacien en Jura Souabe (N.J. Conard et M. Bolus 2008).

A Kostenki 12-III (Volkov). Au moins une date de 41506+/-314 cal. BP (J. F. Hoffecker, V. T. Holliday et al. 2008, tab. 2) est plus ancienne que les cendres. Les deux dates de Kostenki 14-IVb (Markina Gora) de 41378+/-269 et 41631+/-301 cal. BP (J. F. Hoffecker, V. T. Holliday et al. 2008, tab.2) sont aussi un peu plus anciennes que les cendres. À mon avis une nouvelle date de 45561+/-969 cal. BP pour Kostenki 1-V (Poljakov) (lettre de Andrej Sinitsyn du 27.06.2015) est la plus vraisemblable.

Les sites en dehors de la région de Kostenki où le marqueur des cendres volcaniques manque posent problème.

À Birjuč'ja Balka 2, horizon 3, on a des dates entre 31135+/-362 et 35398+/-417 cal. BP (M. Otte, A. E. Matyukhin et D. Flas 2006) et pour Garči I de 33164+/-737 cal. BP (P. Ju. Pavlov 2010). À Sungir il y a environ 35 dates entre 14600 et 30000 BP, dont

les dernières pour l'homme sont de 33326+/-518 cal. BP (S. Nalavade-Chavan, J. McCullagh et R. Hedges 2014), pour les enfants 34166+/-488 et 34290+/-426 cal. BP et pour un os de mammoth 34300+/-311 cal. BP (A. Marom, J. McCullagh et al. 2012).

Je soupçonne, que ces dates comme quelques dates dans la région de Kostenki sont trop jeunes.



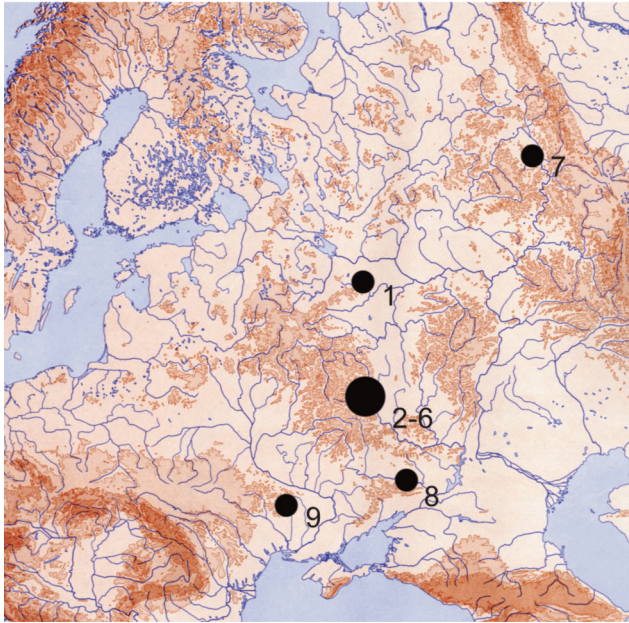


Figure 1: La répartition du Sungir'-Streleckien.

- 1 Sungir' (O.N.Bader 1978; 1998)
- 2 Kostenki 1-V (Poljakov) (A.N.Rogačev 1957; M.V.Anikovič, V.V.Popov et al. 2006)
- 3 Kostenki 6 (Strelecka) (A.N.Rogačev 1957; N.D.Praslov et A.N.Rogačev 1982)
- 4 Kostenki 11-V (Anosovka 2) (A.A.Veličko et A.N.Rogačev 1969; N.D.Praslov et A.N.Rogačev 1982)
- 5 Kostenki 12-III (Volkov) (N.D.Praslov et A.N.Rogačev 1982; M.V.Anikovič, J.F.Hoffecker et al. 2005 ; G.M.Levkovskaya, L.S.Shumikovskikh et al. 2015)
- 6 Kostenki 14-IVb (Markina Gora) (A.A.Sinicyn 2015b; A.A.Sinicyn, J.F.Hoffecker et al 2004)
- 7 Garci I (P.Ju.Pavlov 2010)
- 8 Birjuc'ja Balka 2, horizon 3 (M.Otte, A.E.Matyukhin et D.Flas 2006)
- 9 Vis' L.L.Zaliznjak, M.M.Belenko et al. 2008)

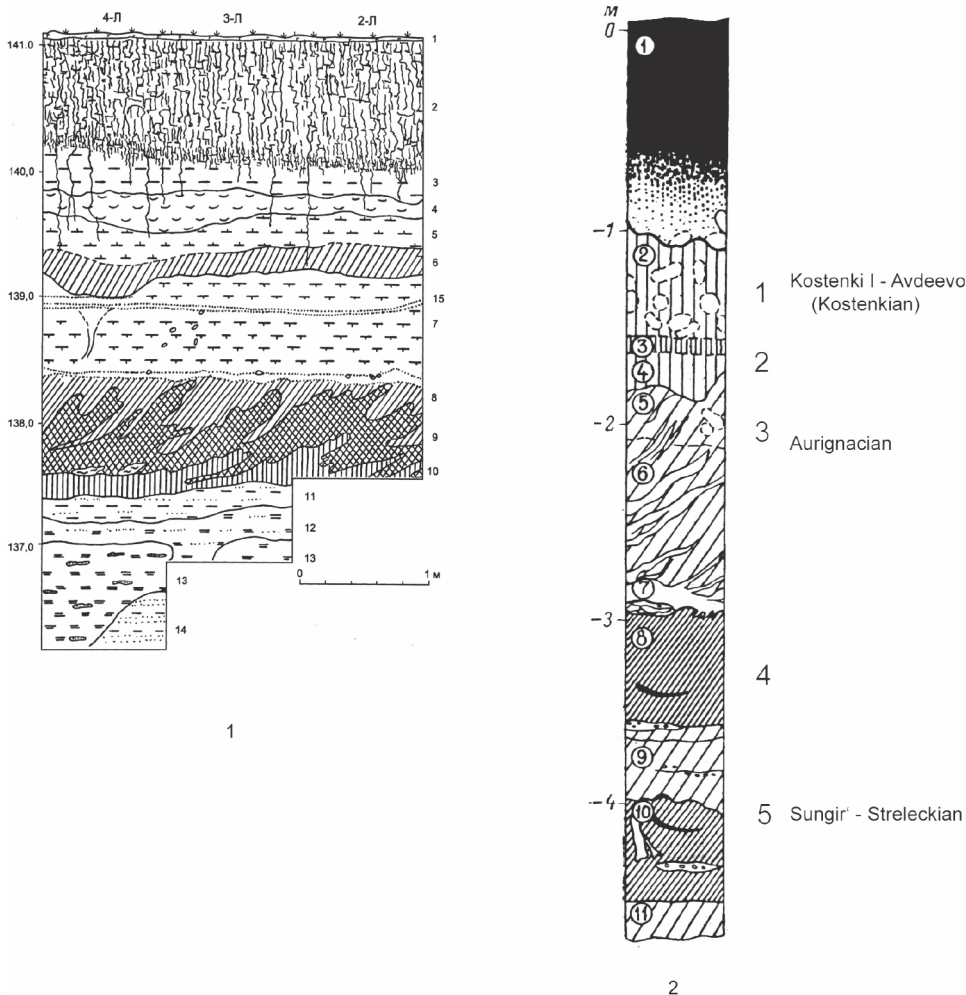


Figure 2: Sections de Sungir' (1) et Kostenki 1 (Poljakov) (2). D'après N.O, Bader et L.A. Michajlova 1998 (1) et. N.D.Praslov et A.N.Rogačev 1982 (2).

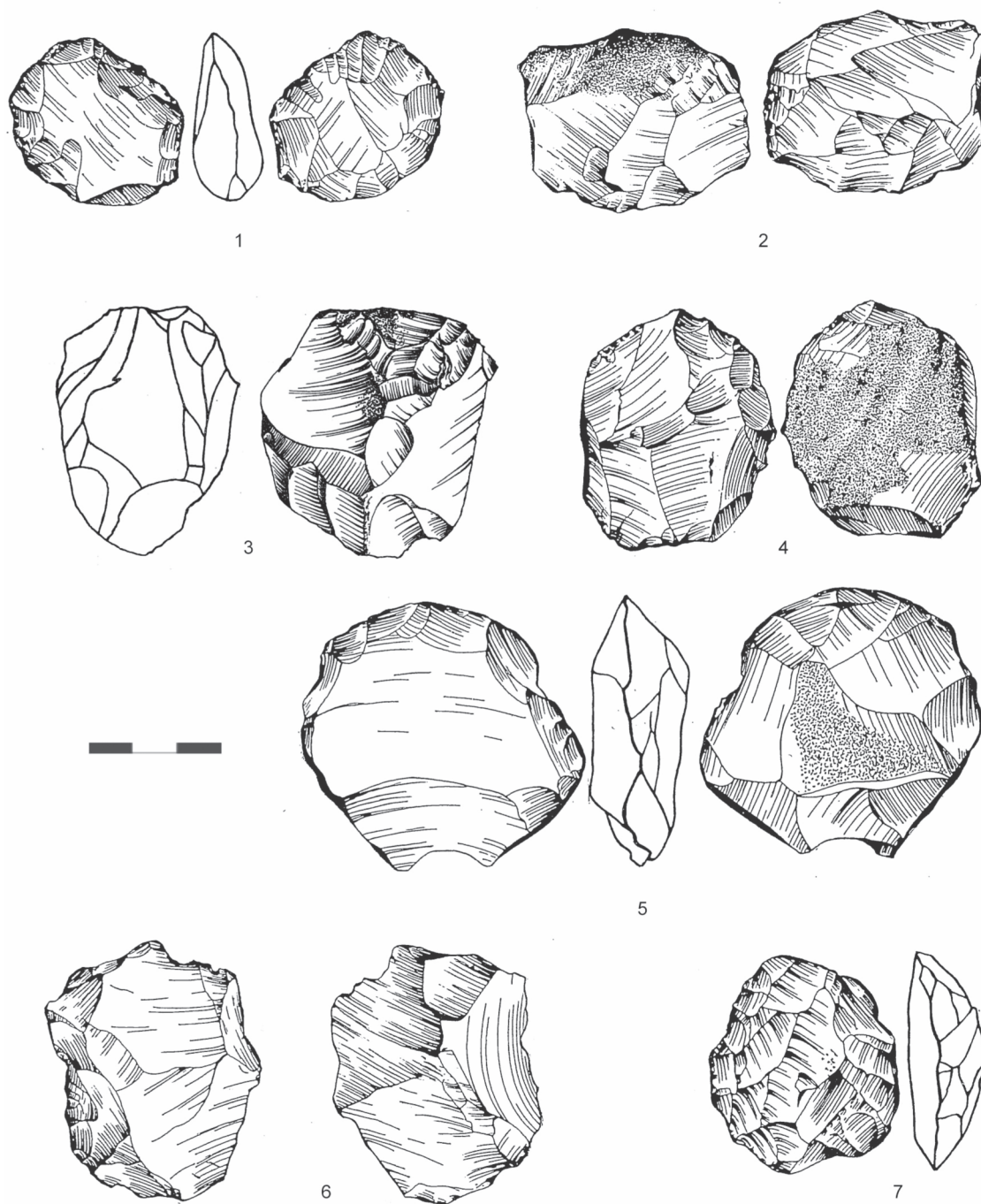


Figure 3: Sungir'. Nucleus à éclats. D'après O.N. Bader 1966 (3); 1978 (1-2, 4-7).

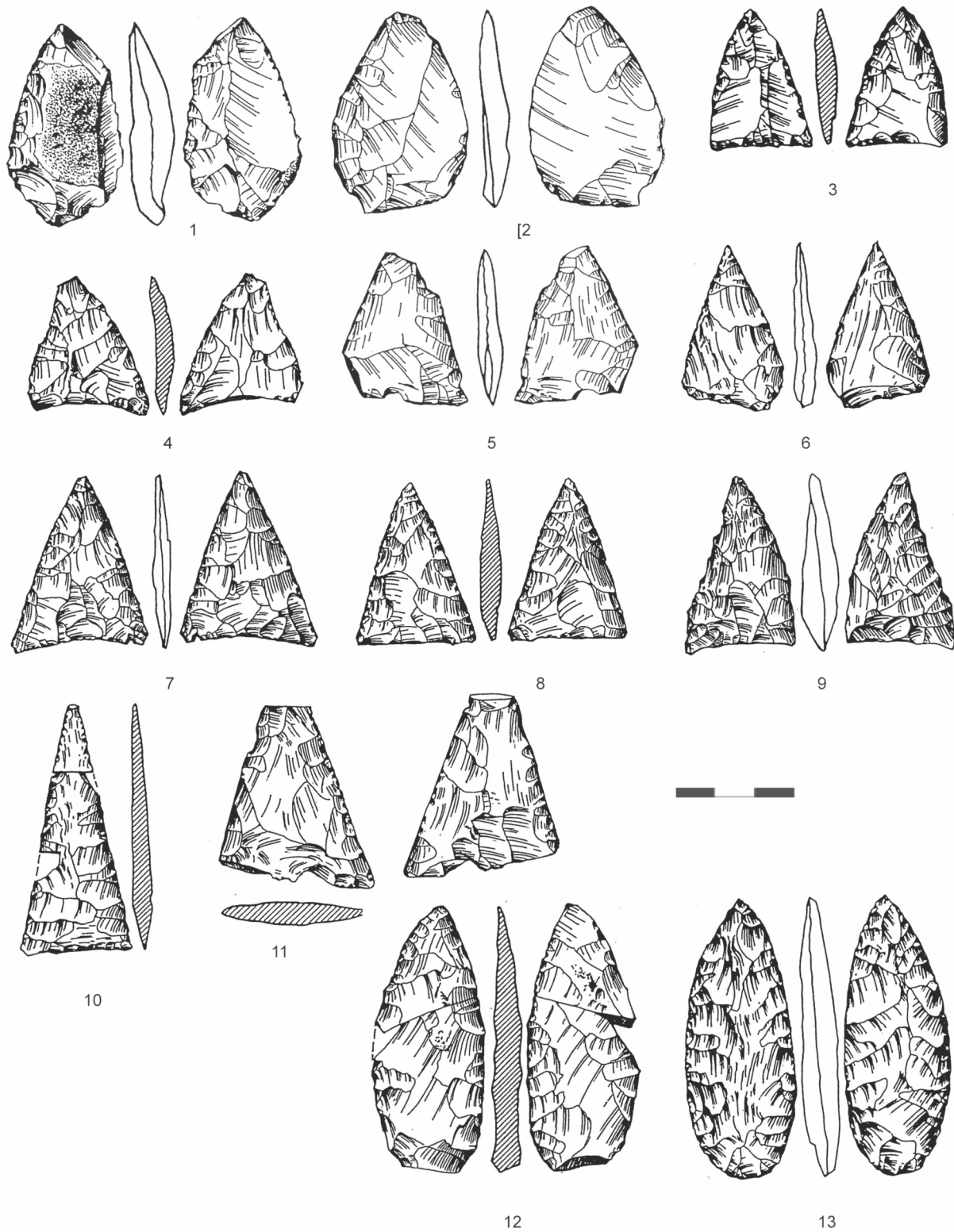


Figure 4: Sungir'. Racloirs simples. D'après O.N.Bader 1978.

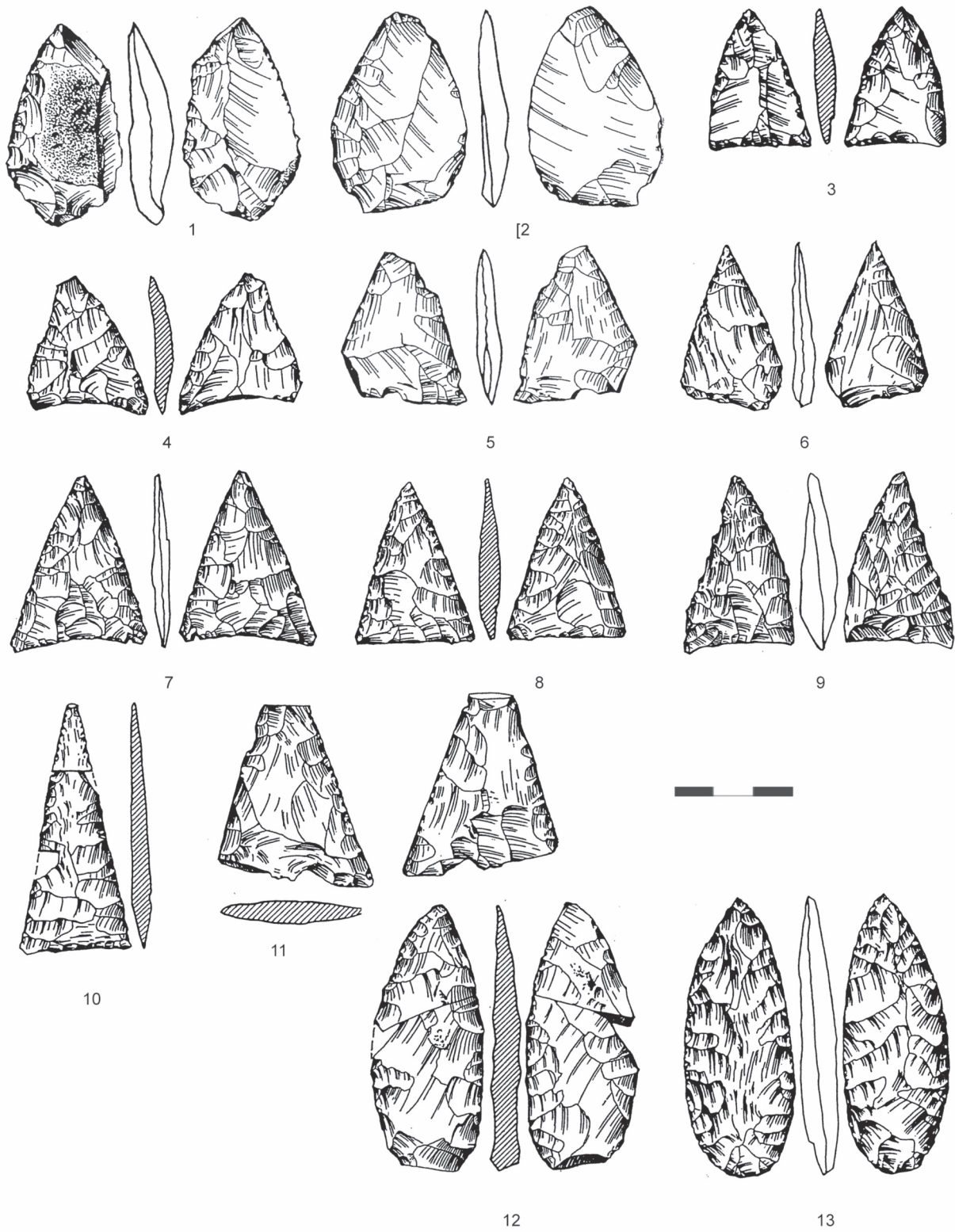
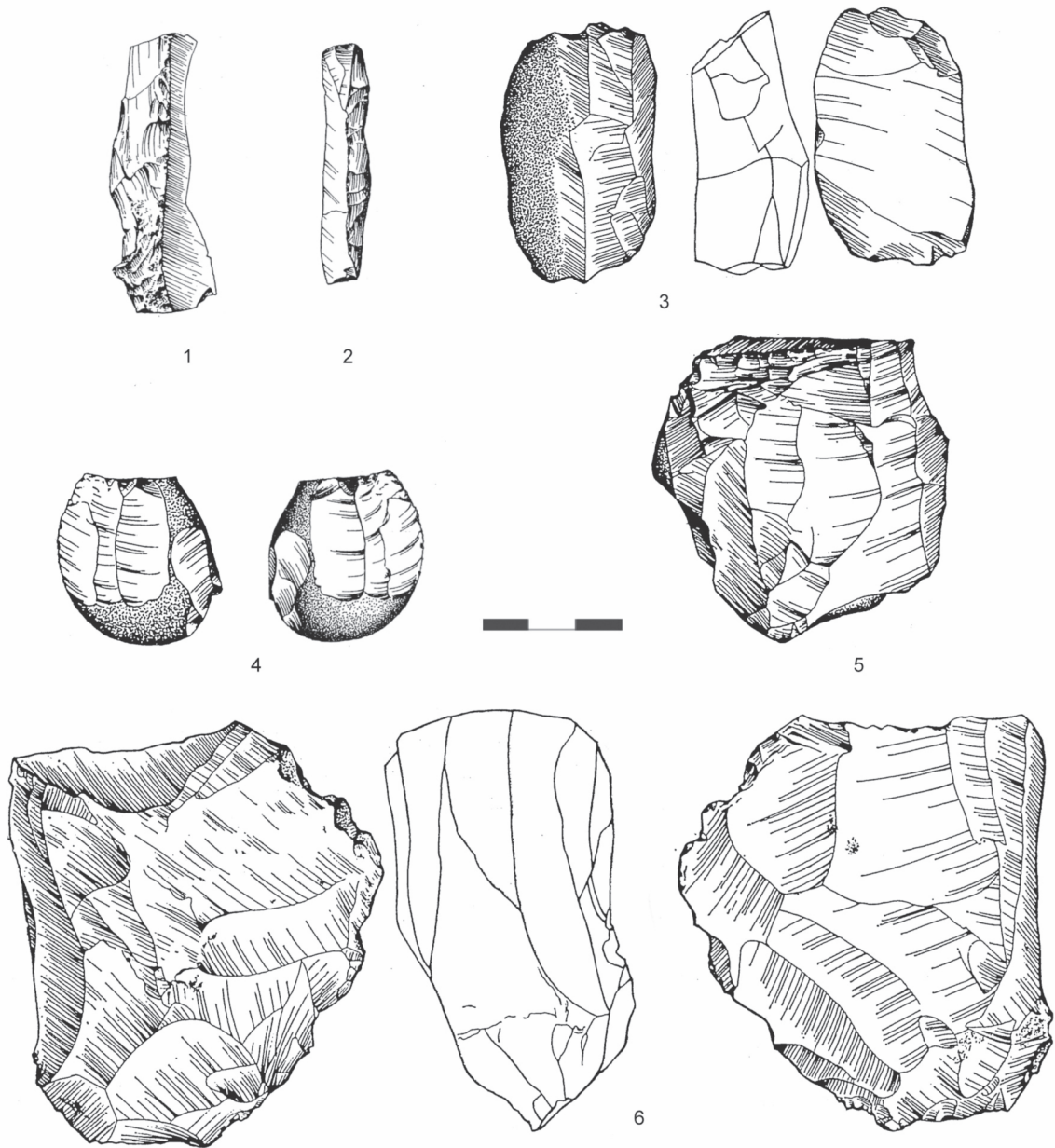
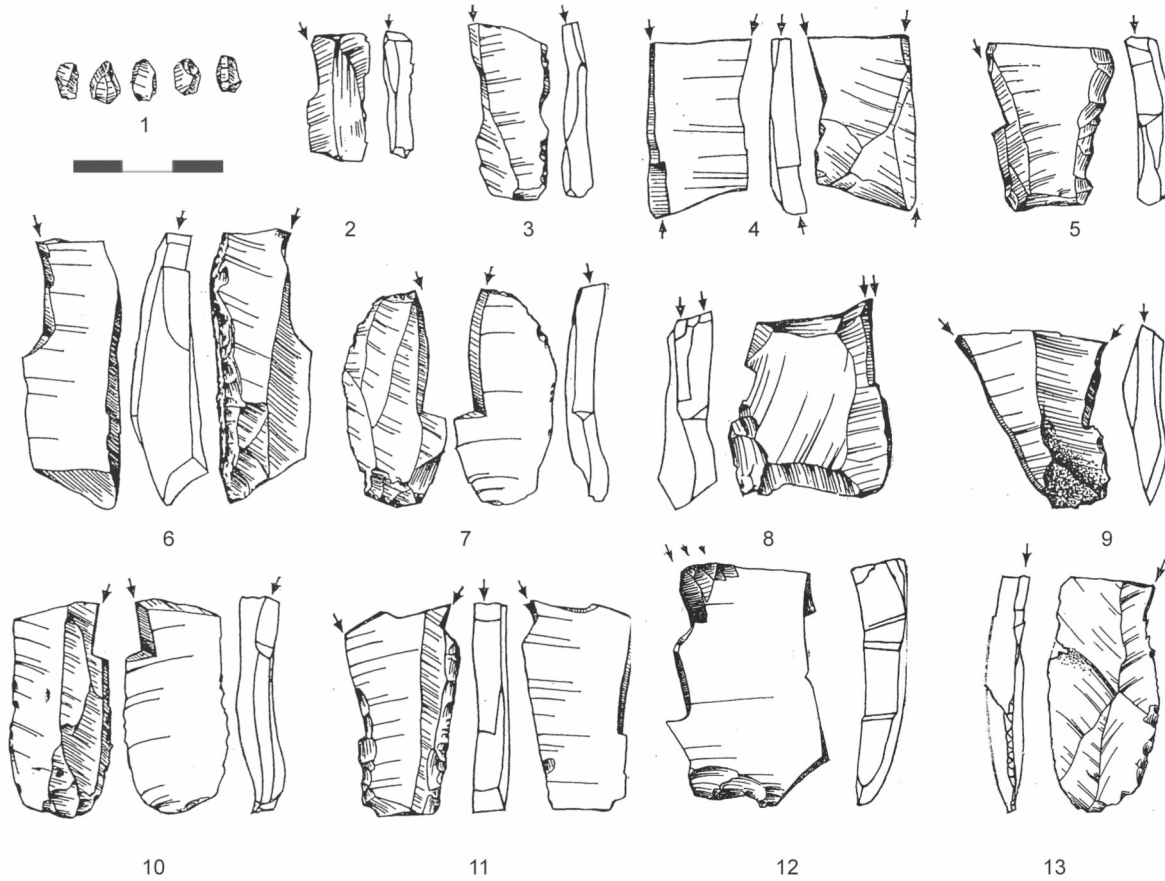


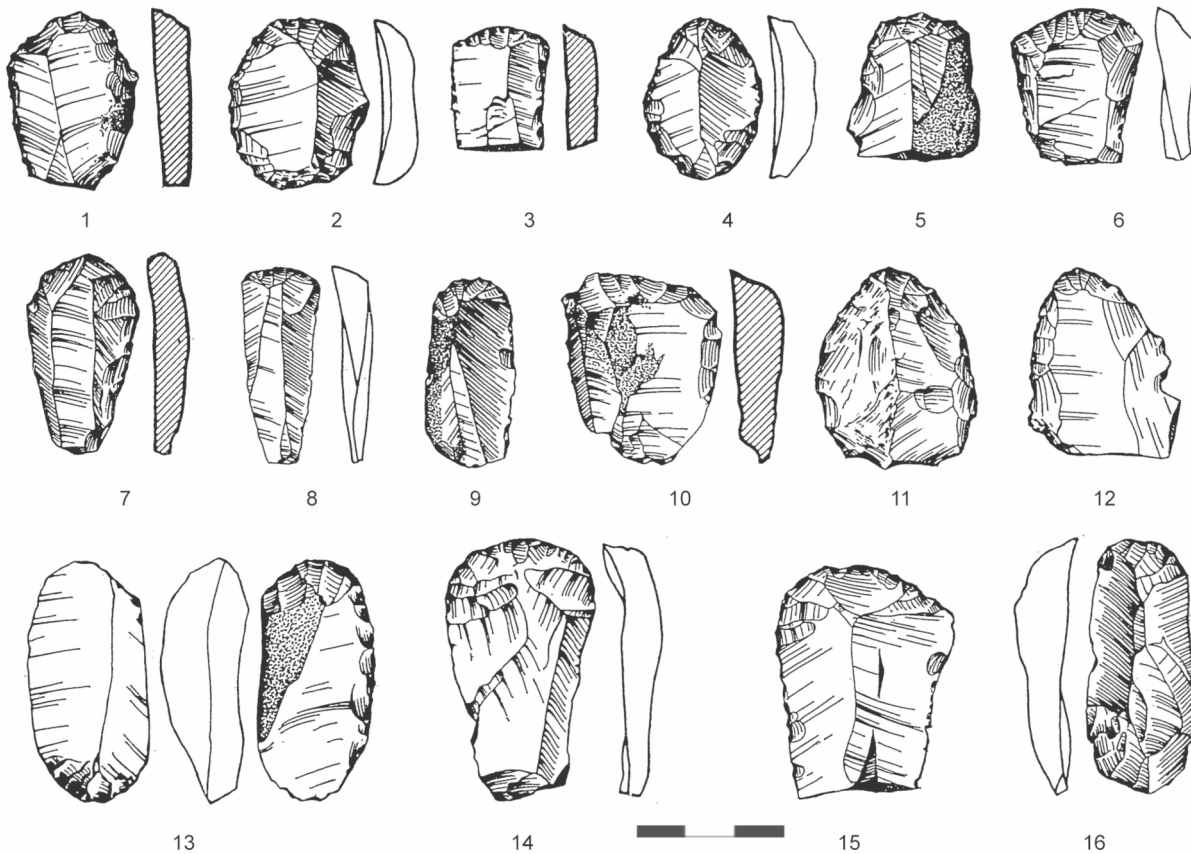
Figure 5: Sungir'. 1-2 Ebauches de Pointes de Sungir'. 3-11 Pointes de Sungir'. 12-13 Pointes foliacées.. D'après O.N.Bader 1978.



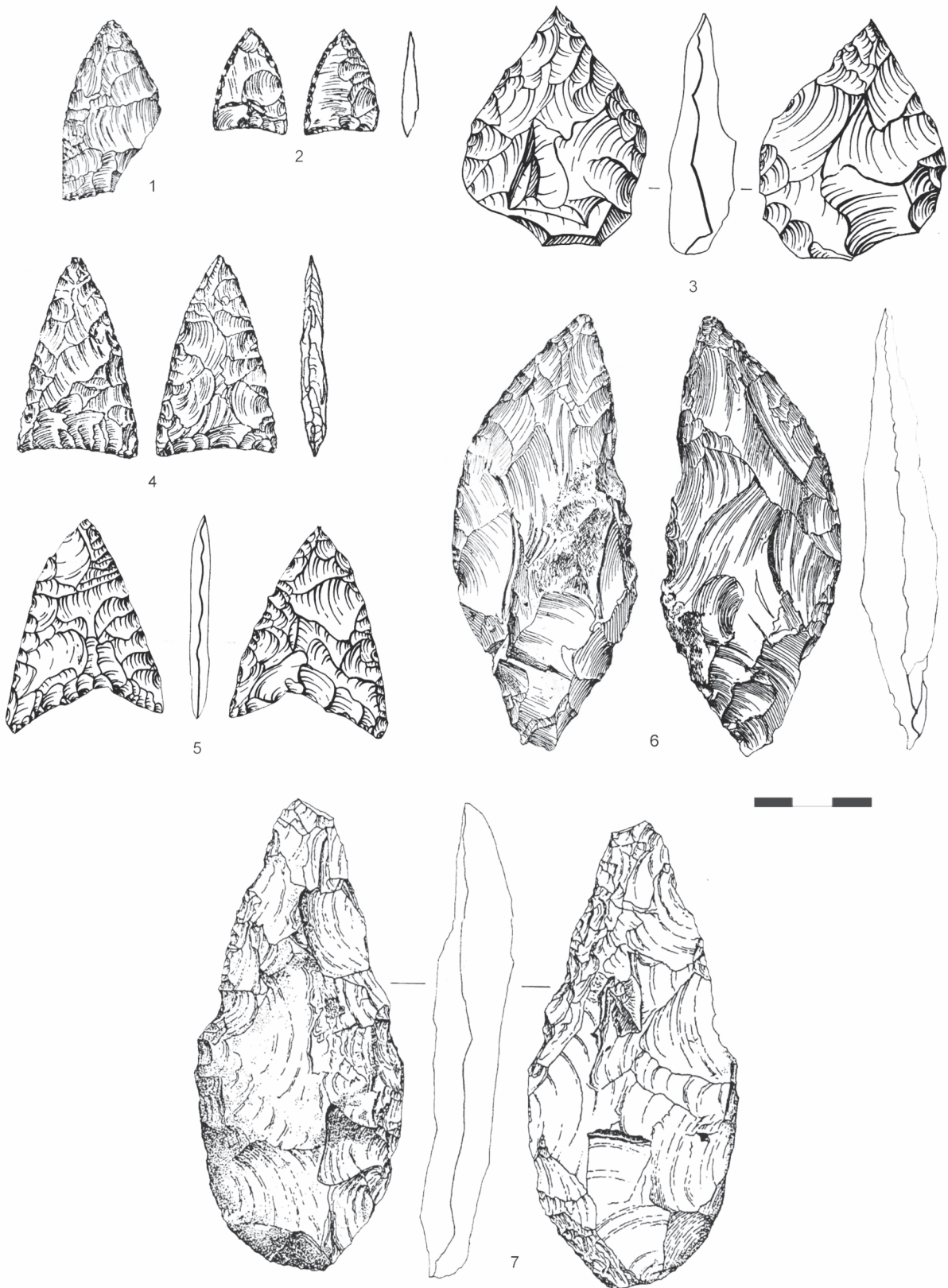
*Figure 6: Sungir'. 1-2 Lames à crête, 3-6 Nucleus à lames. D'après O.N.Bader 1966 (1-2.4); 1978 (3.5-6).*



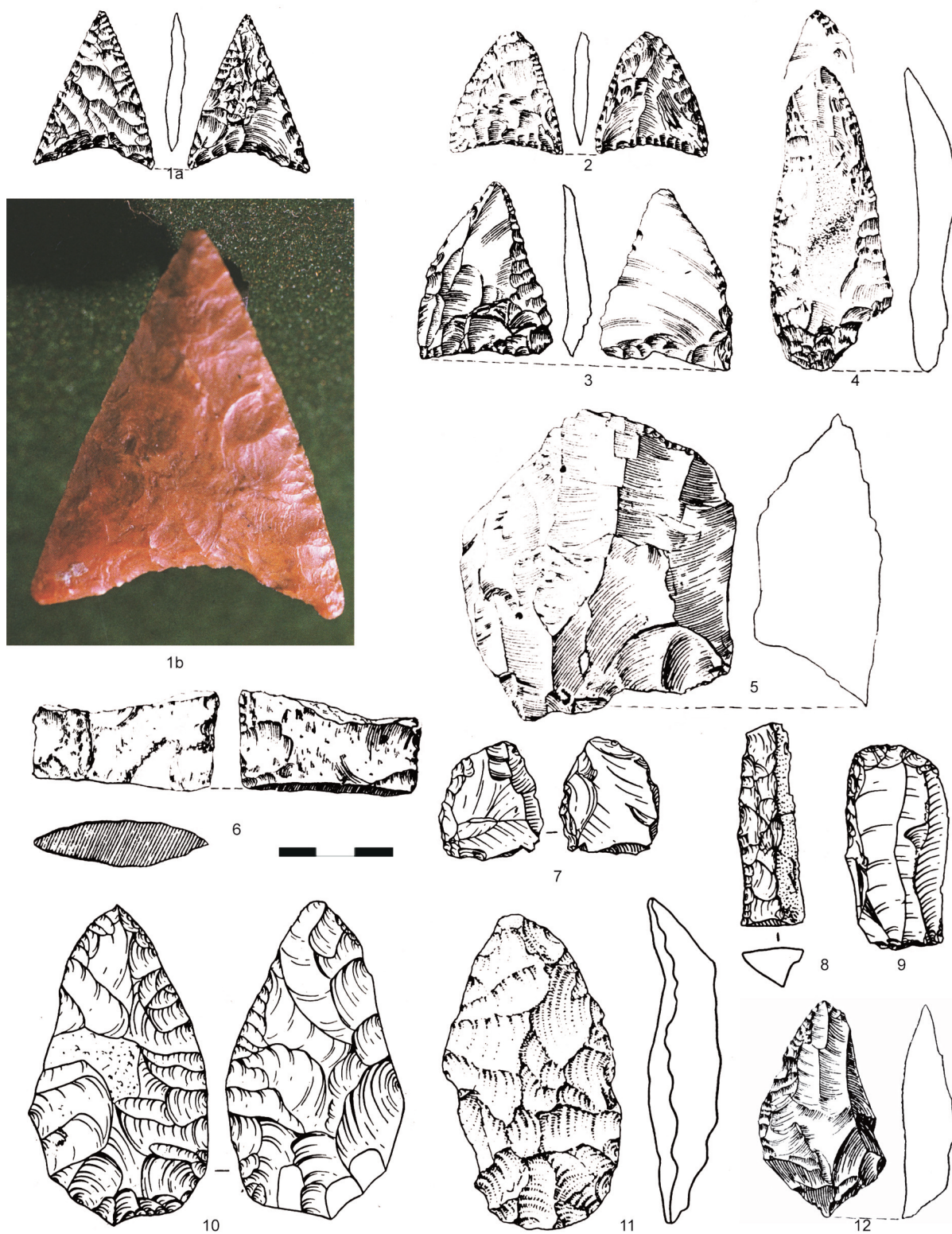
**Figure 7:** *Sungir'*. 1 Pétits éclats d'une succession de 49 c rochets (barbelures) dans la partie distale d'une lance en ivoire de la tombe du garçon. Ces éclats de silex brunâtre viennent d'une nodule. 2-13 Burins sur cassure, vraisemblablement nucléus à lamelles. D'après O.N.Bader 1978.



**Figure 8:** *Sungir'*. Grattoirs courts. D'après O.N.Bader 1978



**Figure 9:** *Kostenki 1-V (Poljakov). . 1-2, 4-5 Pointes de Sungir'. 3 Ebauche d'une Pointe de Sungir..6 Keilmesser type Volgograd. 7 Biface. D'après A.N.Rogačev 1957 (1-2, 4, 6), A.N.Rogačev et M.V.Anikovič 1984 (3, 5), M.V.Anikovič, V.V.Popov et al. 2006 (7).*



**Figure 10:** Kostenki 6 (Strelecka). 1-3 Pointes de Sungir'. 4 Pointe de type du Paléolithique moyen. 5 Nucleus à lames. 6 Fragment d'un outil bifaciale. 7 Pièce esquillée. 8 Lame à crête. 9 Grattoir. 10 Biface. 11 Eclat retouché. 12 Racloir. D'après A.N.Rogačev 1957 (1a, 2-6, 12), N.D.Praslov et A.N.Rogačev 1982 (7-11), A.N.Rogačev et M.V.Anikovič 1984 (1b).



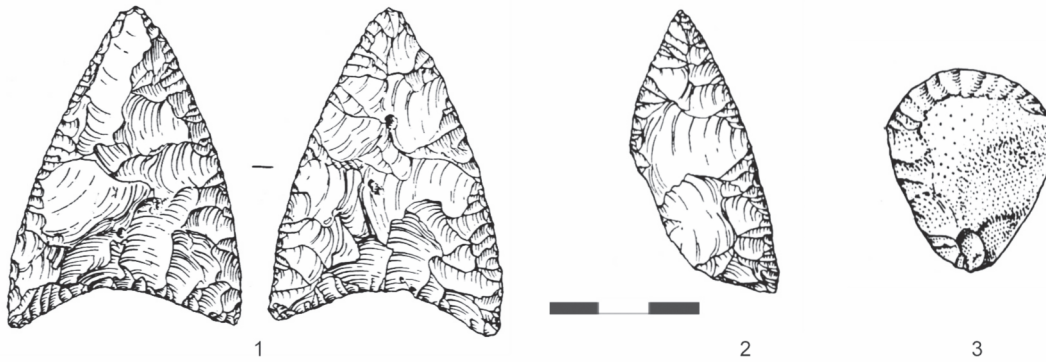


Figure 11: Kostenki 11-V (Anosovka 2) 1-2 Pointes de Sungir'. 3 Grattoir court. D'après N.D.Praslov et A.N.Rogačev 1982.

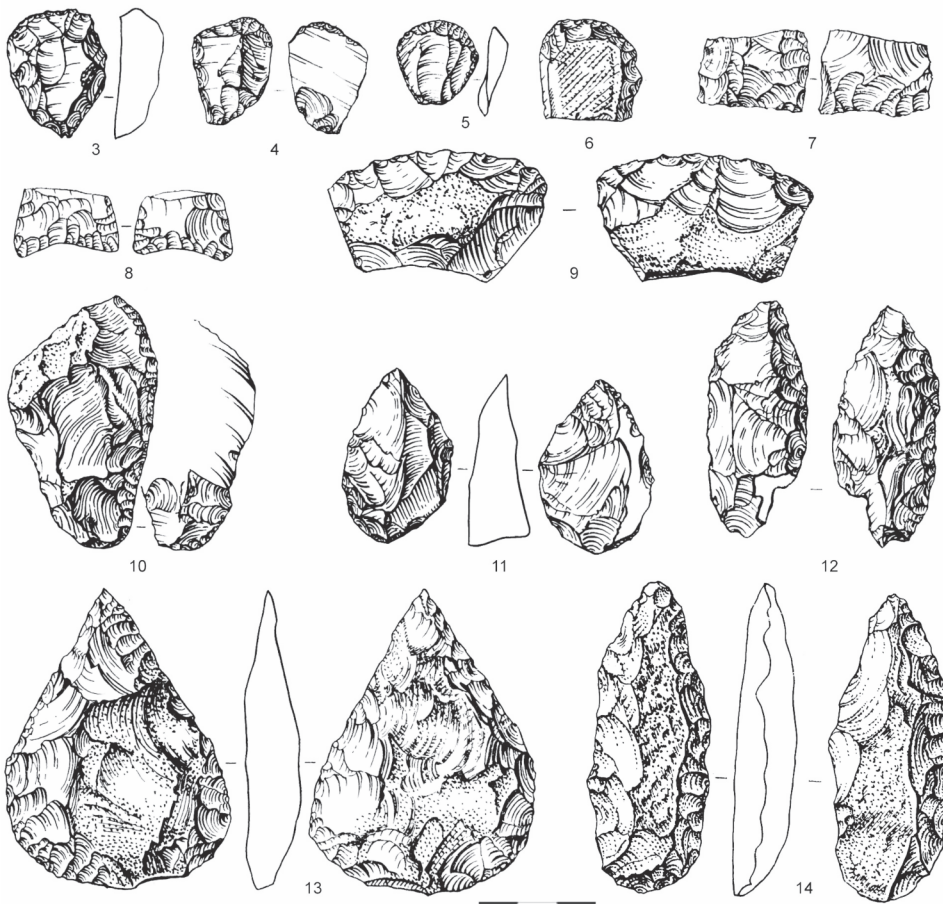
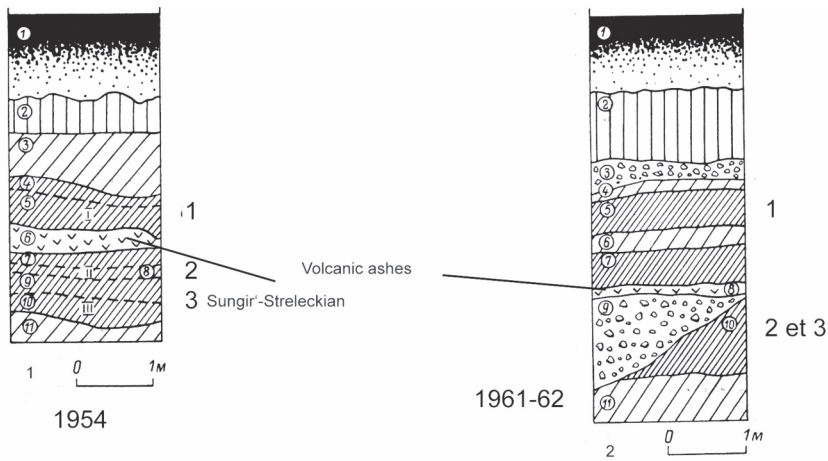


Figure 12: Kostenki 12-III (Volkov). 1-2 Pointes de Sungir'. 9 Racloir bifaciale. 10 Racloir simple. 11 et 13 Ebauches de Pointes de Sungir' (?). 12 et 14 Pointes foliacées. D'après N.D.Praslov et A.N.Rogačev 1982 (1-2), A.N. Rogačev et M.V.Anikovič 1984 (3-14).

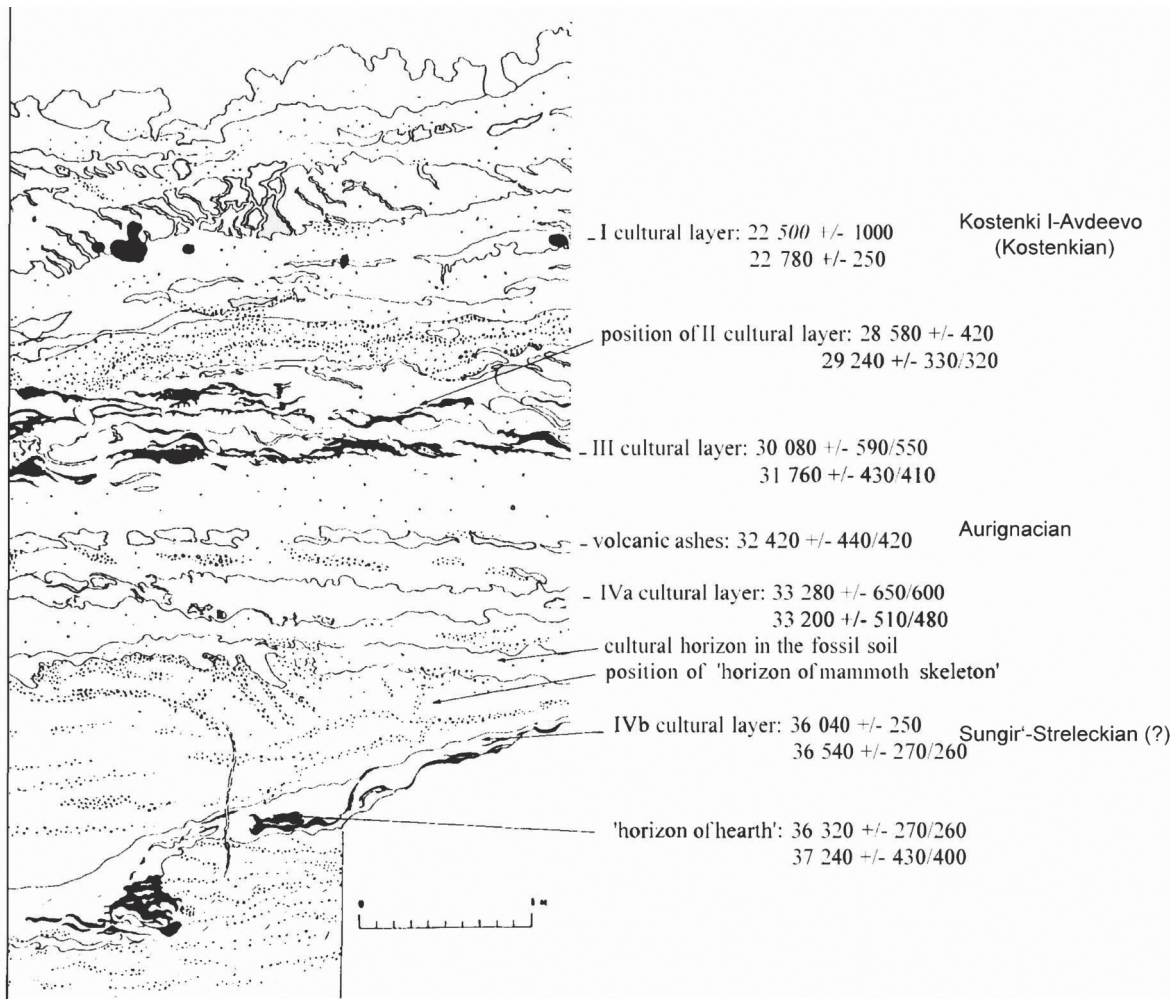
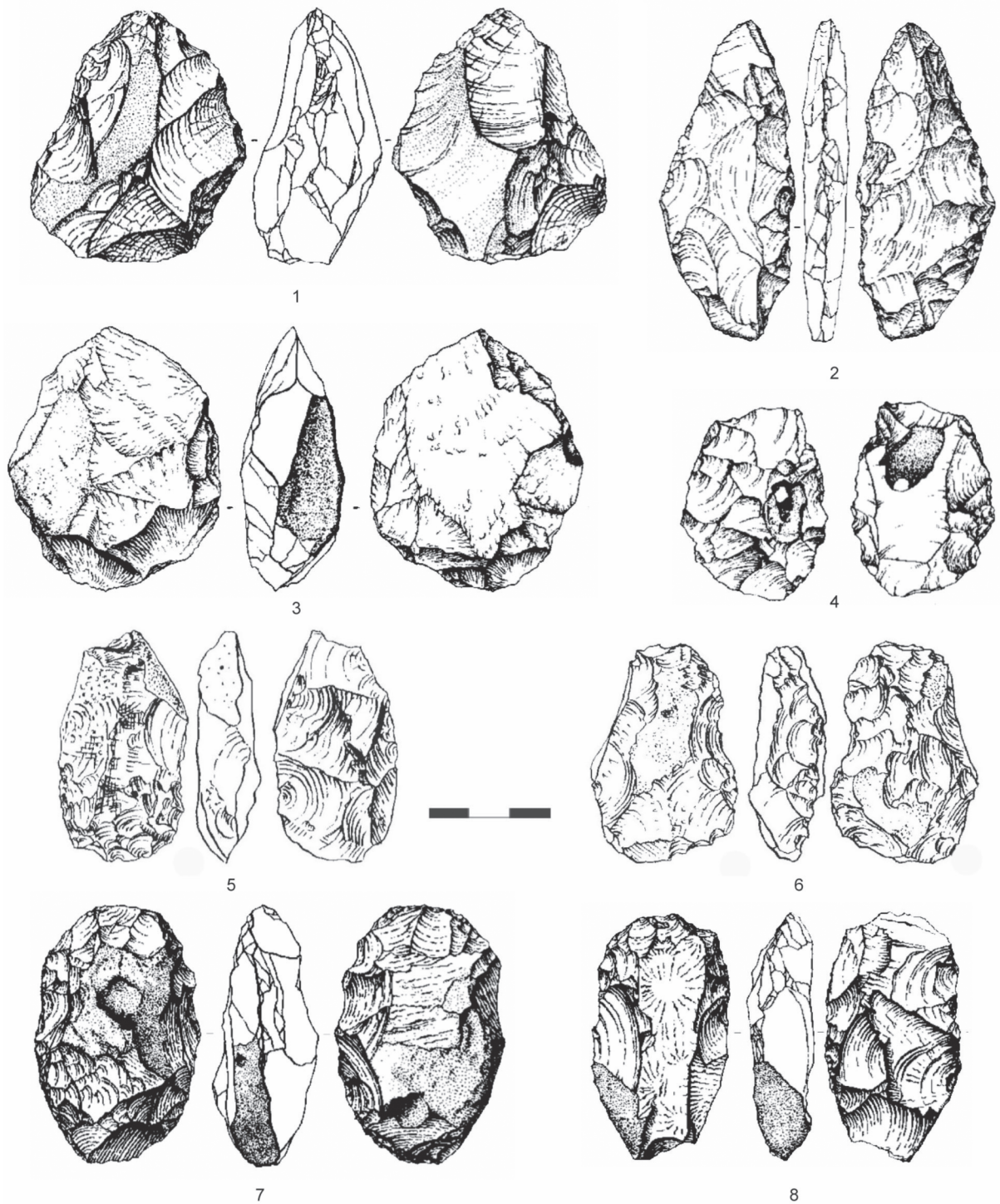
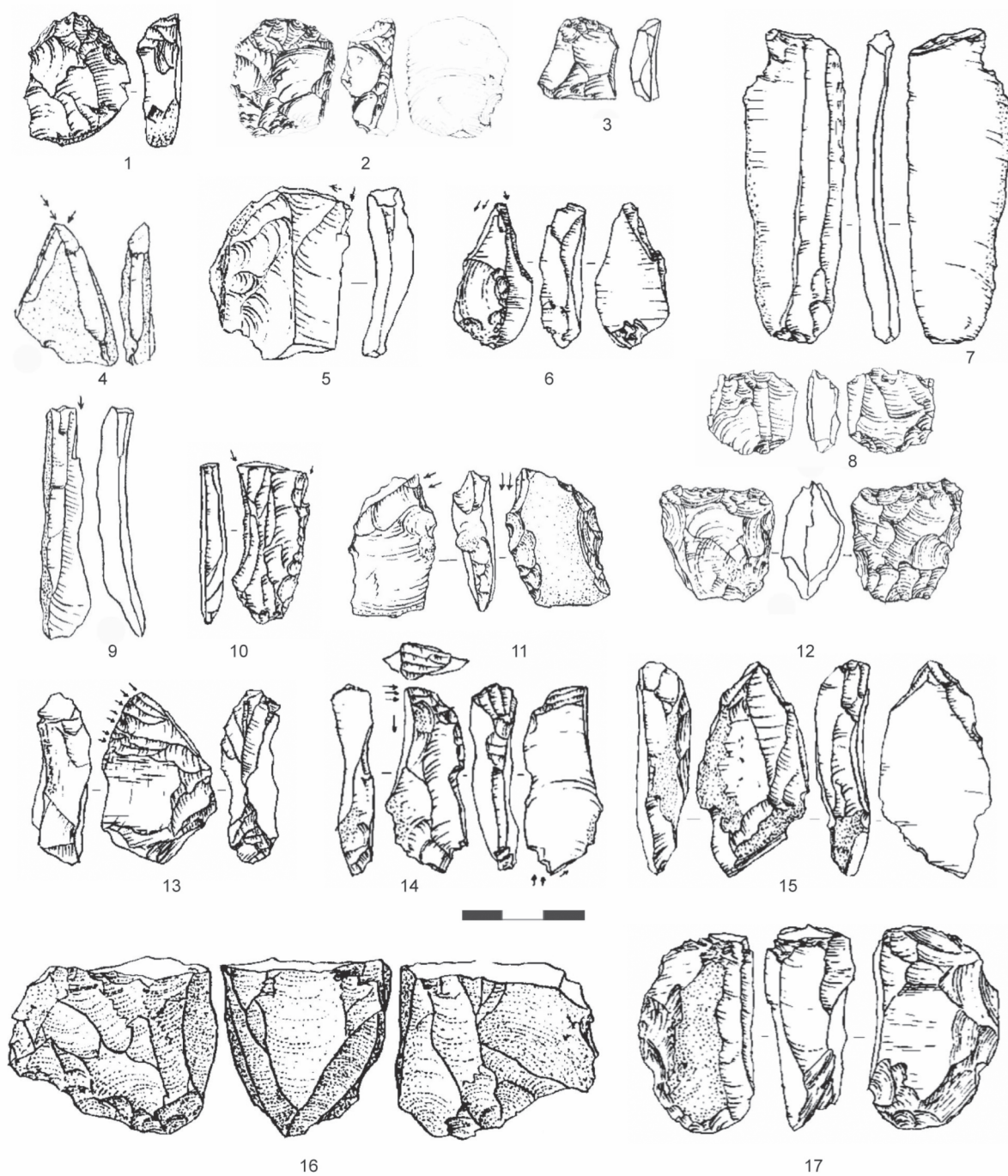


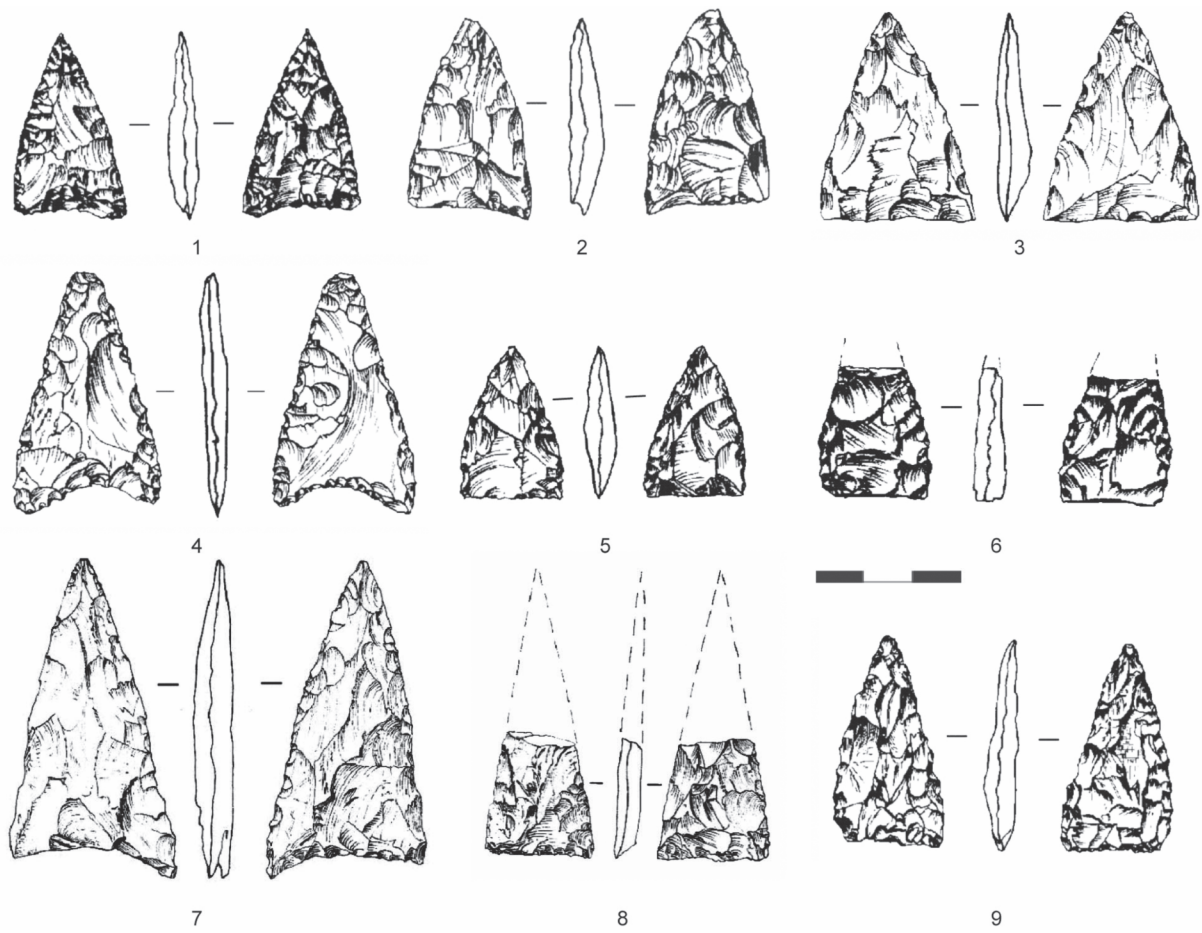
Figure 13: Kostenki 14 (Markina Gora). Position stratigraphique des niveaux archéologiques. D'après A.A. Sinitsyn 2004, modifié.



**Figure 14:** *Kostenki 14-IVb (Markina Gora). 1. 3 Ebauches de Pointes de Sungir' (?). 2 Keilmesser type Volgograd. 4-8 Artefacts bifacials. D'après A.A.Sinitsyn 2003b (5-6), A.A.Sinicyn 2015b (1-4; 7-8).*



**Figure 15:** Kostenki 14-IVb (Markina Gora). 1-3 Grattoirs courts. 4-6. 9-11. 13-15 Burins ou nucleus à lamelles. 8. 12 Pièces esquillées. 16-17 Nucleus à lames. D'après A.A.Sinitsyn 2003b (2-5 ; 8. 12. 16), A.A.Sinicyn 2015b (1 ; 6-7. 9-11. 13-15. 17).



*Figure 16: Garči I. Pointes de Sungir'. D'après P.Ju. Pavlov 2010.*

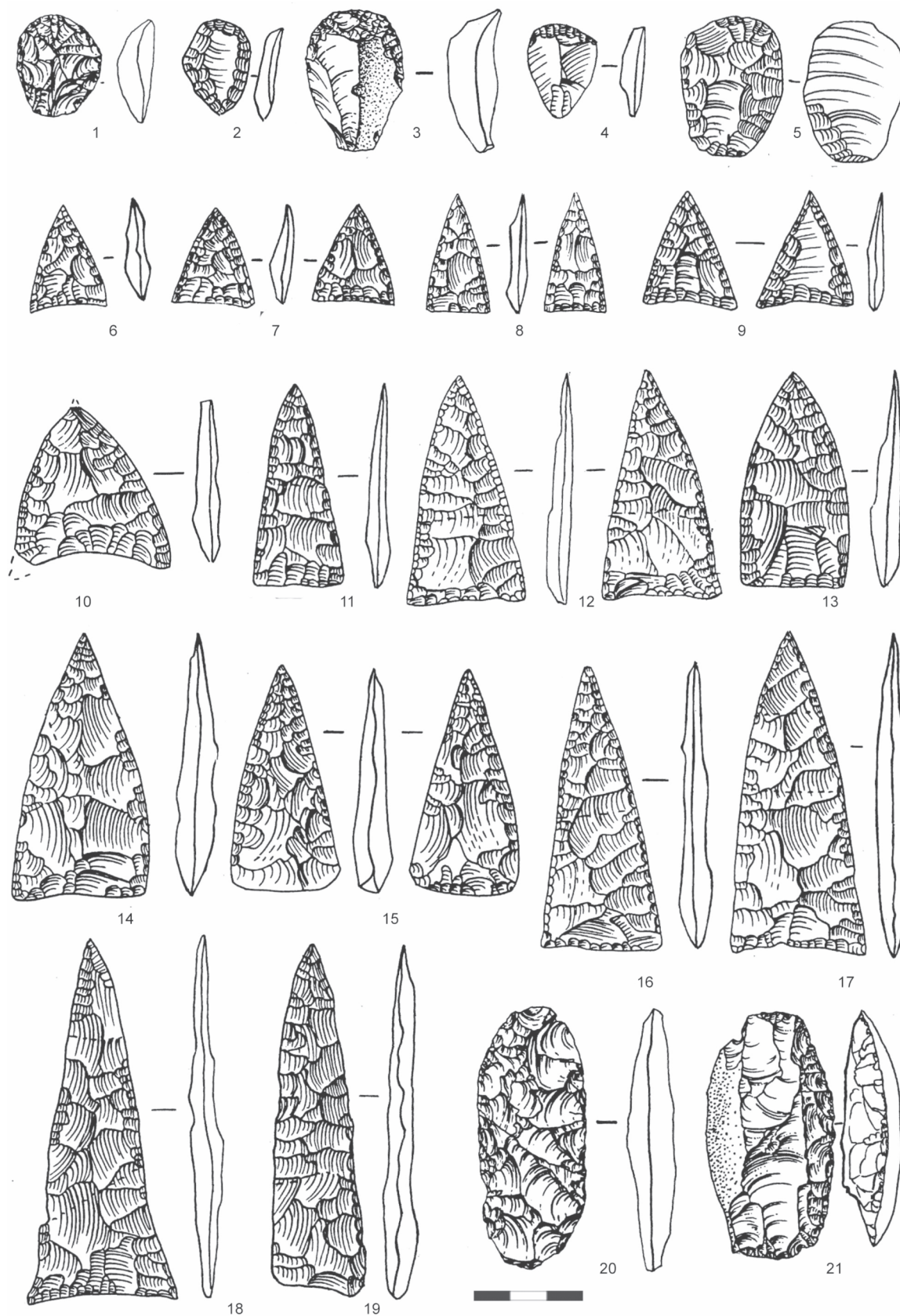


Figure 17: Birjuč'ja Balka 2, horizon 3. 1-5 Grattoirs courts. 6-19 Pointes de Sungir'. 20 Pointe foliacée. 21 Raclor simple. D'après A.E. Matjuchin 2006.

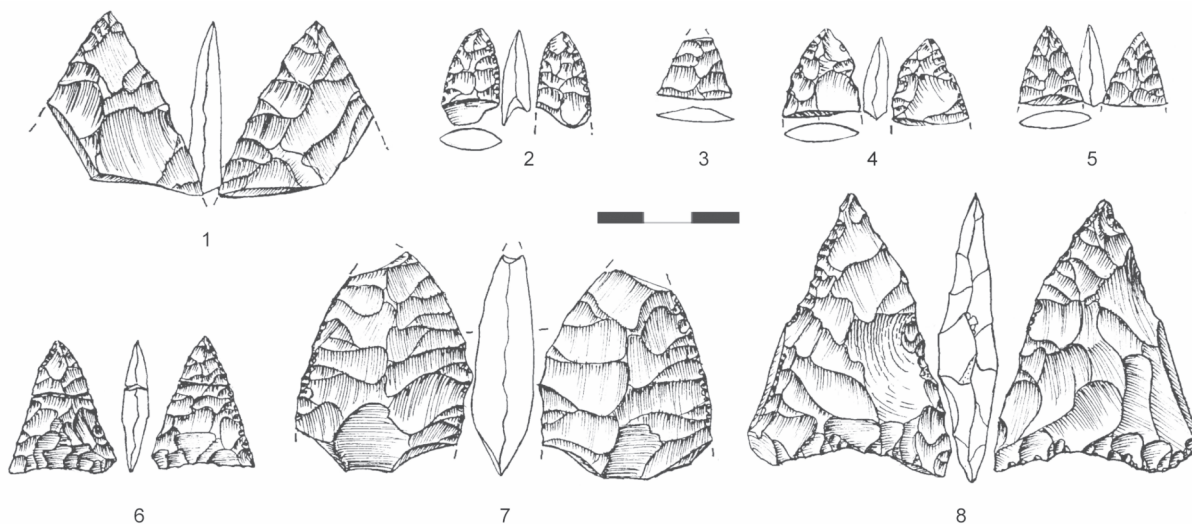


Figure 18: Pointes à retouche bifaciale.. 1.6.8 Pointes de Sungir'. D'après L.L.Zaliznjak, M.M.Belenko et al. 2008.

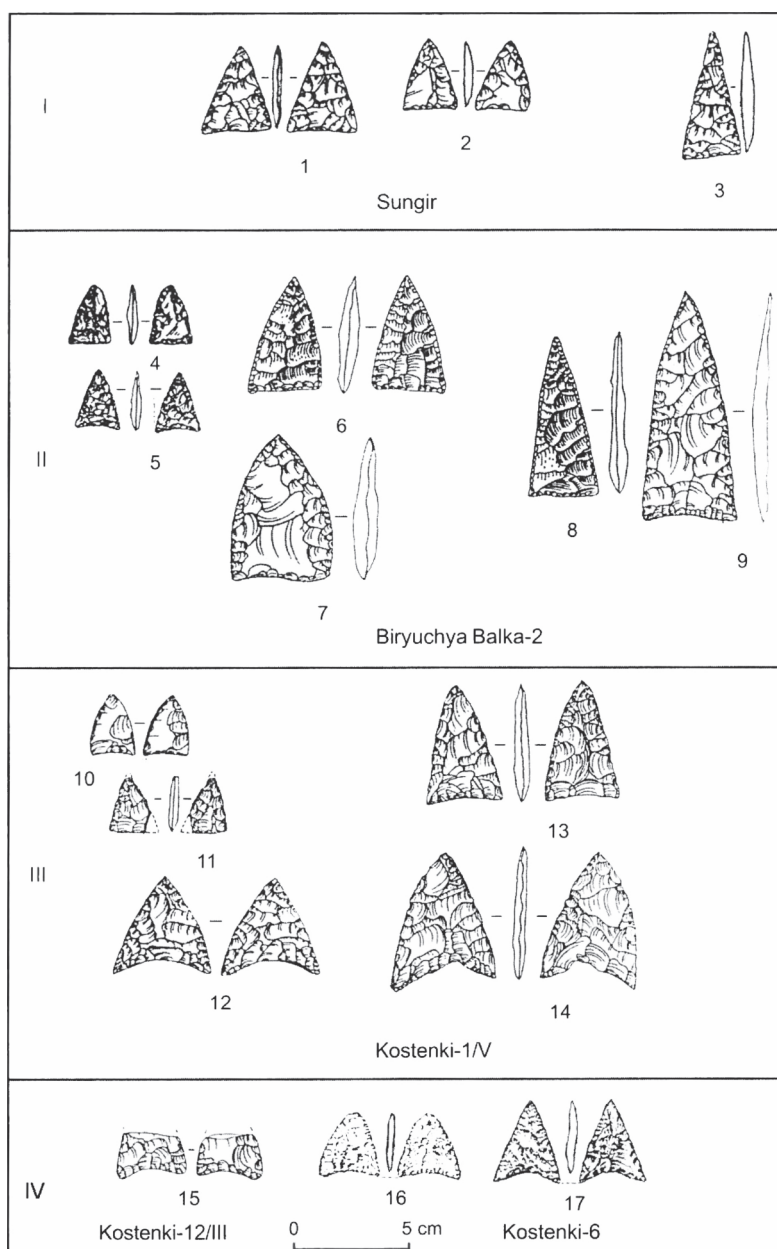


Figure 19: Evolution of the triangular point with concave base in the context of the evolution of tool forms in the Kostenki-Streletskaia culture” (M.V. Anikovič 2005).

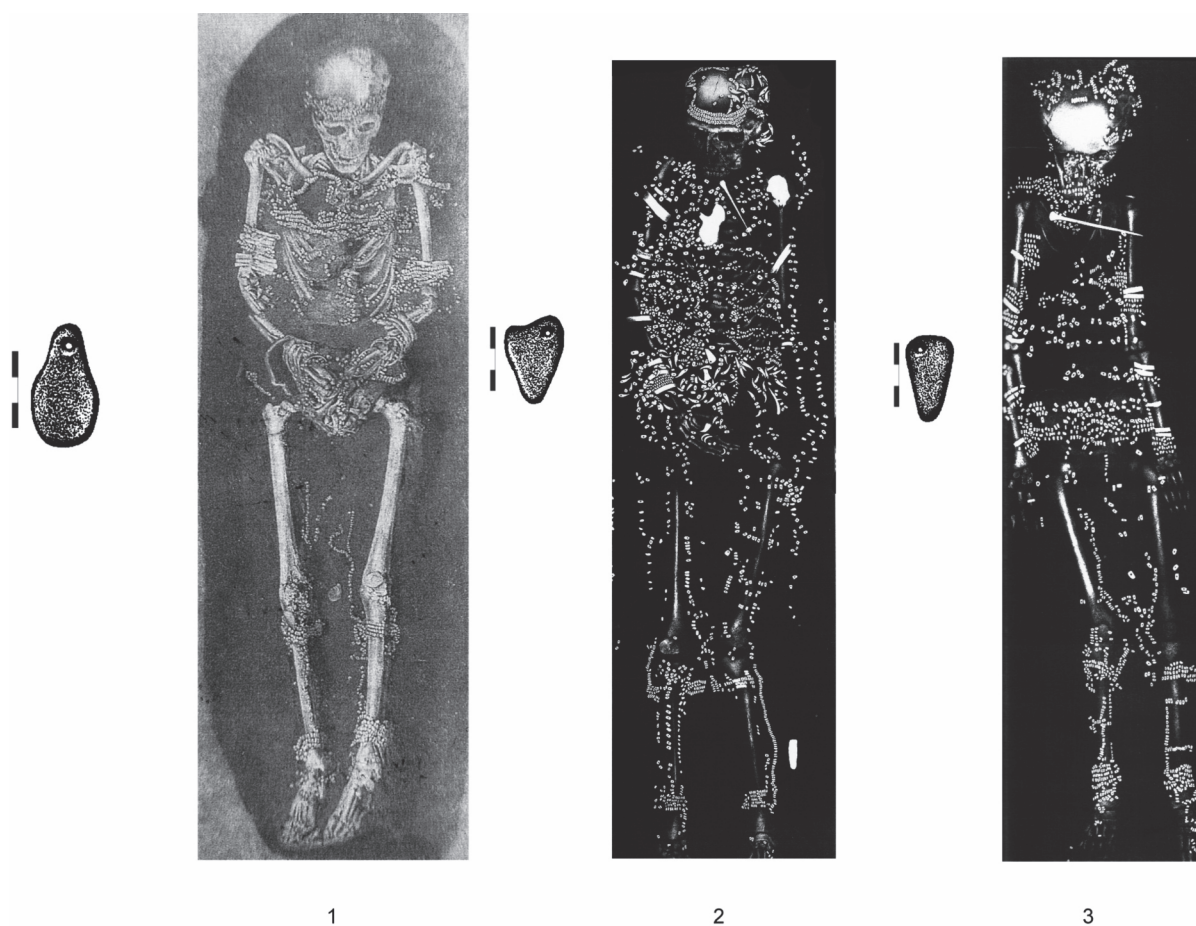


Figure 20: Sungir'. L'homme (1), le garçon (2) et la fillette (3) avec leur galet perforé.

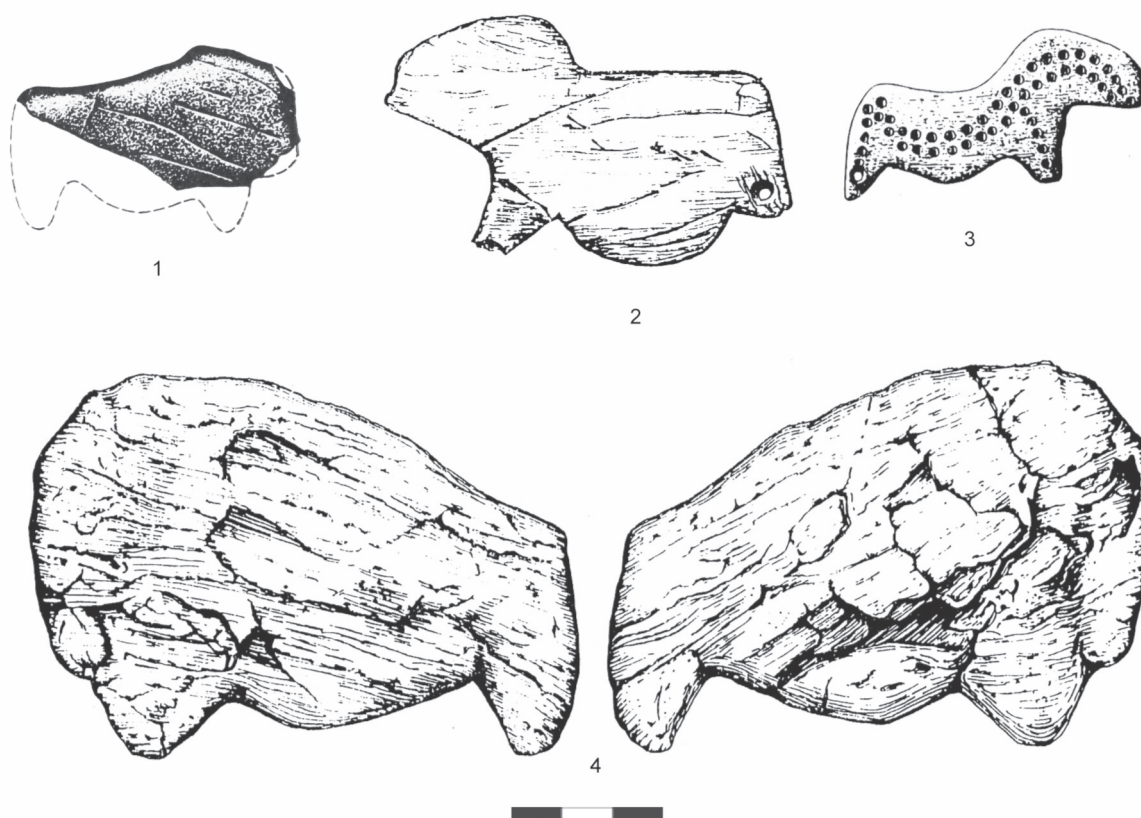


Figure 21: Sungir'. Figures d'animaux en ivoire. D'après O.N.Bader 1974(2-4) ; 1978 (1)



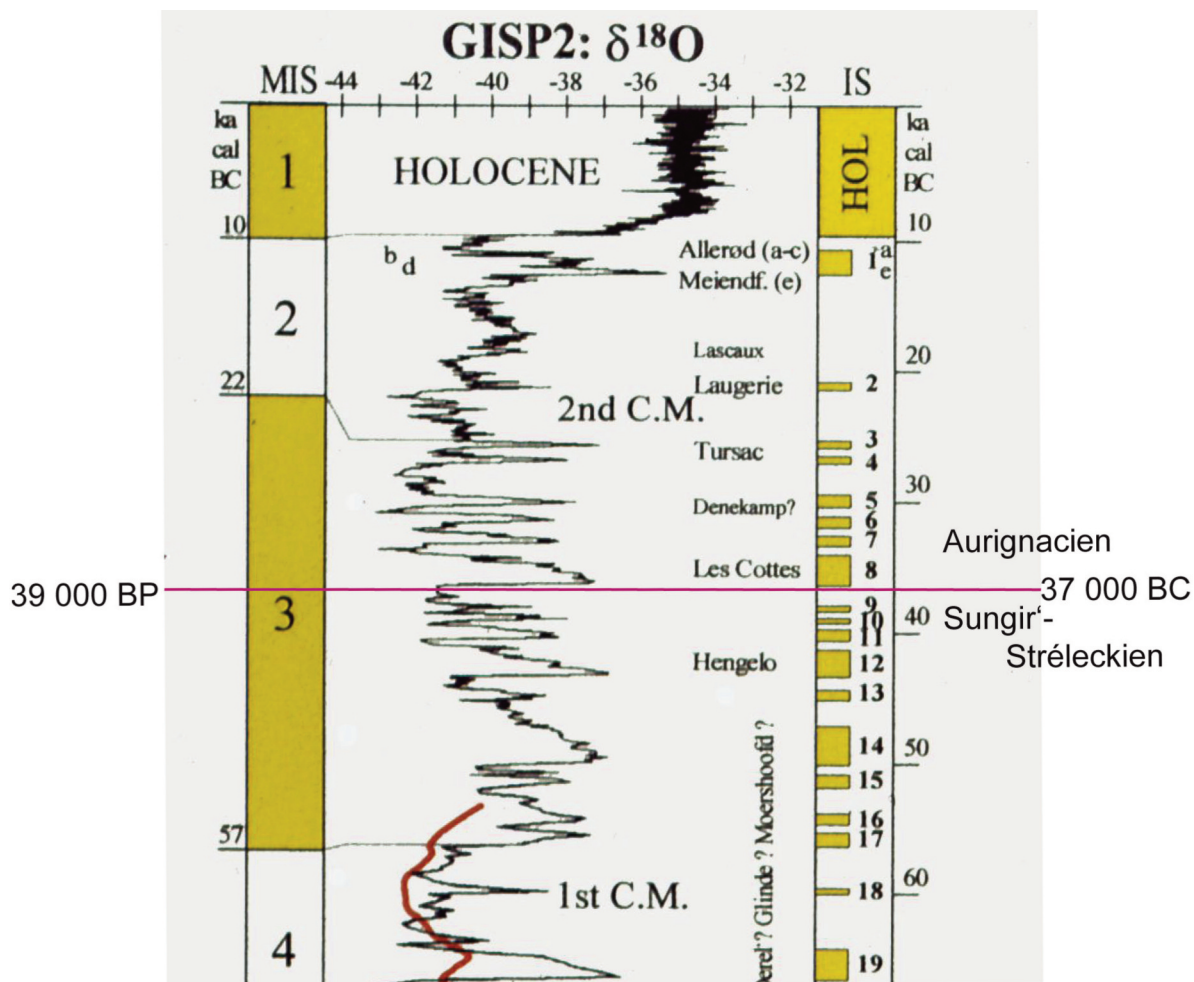


Figure 22: La place de l'éruption du Campanian Ignimbrite dans les oscillations climatiques de la fin de la dernière glaciation. Le graphique avec les Marine Isotope Stages (MIS) et les stadials et interstadials (IS) du Groenland par Olaf Jöris.

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Quand il existe des résumés en anglais ou en français des travaux cités, ces translittérations figurent entre parenthèses. Quand il n'y a pas de résumés je les ai faites en anglais et placées entre parenthèses et en italique.

Une traduction des titres en anglais ou en français (par exemple : E. Trinkaus, A. P. Buzhilova *et al.* 2014) est contre toutes les règles bibliographiques et rend l'utilisation de ces travaux difficile, parfois même impossible.

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## **Historiographical review of comprehensive study of the Upper Paleolithic site Sungir on the Klyazma river and its dwellers (brief archaeological and paleoanthropological overview)**

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### **Summary.**

The first time when one of the northernmost Upper Paleolithic sites in the East European plain was presented to the readers was in 1959. Since that time there have been many archaeological and anthropological studies. The recent years have also seen some genetic research of this small Upper Paleolithic population. Moreover, there are many articles and even books about taxonomic position of the Sungir people, their adaptation to northern conditions, life support and cultural development. This article represents a complete review of literature with description of interpretations and opinions of various scholars. As a result, we make a conclusion that the Sungir people belonged to the *Homo sapiens* taxon, were well-adapted to northern conditions and had complex funeral rites (since the children buried in the double grave were most probably relatives).

**Key words:** East European plain, Sungir, stratigraphy, geological and absolute age, archaeological culture, burials, skeleton S1, craniology, osteology, Bader O.N., Bunak V.V., Debets G.F., Zubov A.A., Sulerzhitsky L.D.



### **Introduction**

The wide archaeological audience was first acquainted with one of the northernmost Upper Paleolithic sites in the East European plain in 1959 (Bader, 1959), 3 years after its discovery and three excavation seasons. Then came O.N. Bader's article "Sungir, its Age and Place among Paleolithic Sites of Eastern Europe" (Bader, 1961).

The international scientific community got acquainted with materials from the site, which had already been acknowledged as a model for comprehensive studies of the Quaternary period, in 1961, at the International Congress of INQUA in Warsaw, with the joint report by

O.N. Bader, V.I. Gromov and V.N. Sukachev (Bader, Gromov, Sukachev, 1961). In 1963, participants of the International Symposium on Paleolithic Stratigraphy and Periodization examined excavation pits of Sungir and geological sections of its surroundings (Symposium resolution, 1965). O.N. Bader's article "Sungir and its Archaeological Profile" was published in the same year (Bader, 1965a).

In 1966, a monograph by three above-mentioned authors published in the Transactions of the Geological Institute of the Academy of Sciences of the USSR summarized the results of 10-year studies at the site (Bader, Gromov, Sukachev, 1966). It contained a casual reference to a very important fact: "Discovery of two burials at the site in 1964 raised its profile in studying of stratigraphy and periodization of the Upper Paleolithic age in Europe" (Upper Paleolithic site..., 1966. P.6) and "Discovery of two burials at the site is very interesting for scientists" (Ibid. P.116). More detailed information about the burials was given in O.N. Bader's articles "Upper Paleolithic Burials near Vladimir" and "Upper Paleolithic Burials and a Grave at the Sungir Site" (Bader, 1965b, 1967).

Quite detailed description of the burials discovered at the Sungir site may also be found in a multi-authored monograph dealing with paleoanthropological finds at Sungir (Sungir..., 1984) opening with O.N. Bader's article (Bader, 1984), which will be discussed below.

The main results of O.N. Bader's work with materials from the Sungir site were described in the monograph "Sungir. The Upper Paleolithic Site" summing up more than 20 years of studies (Bader, 1978). According to Bader, a book called "Sungir. Paleolithic Burials" published as the first part of the multi-authored monograph "The Paleolithic Settlement Sungir (Burials and Environment)" (1998) has been conceived as a wide panorama of primitive society based on comprehensive analysis of the whole set of sources. O.N. Bader's text was published after his death without any factual changes, but was accompanied with editorial comments and notes by N.O. Bader and Yu.A. Lavrushin.

O.N. Bader gives a detailed description of finds, stratigraphy, occupation layer of the burials, skeletons and grave goods. A considerable part of the work is dedicated to reconstructions: a reconstruction of clothes based on accurately recorded position of the vast number of beads on the skeleton bones and under them, a reconstruction of wooden tools and spears in the children's grave, reconstructions of various cults: funeral cult, cult of the dead, cult of celestial bodies, totemism and shamanism.

The last chapter is dealing with symbols, lunar calendar and counting in the Paleolithic age.

Though O.N. Bader himself comments that his main task was a formal statement of facts, his work is marked with the author's fascination with results of the discovery.

Nevertheless, O.N. Bader's publication is very good in reproducing his vision of the site and contains a lot of information about this unique, outstanding discovery in the Paleolithic archaeology – no doubt, the discovery of universal importance (The Paleolithic Settlement..., 1998).

Since that time, both methods and procedures for studying of geology, stratigraphy and age of the sites have undergone significant changes in the course of progressive advance of Paleolithic science, and therefore all the above-mentioned works are worthwhile for the history of science.

Thus, we will focus on the summary of scientists' conclusions regarding geological and absolute age of the site and the burials, their archaeological context, living environment of men, their economic and household structure, to some extent – their spiritual life.

Results of further excavations and studies performed during almost half a century are summed up in multi-authored monographs – the above-mentioned monograph published in 1998 and two monographs dealing with paleoanthropological finds at the site (Sungir, 1984, *Homo sungirensis*, 2000).

## I. Geological and archaeological contexts

**Location of the site, its geological and absolute age and archaeological profile.** The site is located on the left bank of the ancient Klyazma, in its spit with the Sungir stream, at the height of 5-8 m above the water edge. Occupation layer of the site occurs in a clay loam mantle covering a Dnieper moraine, in the upper part of second-from-the-bottom buried soil. The problem of geological age of the site was dealt with in different ways – from Mikulino to Ostashkovo age (Bader, Gromov, Sukachev, 1961; Lazukov, 1965; Ivanova, 1965).

Today, there is a whole series of dates. Thus, the laboratory of the Geological Institute of the Academy of Sciences under the guidance of L.D. Sulerzhitsky has obtained 21 dates for the occupation layer based on collagens of mammoth, horse and reindeer bones (Lavrushin *et al.*, 2000). The basic array of dates, between  $28800 \pm 240$  (GIN-90) and  $26300 \pm 300$  (GIN-9034) covers the time of active life of the settlement. As for the vast area of the excavation pit (connected with quarrying) equal to 4500 sq. m, the rich occupation layer has been recorded over the area of 80x100 m over the whole mass of buried soil. The total thickness of the soil and occupation layer subject to intense and complex deformation is 1 m.

A detailed palynological study, in combination with thorough geological study of the occupation layer, allowed detecting there two members consisting of buried

soils intensely dislocated by slope processes (Lavrushin *et al.* 2000). Men lived at this site in various natural environments, which is testified by palynological studies and coordinated with the dates. First of all, there were fir forests with various degree of closeness; meadows were covered with miscellaneous herbs, while the Sungir valley was waterlogged. During formation of the second buried soil, the fir forests were replaced by pinaceous communities; open spaces were covered with meadow vegetation and bogs. In terms of faunistic remains, the site has the typical mammoth fauna that existed in landscape and climatic conditions of cold tundra steppe (Vereshchagin, Kuzmina, 1977, Alexeyeva, 1998). However, bones of brown bear, cave lion, marten, on the one hand, suggest the existence of forested areas, and on the other – confusion of faunistic finds from different layers (Alexeyeva, 2000).

Thus, L.D. Sulerzhitsky and his co-authors disputed a concept of one-layer nature of the site and formulated an idea of 2 occupation layers (Lavrushin *et al.*, 2000).

In the course of archaeological studies performed at Sungir, O.N. Bader found some clusters of occupation remains with hearth pits, dozens of bonfire sites and hearth pits outside these clusters, places of bone and flint processing and two graves with 5 burials in them (O.N. Bader, 1984. P.6). Flint tools from the site are made of boulder flint and characterized by the primitive technique of splitting and making of some archaic forms represented by a series of scrapers, tools close to manual points, many various chisel-shaped tools and individual discoid nuclei (O. Bader, 1984. P.6-13). A form specific for Sungir is a flint pike with concave base made with the use of flat retouching. Flint tools from the site are characterized by low percentage of knife-shaped blades as compared to flakes. Bone and horn tools demonstrate application of various processing techniques – lengthwise dissecting of tubular bones, cutting, circular carving, drilling. The well-developed appearance of bone tools is suggested by the presence of spikes and flat sculptures. O.N. Bader, the author of excavations, classified the site as belonging to the later age of the Kostenki-Sungir or Streletskaya-Sungir culture (O. Bader, 1984. P.8). The question of cultural affiliation of the site was also raised later, on the basis of new excavations and analysis of new finds (N.O. Bader, 1998; Grikhova, 19; Anikovich, 2004).

**Living conditions and economic/household structure of the site dwellers.** According to the authors of excavations, the site should be reconstructed as a seasonal hunting camp. Analysis of faunistic material from occupation layer of the site suggests that these were mainly food waste, which is testified by milled skulls and long bones. The main huntable species were: arctic fox, reindeer, horse, mammoth. Bones of arctic fox, wolf, brown bear, wolverine and marten are indicative of fur trapping (Alexeyeva, 2000).

**Description of graves and reconstruction of funeral rites.** A detailed description of two graves, grave goods and reconstruction of funeral rites may be found in several articles by O.N. Bader (Bader, 1965, 1967, 1984).



The graves were situated in the south-western, upper part of the site, about 3 m from each other. The Grave 1 contained a skeleton of an elderly man (S1). In the upper part of the grave, on an ocher spot, there was a skull without teeth and a lower jaw bone (S5) lying near a big stone. The Grave 2 contained a paired burial of two children buried antithetically head to head (S2 and S3). The same grave contained a human femur labeled as S4. Moreover, O.N. Bader describes S6, as remains of a completely destroyed burial above the Grave 2, in the form of bone traces (O.N. Bader, N.O. Bader, 2000. P.25). Remains labeled as S7 are represented by a femur fragment in a soil flow between the Graves 1 and 2. The authors of excavations assume that it was carried out by this flow, which passed through the upper burial of the Grave 2. According to preliminary estimate, these bones belonged to an adolescent female. S8 is a fragmented skeleton (skull and femur fragments) found in 1969, 200 m south-eastward from the settlement, at the depth of 4 m. It was studied by a forensic expert V.N. Zvyagin, who concluded that the bones belonged to a very young girl (*Homo sun-girensis*, 2000. P.61). S9 is a skeleton of an adult person found in a quarry during earthworks in 1972, 200 m south-eastward from the settlement, at the depth of 3 – 3.5 m, in the Bryansk buried soil, without any archaeological context. Sungir 7, Sungir 8 and Sungir 9 were not made available to anthropologists, were not studied and are now lost (Bader O.N., 1984, 1998). O.N. Bader thought that he found a burial ground, “a place for burial of kinsmen” (Bader, 2000).

The Grave 1 contained a skeleton of an elderly man stretched on his back, with his head directed northeastwards, with hands lying on his pubis. There were some drilled pebbles on his chest and a flint knife, a scraper and a fragment of bone stem – at the bottom of the grave. The man had 25 thin bracelets on his hands, evidently interleaved with bracelets made of bone beads. There was a triple row of the same beads on his head and 20 drilled arctic fox canines on its back. There were also rows of beads lying along his arms, legs and body, as well as across his chest and hip bones. Altogether, archaeologists found about 3500 beads. The Grave 2 containing remains of two children lying hand to hand was distinguished by enormous wealth. The southern burial labeled as S2 was oriented to north-northeast, while the northern one, S3 – to south-southwest. Both buried children were stretched on their backs, with their hands on their pubes. The burial was simultaneous, since large spears made of mammoth tusk occupied the space of both buried children. One of the main distinctive features of grave goods was two long spears (2.42 m and 1.66 m) and numerous javelins, a pendant in the form of flat sculpture of horse or saiga, drilled pebbles, a large bone sculpture of mammoth (S2), slotted disks, bone daggers, thousands of beads along the skeleton bones and on the skulls. It's interesting that there were also two nail bones of cave lion or panther. Detailed description of the grave goods and its interpretation may be found in the above-mentioned works by the author of excavations.

The author of excavations believed that the grave pits

were dug at the surface of soil and occupation layer, 15 cm above its contact with underlying loam at 65 cm and 74 cm (Burials 1 and 2, respectively). The graves were narrow, with steep walls, which excluded their digging in permanently frozen soil with the use of burning (Bader, 1984. P.8). The bottom of both graves was dusted with coal and red ocher. Soil above the graves was also dusted with ocher. O.N. Bader thought that the paired burial (Grave 2) was older than the Burial 1. The grave was dug in the centre of a large dwelling, probably where the central hearth was situated. There was also an adult man buried above the grave of adolescents, in its upper part, near its surface. He was “stretched on his back, without head; bones of this skeleton were non-extant; they were traced as feeble white calcined streaks” (Bader, 1984. P.8). The dwelling had been abandoned, but after a short period there were three new dwellings built 30 m down the slope. According to the author, the man buried in the Grave 1 belonged to this new group. In the upper part of this grave, just near its surface, there was a large stone lying on a thick ochre spot and a female skull without teeth and a lower jaw bone lying near it. The condition of the latter suggested that it had long been at the surface. First, it was supposed that it was a burial destroyed and pulled apart by solifluction, but later O.N. Bader started to regard this skull and the underlying male burial as one burial with complex ritual (Bader, 1967, 1998).

**Reconstruction of clothing.** Based on the vast number of beads in both graves and their arrangement along arms, legs, across the skeleton, above and below it, in rows, the author assumes that they were sewn on some clothing, which allowed him to reconstruct it. For the man, it seemed to be a fur or leather malice-like shirt, long breeches sewn with light moccasin-like shoes, and a hat decorated with 20 drilled arctic fox canines on the back. Moreover, the author tries to reconstruct some cloak-like upper garments. Shoes of the child S2 are reconstructed as mukluk-type high fur boots tied above knees. The hat has richer ornaments than that of the adult man: in addition to three rows of beads at the front and at the back, as on the male skeleton S1, it has arctic fox canines on its top and a small flat ring, perhaps for tying together arctic fox tails on the hat. The beads found on S3 confirm the reconstruction of clothing, but allow finding some differences. Its headdress is represented by a headband, which is also sewn with three rows of beads, and a hood or a cape (Bader, 1984, 1998). “Clothing of the Sungir people may be considered as an initial form for the history of arctic costume” (Bader, 1984. P.9).

**Absolute age of the burials.** Dates of the burials are poorly consistent with each other and contradict the dates of occupation layer. Dates for the Grave 1 obtained in various laboratories are 4000 - 5000 years later than the basic array of dates obtained for the occupation layer. According to the Oxford laboratory, the Graves 1 (S1) and 2 (S1, S2) are simultaneous and 4000 years later than the settlement. Dates obtained in the Arizona laboratory suggest simultaneity of the Burials S2 and S3, which is consistent with archaeological observations regarding the burial of adolescents in one grave and corresponds to the

occupation layer dates. According to the same laboratory, the Sungir 1 burial is much younger –  $19160 \pm 270$  (AA-36473) than the burial of adolescents and the occupation layer. The problem is exacerbated by the fact that the occupation layer and the upper part of grave pits were disturbed by complex cryosolic deformations, including frost wedges (Lavrushin *et al.*, 2000). A recent dating of the skeleton from Sungir 1 showed older age as compared to earlier analyses (Dobrovolskaya *et al.*).

Of course, the most important reliability criterion for radiocarbon dates is their closeness and consistency. But, as Yu.V. Kuzmin says, unfortunately, new results of radiocarbon dating do not solve old problems caused by the fact that the geological structure of Sungir do not have any features that could help us to find at least one chronological limit of burials (Kuzmin *et al.* 2004).

## II. Palaeoanthropological finds

Anthropologists have managed to use the following finds: Sungir 1 – a skeleton and a skull of an elderly man; Sungir 2 and Sungir 3 – skeletons and skulls of children; Sungir 4 – a diaphysis of a hip bone from the Grave 2; Sungir 5 – a skull of an elderly woman without a lower jaw bone (?); Sungir 6 – a lower jaw bone of a woman (?)



### Sungir 1.

**Craniology.** The skull and the skeleton of an elderly man found in the burial discovered at the site in 1964 were first published by G.F. Debets (Debets, 1967). It was a preliminary publication and many dimensions were approximate. Although the skull is preserved quite well, impressed neck bones have displaced the skull base and caused dis-

placement of bones in the left temporoparietal region. The cerebral cranium is described very briefly. The author mentioned quite large longitudinal diameter and average transversal and altitudinal diameters, moderate forehead slope, well-developed glabella, large mastoid and above-the-average development of nuchal muscles. The main feature of the facial skeleton structure noticed by G.F. Debets was very large upper height of face and all the lateral dimensions of facial skeleton – upper width of face, bizygomatic diameter, biorbital and middle width of face and lower jaw bone width. Such average dimensions are today found only among East Siberian populations, among the Eskimos and some groups of Native Americans. Except for the face height, such dimensions are frequent among the European Cro-Magnon men, too. The author draws attention to a combination of small nasal protrusion angle (220) and high nasal bridge – a combination that cannot be found among average dimensions in series. In general, racial features of the skull are indistinct. Such a skull can be found in any European population. But the Zhoukoudian skull No. 101 (China) is also similar to the Sungir 1 skull by a number of measures. The author thought that there were no objections to considering the Sungir man as “a representative of the Cro-Magnon type in a broad sense of this term covering all the Late Paleolithic people of Europe, except for, perhaps, “Grimaldian Negroids” (Debets, 1967. P.164). We should say here that G.F. Debets accepted the theory of quite early formation of racial features common to modern mankind, according to which the main features of three big races could already be found in the morphologic type of Upper Paleolithic men. According to him, the Upper Paleolithic population of Europe is close to modern Europeans in terms of nasal protrusion and horizontal profiling of face (Debets, 1950, 1955, 1956, 1961).

The skull was further studied by V.V. Bunak (Bunak, 1973). He examined the skull after small restoration done by M.M. Gerasimov. V.V. Bunak described the skull in more details and in comparison with other Upper Paleolithic finds from Europe. He noted that among Late Paleolithic craniological material only Solutrean skulls were shorter than the Sungir skull and only Cro-Magnon skulls were wider. The skull S1 was characterized by moderate mesocrany, ortho- and metriocrany. In terms of fronto-parietal and asterion-parietal indices, the skull occupies mean position in series of Late Paleolithic variants. While describing facial skeleton, V.V. Bunak also lays an emphasis on large dimensions of facial skull amounting to 53% of cerebral module – a value that is close to values characteristic for modern man. While comparing the skull S1 with other finds, V.V. Bunak mentions their common feature – signs of increased vertical and decreased horizontal profile, a combination that is quite rare among modern racial variants. The main message of V.V. Bunak’s report at the 9th International Congress of Anthropological and Ethnographical Sciences in Chicago (Bunak, 1973) was the search for a place of the Sungir skull among other Late Paleolithic skulls. Empirical analysis allowed him to detect three morphogenetic tendencies for about ten male skulls from

forty Upper Paleolithic skulls well-known for anthropologists. However, these tendencies were not very pronounced and were represented by the following variants:

1 – Deviation from the average type towards longer, wider and lower braincase combined with average width and low height of facial skeleton; 2 – Shift towards hypsicrany with average skull width, combined with high and average-wide face and high, average-wide or narrow nose; 3 – Deviation from the average type towards short, wide and high skull combined with wide nose.

However, according to V.V. Bunak, similarity of metric and descriptive features of European Late Paleolithic skulls is distributed quite ambiguously. The most similar were the skulls from Sungir and Předmostí 3, especially in their facial dimensions, which does not exclude considerable differences in their structure noticeable during visual inspection. Its other features are similar to those of the skull from Chancelade. Morphological tendencies on Upper Paleolithic skulls are not as pronounced as on skulls belonging to later periods. The above-mentioned variants belong to early stages of differentiation and early forms are characterized by preservation of primitive features or atypical combinations of features not common to modern man (Bunak, 1973).

In contrast to G.F. Debets, V.V. Bunak, who adhered to the hypothesis of craniological polymorphism of fossil forms (Bunak, 1951, 1959, Bunak, 1961), believed that morphological complexes characteristic for the Upper Paleolithic men did not reflect the modern craniological differentiation and that modern intraspecific taxa of mankind had not formed at that time, yet.

V.P. Alexeyev dedicated several pages in his summary “Palaeoanthropology of the Earth and Formation of Human Races. Paleolithic Age” to morphology of facial skeleton of the male skull Sungir 1 (Alexeyev, 1978. P. 185-187). In one of his earlier works (Alexeyev, 1976) he gave reasons for ‘proto-mongoloid’ nature of the Sungir 1 skull, based on the nasal protrusion angle of 22 degrees and certain flatness of facial skeleton at the nasion level, as well as on largeness of facial skeleton, including palate.

As is customary in Russian paleoanthropology, while differentiating European and Asian forms, V.P. Alexeyev attached great importance to horizontal profile angles of facial skeleton, nasal protrusion angle, as well as dacryal and symotic indices and compared so-called ‘proto-mongoloid’ forms from the Upper Cave of Zhoukoudian and from Dundianyan (Weidenreich, 1938-1939, Woo Ju-Kang, 1959) to Upper Paleolithic skulls from Europe (Alexeyev, 1978. P. 185-187). It turned out that the Sungir 1 skull, as well as the Skull 101 from Zhoukoudian, fell within European variations and therefore had to be excluded from consideration while analyzing early stages of formation of Asian finds, though two other skulls from the Upper Cave, 102 and 103, and the skull from Dundianyan demonstrate a shift towards mongoloid features.

In the multi-authored monograph “Sungir. An Anthropological Study” published in 1984 (Sungir..., 1984) interpretation of materials from Sungir pretty much re-

flected the condition of several problems of paleoanthropology and anthropogenesis theory topical for that time. In particular, the Sungir children were studied in terms of possible inter-subspecific miscegenation of Neanderthal men and Sapiens or stadial transformation. Some researchers thought that dating of the burials (according to the Groningen laboratory, it was then believed that it was within the range of 24-25 thousand years ago) and ‘morphological transitivity’ of the paleoanthropological materials from Sungir confirmed existence of the Neanderthal stage of anthropogenesis (Sungir... P.3). The work included results of a wide range of studies: craniology, osteology, odontology, micromorphology and radiology.

Results of more detailed morphological analysis of the Sungir 1 skull are published in a posthumous work by V.V. Bunak (Bunak, Gerasimova, 1984). It was based on a very detailed study of the main structural elements of the skull – supraorbital region pattern, mastoids, cranial sutures, individual bones of cerebral and facial skeleton – in wide comparison, including both earlier and modern forms. The supraorbital region of the Sungir skeleton shows a set of features characteristic for skulls of fossil men of modern type (neoanthropi): slight narrowing in the postorbital region, moderate protrusion of zygomatic processes, dissected surface pattern. The mastoid measured according to Broca (Broca, 1875) and Zoja (Zoja, 1864) and the height-to-width ratio (according to Zoja), the value of which does not even transgress with the data for paleoanthrop, evidently testified that the skull belonged to modern man. As for such characteristics of braincase as bone thickness, capacity, general dimensions, the Sungir 1 skull also belongs to the skulls of modern type. A distinctive feature of the neurocranium is its mesocrany being a consequence of decreased longitudinal diameter (at the boundary between small and average values of the Upper Paleolithic range) and increase in transversal diameter. Contours of the neurocranium and namely their angularity, a roof-shaped vault with parallel sidewalls, a noticeable retro-orbital narrowing testify the preservation of features common to the Upper Paleolithic variants. The facial skeleton strikes with its size, alongside with the absence of archaic features. Due to the face height, the skull represents an exception in the group of Upper Paleolithic skulls from Europe. Large dimensions are also characteristic for the face width, as well as alveolar width and palate size. Horizontal profiling of the facial skeleton reveals the disharmony specific for Upper Paleolithic skulls. Vertical profile angles suggest the mesognath. The nasal protrusion angle is comparatively small, while the nasal bridge width and protrusion are average. The lower jaw bone has all the features characteristic for lower jaw bones of modern man. The combination of features shown by the Sungir 1 skull is found very rarely among modern racial variants, while among fossil skulls the closest analogies are: the Předmostí 3 skull (Moravia), on the one hand, and the Zhoukoudian 101 (China), on the other, i.e. the Sungir 1 skull corresponds to the generalized type of *H. sapiens* and belongs to the group of Upper Paleolithic skulls from Europe, which is distinguished – in spite of strong polymorphism – by certain neutrality, ab-

sence of sharp deviations towards wide nose, flat face or, in contrast, jaw protrusion. Similarity of these forms is caused by the fact that they evolved in one direction – not only in Europe, but also within northern Eurasia (Bunak, 1973, Bunak, 1980, Bunak, Gerasimova, 1984). V.V. Bunak proposed the following taxonomic designation of the studied find – *H. wurmensis neoanthropus ost-europaens sungirensis* (Bader, 1984. P.98), or *H.sapiens fossilis sungirensis*. The latter specification of place played a low-down trick on Bunak's colleagues, who later prepared a new version and a new publication of materials and called it "Homo sungirensis", involuntarily granting this form a status of new species.

**Osteology.** The first description of postcranial skeleton was also given by G.F. Debets (Debets, 1967). This description contained metric characteristics of long bones. The author noted long length of the bones, especially the collar bone, and made a conclusion about clearly gracile structure of the shoulder girdle, based on the ratio between the diaphysis circles and sections and the length of shoulder and forearm bones. The femur was solid, in contrast to the shin bone, which was rather similar to upper extremity bones in terms of the ratio between its length and width. The author also noted platynomy of the shin bone and the platimetry of the femur, which is considered to be characteristic for the Cro-Magnon men, as well as ratios between distal and proximal segments of both extremities, which are more characteristic for modern populations of the tropical zone, but rarely found in Upper Paleolithic Europe. Based on the formula proposed by G.F. Debets making allowance for length and ratios of bones, anthropologists have calculated the body length of the Sungir man (180 cm) and his weight in case of average development of fatty layer (71 kg).

Later, a more detailed study of the postcranial skeleton Sungir 1 was performed by E.N. Khrisanfova, which served – to a certain extent and due to completeness of the studied skeleton – as a basis for studying of the palaeoanthropological aspect and reconstruction of the habit of fossil Hominidae (Khrisanfova, 1979, 1980, 1984, 2000). The author has shown the osteological polymorphism of postcranial skeleton of fossil men expressed in variations of proportions and general body dimensions and hypothesized that it reflected the adaptive reaction of fossil men populations. Many morphotypical features of the Sungir man place him in close quarters with modern Arctic populations and, in part, with the Neanderthals. These are: exceptionally heavy build, pronounced brachymorphia of upper part of body, well-developed mesomorphic component, very solid skeleton. The ratio between weight and body surface corresponds to the group maximum of modern man and is close to that of conventional Neanderthals (Khrisanfova, 1978, 1980). On the other hand, Khrisanfova thinks that the features of postcranial skeleton have some specific, archaic features placing the Sungir man in close quarters with "Sapientic Mousterian men from East Europe (Romankovo, Samara, Shkurlat) and "proto-Cro-Magnon men" from Western Asia (Skhul). These are: tallness, ab-

solute and relative elongation of forearm and shin, a tendency to short body, i.e. features common to initial constitutional specifics of population and mainly characteristic for groups of southern origin.

The further development of this topic may be found in a monograph published in 1984 and containing a very detailed analysis of postcranial skeleton performed by E.N. Khrisanfova. The research program includes determination of 202 features and 72 indices selected on the basis of the need for complete and detailed characterization of the studied skeleton and the extent of previous investigation of comparative materials (Khrisanfova, 1984). The author studied linear and lateral proportions of the adult man S1, proposed the reconstruction of body length and build in general, described long bones of upper and lower extremities, hand and foot bones, shoulder girdle bones and pelvis, as well as axial skeleton. The general build of the Sungir man was considered by E.N. Khrisanfova as a kind of Paleolithic tall athletic variant with exceptional for modern man shoulder width, adapted to severe living conditions in the periglacial zone (Khrisanfova, 1984. P.107).

The Sungir individual had slightly shortened arms as compared to legs, which was considered by Khrisanfova as a 'Neanderthaloid' feature, though internal proportions of extremity segments are absolutely those of Cro-Magnon type, which is especially evident in elongation of shin. The lateral proportions of S1 are distinguished by exceptional peculiarity. They testify sharply brachymorphic proportions of the upper part of body, which is especially remarkable considering his tallness. The conventional index of the ratio between leg length and body length suggests a shift of the individual's proportions towards 'gigantism'. Individual bones are described by the author in comparison with a wide range of fossil forms and modern population groups. The author notes the absolutely 'sapientic type' of long bones, but also points at some 'primitive features' such as platimetry, femoral neck flatness, a tendency to rounding of diaphysis in its middle, large humeral head, relative elongation of radius neck, absolute solidity of humerus epiphyses, etc. A very detailed study of hand bones allowed the author to make a conclusion that despite of large fingers the hand was brachydactylic, very large, with elongated carpal and metacarpal parts. The foot is very large and solid, and the ankle bone is especially large. The first instep bone and the first finger are much longer than the group maximum for modern men. The foot structure does not show any similarities with any certain types, but most of its features fall within variations of Caucasoid and Negroid forms (Khrisanfova, 1984. P.123). The shoulder girdle structure is characterized by exceptional length of the collar bone, which is much longer than the upper limit of group variations among modern men. According to Khrisanfova, brachymorphia of the upper part of body could be not only an individual, but also a population feature, "placing the site dwellers in close quarters with the Neanderthals from the periglacial zone" (Khrisanfova, 1984. P.125). The pelvis of the Sungir man was high and narrow, with a very large cotyloid cavity.

The S1 skeleton showed some features characteristic for functional complexes. On the upper extremity skeleton they are connected with work hypertrophy of the hand, with manifestations of anatomic and functional dexterity. On the other hand, the signs of 'power adaptation' manifest in great height development of first radius joint components and widening of nail bones are more pronounced on the left. E.N. Khrisanfova considers some specific features of the left foot and the lower extremity as a whole in terms of morphofunctional asymmetry and connects them with the "complex of hunker position" and other statistical "rest poses", with main support on the left leg (Ibid. P.128).

According to the morphology of postcranial skeleton, E.N. Khrisanfova considered the taxonomic position of the S1 individual as *H. sapiens sapiens* close to the Cro-Magnon variant (tallness, elongation of middle parts of extremities, platynemy of shin bones, high and narrow pelvis, ankle bone type, large brachydactylic hand, etc.). At the same time, there are some features placing the Sungir 1 man in close quarters with the Neanderthals, i.e. this skeleton is close to a group of Middle and Upper Paleolithic forms having both sapientic and neanderthaloid features. The author also noticed the disharmony, 'looseness' of morphological correlations while comparing homologous segments of upper and lower extremities and, above all, hand and foot of such forms as Sungir 1 and Skhul 4. While making racial and diagnostic comparisons, E.N. Khrisanfova noted insufficient differentiation of the studied skeleton. In many osteometric features it demonstrated primary closeness to modern populations of Europe and Africa and in some features – to so-called 'natural populations' in general.

The skull Sungir 1 served as the basis for waxed reconstruction. Unfortunately, M.M. Gerasimov left nor his description of the Sungir 1 skull, nor his work aimed at the skull restoration and the face reconstruction. Reconstruction of the Sungir man appearance based on the slightly 'rejuvenated' skull, since his biological age was 50-55 years, gives us a figure of a handsome man, about 40 years old, with wide shoulders, of clearly athletic build. It comes under notice that he has slightly flat upper part of the face and the narrow forehead, the roof-shaped cranial vault, slightly protruded nasal bones giving his appearance a touch of Mongoloid features, and it is noteworthy that the 'Mongoloid nature' of the Sungir skull is more pronounced than that of the skull from the Upper Cave of Zhoukoudian (China).

A monograph published in 2000 – "Homo *sungirensis*" – does not contain any crucially new information in relation to morphology of the Sungir 1 skull, except for the study of the skull craniotrigonometry. This program has been developed by one of the authors of this essay (Vasilyev, 1999, 2000). It is based on angular parameters of various skull planes and allows us to estimate the relativity of particular dimensions, i.e. describes not so much dimensions of skull and its parts as its morphogenetic elements, which are not easy to compare on skulls of different size. According to the angular skull morpho-

metry, remains of the Sungir man fell into the same group as such finds as Florisbad, Markina Gora, Mladeč Lautsch 1, Oberkassel, Předmostí III, Zhoukoudian 101 and Fish Hook. This group is characterized by average height of zygomatic bone, relatively narrow base of frontal process of maxillae and piriform aperture, widened middle part of facial skeleton.

T.I. Alexeyeva, in a chapter called "Anthropological Profile of the Sungir Man and His Taxonomic Position Revisited" (Alexeyeva. Ibid. P.180-192), repeated some conclusions made by previous researchers (Debets, 1967, Bunak, 1973, Alexeyev, 1976, 1978, Bunak, Gerasimova, 1984) and concluded that there were no special differences between them, despite of their different views of race formation. "The Sungir man is peculiar, but he does not go beyond variations of 'Upper Paleolithic men from East Europe'". Truly speaking, it's hard to understand what the author meant, since the whole East Europe is represented by two skulls of adult individuals from Kostenki (T.I. Alexeyeva herself noted the peculiarity of the skull from K-14!), the skull Sungir 1, two children skulls from the same site (age – inf II) and two children skulls from Kostenki (age – inf I). With a view to specify the position of the S1 skull among other Upper Paleolithic finds, she used the canonical analysis. 5 analyses with intermittent increase in the number of compared skulls due to exclusion of some features and decrease in the number of skulls due to increase of analyzed features led the author to the conclusion that had already been made by previous researchers on the basis of empiric studies – that the Sungir 1 skull belonged to a wide polytypic species of the fossil *Homo sapiens* represented by rare remains found in vast territories of northern Eurasia. As for the osteological data offering an opportunity to estimate the Sungir man as a peculiar Paleolithic tall athletic variant with exceptional shoulder width adapted to severe living conditions in the periglacial zone (Khrisanfova, 1984, 2000), they were supplemented with results of detailed micromorphological studies (Mednikova 2000, Dobrovol'skaya, 2000). These studies testify that the strategy of skeleton solidity formation and hematogenesis opportunities of the Sungir man differed from those of the Neanderthals. The Sungir 1 individual demonstrates large dimensions of long bones with well-developed pattern, large epiphyses and large diaphysis perimeters with relatively and absolutely thin diaphysis walls and large medullar space. These specifics are, on the one hand, connected with the need for higher solidity of skeleton in conditions of increased physical load and on the other – with increased opportunities for hematogenesis in conditions of hypoxia in the periglacial habitat.

Summarizing the existing publications concerning the Sungir site and the human remains labeled as Sungir 1, we consider it possible to note the following:

1. For the time being, knowingly inconsistent 14C dates of the adult and the children burials do not allow us to consider the individuals found at the Sungir site as belonging to one population. Perhaps, current genetic studies will help us with that.

2. Since there are some stratigraphic and palynological evidence suggesting that the site could have two layers (possible belonging of the site and the adult burial to different ages, inaccurate archaeological dating of other finds, except for the two burials), the idea of 'clan cemetery' should be abandoned, as well as reconstructions of complex funeral rites and relations between the site dwellers on the basis of human remains found there.
3. According to the authors of this review, a tendency to emphasize the 'Neanderthaloid' nature of the Sungir finds postulated in the 1984 monograph (Sungir..., 1984) and in anthropological literature in general (Kozintsev, 1997, Anikovich, 2004, Mednikova, Zubov, 1984, 2000, 2004) is not represented in the morphology of the S1 skull. Upper Pleistocene forms with the underformed complex of skeleton features, as the S1 skeleton, do not imply the Neanderthaloid origin of such rudimental sapientic forms. These 'Neanderthaloid' features could rather be a manifestation of so-called Arctic adaptive type characteristic for both West European Neanderthals and to fossil Sapiens of the East European plain.



### Sungir 2 and Sungir 3.

Skulls of individuals buried in the Grave 2 (Sungir 2 and Sungir 3) were first studied by T.A. Trofimova (Trofimova, 1984). A detailed odontologic study was conducted by A.A. Zubov (Zubov, 1984). The first study of postcranial skeleton was conducted by B.A. Nikityuk and V.M. Kharitonov (Bader, Nikityuk, Kharitonov, 1979, Nikityuk, Kharitonov, 1984) and supplemented by a

short radiologic summary (Bukhman, 1984). When the skeleton bones were found, they were well-preserved, but a vast number of grave goods, complicated clearing, labour-intensive recording (we should remember that it was almost 50 years ago) caused damage to children's skulls and postcranial skeleton bones and they required some restoration work performed by T.S. Surnina and G.V. Lebedinskaya. They also made waxed reconstructions based on children's skulls (Lebedinskaya, Surnina, 1984).

Later on, these materials without considerable changes were published in a multi-authored monograph (*Homo sungirensis...*, 2000), but also supplemented with articles written by a group authors who published their considerations regarding sex and age of these finds (Mednikova *et al.*, 2000, Kozlovskaya, 2000). Examination of preadolescent fossil forms is very interesting due to a number of reasons. First, it affords an opportunity to use these preadolescent forms in the taxonomic analysis alongside with adult ones. Second, it is very important for identification of ontophilogenetic relations in anthropogenesis, since evolutionary changes partly consist in transformation of the course of ontogenesis. Third, correct restoration of definitive features based on features of young forms. If there is no doubt in determination of biological age (which is almost impossible), it is very interesting to study the rate of 'growing-up' as compared to modern man (Kharitonov, 1995)

**Sex and age of the buried individuals** were determined on the basis of their teeth and postcranial skeletons. The individual S2 had only permanent teeth; as for third molars, only the right M3 has cut, while the others are sitting deep in alveoli. Moreover, second lower premolars, both second upper molars and a right lower canine have not reached their final position in tooth alignment. Condition of the tooth system of the individual S3 testifies younger age: a set of permanent teeth is incomplete; remaining primary molars are close to dedentition, first premolars are sitting in alveoli. Analysis of mesio-distal and vestibulo-lingual diameters of crowns, indices and modules of crowns (according to R. Martin), as well as heights of crowns allowed A.A. Zubov to determine sex and age of the individuals with sufficient certainty: S2 - ♂, age - 11-13 years old; S3 - ♀, age - 9-11 years old. (Zubov, 1984).

Morphology of the postcranial skeletons showed the following results: sex of S2 - ♂, age - 12-13 years old; sex of S3 - ♀, age - 9-10 years old. These figures were based on the data concerning the length of collar bone characteristic for modern man and the size of lateral diameter of humerus diaphysis. In a later work (Nikityuk, Kharitonov, 1984) age of S3 was determined on the basis of longitudinal and lateral dimensions. Determination of the scatic-pubic index for this skeleton allowed the scientists to consider it as belonging to a girl (Bader, Nikityuk, Kharitonov, 1979). As for the individual S2, the growth of lateral dimensions was slower than the growth of longitudinal ones as compared to modern children, and longitudinal dimensions of humerus, cubitus, radius, femur and shin bone corresponded to development of modern 12-14-year-old adolescent. These measurements may be

supplemented with a radiological study. According to radiograms, the individual S2 was 13-14 years old, and S3 - 11-12 years old (Bukhman, 1984). The morphological and radiological data are mutually consistent. Based on development of hip bones, age of the buried individuals was estimated as no more than 13 years old (Bruzek, Novotny, 1993). Later on, age and sex of individuals buried in the Grave 2 were again examined by a different group of authors (Mednikova *et al.*, 2000). They also used morphological criteria and eventually agreed with earlier measurements. Meanwhile, biological age of the individual S2 determined on the basis of the radiological diameter of femur turned out to be 19.94 years old  $\pm 14.5$  months and that of the individual S3 - 7.31 years old  $\pm 14.5$  months (according to the regression equation for boys) and (according to the regression equation for girls) - 7.56 years old  $\pm 16.4$  months (Kozlovskaya, 2000) Based on these strange figures, osteometric indices and diaphyseal radiographic data, the authors concluded that "the Sungir individuals keep ahead children of similar tooth age from various paleopopulations of modern man" (Mednikova *et al.*, 2000. P. 57-59).

Genetic data showed that the individual S3 was a female (Poltoraus *et al.*, 2000).

**Craniology.** In her general estimation of craniological features characteristic for the children from the Grave 2, T.A. Trofimova have first of all mentioned a number of modules of brain case and facial skeleton that are considerably larger than those of modern children.

**Skull S2** is large, mesocranic, pentagonoid. The author pays special attention to poor development of mastoid processes, signs of 'chignon-shaped' napex, low temporal bone, with a straight edge. The face is characterized by large values of upper height and bizygomatic diameter as compared to modern children (according to: Sysak, 1960). The face is mesognathic in terms of overall facial angle and prognathic in terms of alveolar one (M.72-810 and M.74-540). The piriform aperture is narrow and high, its lower edge has the shape of sulcus prae-nasalis. The orbits are low and rectangular. Trofimova considered such characteristics as protruding forehead and prognathism as probable manifestation of equatorial features. According to her, the chignon-shaped napex and the structure of temporal bone suggest preservation of several Neanderthaloid features along with features characteristic for modern man.

**Skull S3** is also very large. It is distinguished from the above one by its brachicrany, but it is also pentagonoid with prominent frontal and parietal protuberances and protruding napex. At the same time, it is not so 'chignon-shaped', while the forehead is less protruding. In terms of absolute values, the facial skeleton is much larger than that of S2, though the latter belonged to the male of older age. The orbits are larger and higher, the piriform aperture is wider, with the lower edge of infantile shape. Nasal bones are very prominent (M. 75(1)-290). The author designates the girl's skull S3 as belonging to the Cro-Magnon type with preservation of several Neanderthaloid features.

While characterizing lower jaw bones of the Sungir children, the author mentions their very large dimensions being much larger than those of modern children, which is connected with overall large dimensions of the Sungir skulls. In addition to comparison with modern children, Trofimova compared the Sungir children with the child from Gorodtsovo (Kostenki XV, Yakimov, 1957), Předmostí XXII (Matiegka, 1934), and the Neanderthal child from Teshik-Tash (Debets, 1940, 1947, Gremyatsky, 1949, Alekseyev, 1973). The author pointed out large dimensions of brain cases of all the compared skulls and similar features of particular skulls. Comparison with the skull from Teshik-Tash was caused by the author's hypothesis that the adolescents' skulls had some 'Neanderthaloid' features. In this connection she considered some indices characterizing specific features of occipital region and demarcating 'Paleoanthropi' and 'Neoanthropi' (Roginsky, 1951). Each of these indices taken apart does not allow us to determine the systematic position of the Sungir children with full confidence, due to considerable transgression of these figures. However, overall examination of the indices allowed the author to make a conclusion about some resemblance of the Sungir skulls with that from Teshik-Tash (Trofimova, 1984. Table 7. P. 154).

While analyzing craniological features of the children's skulls, T.A. Trofimova restored definitive dimensions of adult forms on the basis of values characteristic for children - a method widely used in Russian paleoanthropology in those years (Yakimov, 1957, Debets, 1961, Alekseyev, 1973, 1978, Gohman, 1984). The author concludes that the skull S2 (adult) is closer to the skull S1, than the skull S3. But at the same time she states the presence of equatorial features for the skull S2. Comparison of the male skull S1 and the skulls of 'adult' individuals S2 and S3 shows that it falls in between these forms demonstrating the largest value of upper facial height. In conclusion, we should note that T.A. Trofimova was somewhat contradictory in her opinions. She adhered to V.V. Bunak's concept of craniological polymorphism of the Upper Paleolithic mankind and at the same time shared Y.Y. Roginsky's (1949, 1969) point of view on formation of modern races as early as in Upper Paleolithic age (Trofimova, 1984. P. 155). The same article was published in the monograph *Homo sungirensis* (2000), but with some critical comments of one of the authors of the present report (Gerasimova, 2000).

The same monograph contains the results of cranio-trigonometry study of S2 and S3 acquiring special importance for comparison of adult and preadolescent forms.

## **Cranio-trigonometry (angle morphometry of skull)**

### **Sungir 2**

As a matter of fact, angle dimensions of the brain case suggest the Sapientic nature of the individual from the burial Sungir 2. It is interesting to point out that angle characteristics for triangles ast-l-ast, au-l-au, po-b-po, n-b-au, n-b-ast and ba-au-b reflecting the configuration of

occipital and frontal regions and the brain case are generally similar to those for the skull from Teshik-Tash. We consider this similarity as a uniform tendency of the whole Homo genus to roundness of brain cases and, therefore, greater curvature of investing bones at the early age.

In terms of some angle parameters of facial skeleton, the individual from Sungir 2 is close to such finds as Dolní Věstonice III, Markina Gora, Talgai, Předmostí III, Sungir 1, Cro-Magnon I and II. There is also some similarity with the individual from Teshik-Tash – in relatively small value of zygomatic bone height (fmt-infor-zm angle).

Thus, we can designate the child from Sungir 2 as belonging to the Homo sapiens taxon with full confidence. The skull is distinguished by strongly pronounced left-hand asymmetry of parietooccipital region. This asymmetry was probably intravital, since the skull was mainly lying on its base and was oriented in the sagittal plane in the excavation pit. Such asymmetry represents an indirect indicator of better development of parietal and occipital lobes of the left brain hemisphere. The asymmetry in position of auditory ducts is similar to that of the Sungir male. The comparative analysis showed that most angular dimensions of the Sungir 2 skull are similar to those of gracile forms like Dolní Věstonice III and Markina Gora. Some angle parameters of the brain case are also similar to the Teshik-Tash find. All these factors emphasize infantile characteristic for shape of the Sungir 2 skull.

### Sungir 3

In terms of many angle characteristics describing relatively roundish shape of brain case, its occipital and frontal regions, the skull is similar to the Teshik-Tash find.

The comparative analysis showed that some angular dimensions of facial skeleton of the child from Sungir 3 are similar to such finds as Dolní Věstonice III, Cro-Magnon I and II, Zhoukoudian, Talgai, Markina Gora, Sungir 1, Mladeč Lautsch I. The relative width of piriform aperture is similar to that of the Teshik-Tash find.

Thus, in terms of most angle parameters, Sungir 3 belongs to the Homo sapiens taxon. The comparative analysis showed that some morphogenetic features of the child from Sungir 3 are close to those of eastern Sapienic forms (Zhoukoudian, Talgai) and to gracile European forms (Dolní Věstonice III, Markina Gora). Some parameters of the Sungir 3 brain case are similar to those of the Teshik-Tash find. Almost the whole brain case shows slight right-hand deformation. Judging by the position of the skull in the excavation pit, this deformation was probably intravital, as in case of Sungir 2. This asymmetry may suggest better development of the right brain hemisphere.

While comparing angle dimensions of two children from Sungir, we have noticed some resemblance in relative dimensions: ast-l-ast, au-l-au, po-b-po, ft-b-ft, b-ast-

l, b-n-au, b-n-ast, zm-n-zm, n-fmt-zm, nl-zpinf-infor, gn-1/2go-id. Such correspondence of dimensions may suggest not only the same typological background of both skulls, but also probable kinship of these individuals.

**Odontology.** The morphological description of dental arches shows the narrowness of the dental arch of the upper jaw bone of S2, which is almost U-shaped. Crowding is insignificant (on the lower jaw bone near the right canine); there are small diastemata on the upper (C-P1) and lower jaw bone (P1-P2). The occlusion is psalidontic, which is rare and not common for Upper Paleolithic men, but characteristic for modern man.

Upper and lower dental arches of the individual S3 are trapezoid due to angles formed by solid canines. The occlusion is moderate psalidontic, irregularities of the dentition may be explained by cutting of permanent teeth.

Dimensional features of crowns of all types of teeth belonging to the individuals S2 and S3 showed that, in spite of some differences (S2 has larger vestibulo-lingual diameter), they both represent a macrodontic population. Thus, VLcor of the central lower incisor of the both individuals is higher than that of the Peking man. The studied individuals are characterized by high indices of crowns of upper second molars. The author mentions that the crowns are higher than those of modern man and considers that as an archaic feature. The evolutionary-comparative analysis of teeth dimensions of the Sungir individuals showed strongly pronounced similarity of numerical information about teeth dimensions with early Upper Paleolithic individuals from Europe. Most teeth dimensions characteristic for the Sungir children are larger than those of late Upper Paleolithic individuals. In terms of odontometry, the author designates “the Sungir skulls as belonging to the early phase of Upper Paleolithic age, with preservation of some remnant features of the previous, Neanderthal stage of evolution” (Zubov, 1984. P. 169).

In addition to hypermacrodontism, the author identified a number of morphological features considered as archaic ones, placing the Sungir individuals in close quarters with Neanderthal men: 1. a solid median crest on the lingual surface of medial upper incisors (S2); 2. strongly pronounced molarization of second lower premolars (S2); 3. well-developed hypocone and slightly reduced metacone on first upper molars (S2); 4. overall shape of lower molar crowns, additional third-order elements of the chewing surface pattern on molars. In terms of all the other odontologic and odontoglyphic features, the individuals found in the Grave 2 (S2 and S3) are typical representatives of H. sapiens fossilis. At the same time, some characteristics such as mild or even absent spatulation of upper incisors, presence of tuberculum anomale, type II of the second metaconid sulcus, 4-tubercle lower molars, absence of distal crest on trigonid, the sixth tubercle and interradical enamel streak testify belonging of these forms to the western odontologic stem (Zubov, 1984, 2000).



**Postcranial skeleton.** The authors (Nikityuk, Kharitonov, 1984) publish a detailed osteoscopic description of remaining cervical, dorsal and lumbar vertebrae, ribs, blade and collar bones, long and small bones of upper extremity and foot bones and point out some 'peculiar' features, i.e. differences from modern man. In particular, they mention well-developed pattern on upper surface of ribs, flatness of the first rib of S3, peculiarity of the right blade bone of the same individual, the scapular end of breast bone that is wider than the sternal one – as distinguished from S2 having the humeral end that is considerably thinner than the sternal one. The humerus of S3 is smaller than that of S2 and has a different torsion angle. It is also more tortuous than humeri of modern man and has different ratio of epiphysis and diaphysis solidity. It is much more solid than the humerus of S2. The femurs of S2 are distinguished by well-developed pilasters, obtuse angles of the femoral necks and diaphyses. The femurs of S3 have a flattened diaphysis with thickness increasing towards epiphyses. The angle of femoral neck and diaphysis is wider than right angle. This list goes on, but the authors do not make any conclusions based on descriptive characteristics and allow their readers to explain them with individual variability. Much more demonstrative were metric characteristics. They were compared to those of the individual S1, the child from Teshik-Tash and modern children, the youth from Caves of Grimaldi and a series of children's skeletons of so-called natural population of the Knoll Indians (Sundick, 1978). The authors state the considerable size of collar bones of the Sungir individuals, which is comparable to that of the child from Teshik-Tash (though the latter's collar bone is more gracile). The humerus of the younger child (S3) is shorter, but more solid. Its least circumference is larger than that of the Teshik-Tash child and, of course, larger than that of modern men of the respective age. The dimensions of humeri, brachii, femurs and shin bones of the Sungir children are larger than those of the children from the 'natural' population of the Knoll Indians. The authors concluded that some differences between the adult man S1 and the children S2 and S3 in measuring features and indices are on one track as compared to modern population. It allows the authors to consider these differences not only as group but also as ontogenetic ones. At the same time, the differences between S2 and S3 are mainly explained by differences in age dynamics of their postcranial skeleton features. Higher

solidity of the S3 skeleton and signs of phenotypic discordance identified by the osteoscopic analysis allow the authors to speak about the possibility of genotypic differences, and it is quite surprising given the common burial of the children (Nikityuk, Kharitonov, 1984. P. 197). The authors who studied children's skeletons from the Grave 2 shared the idea of hybridization between *H. sapiens* and *H. neanderthalensis*.

Summarizing our historiographic review of works dealing with morphology of paleoanthropological finds from burials at the site of Sungir (Sungir, 1984, *Homo sungirensis*, 2000), we can say that most authors of these works interpreted the Sungir materials in terms of either possible miscegenation of Sapients with Neanderthals or stadial transformation, as well as intraspecific differentiation of *H. sapiens*. Some time ago all the Russian scholars adhered to the idea of transformation. But later the West-European Mousterian Neanderthals were estimated as a special taxon with common morphological features, territory and lifetime, with a very high degree of biological specificity, and the above-mentioned hypothesis started to lose its supporters. Nevertheless, the idea is not completely outdated, yet, and it is the 'intermediate character' of the Sungir forms that is used to explain belonging of 'transitional' industries and formation of Upper Paleolithic population of Europe, in terms of possible participation of European Neanderthals in this process (Anikovich, 1997, Kozintsev, 1997, Mednikova, 2000). Most probably, such a notion is explained by an old idea that *H. neanderthalensis* was a subspecies of *H. sapiens*. Although nothing contradicts the concept of co-existence of Sapientic and Neanderthal hominids in the same territory, transformation of the Neanderthal men into the early Sapientic type "implies the considerable rearrangement of growth gradients and genetic correlations that was hardly possible without loss of viability" (Bunak, 1980. P. 58).

The authors of this essay (S.V. Vasilyev, M.M. Gerasimova) share the ideas of species specificity of Neanderthal and Sapientic forms and of possible miscegenation between them on very early stages of development at the subspecific level of *Homo heidelbergensis*.

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## The Multilayer Nepryakhino Site and the Streletskian

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### Summary

Nepryakhino' bifacial points look pretty archaic even for Early part of the Upper Paleolithic. Its neighborhood in the same complexes with numerically and qualitatively representative group of Middle Paleolithic tool types seems organic. Presence of quite developed types of pre-forms and blade cores in those layers are unexpected and especially interesting.

**Key words:** Multilayer site, Early Upper Paleolithic, bifacial points, prismatic cores, sidescrapers

A Paleolithic site of Nepryakhino is situated 2 kilometers to the north of the village of same name in Ozinskiy District of the Saratov region, was discovered in 1989.

With regard to the geomorphology, the area where the site is situated is interesting for the reason, that at this place, in the interfluves of the Volga river and the Ural river, at the south-west border of the Syrtovaya plain the upland Obshchy Syrt is located. By its origin it is a peneplain of the Oligocene age, predominantly consisting of chalk and paleogene sands, limestones, sandstones and chalk. With its clear shelves up to 60 meters high, it differs from the younger Syrtovaya plain of the Early Quaternary age that stretches to the west and south-west right up to the Volga river.

Obshchy Syrt splits into separate ridges. Dividing ridges are separated into the local massifs in the form of mountain crests, upon which there are some denudation residual hills of different heights (Absolute height 90-220 metres). The slopes of the residual hills are asymmetrical and have a stepped, terrace-like structure. Within the limits of Southern Obshchy Syrt the river valleys are feebly marked. Apart from floodplain, they have well-developed terraces of Pleistocene age, and the second one occur fragmentary. In bare outlines the relief was formed by the end of the Late Khazar time (Vasilyev U. M. 1961).

The cluster of the cultural layers of Nepryakhino Site is assigned to the one of the offspurs/ residual hills of Southern Obshchy Syrt. The modern river-bed is situated 500 m to the west-south-west of the site, and its floodplain with oxbow lakes to spring from the very foot of denudation residual hill.

The residual hill consists of medium quartz sand, which are replaced by sandstone quartzite (the lower part of Saratov complex of Paleogene System), which, in their turn, give place to the package of Quaternary layers of Aeolian origin up to 3,5 m thick. On the slopes of the Muravlinskii Blue mountains around the site there is a stratum of quartzite-like sandstone of a light grey color and up to 1 m thick, that serves as a covering for Paleo-

gene sands. On the top the sandstone is blocked by the package of sedentary soil deposits.

The quartzite plate, as a result of cracking on the surface, is represented, as a rule, by separate blocks. The quartzite is medium- and coarse-grained, of a grey colour (sometimes bluish grey), quartz grains are united by a quartz or opal cement, the isotropy is high, the foreign inclusions are rare. The quartzite particles both on the surface and inside the cultural layers are represented by subcube, less often by slab pieces of different, often very large (over 50 cm across) size.

The field investigations of the site were continued in 1990, 1993 and 1995 by stationary excavations (Zakharikov A., 1997, p. 99-123; Zakharikov A., 2002, p. 186-206), specialists of scientific research geological institute of Saratov state university conducted a scientific investigation of the vertical profile of the excavation pit, samples for granulometric, palynological and paleomagnetic analyses were taken. The obtained data confirmed the Pleistocene age of the cluster of cultural layers, with the exception of covering soil, which has a Holocene age.

The layers 1 to 7 are dense with debitage products of different intensity. Compact, well-marked cultural layers in the vertical section are not recorded. The complexes are examined according to lithological layers.

The artifacts are angular and not patinized. The exceptions are the pieces in the layers 2-5, that have a whitish patina, that occurs as a result of weathering. It is significant that only supine artifacts are covered with patina.

A quite representative spore-pollen spectrum is described in one sample (layer Б-I). As N. I. Kuznezova, a member of the palynological laboratory of geological scientific research institute of Saratov State University, concludes, the age of enclosing strata can be defined within the limits of maximum of the last glaciations (Ostashkovo level in the scheme of Interdepartmental Stratigraphical Committee, 1986 (Shadruchin A. V. 1992, p. 11-13).

Out of almost hundred units of faunal remains, found in the excavation pits, only 17 of them are definable to some extent (the definitions of A.K. Kasparov, Institute for History of Material Culture of Russian Academy of Sciences):

Layer Г-H – *Ovis/Capra* sp.: carpal bones (2 samples), phalanx.

Layer K-I – *Mammalia* indet.: the fragment of tubular bone.

Layer Слой К-II – *Equus* sp.: fragment of a tooth; *Bison* sp.: fragment of a tooth, astragals dex.

Layer K-III – *Mammuthus* sp.: fragments of tusks (5 samples); *Coelodonta antiquitatis*: a rib; *Equus ex gr. Caballus*: lower jaw; *Bison* sp.: ribs (2 samples), a fragment of distal epiphysis humerus sin.

In 2006 Marcel Otte (Marcel Otte, Universite de Liege) got the AMS bone date for the lower part of the layer K-II of Nepryakhino site –  $32\,810 \pm 450$  BP (Beta-217473)<sup>1</sup>. In 2012 we got another AMS date from Otte via email – for the upper part of the layer K-III  $36\,060 \pm 350$  BP (Beta-244075)<sup>2</sup>. The received absolute data allow to have a more well-reasoned look at the geochronology of the Palaeolithic layers of Nepryakhino.

To the time interval, corresponding to the obtained radiocarbon dates, belongs the border between the glacial Würm-III and interglacial Periods Würm- III-IV (Arcy, Denenkamp) of the West European geochronological sequence.

## 1. The layer-by-layer description of the quartzite complex

### Layer 1 (Γ)

The total amount of findings in the layer Γ– 9481 (9480 quartzite pieces and 1 fragment of a pottery vessel)

In the layer 1 Γ-H the rim fragment of the profiled and richly ornamented pottery vessel (the ornamentation was done with stroked and fine comb ornament, which is characteristic of Eneolithic Altata type of Trans-Volga territory).

Based on the sum of techno-typological features it seems possible to attribute the complex of the level Γ-H to neo-eneolithic period.

### Layer 2 (Б-I).

The collection of stone artifacts is relatively small. The total amount of findings – 1445. The proportion of splinter and fragments is very high (41%), especially in the upper part of the layer.

Characteristic cores and extreme unspecified the tool assemblage are discerned of this complex. Among cores the group of prismatic core is the most prominent. Both – cores at the early reduction stage and exhausted are present. All of them have a massive body, 6 out of 7 are distinguishable through their elongated proportions. They all have well-shaped narrowed bases, rather sharp splitting angle (60-75°), semicircular flaking surface front. The flaking was carried out from one platform in one direction.

Among the blanks without secondary treatment there is a group of technological blanks, connected with the preparation, correction and rejuvenation of the prismatic cores. These are “crested” blades, flakes of the radical correction of the core-platform – “core-tablets” and spe-

cific transverse flakes of the reforming of the prismatic cores (Zakharikov A. P., 1997).

Blades are quite numerous (15% of all blanks). They have the regular parallel faceting of the dorsal surface and characteristic features of the upper Palaeolithic knapping technique at the basal part of the flake: dotted, linear and concave striking surfaces, diffuse bulb of applied force, “lip” or “visor” between the ventral surface and the striking platform. The method of the rough reduction of the surface is also noticed. The striking surfaces themselves are smooth or with some minor corrections.

The tools in the layer are few in numbers, for this reason it is difficult to characterize the peculiarities of the tool set. Mostly, it is scrapers, side-scrapers and retouched flakes.

### Layer 4 (Б-II)

Almost one meter thick loam contained 119 quartzite pieces in total, and in the upper part of the layer they are sporadic – 27 flakes. The main part of the complex originates from the level connected with the underlayer 5. Characteristic is incredibly high percent of artifacts with retouch – 42%. However, characteristic artifacts are few in numbers. Retouched flakes make up almost the half of the tool assemblage. Among the morphologically formed tools the group of the end scrapers on the plate flakes and convergent side-scrapers on the massive flake can be distinguished. Nuclei – 5 samples.

### Layer 5 (К-I)

The layer is extraordinarily dense with tools and wastes from the stone knapping, and just debris.

The collection consists of 8893 quartzite pieces. Core-like – 70 samples. The cores of parallel flaking with flat or slightly bulging front prevail – 12 one-platformed and 5 two-platformed (among them 2 are of the opposite flaking. One of the one-platformed core with slightly bulging flaking surface and the flaking in the sub-parallel direction has a subtle frontal longitudinal ridge, which makes it similar to its prismatic cores preforms. There are 2 rough-prismatic cores and one proper prismatic core. All core are at the initial stage of reduction. There are 13 atypical cores, even greater in numbers (31 samples) are indefinable, mainly trial pieces. 13 preforms of the prismatic core are of interest (fig. 4, 1). They have a prolonged shape, as a rule, sub-triangle section, narrowed base, longitudinal ridges, faceted with the alternating removals, roughly shaping striking platforms.

The overwhelming majority of the blanks are by-products. Above all, these are the flakes of the processing of the large bifacial tools. The blades are sporadic. It is in accordance with the fact that in general core are very few

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№ OF LITHOLOGICAL LAYER	CULTURAL LAYER	DESCRIPTION	THICKNESS
1	Г	Casing soil - black mould humus The upper cespitose part (Г-B) is grayish. The lower part (Г-H) is a little bit darker. The contact with the underlayer is clear.	up to -0,3m
2	Б-I	Light-brown loam. In the lower part – light carbonate disseminations in the form of flakes, which are 2-3 cm in diameter. The layer is split by the wedges of leaking humus.	-0,4-0,6m
3		A thin black-gray stratum – buried soil	up to -0,02m
4	Б-II	Light-brown loam. The layer is enriched by the carbonates of a thin structure, which define the whitish color. The transition to the 5th layer is not clear, the border is uneven	-0,5-0,7m
5	К-I	Light-brown loam with disseminations and lentils of a darker (humic?) loam. The layer is dense with detrital material. The detritus are cemented by mineral salts with the tools and flakes and make up a solid breccias.	around -0,4m
6	К-II	Buried soil of a rich black soil type, dense with humus, of a black-chestnut color	-0,2-0,5m
7	К-III	Pale-yellow sandy loam/ loess-like loam? The structure of the layer is heterogeneous. There are some inclusions and lentils of gravel, clay- and other rocks. Closer to the bottom the amount of sand in the layer gets higher.	-0,4-1,0m
8		Quartz sand of a palaeogene age. It is separated from the superstratum by the plate and loaves of quartzite.	visible thickness -10m

**Table 1:** Subsurface stratigraphy (summary data)

in numbers, and the exhausted samples are absent. There are several samples of crested blades and core “tablets” (fig. 4, 3).

One cannot overlook the fact that there is a high percent of retouched pieces (10,3%, and in the upper levels of the layer it is even higher – 29,5 %). These numbers are overstated due to many retouched pieces of natural origin. Retouch is in many cases similar to the damage through trampling down (see Schelinskiy V. E., 1983, p. 86-88; fig.1), which is connected to the extraordinary large amount of quartzite material in the layer.

Characteristic tools are rather large in numbers. The most diverse are side-scrapers (fig. 3, 1,) -241 samples (26%): longitudinal -82, double – 40, transverse and diagonal-10, convergent – 22, angular -33. Points are few in numbers, as well as in other layers. There are only 5 of them, but they are represented by the remarkable forms (fig. 3, 2).

There are 24 scrapers in the layer 5 (2,5%), they are represented by different types. In the collection there are several scrapers of high shape, so-called scrapers with denticulate edge (grattoir denticule), scrapers with stem (fig. 3, 3), with beak (nosed scraper), double scraper, circular scraper.

Bifacial tools – 183 samples (20% in the lower part of

the layer 33%). Triangle/ leaf-shaped -50 pieces. Many of them are broken. The asymmetrical bifaces are less in numbers- 22 samples. Rough and partial bifaces together make up 41% of the total amount of the double-sided tools. “Other bifaces” (35 samples) may include not well-informative tiny fragments of the double-sided tools with regular treatment and intact pieces of original form.

There are a lot of large massive tools – 108 (12,5%). Mainly, these are the result of culling.

56 items belong to the group of denticulate tools. These are the tools of two types: the tools with denticulate edges, often shaped by the alternating retouch, and the tools with one or some retouched notches.

Characterizing the secondary technology, it should be noted that the burin blow technique was rarely applied, both in the complex of layer 5, and in other layers. The secondary thinning of the basis of the artifact and the whole implement from the ventral side comes up quite often. In general, the retouch is versatile, often it is extensive, significantly modifying the blank.

### Layer 6 (K-II)

The total amount of splitting products in the layer - 10566.

The cores are low in numbers – 13 samples (0,1%). Out of them: 5 are of parallel splitting with a flat front part, 8 unsystematic, one nuclei is with a treatment of the sides and the base and looks like a perform.

About untreated debitage products we can say the same as what was already pointed out above concerning the flakes of the layer K-I.

Tools – 322 samples. Points are greater in numbers than in other layers – 12. Among the classical points on the triangle flakes with stabilizing edge retouch, (fig.3, 4) there are big prolonged, in their form similar to leaf-shaped points, formed with the retouch, covering the whole back (fig.3,5); sometimes they have a ventral underworking.

Sidescrapers (81 samples) are represented by all the main types. Both – flakes and quartzite pieces were used as blanks. Most numerous are longitudinal sidescrapers -33%, double -17%. The group of sidescrapers with converging edges (fig. 3, 6), including convergent, angular and limaces make up 36% of all the sidescrapers) in layers 5 and 7- 22%). Among all types of the scrapers there are tools with double-sided treatment of different elements. They are not distinguished into separate types, since the method of bifacial treatment in Nepryakhino is in general very well represented. There are 9 samples of scrapers. Retouched flakes, compared to layer 5, are less numerous. Rough massive tools are 19 samples.

Bifaces -78 samples, they make up 24% of all tools of the layer (fig. 36, 1-4). It is significant that 46% of them are broken (fig.36, 2, 3).

The group of pointed prolonged triangle/leaf-shaped bifaces (34 samples) and asymmetrical “knives” stand out among the total mass. The pointed bifaces are different for the reason that in their shape or peculiarities of treatment, one way or another, the model of the point of the spear/dart can be traced. Their common features: symmetrical form in plan and in profile, prolonged shape, relative thinness, blades converging by the angle of 45-65°, lenticular section, the base is straight or round-rectangular, flattened.

Not numerous, but also interesting is a group of asymmetrical bifaces – 5 items (in the layer 5-22).

Relatively numerous are rough and partial bifaces – 25 samples. The general tool model is poorly marked in these samples. They are, as well as the biggest part of the triangle/leaf-shaped bifaces, are unfinished products.

### Layer 7 (K-III)

Total amount of artefacts -4288 samples.

In this layer the only bone tool was found (fig. 4, 6), made of the rib of a large mammal (mammoth?). According to A. K. Filippov, this tool was used for troweling the stitches on the skins.

Out of 26 core-like items almost a half (11) are “opportunistic” cores. There are 7 cores of parallel knapping,

one is strongly worn-out, radial, 5 are indefinable. In the complex of the layer 7 there are also two precores with a bulging front, prolonged ridges, which prepared with alternated removals (fig. 4, 2), similar to the preforms of the prismatic cores in the layer 5. From the striking platform of one of them 3 short blade-like detachments are split off (fig. 4, 2).

Flakes are pretty similar to blanks of the layers 5 and 6. Crested blades – 2 samples.

Tools -119 samples. Bifacial tools -33 items (28%). Almost half of them is triangle/leaf-shaped bifaces (fig. 2, 5). There are only 2 asymmetrical bifaces. Rough and partial – 21%. Rough massive tools are not numerous.

Side scrapers of all types – 33 (28%). Longitudinal side scrapers prevail – 48%. There is almost the same amount of double (9-12,5%), transverse and diagonal, angular, convergent (fig. 3, 7) and scrapers of the original form (other). In the collection of the layer K-III points are absent, scrapers and burins. Denticulate tools make up 10% of the tool set. 22% - flakes with retouch (fine edge dorsal irregular retouch prevails). In the group of original tools the perforators, made with alternative retouch on the proximate blade section is interesting.

The peculiarity of the complex of the layer 7 is that many types of tools are represented by very expressive, thoroughly shaped items.

It should be highlighted that any formal classification of the collection, containing numerous unfinished items, will be very relative. Some items could occupy space in different sections of the tables.

In general, the following can be said about the structure of the quartzite complexes of the Paleolithic layers of Nepryakhino:

- In the collection of the layer 2 (B-I) the group of items, connected with producing, correction, reshaping and rejuvenation of prismatic cores is well represented. Almost all the blades are fragmented. The tool set is characteristic of the absence of bifaces and relatively high percentage of scrapers.
- Not rich and unexpressive complex of the layer 4 (B-II) is characteristic of the numerous retouched artefacts. By its position in the profile this complex is familiar to the assemblage of the underlayer 5.
- Three lower layers reveal marked similarity in their techno-typological features. Their common features are: the small role of the core detachment in industries; high percentage of bifaces and side-scrapers; rarity of points and scrapers; single cases of the usage of burin blow technique; general predominance between the tools on flakes artefacts of the Mousterian group over upper Palaeolithic. Complex of the layer K-I, compared to the two other lower layers, has a higher percentage of preforms of prismatic cores and other core-like forms, numerous retouched items (often of natural origin), the lower amount of bifaces. In collection of the layer K-II the core-like and rough massive tools are less numerous,



points are bigger in numbers. Complex of the layer K-III is characteristic of the highest percentage of bifaces (28%), including triangle/ leaf-shaped, less amount of tools with irregular treatment, the absence of scrapers and points.

The rich collection of the debitage products of Nepryakhino Site enables to look at various aspects of the utilization of raw materials and the technology of quartzite knapping. The most informative are the complexes of the three lower layers of the site.

The strategy of the utilization of raw materials in the layers K-I-III.

In the collection of the lower layers of Nepryakhino by-products prevail, which is an evidence of the extensive model of its utilization, as well as at many other sites, confined to the outcrops of the raw stone materials. For further usage mostly massive (these are most characteristic of Nepryakhino deposits) quartzite “blocky” pieces, resembling “brick” in their contours, were selected. The test of the material was made with several large detachments. Samples, not meeting the necessary requirements, were discarded.

After testing the less massive quartzite pieces were used for the fabrication of bifacial tools, more massive – for the production of cores. Culling of the items was carried out at all stages- both at the production of bifaces and at the manufacture of cores. Discarded or “put off” and for some reasons unclaimed items make up a significant part of collection of the lower layers of Nepryakhino.

Fully shaped prismatic cores were carried away from the site for further utilization. Different forms of flat nuclei were locally knapped. From the obtained blanks side-scrapers, scrapers, points and other tools were made.

Points of spears/darts were made predominantly with a method of biface knapping technique (see below: the technique of the production of bifacial tools). Finished implements were carried out of the boundaries of the site.

Flat tabular quartzite pieces were rarely used for knapping. Exclusively tools were made from them. Large tablets were appropriate for bifaces, and small, as an alternative to flakes, were used for the fabrication of side-scrapers, scrapers, etc. A peculiar case of material utilization was a special detachment from the large fragments of the quartzite plate, almost without a preliminary preparation, macroflakes. Macroflakes, along with large plates, were used for producing bifacial points.

At the moment there is a following correlation between the Pleistocene layers of Nepryakhino and the geochronological scale:

Layer K-III – stadial Wurm III (middle Valdai stage 4)<sup>3</sup>;

Layer K-II – interstadial Wurm III III-IV (Arsi, the Denenkamp) (middle Valdai stage 5);

Layer K-II – interstadial Wurm III-IV ( Arsi, the Denekamp) (middle Valdai stage 5);

Layer K-I – stadial Wurm IV – Late interstadial Wurm III-IV (Arsi, the Denenkamp) (middle Valdai stage 5);

Layer K-I – stadial Wurm IV –late phase of the interstadial Wurm III-IV (Arsi, the Denekamp) (middle Valdai stage 5);

Layer Б-II –early phase of the stadial Wurm IV (Late Valdai– Ostashkov);

Layer 3 (upper buried soil) – interstadial Tursak? (Gmelin? soil-forming horizon);

Layer Б-I –late phase of the stadial Wurm IV (Late Valdai– Ostashkov).

Thus, industries of the Pleistocene layers of Nepryakhino site reflect all chronological stages of the development of the Upper Paleolithic from its earliest stages (layers K-III and K-II, and, apparently, layer K-I) to the well-developed and, probably, late Paleolithic stage (layers Б-I, Б-II). Complex of the layer K-III, even considering the tendency towards making the whole range of early Upper Paleolithic sites older than they are (see Anikovich M.V. 2006, p. 97-99; Derevyanko A. P., Shun'kov M. V. 2006, p. 110-113), can be seen as an industrial phenomenon of the early stage of Upper Paleolithic.

Industries with bifaces of the Early Upper Paleolithic is quite a widespread phenomenon in the central and east Europe. To denote the industries of the early Upper Paleolithic with characteristic double-sides tool shapes and a range of others (predominantly archaic) features the notion “Seletoid technocomplex” is used (Ankovich M.V., 1993, p. 3-19) or “eastern selet” (Demidenko U. E., 2003b, p. 36-50).

Taking into account all techno-typological features (first of all, based on the bifacial forms and Mousterian group in the tool set), the industries of the three lower layers of Nepryakhino can be included into the wide circle of sites of the Eastern Selet (Zacharikov A.P., 1999a, p. 197-206), on which background they stand out because of their blade knapping tradition, based on the prismatic cores.

## 2. Conclusion

In all Paleolithic layers of Nepryakhino (except for the less informative layer Б-II) the specialized production character is clearly defined.

For the complex of the layer 2 (Б-I) functional domi-

<sup>3</sup> Unfortunately, we have only two absolute dates so far, which is, for sure, not enough for 6 pleistocene layers of the cut. Besides, there is the so-called “radiocarbon plateau”, which covers C14 dates in the interval of 31-39 kyr BP, which some authors consider as equal (Chabay V.P. 2003, p. 80). Thus, it is not excluded that the lower buried soil could be formed in the time of the earlier interstadial Hengelo (CBC3).

nant is the production of blanks, based on the reduction of prismatic cores. In the complex of the layer there are artefacts, reflecting different stages of this activity: an acquisition, the extraction, selection and testing of the raw material, production of the prismatic cores and their blades reduction. Debitage products-blades- were carried out of the site.

In the layers K-I-III quartzite complexes reflect two types of specialized production: the production of the prismatic cores and the production of bifacial points (finished cores and points were carried out of the site). The second specialization, judging from the large amount of corresponding by-products, prevailed. The reduction of plane cores and getting blanks, as well as the production of tools on flakes, played a minor role and only served the needs of the group in life support during in the times of functioning of the workshop-site.

Today we can consider complexes of the three lower layers of Nepryakhino, which have an Early Paleolithic age, as approaching in terms of age and typological and technological characteristics the industry, which combines the blade reduction of volume prepared massive cores with a quite bulging front (applying Upper Paleolithic knapping technique – margin detachment), a high percentage of the tools of the Middle Paleolithic type, primarily side-scrapers (not only simple and double, but also multiple and expressive convergent and angular), and, at last, a high percentage of bifaces, primarily biface points of prolonged proportions.

The comparison of complexes of the lower layers of Nepryakhino with the material of the chronologically close Paleolithic sites is appropriate to do according to these characteristics.

When comparing the industries of the lower layers of Nepryakhino with the industries of the famous Paleolithic sites of Late Mousterian and Early Upper Paleolithic age, we always had to involve the material of the sites, which are located quite far. The reason is simple – there are no other sites at the Volga-Ural interfluvium.

The most numerous sites with cultural layers of the early Upper Paleolithic age are located in Kostenki-Borshchevo area in the Middle Don River (Paleolithic of the Kostenkovsko-Borshchevskiy area...1982; The early stage of the Upper Paleolithic...2006). Among them we should, first of all, pay attention to the complexes, which belong to Strelezkaya culture (Anikovich M.V., 1977, p. 94-112; Rogachev A.N., Anikovich M.V., 1984, p. 179-181; Anikovich M.V., 1988; Anikovich M.V., 1993, p.3-19). The age of the earliest Strelezkaya culture sites (Kostenki 12, layer 3; Kostenki 6 (Streletskaia); Kostenki 1, layer 5) according to the latest data – 38-40 kyr BP (Sinitsyn A.A. et al 1997, p. 21-66; Anikovich M.V., 2005, p. 70-86; Holiday V.T. et al. 2006, pp. 57-80).

The early industries of the Kostenki-Strelezkaya industry are notable for the non-blade core percussion technique, clearly defined Mousterian group (simple, convergent and angular side-scrapers, points and truncation forms) in the tool set, the rare usage of the burin

blow, special types of bifaces (primarily triangular points). At the late stage we can trace the eliminating of the Mousterian traditions and the development of the Late Paleolithic elements of culture. The blade becomes the main type of blanks, and in the tool set of, for instance, Sungir site (which is referred to Strelezkaya culture not by all scholars) there are a lot of Aurignacian elements. To the time of 28 kyr BP the sites, referred to Strelezkaya culture, are known at the territory from the Lower Don to the Ural (Matioukhine A.E., 1990, p. 141-160; Pavlov P.U. et al, 1996, p.73; Anikovich M.V. 2006, p. 97-00), which can be rather an evidence of the unity of the techno-technological basis, than of cultural closeness.

The lower layers of Nepryakhino are similar to the Kostenki-Strelezkaya sites only in terms of the high percentage of the Mousterian tools, bifaces and the rare usage of the burin blow. The side-scrapers of Nepryakhino are much more versatile (the groups of angular and convergent side-scrapers are distinguished), typical scrapers of Strelezkaya type and triangular points are absent. In general, the bifaces of Nepryakhino are remarkable for both their size and their proportions and the manner of treatment, which seems more archaic. Preforms and prismatic nuclei of Nepryakhino themselves do not have analogies in earlier sites of Strelezkaya culture, for which the blade reduction is not characteristic at all.

Numerous camps with the cultural layers of the Early Late Paleolithic in Biryuchya Balka in Rostov region (Matyuchin A.E., 2001, pp. 26-36; Matyuchin A.E., 2002, pp. 24-28; Matyuchin A.E., 2003, pp. 12-27), partly connected with Kostenki-Strelezkaya culture and which are, predominantly, workshops, bear resemblance to the lower layers of Nepryakhino. Thus, the materials of the 3rd layer of Biryuchya Balka 2 (there are several AMS – data, the oldest and, according to A. E. Matyuchin, is the most preferable is 31 480± 200 BP (Beta-183589), quite representative and containing more than 200 bifacial points, display the blade detachment (including the cylindrical prismatic and sub-prismatic cores close to those of Nepryakhino), numerous various side-scrapers, at the same time the scrapers are typologically expressive and numerous. The morphology of the bifacial points of the 3rd layer of Biryuchya Balka 2 is also different of that of Nepryakhino – these are the typical triangular points of Strelezkaya type with the concave, less often straight base, with mostly shortened proportions (Matyuchin A.E., 2012, p. 175-194). Bifacial points of the 3rd layer of Biryuchya Balka 1a are morphologically closer to the points of the lower layers of Nepryakhino (Matyuchin A.E., 2002a, pp. 14-28; fig. 6-9). For this layer there is also an AMS date (Matyuchin A.E., 2012, p. 29), and it is earlier than the dates of the 3rd layer of Biryuchya Balka 2 – 35900±280 BP (Beta – 183587). The similarity is, first of all, in the functional specificity of the sites, in the presence of different bifaces and side-scrapers. However, both the character of primary knapping and the general typological character of the industry of the 3rd layer of Biryuchya Balka 1a, according to the published data, is not clear yet. The comparison of so complicated complexes requires a more detailed comparative analysis.

Among the Middle Paleolithic sites of the Eastern Europe, which have a late age (at least, corresponding to oxygen isotope stage 3), those referred to the “East Micoque” draw our attention. The materials of these sites are taken by the researches (Anikovich M.V. *et al.*, 2008, pp. 106, 107) as a possible genetic basis of the East Szeletian, and, in particular, Kostenki-Strelezkaya culture. The whole set of the “East Micoque” sites were present until the Arci Interstadial (Chabai V.P., 2003, p. 78-82).

The most of late Micoque sites are located in the Crimea, which even acquired a name of “neanderthalic refugim” (Anikovich M.V. 2006, p.96). The East Micoque is different from other Mousterian industries (both levaluzski and non-levaluzski) by the broadly represented group of double-side treated tools. Close by age to the lower layers of Nepryakhino (taking into account all the concessions, we take the interval of 30-40 kyr BP) the Micoque complexes are known in Zaskalnaya V, Zaskalnaya VI, Kabazi V, Prolom 1, Staroselye, Buran-Kaya III, probably Prolom 2<sup>4</sup>.

Commensurable with points of Nepryakhino according to general morphology bifacial pieces are present in layers II, III and III-a Zaskal'noe VI (Kolosov Y.G. 1986, table. XLVII, 1; LVIII, 2). Convergent and angular side-scrapers are also typical for those assemblages. It is indicative that those layers earlier described by Y.G. Kolosov as camp-workshops (Kolosov Y.G. 1986, p.p. 39-52), which well coincides with morphology of majority double-sided worked «knives», with unworked natural and artificial striking platforms (usually described as tubbers). Presence of bifacial point in the group of double-sided worked tools marked for flint complex of the lower layer of the Prolom 1 (Stepanchuk V.N. 1994, p. 146). Elongated bifaces, reminding Nepryakhino' pieces by its general form, are present in Zaskal'naya V, Staroselye, Kabazi V (Kolosov Y.G. 1986, p.p. 110-126, table. 11; Chabai V.P. 2008, fig. 12, 3). Micoquian' complexes of Zaskalnaya V, Zaskalnaya VI and Staroselye are characterized by big percentage of prismatic and subprismatic cores and blades which apparently were purposed blanks. It looks that precoces of Nepryakhino-type with lengthwise ridges given by distinctive knapping technique (also called gigantolithes), not exists in Zaskalnaya V, Zaskalnaya VI, not even in blade-typed industry of Staroselye, but the very fact of combination of develop-

ped technology of double-sided knapping with blade knapping technology seems important<sup>5</sup>.

The combination of layer C from station Buran-Kaya III, beside remarkable leaf-shaped bifacial points of double-convex section contains a series of geometric microlithes – trapezes and also various scrapers and other Palaeolithic kinds of tools – on this base the industry of this layer is attributed not as Micoquian but as “Eastern Szeletian” (Chabai V.P. 2000, p. 26-28; fig. 4). Resemblance with industries of lower layer from Nepryakhino site is seen only in relation to bifacial points and it is not evident.

We should stop on important peculiarity of Micoquian' industries as plano-convex section of bifaces. By its shape it may be absolutely analogous to leaf-shaped, triangular and other points of the Upper Paleolithic. But the section of last ones is primarily bi-convex.

Author's attempt to find similarity in technological traditions of late Micoquian of Crimea with industries of lower layers of Nepryakhino bring him to the following conclusion. The important factor which points to that resemblance is not presence of double convex bifacial points in late-Micoquian complexes, but distinctly seen signs of use of soft knapping-technique and blow “in ridge”<sup>6</sup>. Thus, the set of technical methods of «Micoquian» artisans allowed him to produce points, similar to Nepryakhino'-type in a bulk. Stylistic differences of Micoquian' bifaces from Nepryakhino' bifaces may have cultural, economical or other (peculiarities of the raw material) reasons.

Thus, we have whole stratum of the sites of the Late Middle and Early Upper Paleolithic with bifacial tools including points on Russian plane and in Crimea. These industries are very different<sup>7</sup>. Part of them has reliable geostratigraphic position, absolute dates, enters into groups by technical and typological indicators in steady «facials» (Crimean Micoquian), or for Earlier Upper-Paleolithic (Kostenko-Borshchevo region) even into archaeological cultures. Others are not dated with the same reliability, and set of technical and typological indicators testifies about it peculiarity.

But considering whole set of facts we may come to conclusion about abundance in the end of Middle Pale-

<sup>4</sup>For Zaskalnaya V, layer 2, there is a radiocarbon date Ki-10743 – 31,60±0,35; for the layer III of Zaskalnaya VI – radiocarbon dates - OxA-4772 – 35,25±0,90; Ki-10894 – 36,40±0,45; Ki-10609 – 38,20±0,40, for the layer IIIa – OxA-4132 – 30,76±0,69; OxA-4773 – 39,10±1,50; Ki-10610 – 39,40±0,48; Kabazi V – the set of horizons III/1a (interstadial Denecamp) – OxA-2134 – 30,98±0,22, – the set of horizons III/5 (interstadial Hengelo) – OxA-4726 – 38,78±0,36; Prolom 1 the upper layer – GrA-13917 – 30,51±0,58/0,53; GrA-13919 – 31,30±0,63/0,58; the lower layer – Ki-10615 – 33,50±0,40; Ki-10616 – 35,20±0,45; Buran-Kaya III layer C – OxA-6869 – 32,20±0,65; OxA-6672 – 32,35±0,70; OxA-6868 – 36,70±1,50; Staroselye layer 1 – 41,2±1,8 and 42,5±3,6 kyr BP (Chabai V.P. 2000, p. 26-28; fig. 2; Chabai V.P. 2003, table 1; Chabai V.P. 2008, table 9).

<sup>5</sup>Combination of leaf-shaped bifacial edges and plate split of queen cells is typical for the number of industries of Central and Western Europe, for instance Linkomb-Ranis-Ezhmanovice group (its age defines by multiple radio-carbon dates in interval 30-40 тлн) (Vishnyatsky L.B. 2008, pp. 152-155). Prismatic technik of initial splitting are mentioned for some selet's combinations (Dolukhanov P.M. *et al.* 1980, tabl. 3; Grigoryev G. P. 1968, p. 43; Grigoryeva G.V., Anikovich M. V. 1990, p. 9-11).

<sup>6</sup>See for instance: Kolosov Y.G. 1986, table. XV; XXIX; XXXIII, 3; Demidenko Y.E. 2003, p. 28-154; Chabai V.P. 2008, fig. 13; 14; 15, 2.

<sup>7</sup>There is not enough publications on many mentioned monuments mentioned above. Probably this problem will never be solved but we should seek after it.

lithic technical traditions of producing bifacial tools on Russian plane, in Crimea and probably even in Transural territory. In this connection it is not surprising that even in Early Upper-Paleolithic there were workshops of production double-sided processed points (lower layers of Nepryakhino, Biruchya hollow 1a layer 3, Biruchya hollow 2 layer 3). There are yet no stylistic parallels to Nepryakhino points<sup>8</sup>.

On many sites of the final period of the Middle Paleolithic prismatic core, crested blades of preparation and reshape of core-surface, purposeful blades themselves are

present. There are no analogues to remarkable preforms of cores from lower layers of Nepryakhino neither in Later-Mousterian nor in Early Upper-Paleolithic sites of Eastern Europe.

Thus, Nepryakhino' bifacial points look pretty archaic even for Early part of Upper Paleolithic. Its neighborhood in the same complexes with numerically and qualitatively representative group of Middle-Paleolithic types of tools seems organic. Presence of preforms and blade cores in those layers quite developed type is unexpected and especially interesting.

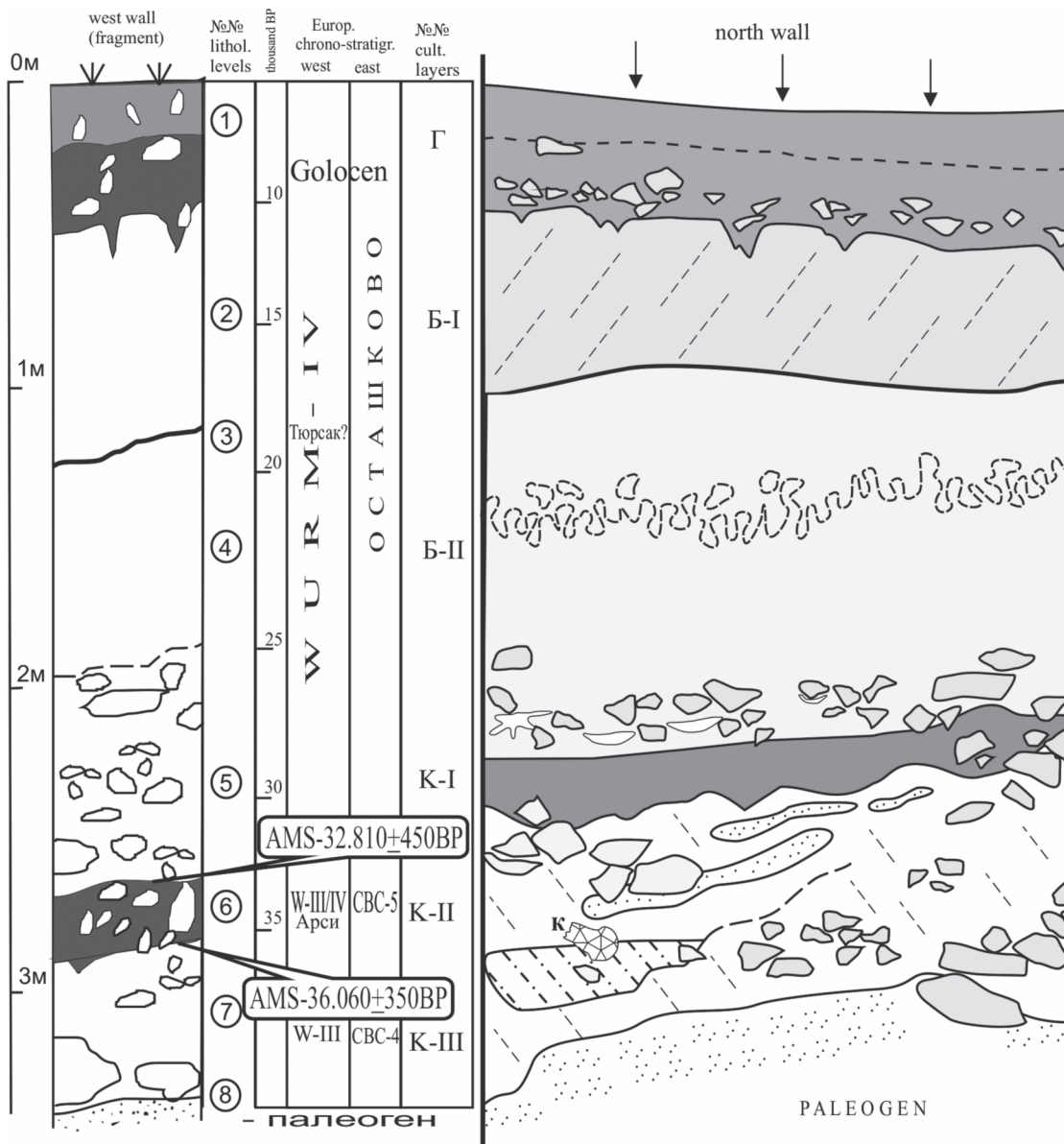


Figure 1: The Nepryakhino Site. The stratigraphy and geochronology.

<sup>8</sup> Actually, we cannot say that the stylistic canon for lower layers of Nepryakhino' edges is reliably established because of small amount of completed pieces in collection.

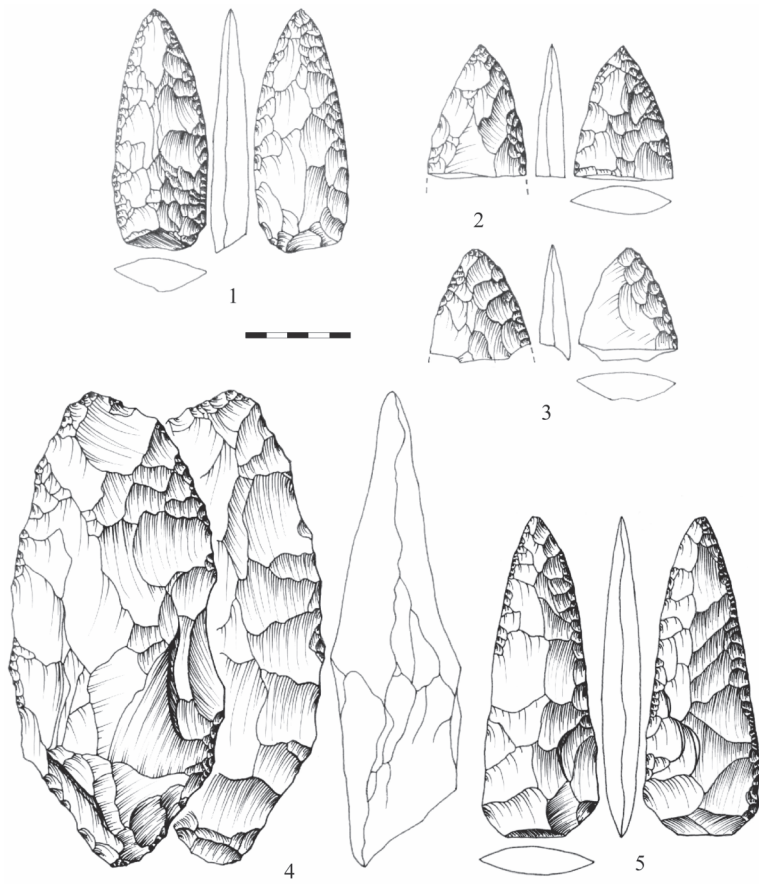


Figure 2: The Nepryakhino Site. Bifacial points 1-4 - layer K-II, 5 - layer K-III

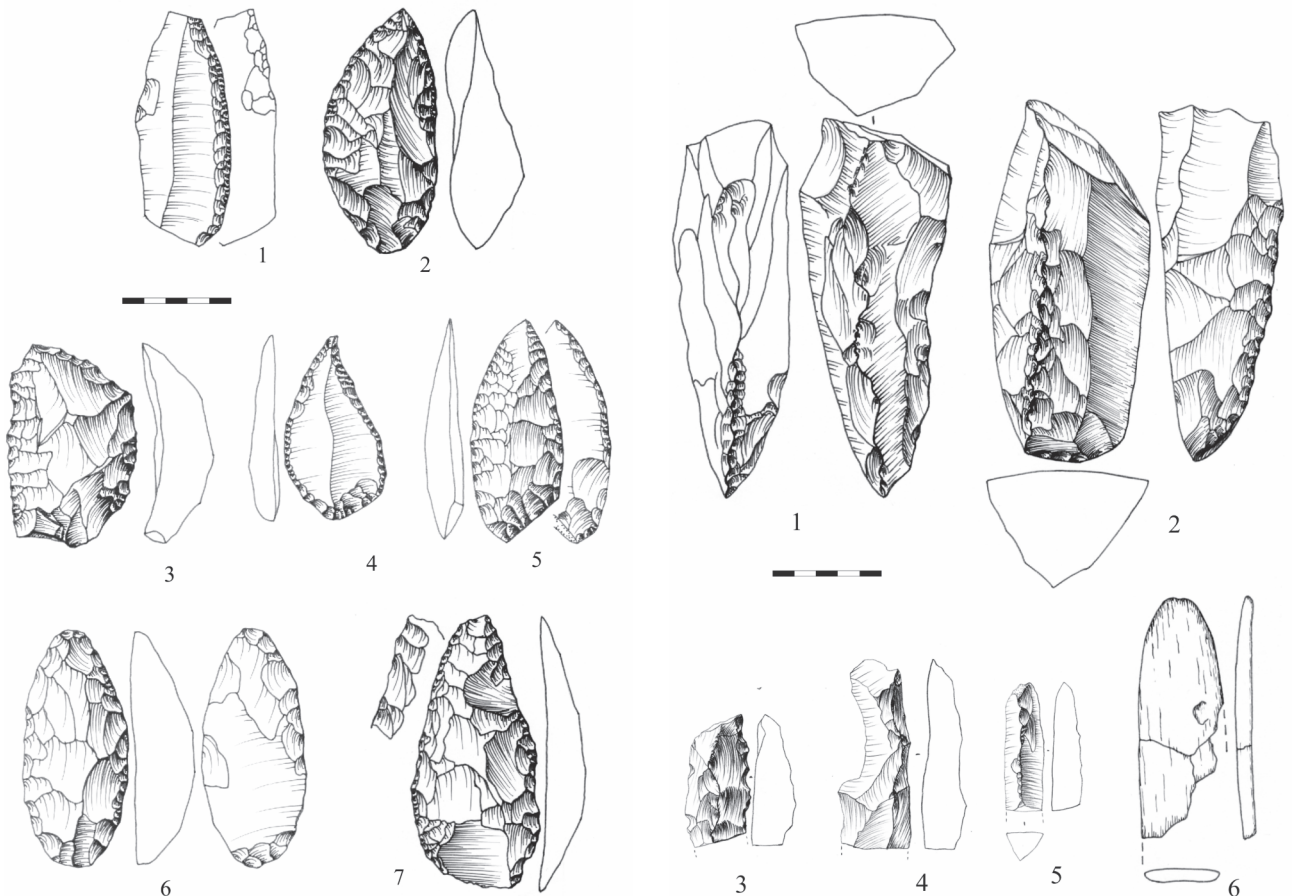


Figure 3: The Nepryakhino Site. The tools mousterian. 1-2 - layer K-I, 3-6 - layer K-II.

Figure 4: The Nepryakhino Site. Cores, Crested blades and bone tool. 1,3 - layer K-I, 4, 5 - layer K-II, 2, 6 - layer K-III.

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## Personal ornaments and decorated objects from the Early Upper Paleolithic site of Sungir

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### Abstract

The general analysis of material culture of the Early Upper Paleolithic site of Sungir is complicated and hotly disputes. Personal ornaments and portable art objects – beads, pendants, zoomorphic figurines, engravings - have been the subject of study. However, in-depth study of all the giant complex (more than 15,000 items) of these objects was not provided.

The first results of a new comprehensive study of personal ornaments and decorated objects allow re-evaluate the value of this material to characterize the relationship of different parts of site, as well as burials. The solution of this problem is particularly helped the identification of individual techniques of manufacture of beads certain types.

New evidence of ornamental decoration on ivory objects, including all the figurines, found in the result of work with a collection from O.N. Bader excavations. Results of the study of ornament manufacturing techniques and principles of its location revealed some typical cultural characteristics Sungir.

Certain influence on the technique of manufacturing certain types of Sungirian pendants had a cultural traditions Initial Upper Paleolithic of the Russian Plain (eg., Kostenki XVII/2). Aurignacian features in personal ornaments and ornament patterns are similar both in the rare materials of the Russian Plain (Kostenki I/3), and in the materials from Central and Western Europe. Using personal ornaments on the burial suits are similar to the materials of the early Gravettian of Moravia (the problem of the influence direction has not been studied).

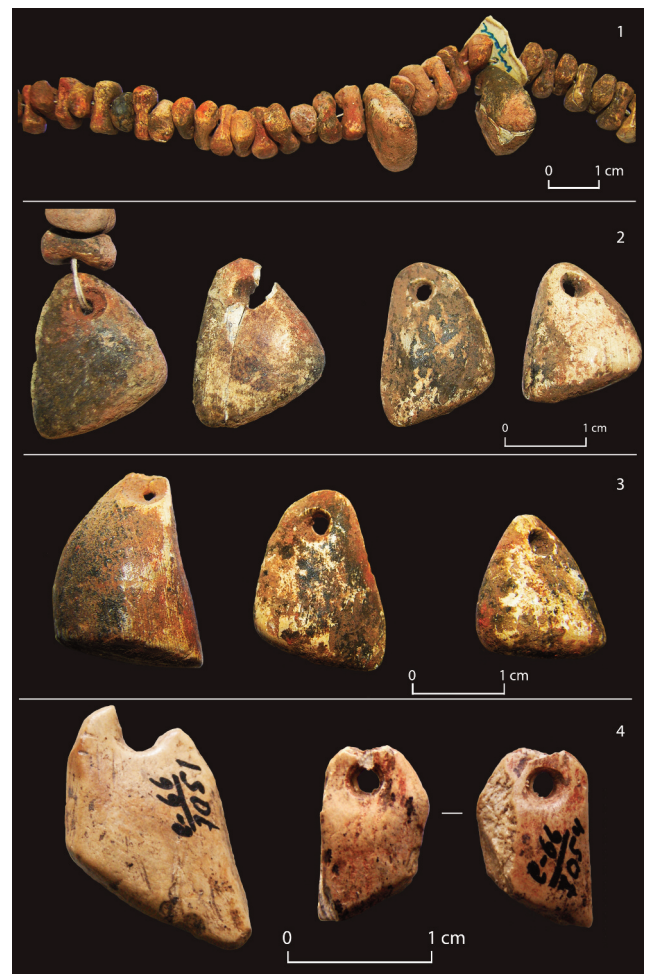
This is a complex mosaic of cultural influences in the Sungir materials provides a new look at the cultural and historical processes (including migration of people and ideas) that took place in Europe in the Early Upper Paleolithic.

**Key-word:** Initial Upper Paleolithic, Early Upper Paleolithic, Aurignacian, Sungir, personal ornaments, decorated objects, portable art, ivory

### Introduction

The age of the Early Upper Paleolithic site Sungir, which is the subject of endless debates, dates back to about 34-30 ka cal BP (eg., Kuzmin *et al.*, 2014; Marom *et al.*, 2012). Results of paleoanthropological research of human remains from burials are uniquely identify site inhabitants like *Homo sapiens*. Stone industry features is characterized transitional industries from the Middle Pa-

leolithic to the Upper Paleolithic (eg. Streletskian, Szeletian...). A few types of tools from bone, ivory and antler have a broad similarities in the materials of the European Early Upper Paleolithic sites.



**Figure 1:** Sungir ivory personal ornaments (beads and deer canine imitations) from children's burial (1-3) and cultural layer (4).

The collection from its excavation comprises more than 80,000 objects (Upper Paleolithic site ..., 1998). A wide variety of personal ornaments (fig. 1, 2, 4-9) is found in the cultural layer and the burials of the site, including fragments of *Dentalium* sp., the perforated Paleogene fossil shells *Gryphaea*, bone tubes, pendants made of arctic fox canines, one pendant made of a wolf canine, ivory, bone and stone beads and pendants; ivory bracelets, rings, and carved discs, zoomorphic pendants (Bader, 1973, 1978; Zhitenev, 2007, 2011; White, 1992, 1993). O.N. Bader's statement about the presence of the belemnite pendants in the cultural layer of the site is erroneous (Bader, 1978). The belemnites with cuts, present in the collection, are the evidence of segmentation of the be-

lemnites, but not personal ornaments. There are no objects made of belemnite on the site. One of the possible explanations for the significant number of cracked belemnites is that these are the traces of pretreatment for later use, e.g. for medical or cooking purposes, as a preserving supplement for storing meat for the long term. Technology of segmentation belemnites has direct analogy with materials (fig. 3) from an Initial Upper Paleolithic site Kostenki XVIII/2 (White, 1993).



**Figure 2:** Sungir: fragments of belemnites with segmentation traces (1-2), fragments of *Dentalium* sp. (3).



**Figure 3:** Kostenki XVIII/2 layer: Initial Upper Paleolithic personal ornaments from belemnites and arctic fox canines;

## Personal Ornaments

The basic amount of personal ornaments were found around and in the graves. Two graves found at Sungir. Female skull (ind. C5) was located on the surface of the grave 1, over the burial men (ind. C1), which was at the bottom of the grave. Upper burial in the grave 2 is the burial of the postcranial remains (ind. C6 - women?). Lower burial in the grave 2 is the burial children placed head-to-head (ind. C2 - south burial adolescent - boy, ind. C3 - north burial child - girl).

In the women's burial (ind. C6) found 19 personal ornaments directly into the grave (17 drilled and non drilled ivory beads, a perforated arctic fox canine, ivory ring); more than 130 ornaments found above grave, but the relationship of all with the burial is not obvious (Bader, 1973, p. 138). In the men's burial found about 3600 personal ornaments (Bader, 1967, p. 156). The largest number of personal ornaments on the Sungir site found in the burial of children.

Pendants of fox canines (fig. 6) is the most indicative for the analysis of personal ornaments for the current research (as the most compact and statistically significant type of pendants).

In total, the children's burial contained 9,343 intact personal ornaments, 834 fragments and 151 unlabeled beads, which could not be attributed to either boy's or girl's burial (Zhitenev, 2013). The girl's burial contained 4,849 intact personal ornaments and 425 fragments; among them just one arctic fox canine, which was located under the lower jaw. 4,494 intact personal ornaments and 409 fragments were related to the boy's skeleton; among them were 185 intact arctic fox canines and at least 43 fragments. 42 intact canines were found near the skull, the number of fragments is unknown. At the right shoulder, 21 ivory beads and 3 arctic fox canines were located. 4 canines and 10 beads were found near the right wrist. At the level of lumbosacral spine, 136 intact canines and at least 43 fragments were located.

More than 20 pendants made of arctic fox canines were found in the cultural layer of the site. Unfortunately, only 14 objects have an exact address. The spatial distribution shows the accumulation of canine-made ornaments in the area around the grave 2, at the level of 3-5 horizons. On the remaining site area, the arctic fox teeth pendants do not form any assemblages. It should be noted, that almost all awls found in the cultural layer of the site, are also concentrated around the grave space. Such picture, apparently, is the result of specific funerary activities.

A striking analogy to it is the spatial distribution of the fox teeth pendants, needles and needle cases in close vicinity to the burial in Kostenki XV (Zhitenev, 2007). The connection between pendants and needles can often be traced in the Upper Paleolithic sites. On some sites, one can identify if not the place of creating the pendants,

at least the area, where they were attached to certain details of the costume.

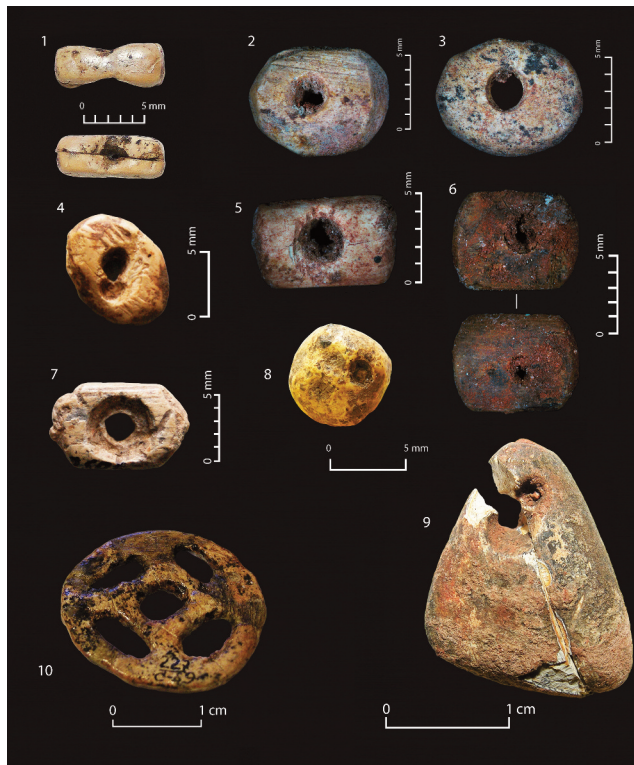


Figure 4: Sungir: ivory beads (1-7), ivory bead blank (8), ivory pendant (9), ivory carved disc from children's burial (10).



Figure 5: Sungir: stone pendants and stone pendant blank.

The situation in Kostenki XV appears to be an excellent illustration of the location of a variety of pendants on a limited area in the cultural layer. In the cultural layer

of Gorodtsovskaya site (Gravettian time) fox teeth pendants were discovered both in the burial (more than 150 teeth sewn onto caps), and in the close vicinity to it, on a limited area of the cultural layer (30 teeth).

All morphological subclasses of teeth, which belonged no less than 11 arctic foxes, were used for manufacturing pendants quite equally. The spatial distribution of bone tools traditionally associated with the manufacturing and finishing of clothing has shown obvious correlation in the location of pendants and needles with the needle case, while the location of awls and other bone tools in the cultural layer is not restricted to the grave space only.

A similar pattern is apparently the result of relatively short-term purposeful funerary preparations, after which, at least the said area around the burial was essentially out of use.

The results of the analysis of the spatial distribution of all kinds of ornaments and unfinished pieces in the cultural layer of the site provide plain evidence to the thesis that accumulation of the arctic fox canine pendants near the grave 2 is deliberate (Zhitenev, 2011). The presented plan reflects the location of the vast majority of the artifacts discussed, but not 100% of them, as some of the ornaments have no definite address. Most of the ornaments in the area of accumulation near the grave 2 were revealed in 3-5 horizons, as well as in the assemblage in the excavation III, small in size, but extraordinarily rich in the number of ornaments and their unfinished parts.

The results of the zooarchaeological stage of studying more than 180 pendants made of arctic fox canines (from the burials and cultural layer) allow to say with confidence that all morphological subclasses of canines of more than 50 arctic foxes were fairly equally used for manufacturing pendants. The features of manufacturing techniques of some types of ornaments from Sungir site were initially described in detail by S.A. Semenov, and later completed by R. White and G.A. Khlopachev (Khlopachev, 2006; Semenov, 1968; White, 1999).

The results of studying the arctic fox canines allowed finding a certain discrepancy in the perforation techniques on the ornaments from the burials and those from the cultural layer of the site. The vast majority of canine pendants found in the burials have clear signs, that just a few craftsmen manufactured these ornaments.

There are no unfinished pendants made of arctic fox canines in Sungir cultural layer, although there are some unfinished ornaments of other kinds. Among the Palaeolithic sites I have studied, the only two, where a variety of unfinished ornaments made of animal teeth was found, were the collections of the Gravettian sites Gagarino (fig. 7, 1, 3) and Khotylevo 2. Only two (single?) unfinished pendants made of arctic fox canines (fig. 7, 2) are found in the burial of an adult male (grave 1, ind. C1). Various unfinished ornaments are found in the graves of



**Figure 6:** Sungir: pendants made of arctic fox canines.

children and the man alike (fig. 4 - 5). Therefore, we can assume the existence of practice of using not only the special funerary artifacts, but also the unfinished objects. The issue of fastening the ornaments with incomplete perforation is resolved in each case individually. In case of the bracelet, it is either placed on the shortened arm under the garment, or fixed by overlapping the two ends of the bracelet. In case of arctic fox canines, they are placed onto/into the ochre mass, that thickly covered the man's head (similar to the individuals from the triple burial of Dolní Věstonice II), or tightly pressed with a thread on a cap thickly sprinkled with ochre.

The fox canines perforation was done using different individual approaches (fig. 6). Initially, it should be noted that methods of flattening of the canine roots prior to the perforation varied greatly. The most common perforation of arctic fox canines from the cultural layer (and the wolf canine pendant) is the double-sided drilling; there are also clear signs of work of different people. In the children's burial, the perforation techniques vary considerably. Thus, one series of perforated canines is drilled (in the other series: perforation by gouging; pres-



**Figure 7:** Arctic fox canine's pendant blanks: Sungir (2) and Gagarino (1, 3).

sure or indirect percussion; cutting) from one side only, while the hole on the other side is perforated by pressure or percission through (similar to the technique used on some stone pendants); the perforated hole can be either neatly modified with reaming or cutting (for smoothing and/or alignment purposes), or left untreated.

However, this variety of ornaments is assorted in the manner of manufacturing holes and is clearly divided in turn into several separate series, apparently due to the craftsmen's individual work style (similar techniques of perforation and individual features of the craftsmen are identified in a series of personal ornaments (fig. 3) from Kostenki XVII/2, an Initial Upper Paleolithic site).

Similar techniques were used to perforate the stone pendants, which suggests that the same craftsmen produced objects made of different materials. Similar perforation styles (techniques) in the children's and adult's burial may also indicate that they were not long separated in time - within two or three generations (at the level of inheriting the cultural and technological traditions from grandmother to granddaughter). Another explanation for this phe-

nomenon could be a long existence of unique family traditions. However, the observation and analysis results on the characteristics of perforation technology of the objects from the cultural layer contradict this idea in part.

There are no signs of wearing on a considerable part of ornaments found in the graves, while almost all pendants found in the cultural layer of the site had been worn heavily. There are other artefacts in the burials, which, apparently, nobody ever used, but which bear the clear signs of hasty, yet thorough manufacturing (fig. 4). One of the most striking examples is the figurine - a horse-shaped pendant from the boy's grave (fig. 9). However, not only the ornaments and small figurines were produced immediately before the inhumation of children, but also spears and lances made of mammoth ivory (Girya, Khlopachev, 2006).

The presence of bracelets, rings, discs, and fossil shells, as well as the placement of the ornaments on the costumes of the buried finds analogy in the early Gravettian site in Moravia, close in terms of time and distance (eg., Klima, 1987; Taborin, 2000).

The dominance of ornaments made of arctic fox teeth and the presence of imitations of deer canine indicate the specific group markers traditionally used by the groups of hunter-gatherers from the Russian Plain, starting from the Initial Upper Paleolithic and with the ongoing cultural contact/exchange with the Central Europe at least.

The ungual phalanges of the cave lion from the children's burial are likely to be also a part of personal ornaments. One ungual phalanx was located contra laterally on the right side of the abdomen of each buried at the same – lumbosacral - level (which apparently was associated with certain perceptions about the place of these symbolic objects on the garment). Moreover, the boy had "on the left cheekbone and almost between teeth – a large ungual joint" of the cave lion (Upper Paleolithic site..., 1998, p. 77). Another ungual phalanx was found in about fifteen meters to the southeast of the grave № 2 (with children's burial). The lion's paw (*Panthera spelaea*) in anatomical order was found nearby. It is important to notice that, despite the profound differences in the diet of the buried adult male and the girl vs. boy, both males' costumes are ornamented with arctic fox canine's pendants. While the girl had only one canine as pendant around the neck. In the upper burial of grave 2 (ind. C6), where only the poorly preserved postcranial, most likely female, remains were found, the ornaments of arctic fox canines were not revealed. Thus, despite the social and age class differences, the costume ornaments of Sungirians were subject to some other, probably more profound, regulatory framework.

This can be illustrated by the example of the arctic fox canines pendants, used in the boy's clothes (ind. C2) to decorate the cap and the belt, and in the males' clothes (ind. C1) – to decorate the cap and trousers. Thus, we see clearly the special role of the ornaments made of arctic

fox canines in male costume decoration and especially for the cap. The issue of the boy's social and age class position in the community, as well as the burial status of children and their costumes (in comparison with adult costumes) requires separate consideration.

Sungir personal ornaments combine different types of Initial Upper Paleolithic and Early Upper Paleolithic personal ornaments (and particularly – Aurignacian beads) and perforations technique (and Initial Upper Paleolithic, Aurignacian, and beyond-Aurignacian features).



Figure 8: Sungir: ivory pendant-figurine of a schematically rendered horse or saiga, decorated with a pattern of drilled dots and painted with red ochre.

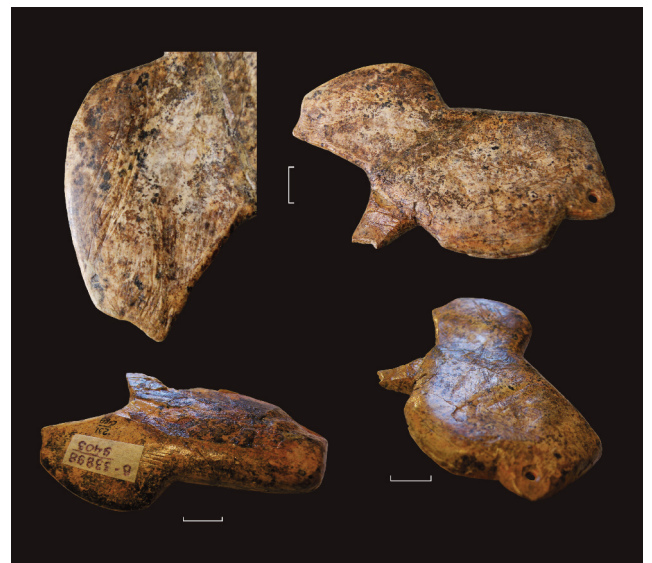


Figure 9: Sungir: ivory horse-shape pendant-figurine with traces of the clear signs of hasty, yet thorough manufacturing, special for inhumation (1-3) and decorated with a cut lines on the head (4).



**Figure 10:** Sungir: ivory carved discs (from: Soldatova, 2014a, p. 168, fig. 8).



**Figure 12:** Sungir: decorated ivory (left) and antler (right) perforated batons (from: Soldatova, 2016, fig. 12).

### Decorated Objects

The decorated objects from Sungir cultural layer and burials are scarce: an ivory zoomorphic (horse or saiga) pendant from the cultural layer (fig. 8), an ivory zoomorphic pendants / statuettes (horse and mammoth or bison) from the boy burial, an ivory bracelet from the man burial, ivory discs (fig. 4,10, 10), an ivory spindle-shaped object (fig. 11), perforated batons made of antler and ivory (fig. 12), and a fragment of mammoth tusk (fig. 13) and some others. The terminological and methodological



**Figure 11:** Sungir: ivory spindle-shaped object decorated with a drilled dots.



**Figure 13:** Sungir: fragment of mammoth tusk with engravings and ornamental incisions.

foundation for description and analysis of the decoration is built primarily on the works of M.D. Gvozdover (Gvozdover, 1985, 1995).

The geometric decoration (linear, reticulate and central) consists of such elements as drilled dots, lines (dashes, one isolated angle), and segments (decorative rosettes). The geometric shapes (e.g. rectangles, triangles) and complex patterns (herringbone, zigzag) are not typical for it. The main elements of the patterns are the following: drilled shallow holes (sometimes, deepened holes); either short carved lines (not cut) or profound and broad (including annular) incised lines; segments of decorative rosettes, made by slitting carving.

Ivory flattened zoomorphic pendant ( $5.6 \times 2.7 \times 0.4-0.1$  cm) - a figurine of a schematically rendered horse or saiga (fig. 8), decorated on both sides with a pattern of drilled dots and painted with red ochre. Two smoothly curved lines run on the right side of the figurine from muzzle to croup, each line with 20 dots, the lines on the legs have 5 dots, including the double-sided drilled perforation for suspension. On the left side of the figurine, the lines are made somewhat differently: they are less curved and less carefully planned, the upper line consists of 17 dots, and the bottom line consists of 19 dots. There are 4 dots on the foreleg and 5 on the hind leg. This is a classic description of the pendant's decoration (Bader, 1978).

The surface of the figurine is carefully polished. In addition to a small number of traces of manufacturing and processing, there are traces of marking the line pattern for the dots (or using of manufacturing/processing traces as such). The front part of the head is pointed, almost like a blade, which suggests that the object had a production function (Bader, 1978).

Zoomorphic pendant ( $8 \times 4.9 \times 1.4$  cm) is found in the children's burial (grave №2, the south burial, ind. C2), on the boy's chest (fig. 9). It is a massive figurine of a horse with disproportionately short perforated hind leg. The front part of the head is pointed, almost like a blade. The surface of the figurine is polished. However, numerous traces of manufacturing and processing preserved. Drilled dots and series of cut-lines on the head decoration discovered recently and it's in the course of studying.

Ivory spindle-shaped object (in the form of a navette) ( $18.2 \times 3.3 \times 3$  cm) is found in the female burial (grave №2, the upper burial, ind. C6) and is poorly preserved (fig. 11). The object has a flattened base, it is circular in cross section, its surface is polished (engraved lines are preserved?). Both ends are pointed, with traces of transversal notches and traces of using the object as a retoucher (?) or specific ornamentation, perhaps of technical character. The traces of ochre can be found on the surface. Groups and single drilled dots (and cutts?) are fixed on the surface of this ivory object. Approximately in the center of the object a drilled dots ornamentation is made, forming a belt. It is a line of minimum in nine shallow

circular drilled dots. A little further, also across the object two more drilled little dots are made. Judging by the location of the decoration, the object was girded by this belt of dots in its circular side, but not the flattened side, which allows it being stable, while in a horizontal position.

Ivory sculpture (pendant) of a "mammoth" ( $11.2 \times 7.9 \times 3.1$  cm) is found in the children's burial (grave № 2, the south burial), under the boy's left shoulder (ind. C2). The surface is poorly preserved, there are traces of manufacturing and polishing. Drilled dots decoration discovered recently and it's in the course of studying (like decoration on the other figurines from Sungir). Compositionally one of the decoration's area on this sculpture is similar to the dots decoration inside the ivory bracelet from male burial.

Ivory broad bracelet ( $20.5 \times 2.2 \times 0.2$  cm) from the male burial (grave №1, the adult male burial, C1). Two holes remained on its one end and one hole on the other (the second hole is broken). The surface of the bracelet is polished, there are traces of ochre in some spots inside and outside (hence the bracelet was put on the surface that had been already covered with ochre). Both sides of the bracelet are decorated with drilled dots. Across the width of the object on the inner surface of the bracelet, a pattern of 15 dots is made (Muravyova, 2001). The dots are not deep, some are just outlined. Two rows of six dots are located across the width of the bracelet. Two dots are adjacent to the second and the third dots of one line. There is another dot next to the second dot of the other line. Visually the following decorative pattern is developed: two lines of six dots, each of which almost crossed two other lines - of three or four dots. On the outer surface of the bracelet, almost in the middle, across the width (perpendicular to the length) runs a belt of four dots.

Ivory perforated baton ( $18.6 \times 5.1 \times 1.1$  cm) found in the children's burial (grave № 2, the northern burial, ind. C3) on the left side of the girl's abdomen (fig. 12, left). The rod with traces of ochre has a rectangular head with a cut circular hole. The rod's handle is oval in cross-section; it is flattened on the edge and is slightly pointed. The decoration of dots is made on the front side of the object around the opening on the rod's head and then goes down to the middle of the handle. 23 drilled dots are made around the opening; on the edges of the head, 9 dots are made on one side and 10 - on the other. Along the handle, the dots form two parallel lines - 18 and 19 dots correspondingly. Another 4 dots are drilled approximately in the middle of the handle between the parallel rows, forming the third line; 3 more dots are to the left from the parallel rows.

Ivory disc ( $3.1 \times 3.1 \times 0.3$  cm) found in the cultural layer. One side is a little more flattened. The disc is decorated with a central perforation and a drilled dots, radiating from it on both sides. Each eight of beams extending from the central hole consists of four dots.



**Figure 14:** Sungir: bone "shaft" tool ornamented by a carved annular decoration.

Ivory carved disc ( $2.8 \times 2.6 \times 0.3$  cm) found in the children's burial (grave № 2, the northern burial, ind. C3) on the back of the girl's skull (fig. 4, 10). In the center of the disc, there is a cut hole of oval (rectangular?) form. Four oval holes are located around the central one. Numerous manufacturing traces create the impression that the disc was made immediately prior to the burial and for the funerary purposes, as well as a number of other objects from the grave №2. The overall impression of the appearance of the disc (inelegant, unskillful, rough, obvious carelessness and ineptitude of work here and there, i.e. all signs of lack of matured skills), especially in comparison with other similar objects, suggests that it was created by a child, who did not have sufficient experience in manufacturing such objects. However, the child bore a part and left a touching farewell gift for the buried girl.

Ivory carved disc ( $7 \times 6.8 \times 0.7$  cm) found in the children's burial (grave №2, the southern burial) was soldered with lime in a vertical position to a large spear (fig. 10, upper left). Initially, it was probably mounted on the wooden spear under reconstruction (Bader, 1978). Around one cut central circular hole 10 oval carved segments are placed, narrowing towards the center. The craftsman made some minor mistakes, while marking and manufacturing, which were later corrected during his work by the reduction of one of the segments.

Ivory carved disc ( $5.8 \times 5.6 \times 0.4$  cm) found in the children's burial (grave №2, the northern burial) on one of the ivory lances (fig. 10, lower left). Eight carved oval seg-



**Figure 15:** Sungir: bone "shaft" tool ornamented by a carved annular decoration.

ments surround one central circular hole. The surface is polished; the manufacturing traces are clearly visible.

Ivory carved disc ( $10 \times 9.9 \times 0.8$  cm) found in an upright position in the children's burial (grave №2, the northern burial, ind. C3) on the left side of the girl's abdomen (fig. 10, middle right). Around one carved central circular hole are 8 oval carved segments narrowing towards the center. The segments are intentionally divided into two parts by size (four segments in each part). The arc-shaped outer edge of the largest segment has a carved groove and a circular recess (which accidentally make the segment resemble a zoomorphic head with ears). Similar recesses (and grooves and cuts) of different shapes are present on some other segments. The disc had been heavily used as a working instrument, as judged by the traces and polishing from long-term exploitation.

Bone "shaft" (fragment,  $3.4 \times 1.1 \times 0.8$  cm) found in the adult male's burial in a layer of ochre under the left tibia (grave № 1, ind. C1). The working edge of the instrument is heavily slanted and bears traces of polishing from the long-term use. A fragment of the handle-part of the object is ornamented by a carved annular decoration (winding). The carving is wide and deep, but in some areas the cuts are not increased and remain narrow and shallow lines. A narrow strip of polishing is present on some windings, which are located closer to the working end of the tool. Shallow longitudinal cut line located across the windings on the opposite side of the working edge.



Antler perforated baton ( $26 \times 9.2 \times 2.1$  cm) found in the children's burial, behind the spears to the left of the girl's skeleton (grave № 2, the northern burial, ind. C3; fig. 12, *right*). The hole is cut through; there are traces of ochre on the rod's surface. On the handle's edges, there are groups of short and relatively wide perpendicular cuts: 26 and 22 lines. They are arranged unevenly, some of them bear the traces of rubbing out. Similar cuts are known and on other antler objects of similar shape but without hole or fragmented.

Fragment of mammoth tusk with ornamented incisions and engravings found in a "ritual pit" located between the graves (Bader, 1978). Apart from this fragment, other parts of mammoth tusk were found in the pit, including the overburnt ones, as well as objects made of stone, ivory, antler and bone, including ivory beads, ochre, bird's bone, "the vertebrae of the arctic fox's whole tail and two vertebrae of another tail" (Bader, 1978, p. 78). The tusk fragment is flattened by a cleavage, and lies stably on it, while in a horizontal position. The carved decoration lines are found on the edge of the cleavage, which is not very well preserved. It consists of one row of 16 or 17 short wide relief cuts limited by the engraved line at the bottom. A series of smaller cuts - 7 or 8 items - located underneath, diagonally from the top line (as in a staggered). There are clearly readable engravings on the same fragment of tusk. They are not the only example of engraved fragments of mammoth tusk at Sungir (Bader, 1978).

## Discussion

The issue of nature of decoration made by cuts on the perforated baton remains unresolved, whether it was symbolic or merely technical, especially considering the hypothesis, that these objects were used as tools for making ropes (Rigaud, 2001). The possibility of technical use of such cuts at Sungir site is supported by the appearance of the "needle" / piercing (Soldatova, 2014b, p. 123). Accepting the idea of the technical value of the decorative cuts at the edges of the perforated baton, the drilled pattern on another object can be interpreted with great caution as a decorative image of a rope/thread.

The widespread existence of complex costumes of Sungirians was justified by O.N. Bader on the materials from the burials (Bader, 1978). The hypothesis about the possibility of textile production at Sungir site was first proposed by O. Soffer with co-author (Soffer *et al.*, 2000). Hypothetically, the mammoth ivory disc, found in the children's burial on the girl's abdomen, may also fit into the group of objects related to processing of organic materials of short duration.

The analogies of a widely and deeply carved circular decoration can be found both on the artifacts of the Initial Upper Paleolithic and on the aurignacian objects.

Since the decoration may have not just an aesthetic and symbolic meaning, but also functional, such character can have the objects with circular and spiral pattern,

which is widely known in Eurasia since the Initial Upper Paleolithic. These items could be used as coils (eg., fig. 15), or other devices for winding threads or thin cords of both animal and vegetable origin. In this case, it becomes more understandable widespread of utilitarian objects shape and not the complicated ornament pattern.

Fully accepting the theses of M.D. Gvozdover that "the nature of placement of the elements and their selection are not caused by technical reasons, but by cultural tradition" and that "archaeological culture is characterized by the actual elements of the decoration and their layout on the decorated field, as well as the grouping of elements" (Gvozdover, 1985, p. 19), as well as stating the identified stable relationship between the types of artifact and the characteristics of its decoration, one may talk of an important parallel in the form and nature of decoration between the Aurignacian specimens of portable art of Swabian sites and Sungir. It should be noted that the identified parallel refers, above all, to the decoration's nature and the layout, but not to the technological aspects of its application. A typically Aurignacian decoration, from the point of view of application technology, is presented in the materials of Kostenki site I/3 (Hoffecker *et al.*, 2016; Sinitsyn, 2012), where just like at the Swabian Aurignacian sites, the tapered notches/indentations predominate (fig. 15).

The use of dots in the decoration of bone artifacts in the French Aurignacian (e.g., Abri Blanchard, La Souquette) is equally important. However, the most remarkable (illustrative) reflection is a similar decoration of monumental images (Bourrillon, White, 2015, p. 125, fig. 4). Thus, the tradition of (partial) decoration with notches or holes of the body, neck and legs (in various combinations) existed on the vast territory from the Vézère valley (France) through the Swabian sites (Germany) to the Russian Plain (Russia) in the Early Upper Paleolithic - in Aurignacian tradition. The practices of manufacturing Venus figurines and cave parietal art practices have a similar pan-European dissemination.

The location of the decorated field on the objects and the type of layout of the elements of Sungir pattern, as well as some types of personal ornaments find close analogies in the materials of Early Upper Paleolithic sites in Russian plane and Aurignacian sites in Central and Western Europe, as well as in a number of the Urals and Siberian sites of Early Upper Paleolithic (eg. Pavlov *et al.*, 2001; Pitulko *et al.*, 2012; Sinitsyn, 2012; Derevianko, Shunkov, 2004; Vanhaeren, d'Errico, 2006).

The absence of some types of ivory ornaments at Sungir (eg. double perforated ivory beads, or basket shaped ivory beads), as well as a limited variety of animal species, being source of teeth for manufacturing pendants, is a typical feature of the Upper Paleolithic sites of the Russian Plain both in the Initial and Early Upper Paleolithic, and in Gravettian time (Zhitenev, 2007). Apparently, this certain reduction of some types of ornaments is a specific regional feature.

## Conclusion

The cultural identity of Sungir can not be uniquely determined because of the direct evidence of mosaic influences of various European traditions of the early Upper Paleolithic, and, possibly, the early Gravettian on both the stone (traits of Streletskian, Szeletian and other cultures) and bone inventory, including the artifacts and decoration (especially the Aurignacian), and the funerary rites, including the characteristics of the costumes of the buried (early Gravette?). At the same time, the influence of the Initial Upper Paleolithic traditions are traceable in at least a number of aspects of the Sungir personal ornaments manufacturing technology (Zhitenev, 2011).

Taking into account the entire complex of the currently available data, the most correct is to determine the cultural identity of Sungir materials as a concrete historical phenomenon of polygenetic nature (term view: Gavrillov, 2016).

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# Characterizing the Early Upper Paleolithic bone industry from Sungir

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## Abstract

The open-air Upper Paleolithic site Sungir is located near Vladimir, in the basin of Klyazma river, Russia. It was discovered in the 1956. Later excavations were conducted almost annually. The expedition under the leadership of O. Bader, N. Bader and L.A. Mihailova discovered over 4000 square meters of the site area for 24 field seasons (1957-2004). The majority of radiocarbon dates is ranged from 29,000 to 26,000 BP (34,000–30,000 BP cal.).

Stone industry is characterized by an original stone assemblage with specific triangle points. Analogous industry is discovered at the sites of Streletskian culture at the Middle Done.

Moreover on the Sungir site were opened two burials with remains of four people with a very rich collection of accompanying inventory.

Fauna consist of large amount of reindeer, mammoth, horse and polar fox.

According to distribution of the material O. Bader reconstructed the Sungir as a seasonal camp that was visited traditionally for many years by the same group of hunters.

Many researchers attribute Sungir to Streletskian culture, and some scientists note in its material Aurignacian and Szeletian features.

As a part of this work a general analysis of bone findings from Sungir was carried out, including technical and typological characteristics (except objects from burials). Analysis was conducted of the 171 objects, of which 94 are bone objects, 28 — antler, 49 — ivory.

**Key-word:** Early Upper Paleolithic, bone industry, typological analysis, Sungir site, Aurignacian

## Introduction

The open-air Upper Paleolithic site Sungir is located on the central part of the Russian Plain in the basin of Klyazma river, 192 km east of Moscow, on the outskirts of the city of Vladimir (56°11' NL, and 40°30' EL) (Bader, 1978). It was found in 1956. For 24 field seasons (1957-2004) an expedition under the leadership of O. Bader, N. Bader and L.A. Mihailova discovered over 4000 square meters of the site area. The site became world famous after the discovery of the four burials, one skull, and two femur fragments with a very rich collection of accompanying inventory. Based on a series of 14C the site dates to the period from around 29,000 to 26,000 BP, AMS over 30,000 BP (*Homo sungirensis*... 2000; Kuzmin et al., 2014; Marom et al., 2012).

The remains consist of stone and bone objects, faunal remains, fireplaces, firepits and ritual pits. A complicated burial complex with two graves and two burials in each grave was also found at the site. O.N. Bader singled four aboveground dwellings at the site, but this hypothesis is rejected by a number of specialists (Bader, 1978; Gavrilov, 2004; Seleznyov, 2004).

Stone industry is characterized by parallel reduction. The main type of blank is a flake. The tool kit has two sets of tools. The first one — Mousterian — consists of a side-scrapers, triangular points with concave base and projectile points. The second set — Upper Paleolithic — includes the end-scrapers (single end-scrapers, circular end-scrapers, oval end-scrapers, etc.), burins (truncation burins, straight burins, etc.), punches, pièces esquillées etc. (Bader, 1978; Seleznyov, 2004).

Analogous industry is discovered at the sites of Streletskian culture at the Middle Done. Also this industry has combined two techno-complex elements: Aurignacian and Szeletian (Bader, 1978; Gavrilov, 2004; Grigoriev, 1990; White, 1993).

The faunal record of the Sungir site contains numerous remains of reindeer (*Rangifer tarandus*), mammoth (*Mammuthus primigenius*), horse (*Equus caballus* cf. *Taubachensis* Friend), polar fox (*Alopex lagopus*), wolf (*Canis lupus*), etc. (Bader, 1978).

## Stratigraphic Context

Some authors define the cultural layer as soil-cultural because remains are mixed greatly and can be found through the whole depth of the soil, thickness of this layer is up to 1 m (Bader, 1978).

Contrary to the arguments advocated by several researchers a number of lines of argument indicate that relatively little solifluction or mixing has taken place at the Sungir (*Homo sungirensis*., 2000; Upper paleolithic site Sungir..., 1998). In some parts of the layer fireplace, firepits and ritual pits accumulations of large bones, connected with habitation or household areas, have preserved. Edges and facets of most findings (splintered bones, non-diagnostic shatter) are irregular and rather sharp if not regularised additionally. In other words, the objects do not contain traces of roundness.

## Bone, antler and ivory working

As the materials for the tools found at the site were used bone, antler and ivory. (Soldatova, 2014a, b).

The preservation of the objects is not uniform, the majority of the artifacts have damages of different nature

(weathered damages, damages containing traces of biogenic and biochemical corrosion, etc.) that reduces the informational value of the findings. It must be noted that bite marks on the surfaces of the findings are very scarce. A number of antler objects, regardless of their location in the cultural layer, has a poor conservation of cortical bone — it flakes off and crumbles upon contact with an object.

It must be mentioned that during restoration works a few objects were coated with glue or plaster to such extent that it is now not possible to assess any traces of treatment or exploitation, and in one case, to recreate the original look of the findings. In general, the preservation of the items is satisfactory.

The conducted analysis allows to say that the main hard organic raw material at the Sungir site was bones — 60% of the artifacts are made of this material.

It is impossible to say whether bone raw material was used as a fuel at the Sungir site, as the collection has only six items with the recorded traces of presumably fire nature.

The main bone treatment techniques at the Sungir site are: longitudinal and transverse fracture, sidestruck fracture with a preparatory sawing line, cutting, sawing, planing/scraping, cut-mark technique.

The most common long bone treatment technique is fracture. Thus, the prevailing number of the findings are fragments, debris and flakes. Taking into consideration technomorphological features only, it is impossible to give accurate information on whether these items are kitchen debris created as a result of bone fracture made with the purpose of bone marrow extraction, or whether they are by-products. At the same time the collection lacks tools made of this kind of debris, that leads us to consider the nondiagnostic bone fragments as by-products in this paper. There are several examples when the traces are recorded as small flakes or cuts at the sites of the same category, however, it is difficult to name their functions.

Transverse bone partition was done as a result of producing incisions by cutting, sawing or chopping (notches). For the partition of small diameter bones a circular cut was sufficient, after which the item was fractured. Traces of cutting, which later developed into sawing, are often discernible on the artifacts. A number of findings show cut-marks next to a fracture. In the majority of cases a circular sawing was employed, as indicated by an even edge of the bone's fracture.

It must be underlined that in the majority of cases long bones' mesials were used to make tools at the site — epiphyses were parted on both sides. However, the collection has only one epiphyse with treatment marks.

Cutting technique is demonstrated on the example of a big long bone which cortical bone has clearly defined traces of cutting of the blank, which is believed to have been drop-shaped.

Generally, a finished item was scraped at the final stage of the treatment.

In some cases cut-marks or notches were applied to a tool's proximal or mesial that were supposedly used to hold a thread during the reduction process of awls.

At the Sungir site the main treatment method of the antler was a fracture, the traces of which can be found on the 75% of the items. In three cases the antler main beam (or a tine) was exposed to percussion, after which the antler was fractured, that is proved by the dents on the opposite side. The other findings demonstrate traces of circular percussion.

In spite of poor preservation of several items' compact, they have clearly defined percussion traces that were left in an attempt to chop off a tine. Such deep traces attest to the archaic nature of the antler industry (Semyonov, 1968).

As a rule, the Sungir collection has items made of antler main beam with chopped brow and bey tines. However, the special emphasis must be laid on the fact that separate tines cannot be found in the collection.

Ivory ranks second at the site in the number of findings made of hard organic raw material — 26%.

The main methods of primary treatment of ivory at the Sungir site include transverse fracture, longitudinal and transverse splitting, and exfoliation. At the secondary treatment stage planing/scraping and abrasion were used.

### **Bone, antler and ivory artifacts**

All the collection items can be divided into categories and subcategories: (fig. 1–4) :

- cores blanks: personal ornament blanks, shaft straightener blanks, hunting tools blanks, blanks of dissimilar purpose; ivory flakes;
- by-products;
- nondiagnostic fragments;
- tools: retouchers, hoes, chisels, shaft straighteners, awls, rods, hunting tools (points), items of dissimilar purpose;
- other: items of clothing, perforated discs.

The table 1 shows that nondiagnostic fragments form the biggest part of the collection (36,5%). Blank and tools rank second and third in the number of items — 26% and 22% respectively. Other categories are represented in a smaller quantity.

The collection has 3 ivory cores which were flaking and a negative flake scar that are overlaid by the exfoliation marks. The latter demonstrates that fractured ivory was used at the site. Two of the aforementioned cores compose the ivory's distal, the third core is the ivory's mesial; all of them were formed as a result of transverse fracture. It is not possible to examine the grooves that were used in the partition process due to a poor preservation of the items. Distal core served for the removal of longitudinal flakes, mesial core — for the removal of transverse flakes, which is proven by negative flake scars and traces of their removal. The fourth item is a bone

Category/raw material	Bone	Antler	Ivory	Total:
Cores	1 piece	-	3 pieces	4 pieces (2,5%)
Blanks	5 pieces	10 pieces	30 pieces	45 pieces (26%)
By-products	8 pieces	5 pieces	-	13 pieces (7%)
Nondiagnostic fragments	58 pieces	-	5 pieces	63 pieces (36,5%)
Tools	18 pieces	13 pieces	7 pieces	38 pieces (22%)
Other	4 pieces	-	4 pieces	8 pieces (5%)
<b>Total:</b>	<b>94 pieces</b>	<b>28 pieces</b>	<b>49 pieces</b>	<b>171 pieces</b>

Table 1: Categories of bone, antler and ivory items found at the Sungir site



Figure 1: Bone industry of the Sungir site: 1-5 – awls; 6 – flat pin; 7, 8 – hoe-like tools; 9 – chisel.

core, cortical bone of which has multiple negative flake scars. The function of these flakes is uncertain, since the site’s collection lacks tools made of similar blanks as well as items made of long bones flattened by the same technique.

Blanks are composed of 45 items, 5 were made of bone, 10 were made of antler, and the rest (30 items) were made of ivory.

The category under consideration can be divided into several subcategories, namely: personal ornament blanks, shaft straightener blanks and hunting tool blanks (pro-

jectile points). There is also a number of blanks the function of which can hardly be determined.

This category also includes various ivory flakes. All of them were produced deliberately, although there are no traces of additional treatment. It is probable that some of them are by-products of the ivory industry.

Personal ornament blanks include bracelet blanks, truncating flakes and rods designed to remove bead blanks.

Bracelet blanks’ fragments are thin, narrow and planed ivory blades, 0,8 and 1,35 cm wide, 0,2 and 0,3 cm thick respectively. They have elongated almond shape in section. Finished bracelets had perforations at the ends, but they are missing on the blanks (Muravyova, 2001).

Truncated flakes are represented by 7 items, all of which are small, subrectangular in profile ivory fragments. The artifacts have a clearly defined impact point that appeared as a result of the flake removal from the base. These linear preforms are believed to be related to the production of ivory personal ornament, such as beads and diadems. (Pitulko *et al.*, 2015).

Removal bead blank rods are composed by flattened, well-planed ivory “bars” that contain traces of longitudinal removal of its one end. Two rods contain traces of bead blank marking.

Shaft straightener blanks is a two item group. The first item of the category is a antler main beam fragment with a coronet and a brow tine. The second item is a antler tine with a main beam fragment. Both are T-shaped and contain traces of removal from the antler’s main beam. There are no perforations. The site’s collection has a finished shaft straightener, analogous to the abovementioned blanks.

The site’s collection has two hunting tool blanks (points) – fig. 2: 2, 4. Both are made of ivory and have oval flattened section. It must be noted that the blanks demonstrate different stages of the points’ production.

Thus, the first blank represents one of the initial stages of treatment when the tool’s form has already been



**Figure 2:** Hunting tools from the Sungir site: 1, 3 – points; 2, 4 – blanks for point.

outlined by the removal of the necessary ivory blade and by planing it in a certain way, however, the point's proximal has not been formed yet. The second blank is one of the final stages of treatment: the proximal has already been flattened and narrowed, and the distal has a visible negative flake scar, with the help of which the point's base was formed. Nevertheless, the blank was broken at the base and left unfinished: there are no marks of abrasion (it is to be mentioned that a finished point that forms part of the collection was thoroughly polished and, consequently, the traces of treatment are almost invisible).

The other blanks cannot be subcategorised.

5 blanks are bone items with treatment marks. One of the blanks is a long rod-shaped object made of long bone, oval and flattened in section. Throughout the item's surface there are biochemical corrosion marks, hence it is not seemed as possible to examine the object's traces of treatment or usage. The cutting marks of a drop-shaped item are clearly visible on the bigger flake of a mammoth long bone. The cut's edges contain traces of percussion, it is likely that it was done incorrectly and the blank was damaged (broken) as a result. 3 other blanks are made of

animal ribs. One of the blanks of this kind is an entire massive rib. The proximal is a rib's rear end (extremitas posterior). The rib was deliberately flattened from the item's ventral surface center to its distal. The second blank is a rib's fragment, fractured on both edges. The third blank's proximal was formed as a result of fracture with preparatory incision by sawing.

8 blanks are made of antler. 5 of them are fragments of antler's main beam with chopped tines and palms with separate treatment marks, such as incised lines, notches, etc. 2 blanks are entire reindeer antlers that have a few treatment marks — small notches and incised lines. These items were put into this category based on their formal parameters. Since the antlers were found in the upper burial of the grave №2 and no more similar findings were registered at the site, it is likely they might have had a certain ritual or symbolic purpose. The last blank is a fragment of an antler's longitudinal profile. The proximal had been fractured, the right lateral facet has a cut-mark next to the proximal. The surface had been polished after the cutting. The distal on the ventral surface has a longitudinal sawing, its left lateral facet has several notches.

There are 14 various ivory flakes at the site: 3 longitudinal flakes, 1 transverse. In addition, the collection has 2 triangular rod-shaped flakes. Flat exfoliation products (2 items) were also used as a material. There are 6 flake blanks with flat edges. The characteristic feature of these blanks is due to mutually perpendicular location of the flat ends. The methods of their production and the function of these items are yet to be determined in the future.

The by-products category has 13 items. It includes bone epiphyse with the traces of sawing diaphysis, several antler's coronets, a number of items made of bone and antler with treatment marks.

The nondiagnostic fragments category contains 63 bone and ivory objects. It is not possible to classify them in absolute terms as kitchen debris or by-products.

The tools include 38 items that can be further subcategorised: retouchers, hoes, chisels, shaft straighteners, awls, rods, hunting tools (projectile points).

Retouchers are represented by 7 objects. The functions of these tools can be deduced based on numerous distinctive notches on their ventral surfaces. 5 items of the examined category are fragments of long bones' longitudinal profile. 1 item is an animal rib, both ends of which were formed by a fracture with preparatory sawing 0.2–0.3cm deep. The last item is a biconic object with rounded edges made of ivory. Although the item was poorly preserved, some parts of its surface contain some treatment marks, such as longitudinal parallel lines, presumably formed as a result of planing. In addition to that, there are numerous notches that overlay the treatment marks. Since the tool was found in the grave №2, it might have also had a particular ritual or symbolic purpose.

8 items are hoes, or hoe-like tools, one of which is made of a fragment of a long bone's longitudinal profile,



and the rest — of antler (fig. 1: 7-8). Antler's main beam was used for the production of the main body of the tools. In 3 cases the working end was formed as a result of a longitudinal fracture, the edges were later regularised. 1 artifact is made of a fragment of a longitudinal antler profile. Neither of the items has handles as a separate constructive element. All artifacts of this category have oval and flattened blades. The working surfaces of a number of items are practically polished that leads us to believe they were extensively used.

2 items are antler chisels (fig. 1: 9). One of them has a shape similar to a hoe, but its working end is partly broken and truncated, and the proximal contains traces of microflaking and a negative flake scar. The other tool is made of a hollow antler. Its working edge is formed by a longitudinal cut of 2/3 of its length that lays open the cavity; the edges are rounded. The distal contains traces of exploitation: dents and small negative flake scars.

Shaft straighteners form a category of 4 items: 2 bone objects, and the other two ivory. One of the bone shaft straighteners is made of antler main beam with a fragment of a coronet and a brow tine, the other — of antler tine with a fragment of main beam. Lateral facets of one of the shaft straightener's "handle" there is an ornamental pattern in the shape of small incised lines (no similar ornaments have been recorded on any of the Sungir collection's items examined by the author of this paper) — fig.3.

Ivory shaft straighteners differ greatly in size (18,6 and 11,4 cm), but have the same structure: a quadrilateral



Figure 3: Antler tool from the Sungir site: shaft straightener.



Figure 4: Ivory tools from Sungir stand burials: 1,2 – shaft straighteners; 3 – "retoucher".

head (it was broken on the smaller shaft straightener) and a tapering "handle" (fig. 4). The bigger shaft straightener has a dotted ornamental pattern, analogous to the one on a horse figure and a small disc from the cultural layer and the one on a bracelet found in burial of a man (C 1) (Bader, 1978; Muravyova, 2001).

All the items of this category have round perforations located in the broad part of the proximal, their internal surface is polished enough due to their exploitation.

The site's awls are represented by 6 items (fig. 1: 1-6). The awls' length varies from 6,7 to 10,2 cm, but most tools of this subcategory are 7-8 cm long. All the items are made of animal long bones as a result of fracture or planing. This subcategory has the abovementioned artifacts due to the fact that their distals are broader than the main body of the tools (in 4 cases a handle is formed by bone epiphyse). Most awls have broken working ends. 3 items have cut marks/notches that was supposedly used to hold a thread and that are located closer either to the object's proximal or to its mesial.

One artifact is a flat bone awl, the mesial lateral facets of which also have several incised lines that were probably used to hold a thread.

The next sub category is composed of rods — 5 items. Each of them is a thoroughly treated long bone or ivory rods. The artifacts' proximals are sharpened or have a narrow oval form. The rods have a flattened oval or round profile and insignificant thickness (0,35–0,8 cm). It is difficult to examine their function without a special functional trace evidence analysis. One does not rule out the possibility that a number of items may have served as projectile points.

3 items represent hunting tools — projectile points (fig. 2: 1, 3). One of them was made of an antler tine fragment. The artifact is round in section, with sharpened proximal. The traces of treatment (planing) can be found throughout the surface in the form of long longitudinal parallel lines. As well as that, the mesial has a line of transversed incisions that are not connected with the item's fashioning — the ornamental pattern. 2 other points are made of ivory. The first is a point with beveled base. The section is flattened and oval, 13,9 cm long. The artifact is tapered to the proximal, the very tip is broken, however. Consequently, it is not possible to recreate its original form. The item is well-polished. The second point is ivory and belongs to a different type. It also has a flattened oval section and it is 9,9 cm long. The proximal is oval, slightly flattened. The distal is presumably broken. Hence, the points of the Sungir site's collection vary in raw material, size and form.

2 tool items cannot be placed into any specific category.

One antler artifact is preliminary classified as a striker, or one-side hammer, based on the dents on the coronet and its general morphology. The antler's main beam is broken as a result of preparatory circular percussion — the percussion marks can be seen next to a number of notches. The bey tine is broken diagonally (the lateral surface contains percussion marks), cut and blunted. The coronet contains percussion marks.

The function of a small flattened long bone fragment is not known either. The ventral surface has a negative longitudinal flake scar from the item's proximal. The distal is damaged. There are planing marks throughout the surface.

Nonutilitarian artifacts category consists of 8 objects that are further divided into two subcategories: items of clothing (pins) and slotted discs.

3 artifacts are items of clothing, namely pins. The pins are elongated, well-planed and polished bone objects with a subtriangular proximal — a head.

There are 4 slotted discs in the collection. The discs are thin round ivory artifacts with a circular central perforation and several oval or subtriangular perforations along the edges. The items' function is unknown. O.N. Bader hypothesized that these discs were designed to be put on ivory and wooden spears (Bader, 1998). Although all discs are polished, their surfaces contain clear traces of planing in the form of long longitudinal parallel lines.

An ornamented bone stemmed tool 3,45×1,1×0,8 cm in size, found at the lower burial of the grave №1 (C 1) is of special interest. One of the edges is produced by a bevelled cut and then blunted, the other is broken off. The ornament begins 1,6 cm from the bevelled edge and contains 8 separate slotted discs approximately 0,1 cm wide. It seems likely that the ornament extended farther since the last disc is located on the bevel. The artifact was found coated with ochre, hence it is intensely coloured.

## Conclusion

Therefore, the technological analysis of the collection's artifacts has demonstrated a wide range of methods and techniques of bone, antler and ivory raw material treatment employed at the Sungir site: percussion, longitudinal and transverse fracture, sidetruck fracture with preparatory sawing line, cutting, sawing, scraping, cut-mark technique, abrasion. Although a primary fracture technique differs when applied to bone, antler or ivory raw material, further treatment was similar for all the site's artifacts. It can be stated that there is a certain uniformity in the treatment methods of different kinds of organic solids.

The Sungir site stands out for its comparatively high percentage of antler artifacts (13%) among other sites similar in chronological terms — the Streletskian and the Aurignacian culture sites of the Russian Plain, where treated antler can be found either in small numbers (one or two per examined site), or cannot be found at all. (Paleolit, 1982; Soldatova, 2014b). On the other hand, this fact brings the Sungir site closer to the early Upper Paleolithic sites in Central or Western Europe.

It must be noted that ivory items stand out among other bone artifacts for their meticulous treatment. As well as that, there are practically no objects that had household functions among these objects: hunting tools (projectile points), art objects and personal ornaments of different kinds. The collection has three ivory artifacts that can be attributed to hunting tools: a «retoucher» and two shaft straighteners (fig. 4). However, it is to be mentioned that these items were found in the graves.

It is of interest that there is a smaller number of tools made of various hard organic raw material in relation to the excavated site area. (176 items : <4600 m<sup>2</sup>).

Judging by the collection's composition, it includes items that belong to all of the knapping stages of the operation sequence. Due to the fact that the collection has by-products and a number of blanks with various stages of completion, it can be suggested that bone treatment was done directly at the site. The categories under consideration show the artifacts' functional diversity: there are different kinds of blanks and tools. It can be supposed that the site had various household activities for which solid organic items were used: presumably production of clothes (awls), work activities (retouchers, chisels), hunting-related activities (projectile points, shaft straighteners), agricultural activities (hoes).

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## **Kostenki 14: the unusual earliest Eastern European Cromagnon in light of palaeoradiology**

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One of the earliest in Eastern Europe anatomically modern man Kostenki 14 was particular from morphological point because of his low stature. Radiological research provided with use of microfocus digital X-ray as well microCTscanning revealed additional peculiarities of this individual. It was detected that Kostenki 14 male had exceptionally heavy skeleton because of thick walls of tubular bones and reduce of medullary space. Symmetrical location of medullary stenosis, which is complete in small tubular bones of hands, indicates systemic bone condition, probably, hereditary disease. The paper considers differential diagnostics based on modern clinical, radiological and genetic data. The morphological picture of Kostenki 14 corresponds to modern inherited diseases manifesting as elevated bone density with diaphyseal involvement. The deposition of solid bone in space of medullary canal is clear seen on the microCT slices of small tubular bones. The skeletal condition indicates reduced secretion of thyroid hormone, i.e. hypothyroidism. In row of hereditary disorders with diaphyseal involvement Kenny Caffey syndrome is associated with clinically detected growth retardation, typical for K14 man. A Palaeolithic hunter with hereditary disease like Kenny Caffey syndrome could suffer from anemia, back pain, often convulsions, paresthesia or even from ophtalmologic disorder. Accomplished hyperopia could be useful for distant animals watching, but provided risk of traumas in short distant manipulations.

**Key words:** Upper Palaeolithic, Kostenki 14, radiology of bones, palaeopathology, medullary stenosis

### **Introduction**

Modern radiological techniques mark a new stage in the morphological study of extant and fossil humans, offering opportunities to work with fragmentary or better preserved material. CT scanning and micro tomography help evolutionary anthropologists to get digital 3D copies of unique objects (fossil teeth and bones); to study inner structure by nondestructive methods or to collect large set of comparative data.

Earlier using microfocus X-ray we tried to differentiate between “archaic” and “modern” samples in degree of trabecular system development and mineral density [Mednikova, Potrakhov, Bessonov, 2012, 2013]. Microfocus X-ray is a perspective approach to evaluation of bone condition in pathological and destructive processes, which helps to describe small and low-contrasting details of images with magnification and in good quality. We used the method to study inner structure of small tubular bones (mainly, manual phalanges) from representatives of Middle Pleistocene (Neanderthals from Okladnikov cave and from Kiik-Koba shelter), Upper Palaeolithic

(Sunghir 1 male) and living Homo.

Radiological data were also used in description and interpretation of a specific superficial injury on the Upper Palaeolithic human calvarium. Skeletal remains attributed to Homo were discovered in 1959 by the expedition headed by A. N. Rogachev at the Telmanovskaya site (Kostenki 8). Microfocus radiography has established intravital character of the operative intervention in the centre of the frontal bone, most probably a symbolic trepanation [Mednikova *et al.*, 2012].

Microfocus digital X-ray and computed tomography were also applied in research of built of small tubular bones of Sunghir man [Mednikova, 2012]. Study of hand of fossil hominids traditionally focuses great attention of evolutionary anthropologists. Hand of the Upper Palaeolithic man Sunghir 1 was initially described by E.N.Khrisanfova. General sapient features combined with some peculiar, even Neanderthal those. The similarity of Sunghir male with early modern Shkul 4 was pointed, as well partial similarity with Kiik-Koba Neanderthal. Radiological approaches improved methods of analysis of fossil remains. New comparative materials of the Middle and the Upper Palaeolithic Ages can be used. Recent publication had goal to describe new morphological information about inner and external built of phalanges in context of comparative data. By macromorphological patterns, including absolute sizes, relation of phalanges of pollex, hand of Sunghir shows features of modern anatomy. Hypertrophy of transversal diaphyseal sizes had analogies in some Neanderthal forms. Microfocus digital X-ray corrected knowledge about level of negative influence in childhood, indicated 6 Harris lines in the image of distal phalanx of the 3rd ray. Widening of distal phalanges, robust transversal and lateral ridges of palmar surface of right proximal phalanx, as well massive trabecular metaphyseal structures of middle phalanx reflect intense biomechanical influence, mainly, for the right hand. CT scanning discovered exceptionally robusticity of walls of right tubular bones, comparable with Neanderthal values. But corticalisation of left hand bones is smaller, and large postcranial bones of the same individual have relative gracile walls at all. That means, some «Neanderthal» or «archaic» traits of Sunghir 1 generally reflect occupational stress for the right hand.

Recently a new study was devoted to morphological descriptions of hand remains of other Upper Palaeolithic human from Eastern Europe [Mednikova, Moiseev, Khartanovich, 2016]. Both external and inner structure of small tubular bones of Kostenki 14 male was described. The purpose of current paper is to highlight some unusual features met during radiological examination of K14 bones.

## Patterns of material and methods

In 1954 during excavations of the multi-layered Upper Palaeolithic site Kostenki 14 under the floor of the third cultural layer were found well preserved human remains “in anatomical order”. Recent Radiocarbon dating makes Kostenki 14 one of the oldest fossils of Anatomically Modern Humans from Europe [Douka *et al.*, 2010; Seguin-Orlando *et al.*, 2014].

Data of palaeogenetics [Seguin-Orlando A., *et al.*, 2014] indicated that K14 male belonged to meta-population very successful from evolutionary point. He shares a close ancestry with the 24,000-year-old Mal'ta boy from central Siberia, European Mesolithic hunter-gatherers, some contemporary western Siberians, and many Europeans, but not eastern Asians. Additionally, the Kostenki 14 genome shows evidence of shared ancestry with a population basal to all Eurasians that also relates to later European Neolithic farmers. The main ancestral components proposed for contemporary Europeans, including the Middle-Eastern component commonly attributed to the expansion of early farmers within Europe, were likely already genetically differentiated and related through complex gene flow by the time of K14. His nuclear DNA K14 indicates relatively recent hybridization with Neanderthals, because the length of Neanderthal tracts was higher in K14.

K14 male was particular from morphological point. K14 tubular bones were short with relatively gracile diaphyses. In comparison to other early European CroMagnons male Kostenki 14 had unusual low stature: 159-160 cm by Trotter-Gleser formulae (for Negroids). The closest geographically and chronologically male Sunghir 1 had stature from 175,3 till 184,3 cm [Trinkaus *et al.*, 2014, p.178].

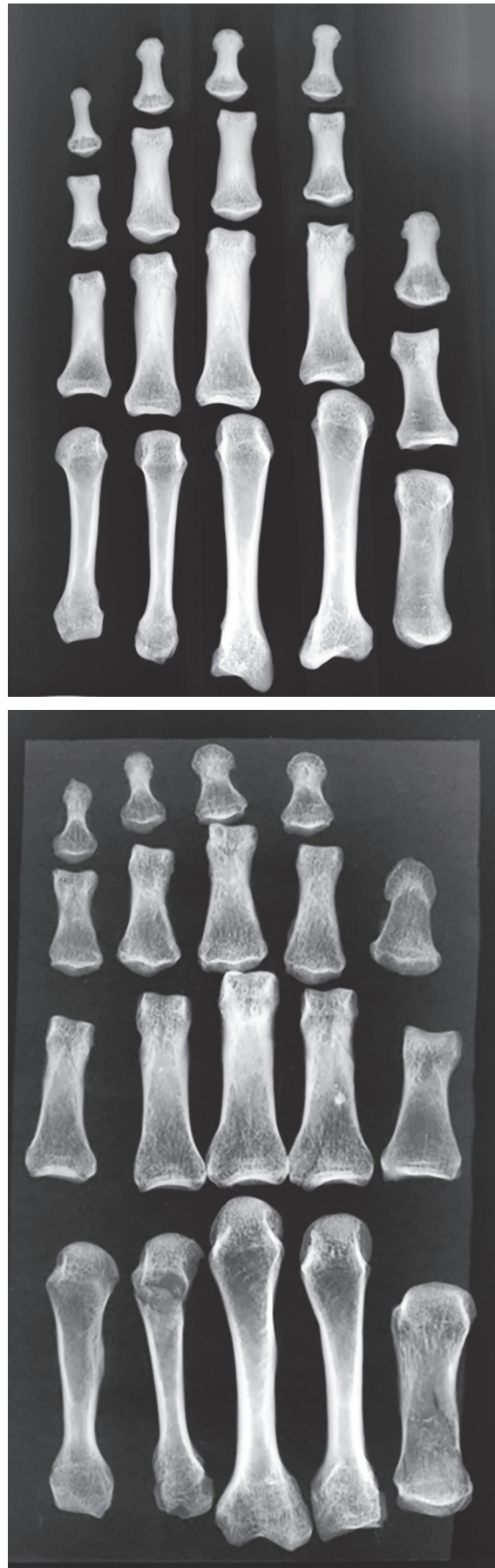
In our study measurements of tubular bones of K14 were taken by digital electronic caliper. The inner structure was investigated by microfocal digital X-ray equipment PRDU and by microtomography (XRADIA 3D digital microscope).

Bony walls were measured at the midshaft level. Features of cross-sectional geometry were estimated according to ellipse formulae.

## Results

The complete preservation of right hand elements gave opportunity to estimate ratio of lengths of the 2nd and 4th fingers 2D:4D, which was 93,32 [Mednikova, Moiseev, Khartanovich, 2016]. The value is identical the value for the right male hands in the control William Bass collection. That means, testosterone secretion in this Upper Palaeolithic male during the 13 week of in utero development was in range of normal values.

The macromorphological examination of K14 hand indicates the external gracility. Manual elements K14 externally show the typically “anatomically modern” built. Moreover, K14 is at the centre of variability of European CroMagnons, supporting data of genetic expertise.



**Figure 1:** Microfocus X-ray films of right hands of two Eastern European Upper Palaeolithic humans.  
 A. Kostenki 14, young adult.  
 B. Sunghir 1, around 40 years old.

There are till 7 Harris lines on the X-ray films of manual bones, better seen in lateral projection. That means a number of growth disruptions till 16,5 years, [time of fusion for modern boys, Schaefer *et al.*, 2006, p.228]. So, the level of episodic stresses in Kostenki 14 and Sunghir 1 seems to be comparable.

By radiological methods were also discovered atypical patterns of the inner structure of many tubular bones [Mednikova *et al.*, 2016]. They are presented in multiple diaphyseal medullary stenosis of all distal, middle and left proximal manual phalanges. So, indices of corticalisation (%CA) of bones of the 3rd ray in males Kostenki 14 and Sunghir 1 differ strongly. Thickness of the walls of the diaphysis of tubular bones is usually explained as the result of hypertrophy caused by physical activity, as shown by a range of empirical evidence [Ruff *et al.*, 1993], but it seems unlikely that mechanical stresses could have been so radically different for two CroMagnons – young adult K14 and mature man S1 (Fig.1).

In opposite to expectations, Kostenki 14 had exceptionally heavy skeleton. Symmetrical location of medullary stenosis indicates systemic bone condition, probably, hereditary disease.

## Discussion

Medullary stenosis, diagnosed using radiological methods, is a rare condition. In the palaeontological record it has been found earlier in *Homo erectus*, in which the cortical layer of the femur was elevated to statistically significant values [Kennedy, 1985]. “Additional” bone material deposits were present in long bones of *H. erectus* not only on the side of the periosteum, but on the surface of the endosteum, closing off the bone marrow space.

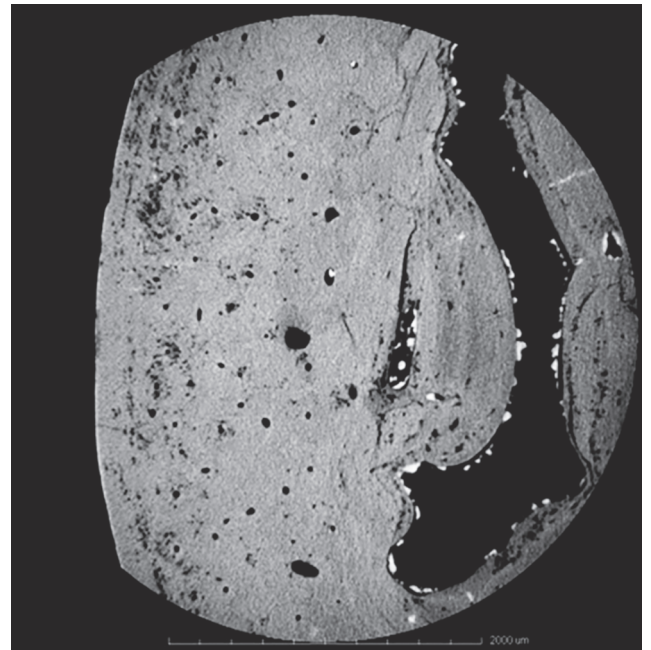
Another case of medullary stenosis was described for Neanderthal distal phalanx from level 12 of Denisova Cave, dating, as minimum, by 60-50 thousands years BP. [Mednikova, 2013].

A classification of congenital osteosclerosis types with elevated bone density has been developed for modern *H. sapiens* based on genetic data and adjusted with clinical, morphological and radiological observations [Vanhoeacker *et al.*, 2000]. For example, displasias with increased bone density today include: osteopetrosis (4 types), axial osteosclerosis (2 types), pycnodysostosis, osteosclerosis Stanescu type, osteopathia striata (2 types), sponas-rime dysplasia, melorheostosis, osteopoikilosis, mixed sclerosing bone dysplasia.

The morphological picture of K14 corresponds to modern inherited diseases manifesting as elevated bone density with diaphyseal involvement. The deposition of solid bone in space of medullary canal is clear seen on the micro CT slices of small tubular bones (Fig.2). The skeletal condition indicates reduced secretion of thyroid hormone, i.e. hypothyroidism.

Among diseases with increased bone density with diaphyseal involvement there are dyaphyseal dysplasia Camurati Engelmann, craniodiaphyseal dysplasia, Lenz

Majevski displasia, endosteal hyperostosis (4 types). But a special attention should be payed to Kenny Caffey dysplasia [Caffey, 1967; Kenny, Linarelli, 1966], which can be both autosomal-dominant and autosomal recessive, with chromosomal locus 1q42-q43 [Kelly *et al.*, 2000, p. 63–64].



**Figure 2:** Kostenki 14. Microthomography of the dorsal wall of the middle phalanx. The deposit of bone inside the medullary canal is visible.

Kenny Caffey syndrome is associated with a number of manifestations. Clinically detected growth retardation (short stature in adult forms – 90%), craniofacial anomalies, small hands and feet, hypocalcemia, hypoparathyroidism. Radiologically detected cortical thickening of tubular bones with medullary stenosis (100%). Absence of diploe in cranial vault was reported. 36% of patients, who had hemoglobin measured, were found to be anemic. 14 from 20 modern patients have hyperopia – a sort of long sight, which doesn't permit to focus on close objects. A case study of modern man, 24 years with Canny-Caffy syndrom demonstrates possible complications for male Kostenki 14, who was the same biological age [Larsen *et al.*, 1985]. A young man “was evaluated for back pain and small testes at the University hospital. He...was found to have short stature, multiple low serum calcium determinations with elevated phosphorus level... His birth weight was six pounds, 11 ounces...his anterior fontanelle closed at age two and half years. He wore glasses at age two...He underwent puberty at age 13 without any subsequent sexual dysfunction or maturation delay...His [adult] height of four feet, 11 and three fourth inches, with a weight of 165 pounds and normal upper-to-lower segment and arm span-to-height ratios...High hyperopia.” [Larsen *et al.*, 1985, p. 1025].

Clinical data show that females with syndrome have no limitations of fertility although it creates serious problems of health of the offspring. For 20 pregnancies of

mothers with syndrome only 9 infants were born healthy. There are non-direct data of limited male fertility. Male-to-male (or by paternal line) transmission is lacking. Only 3 males have been described at an age of sexual maturity. One died at age 19 without history of paternity, another was a 19-years old with a low IQ and cryptochidism, again without history of paternity. The third, at age 40, was unmarried and without children [Ibid. P.1028].

The main problem for a Palaeolithic hunter with similar hereditary disease (in addition to back pain, often convulsions, parhesthesia) could be ophthalmologic disorder. Hyperopia could be useful for distant animals watching, but provided risk of traumas.

## Conclusion

In spite of distribution of serious genetic disorder, probably, reduced male fertility, representatives of meta-

population to which Kostenki 14 belonged, were very successful from evolutionary point. Perhaps, that was connected with human system of social connections and with support of relatives with limited opportunities. The previously reported case of Upper Palaeolithic Romito dwarf supports this idea [Tilley, 2015].

The same mechanism of the reduced male fertility was proposed for elimination of male off-spring after hybridization with Neanderthals, and it should be stressed that Kostenki 14 male had longer Neanderthal tracts.

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## Langage socio-culturel des sépultures de Sungir

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### Résumé

Les sépultures de Sungir révèlent la complexité des rites funéraires pratiqués dans ce site d'habitat de plein air d'Europe orientale. Les essais de reconstitution de la décoration corporelle et de leur langage de représentation sur le corps humain et sur les objets associés dans les sépultures permettent d'apporter un éclairage précis sur le développement du système socio-culturel des groupes Sungiriens au Paléolithique supérieur ancien.

L'analyse comparative des sépultures et des objets d'accompagnement ainsi que le contexte archéologique du site d'habitat conduit à la conclusion que la richesse exceptionnelle de la sépulture de deux adolescents avec tous les types d'objets utilitaires et symboliques traduit la représentation d'un code socio-symbolique d'un groupe de chasseurs de Sungir.

Mots-clés: Sungir, sépulture, Paléolithique supérieur, Europe orientale, sociologie

### Introduction

L'originalité du site de Sungir est marquée par la découverte dans l'habitat des restes de neuf individus, parmi lesquels les deux fameuses sépultures trouvées *in situ* à Sungir (l'homme âgé et les deux adolescents), qui possèdent une importance particulière, du fait de leur richesse et de leur position dans l'habitat. Cela confirme l'originalité propre des Sungiriens parmi les autres unités culturelles européennes de cette période.

Le site de Sungir en Europe orientale nous offre aussi l'avantage de révéler les sépultures dans le contexte d'un habitat de plein air, de mettre en comparaison les structures d'habitats et les structures funéraires, mais également de comparer l'assemblage des artefacts trouvés sur la surface des habitats avec celui trouvé dans les sépultures.

### Le contexte archéologique des sépultures dans le site d'habitat de Sungir.

Dans le bassin du Klasma, le site de Sungir (Paléolithique supérieur ancien d'Europe orientale) est un exemple d'adaptation des groupes humains à l'environnement de climat froid et sec de la grande plaine.

Le site de Sungir est situé près de la ville de Vladimir, à environ 200 km de Moscou. L'habitat de plein air de Sungir est installé sur un haut promontoire de 50 m au dessus de la rive gauche du Klasma et possède une large vue sur la vallée de la rivière.

D'après des fouilles d'O. N. Bader dans les années 1956-1977, le site s'étend sur environ 7000 m<sup>2</sup> (Bader,

1978). Sur cette large surface de plein air, des zones d'activités diverses sont associées avec des concentrations d'ossements de mammouths. Dans la partie nord/nord-est du site, deux concentrations d'os de mammouths ont été trouvées à proximité de plusieurs fosses circulaires ou ovalaires avec ou sans objets à l'intérieur. Dans la partie ouest/sud-ouest, trois concentrations d'os de mammouths ont été trouvées à proximité également de plusieurs fosses circulaires ou ovalaires avec ou sans des objets à l'intérieur.

Ces dernières structures possèdent en outre les restes de 6 squelettes humains. Deux sépultures y ont été aménagées dans des fosses étroites et allongées. Dans la première sépulture, un homme adulte âgé de 55 à 65 ans a été enterré sur le dos. Dans la deuxième sépulture, deux adolescents ont été placés sur le dos, tête contre tête. Les fouilles de quelques zones périphériques effectuées de 1987 à 1995 par l'équipe du Musée de Vladimir avec la participation de l'Institut archéologique RAS ont eu pour objectif de réaliser des études géologiques, sédimentologiques et palynologiques du site (Bader, 1998).

La première interprétation de l'habitat avec leurs sépultures a été proposée par O. N. Bader (Bader, 1978) et ont été récemment reprises par N.O. Bader (Bader, 1998). Cette interprétation traduit le reflet des tendances interprétatives de l'époque, qui étaient fondées sur la reconstitution de structures d'habitat avec des habitations et des fosses utilitaires et/ou rituelles comme à Kostienki 1 et Gagarino. Ces interprétations bien connues de S.N. Zamiatnine et de P.P. Efimenko ont été faites d'après les fouilles des années 30, qui ont donné une grande impulsion aux reconstitutions des structures d'habitats. D'après O.N. Bader, les structures de l'habitat de Sungir sont constituées de quatre habitations entourées de foyers, de fosses utilitaires et de fosses rituelles.

La surface de plein air, plus au moins colorée par du charbon d'os et de l'ocre, n'a livré ni structures en os de mammouths, ni structures en pierre, ni trous de poteaux. Et donc leur interprétation comme habitation est toujours restée discutée. La définition des fosses selon leur fonction, soit utilitaire, soit rituelle, a été basée sur l'assemblage des objets ou leur absence, amenant ainsi plusieurs questions de nature méthodologique, ce qui fait que leur définition réelle reste une question ouverte.

Cependant les nombreux relevés de plans, de photos, et aussi les descriptions des structures archéologiques et l'inventaire des objets de fouilles de Sungir révèlent quelques pistes de corrélation comparative vers des structures archéologiques semblables et des assemblages d'objets accompagnant ces structures.

Bien évidemment, dans l'habitat de Sungir de plus de 7000 m<sup>2</sup>, on trouve à proximité des concentrations d'os-

sements de mammoths, de grandes surfaces, qui ont été aménagées avec plusieurs types des fosses, accompagnant des foyers. Sur cette grande superficie, les restes humains et les deux sépultures closes sont situées dans une partie de l'habitat, à 3 mètres de proximité l'une de l'autre.

Les zones d'habitat de plein air possèdent des concentrations de plusieurs types d'objets utilitaires lithiques et osseux, des parures et de l'art mobilier. L'originalité de Sungir est marquée par la découverte dans l'habitat des restes de neuf individus, parmi lesquels les deux fameuses sépultures trouvées *in situ* à Sungir (l'homme âgé et les deux adolescents), qui possèdent une importance particulière, du fait de leur richesse et de leur position dans l'habitat. Par ailleurs, il faut préciser que les sépultures aurignaciennes nous sont actuellement inconnues. Cela confirme l'originalité propre du Sungirien parmi les autres unités culturelles européennes de cette période.

### La sépulture d'homme n°1 de Sungir

La sépulture, de forme allongée de 2,05 m par 0,70 m, d'un homme adulte âgé de 55 à 65 ans (d'après G.F. Debets) était orientée sud-ouest/nord-est et creusée dans le permafrost à une profondeur de 0,65 m à 0,75 m. Le fond de la fosse était couvert d'une couche de cendre noire, qui a été par la suite recouverte d'une couche d'ocre rouge poudrée.

Le squelette de l'homme était posé sur le dos, sur cette couche d'ocre, les bras sur le ventre (fig.1). Une deuxième couche d'ocre rouge recouvrait le défunt. Une troisième couche d'ocre rouge recouvrait ensuite la fosse remplie de sédiments. Dans cette sépulture, les objets utilitaires sont présents seulement par une lame retouchée, posée entre les pieds. Deux autres objets (un racloir en silex et un fragment de tige avec des incisions) ont été trouvés sous le squelette (Bader, 1984; Bader, 1998, p. 43).

La richesse de cette sépulture se traduit par la présence sur le squelette de très nombreuses perles en ivoire, groupées en rangs parallèles sur la poitrine, sur les bras et sur les jambes. En totalité, le squelette était paré de 3500 perles en ivoire. Celles-ci sont accompagnées de 20 bracelets de fines lamelles d'ivoire, portées aussi de façon groupée sur les bras. Sur le front du crâne, ont été trouvés

trois rangs de perles en ivoire et sur l'occiput et les deux pariétaux du crâne, 20 canines percées de renard polaire, qui ont été probablement cousues sur un chapeau ou un bonnet. Caractéristique aussi est la présence sur la poitrine d'une pendeloque percée en pierre de forme allongée. Grâce à la position sur le squelette de ces différents éléments de parure corporelle, une reconstitution du costume de l'homme adulte a été proposée par O. N. Bader.

L'homme de Sungir portait un chapeau (et un bandeau décoré), il était vêtu d'une tunique courte, d'une veste (ou d'un poncho) et d'un pantalon de peau. Les pieds étaient chaussés de hautes bottes. Les mêmes types de vêtements, avec quelques variations, étaient aussi portés par les deux adolescents (Bader, 1984; Bader, 1998, p. 43, 85 -90).

L'originalité du costume de l'homme se traduit tout d'abord par la décoration corporelle, globale de la tête aux pieds. Le corps vêtu est décoré sur toute la longueur de la face, sur les deux côtés et tout le long du dos. La face et le dos de l'homme ont été décorés de façon différente. Il faut notamment préciser, que les dents de renard polaire décoraient exclusivement l'occiput et les deux pariétaux de la tête.

L'autre trait particulier de la décoration corporelle de l'homme, est la position des rangs de perles en ivoire sur la poitrine, sur les bras et sur les jambes, et aussi la position des bracelets en lamelles et en perles en ivoire sur les bras de façon rythmée et symétrique.

La complexité du rite funéraire de Sungir est confirmée par la découverte d'un crâne de femme sur la surface ocrée de la sépulture de l'homme (une épaisseur d'ocre pur de 3 cm). Le crâne de la femme a été trouvé dans un mauvais état de conservation. Le crâne était posé à côté d'une grande pierre (18,5 x 13 x 9 cm). D'après M.M. Gherassimov il s'agit d'un crâne de femme dépourvue de sa mâchoire, qui montre des traces des décarnisation de la chair. Dans le crâne, une dent de renard polaire sans perforation et une perle en ivoire sans perforation ont été trouvées avec des nombreuses fragments crâniens (Bader, 1998, p. 37).

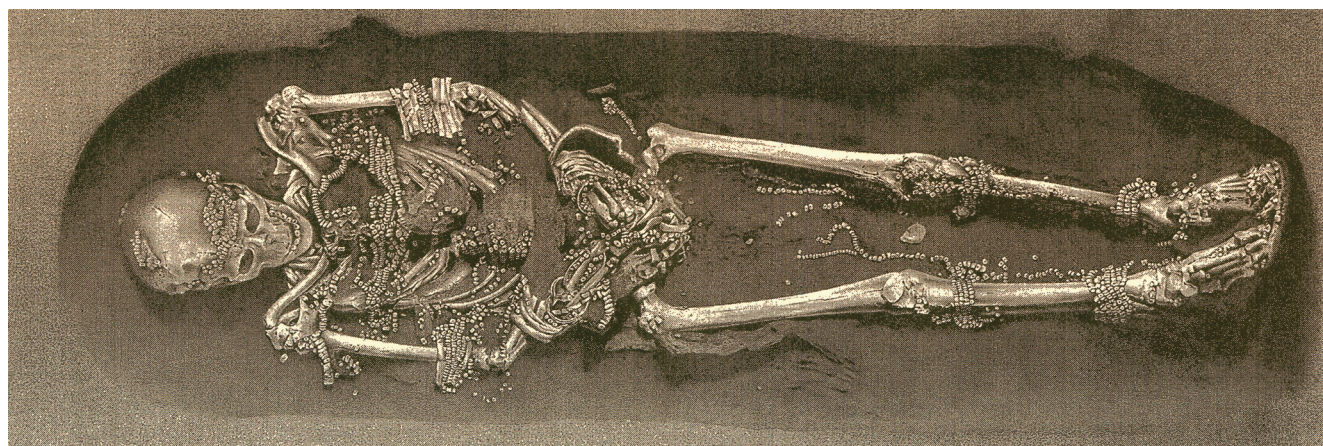


Figure 1: Squelette de l'homme de la sépulture n°1 de Sungir (d'après O.N. Bader).

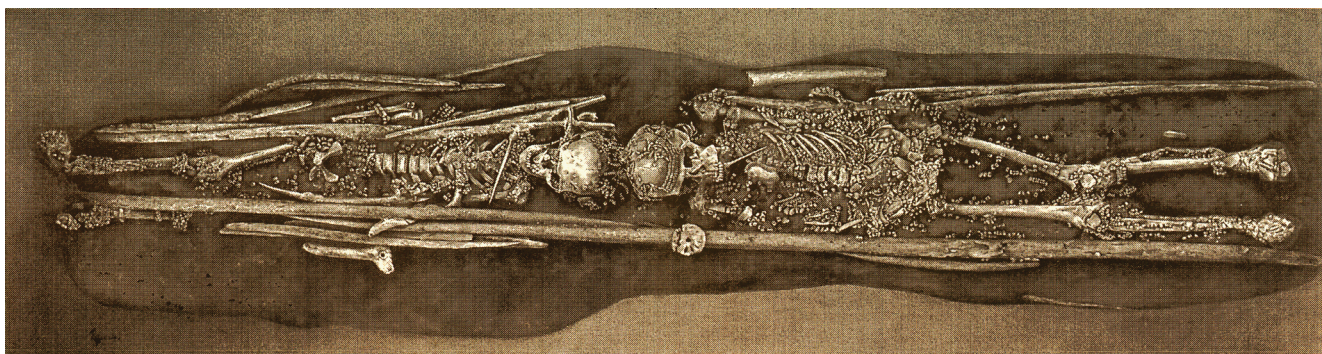


Figure 2: Les deux squelettes d'adolescents de la sépulture double de Sungir (d'après O.N. Bader).

### La sépulture double de Sungir

La sépulture, de forme allongée de 3,05 m par 0,70 m, des deux adolescents était orientée sud-ouest/nord-est et avait été creusée dans le permafrost à une profondeur de 0,74 m (fig.2).

Le fond de la fosse était couvert d'une couche de cendre noire, qui était elle-même recouverte d'une couche de calcaire blanc pulvérisé, qui a été enfin recouverte d'une couche d'ocre rouge poudrée. Sur cette couche d'ocre, les deux squelettes d'adolescents étaient posés, tête contre tête, sur le dos, les bras et les pieds allongés. Une deuxième couche d'ocre rouge recouvrait les défunts. La troisième couche d'ocre rouge recouvrait ensuite la fosse remplie de sédiments.

Malgré l'âge des deux adolescents (le plus âgé de 12 à 13 ans et le moins âgé de 7 à 8 ans), leur sexe reste un objet de discussion. D'après M.C. Akimova, V.V. Bunak et M.M. Gherassimov, les squelettes d'adolescents étaient deux garçons. D'après A.A. Zubov, G.V. Lebedinskaya, J.M. Pinchukova, T.A. Trofimova, le squelette le moins âgé était une fille (Bader, 1984, p.3, 6-13; Bader, 1998, p. 72 ; Trofimova, 1984, p.144-155).

#### Adolescent n 2

Le squelette d'adolescent était accompagné des objets suivants : une longue lance, trois javelots, un poignard, une rondelle ornée; deux couteaux en silex, un perçoir en os. Les vestiges d'une riche décoration corporelle étaient représentés par 2 728 perles en ivoire probablement cousues sur le vêtement.

Les perles étaient groupées en rangs parallèles sur le corps, sur les bras, sur les jambes et sur la tête. Sur le front du crâne ont été trouvés trois rangs de perles en ivoire et sur l'occiput et les deux pariétaux du crâne, des canines percées de renard polaire, qui ont été probablement cousues sur un chapeau ou sur un bonnet.

Caractéristique aussi est la présence sur la poitrine d'une pendeloque percée en pierre de forme allongée. Ces vestiges étaient accompagnées de: une rondelle; des bracelets en lames fines en ivoire, portés aussi de façon groupée sur les bras, deux bagues en ivoire sur l'index de la main droite, une ou deux bagues en ivoire sur le majeur de la même main, la cinquième bague sur l'auriculaire de la même main; une fibule sur la poitrine et une griffe de lion sur le ventre du côté droit.

Au niveau de la taille, un rang de canines percées de renard polaire marque probablement la présence d'une ceinture. Une griffe de lion était placée à proximité des dents, du côté gauche. Une autre griffe de lion a été trouvée au niveau de la taille avec les canines percées de renard polaire.



Figure 3: Figurine de cheval (saiga) de l'adolescent n°2 de Sungir (collection du Musée de Vladimir – Suzdal en Russie).

Sur la poitrine, une statuette de cheval plate en ivoire (8 x 4,9 x 1,4 cm) a été trouvée (fig.3). L'extrémité de la patte arrière était percée et probablement cousue sur le vêtement. Une statuette en ronde bosse en ivoire de mammoth (11,2 x 7,9 x 3,1 cm) a été déposée sous l'épaule gauche (fig.4).



Figure 4: Statuette de mammoth en ivoire de l'adolescent n°2 de Sungir (collection du Musée de Vladimir – Suzdal en Russie).

La présence d'un autre humain est révélée par une partie de bassin humain rempli de poudre d'ocre, qui a été déposé à côté de la main gauche de l'adolescent (Bader, 1984, p.3, 6-13; Bader, 1998, p.77-79).

### Adolescent n 3

Le squelette était accompagné des objets suivants : une longue lance; un bâton percé avec une ornementation en bois de renne, un bâton percé en bois de renne (partiellement endommagé); onze javelots; deux poignards; 21 micro-lamelles groupées, qui pouvaient être les composants d'une lance en bois; un aiguille à chas cassé.

Les vestiges d'une riche décoration corporelle étaient représentés par 3504 perles en ivoire très probablement cousues sur le vêtement. Les perles étaient groupées en rangs parallèles sur le corps, sur les bras et sur les jambes, et sur la tête.

Celles-ci étaient accompagnées de : trois rondelles, de bracelets en lames fines en ivoire, portés aussi de façon groupée sur les bras, une bague en ivoire sur le majeur de la main droite, une bague en ivoire sur l'index de la main gauche, une fibule sur la poitrine, et une griffe de lion sur le ventre du coté droit (Bader, 1984; Bader, 1998, p. 73).

### Codage corporel des Sungiriens d'après leurs sépultures

Les sépultures de Sungir révèlent la grande complexité du codage corporel du groupe culturel Sungirien d'Europe orientale.

La décoration du corps vêtu des trois individus de Sungir (homme et deux adolescents) révèle l'existence d'un vêtement individuel richement décoré de la tête au pied y compris le front de la tête, la face, le dos et les deux côtés du corps.

La tradition caractéristique de la décoration du vêtement apparaît nettement par l'utilisation d'un grand nombre de petites perles en ivoire, probablement cousues sur le vêtement, à la façon de rangs serrés parallèles, horizontaux sur le front de la tête, sur la poitrine, sur les bras et sur les jambes. Cette façon de faire révèle un mode d'ornementation rythmé du vêtement, qui est renforcé encore une fois par la position des rangs parallèles des bracelets en ivoire sur les bras au niveau des coudes et des poignets.

On retrouve ce type d'ornementation sur plusieurs objets de la sépulture (une bâton percé gravé avec des petits points parallèles qui a été trouvé dans la sépulture des deux adolescents) et dans l'habitat (une statuette plate en ivoire de cheval, gravé de petits points en deux rangées parallèles, qui a été trouvée dans l'habitat de Sungir) fig.5.

L'utilisation intensive de perles en ivoire variés montre la particularité nette pour une décoration individuelle du vêtement de chacun des trois individus trouvés dans les sépultures. Durant les fouilles d'O. N. Bader, plus de

10 000 exemplaires de perles en ivoire ont été trouvées, dont 9732 exemplaires dans les sépultures. Elles ont été classées en trois types qui ont été trouvés aussi bien dans l'habitat que dans les sépultures (Bader, 1978, p.169; Bader, 1998, p.85).



Figure 5: Figurine de cheval ornée de Sungir (collection du Musée de Vladimir – Suzdal en Russie).

La corrélation entre l'assemblage des perles en ivoire trouvées en très grande quantité sur les squelettes, les perles trouvées dans les fosses et aussi les perles dispersées sur la surface de l'habitat, est renforcée aussi par la présence des mêmes traces d'usure. D'après les études du tracéologie faites par S. A. Semenov, le nombre important ces perles en ivoire qui portent des traces d'usure (Semenov, 1968), permet de considérer ce vêtement richement décoré comme un vêtement d'utilisation de longue durée, probablement d'utilisation quotidienne.

Les découvertes de plusieurs défenses de mammoths dans différents états de découpage, de nombreuses ébauches de perles en ivoire, de perles sans et avec perforation, révèlent également que l'une des activités de l'habitat de Sungir était dédiée à la fabrication et/ou la réparation et/ ou le renouvellement des décorations corporelles.

Les restes des trois individus trouvés dans deux sépultures de Sungir, révèlent, que malgré la tendance générale à une décoration corporelle systématique, chaque individu a été paré de façon individuelle et très différenciée. Les traits communs se traduisent tout d'abord par la décoration en rangs réguliers de perles en ivoire sur la face et le dos du corps. Ce type de décoration corporelle englobe aussi la tête, les bras, les mains et les pieds. Mais c'est la position des rangs de perles localisés sur chaque corps, qui donne la différenciation de la décoration corporelle.

Dans la sépulture n°1, l'homme a été paré de 3 500 perles en ivoire. Sur ce chiffre, il est intéressant de remarquer que l'homme âgé et l'adolescent le plus jeune ont été parés par le même nombre des perles, mais chacun avait un vêtement différent.

L'utilisation d'autres types de parures comme des canines percées de renard polaire, des pendeloques percées en pierre, des fibules, des bracelets et des bagues en ivoire et aussi des statuettes zoomorphes en ivoire, a transformé chaque corps en une représentation ayant une significa-

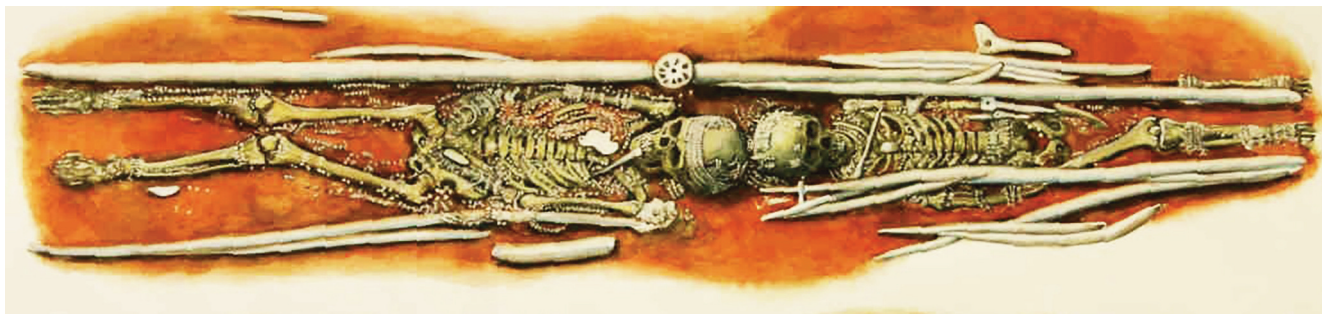


Figure 6: La sépulture double des adolescents de Sungir (dessin L. Balak d'après O.N. Bader)

tion sociale. La grande hétérogénéité des autres objets accompagnant les squelettes renforce cette thèse.

Dans la décoration corporelle des Sungiriens, l'utilisation intensive d'un grand nombre des petites perles en ivoire percées a été complétée avec des dents percées de renard polaire. Les dents percées et non percées de renard polaire ont été trouvées dispersées dans les niveaux archéologiques du site d'habitat de Sungir. Notamment les dents de renard polaire ont servi à la décoration de la tête (de l'homme et de l'adolescent le plus âgé de Sungir) et du corps (de l'adolescent le plus âgé de Sungir). Cette constatation d'une utilisation précise des dents de renard polaire révèle ainsi l'existence d'un marqueur socio-symbolique.

La notation précise des corps des individus de Sungir est révélée aussi par plusieurs types de parures corporelles. Parmi celles-ci, il faut mentionner l'utilisation des mêmes types de parures comme: des pendeloques en pierres et des dents de renard polaire pour les quatre individus, pour l'homme, les deux adolescents et aussi la femme enterrée sans tête sur la sépulture des deux adolescents; les bagues en ivoire pour les deux adolescents et pour la femme sans tête; des fibules en ivoire et des rondelles en ivoire pour les deux adolescents; les griffes de lion pour les deux adolescents.

Les statuettes animalières (cheval et mammoth) sont localisées exclusivement sur le corps de l'adolescent le plus âgé. Cet assemblage d'objets symboliques, révélé par la décoration corporelle, met en évidence une notation très différenciée (individuelle et en même temps répétitive) de chaque individu du groupe culturel du Sungirien.

Le site du Sungir permet également de révéler les sépultures dans le contexte de l'habitat de plein air, et ainsi comparer l'assemblage des artefacts trouvés dans le niveau d'occupation d'habitat avec celui trouvé dans les sépultures. En fait la comparaison des structures funéraires closes pour l'assemblage des objets d'accompagnement des défunts, avec les objets trouvés dans l'habitat montre clairement la cohérence des types objets trouvés dans l'habitat et dans les sépultures.

En particulier il faut préciser, que les types d'objets utilitaires et les éléments de parures trouvés dans les sépultures sont tout à fait équivalents à ceux trouvés sur la surface et dans les fosses de l'habitat. En ce qui concerne notamment les éléments des parures, on note la même corrélation entre plusieurs types de parures trouvés dans

les zones d'activités de l'habitat et dans les sépultures. Celle-ci se rencontre sur toute la surface de l'habitat dans les zones à proximité des sépultures et aussi dans des zones éloignées des sépultures de plus de 50 mètres. Les éléments de parure sont composés de plusieurs types de perles et de rondelles en ivoire, des dents percées de renard polaire, des griffes de lion, des pendeloques en pierre et des pendeloques de cheval sculptées.

Cependant il faut bien préciser que les armes de chasse (longues lances, javelots, poignards) qui sont les objets accompagnant les deux adolescents, sont absents dans le niveau d'occupation de l'habitat de Sungir.

La présence dans la sépulture des deux adolescents de ces types d'objets rarissimes et d'importance primordiale pour la chasse aux gros gibiers (ils sont en effet très rarement abandonnés dans l'habitat), illustre encore une fois la particularité exceptionnelle de cette sépulture comme fournissant un code socio symbolique lié à la réussite de la chasse sur laquelle est basée la survie du groupe humain dans un environnement de faune sauvage et de climat hostile (fig.6).

### Caractère anthropozoomorphe de la décoration corporelle de l'adolescent n°2

La décoration corporelle très complexe de l'adolescent le plus âgé n°2 révèle nettement un caractère zoomorphe renforcé par la présence significative d'objets de chasse dans la double sépulture.

Son vêtement est richement paré de perles de façon traditionnelle pour ce groupe. La décoration concerne aussi des bracelets en ivoire, portés sur les bras, des bagues en ivoires sur les doigts et également la présence de pendeloques percées en pierre. Les nombreuses canines percées de renard polaire ont été trouvées dans le crâne et à proximité mais également au niveau de la taille. Une griffe de lion était placée à proximité des dents, coté gauche. Une autre griffe de lion a été trouvée au niveau de la taille avec des canines percées de renard polaire.

Mais le trait les plus significatifs des représentations de cette sépulture, c'est la position des statuettes animalières. Une statuette en ivoire de mammoth (qui a été parfois interprétée comme un bison) a été posée sous l'épaule gauche. La tête de cet animal était tournée vers la tête de l'adolescent. Sur la poitrine de l'adolescent, était posée une statuette pendeloque d'un cheval (parfois interprétée comme saïga) avec son museau orienté aussi

vers le visage de l'adolescent, sur lequel à côté de la bouche est placée la griffe de lion.

Il faut préciser qu'une autre statuette de cheval orné a été trouvée dans la fosse n°21, 45 mètres à l'est de la sépulture. La ressemblance stylistique de ces deux figurines plates (contour découpé) en ivoire est accentuée par la perforation qu'elles portent sur l'extrémité des pattes arrière pour être utilisées comme des statuettes - pendeloques corporelles.

La position des deux statuettes d'herbivores (cheval et mammoth) à proximité du visage du garçon, avec la griffe de lion près de sa bouche, possède une signification complexe de caractère zoomorphe. Dans ce contexte, il faut également préciser qu'une série de perles en ivoire figurant peut être la queue d'un animal a été trouvée dans le dos de cet adolescent. Donc l'ensemble, cette décoration corporelle évoque un vêtement anthropozoomorphe similaire à des représentations figuratives composites de l'art pariétal et mobilier du Paléolithique supérieur (Iakovleva, 1994, p.90-91).

En effet, malgré les différences de formes de représentation, le vêtement anthropozoomorphe de l'adolescent n°2 de Sungir, apparaît comme une représentation homme - lion - chasseur compatible avec les représentations de l'Aurignacien d'Europe centrale dans l'art mobilier, comme la statuette composite de l'homme - lion à Hohlenstein-Stadel et également comme l'autre statuette composite d'homme - lion de Hohler Fels. (Iakovleva, 2008).

Une différence importante entre la sépulture de l'homme âgé et la sépulture des deux adolescents de Sungir est la grande richesse des objets accompagnants les deux adolescents, parmi lesquels dominent des objets liés aux activités de chasseurs qui donc possèdent une valeur vitale pour ces groupes de chasseurs.

Dans la sépulture de l'homme âgé, les armes de chasse sont totalement absentes. L'absence de toutes les catégories d'armes et d'outils de chasse peut-être liée à son âge et sa position respective dans le groupe, marginale, par rapport aux activités des chasseurs. Tout ce qu'il possède, c'est un vêtement richement paré, dans lequel on peut lire les traits traditionnels de son groupe.

## Conclusions

Les sépultures de Sungir révèlent la mise en œuvre de rites funéraires complexes pratiqués par des groupes Sungiriens au Paléolithique supérieur ancien. Les individus, richement habillés ont été déposés allongés sur le dos avec des objets d'accompagnement dans des fosses funéraires de l'habitat. Les deux adolescents de la sépulture double de Sungir, comme aussi l'adulte âgé de Sungir sont caractérisés par plusieurs types d'objets utilitaires (lithiques et osseux), et aussi par les éléments de parures corporelles les plus caractéristiques de ces groupes, ce qui illustre leur capacité de différenciation socio symbolique avec les mêmes types d'objets utilisés et symboliques trouvés dans la sépulture et dans l'habitat.

Dans les sépultures du Sungirien, il apparaît une in-

dividualisation du vêtement orné de chaque humain. En outre, ces décorations corporelles livrent des éléments de parures, qui peuvent être considérées comme des traits différentiels et des traits communs des groupes dans leurs unités culturelles respectives.

La diversité et la complexité de la structure sociale des groupes humains est révélé par la comparaison de la position des corps complets et les assemblages des objets d'accompagnement dans les deux sépultures de Sungir (l'homme et deux adolescents), par rapport aux vestiges humains posées à la surface des celles-ci. Le corps féminin dépourvu de tête (accompagné seulement de quelques objets utilitaires et de quelques éléments de décoration corporelle), qui a été posé sur la surface de la sépulture des deux adolescents, et le crâne de cette même femme posée sur la surface de la sépulture de l'homme à proximité de la sépulture de deux adolescents réunissent tous ces restes humains dans un même ensemble funéraire réalisé de façon diversifié, dans le cadre du fonctionnement d'un habitat.

La décoration corporelle de l'adolescent n°2 révèle la rare possibilité de pouvoir reconstituer un vêtement humain ayant un caractère anthropozoomorphe richement décoré par plusieurs types d'éléments de parures, parmi lesquelles on note plus précisément la présence de deux types de carnivores par les dents de renard polaire et par des griffes de lion.

La disposition du renard polaire sur la tête (peut-être un bonnet) et la disposition des dents de ce carnivore au niveau de la taille (peut-être une ceinture) sont renforcées par la position d'une griffe de lion au milieu de cette ceinture.

Mais c'est surtout la position d'une autre griffe de lion, qui était placée à proximité des dents, côté gauche, qui relève la marque la plus significative de représentation d'un thème carnivore - chasseur, puissant et dangereux.

Cette signification zoomorphe dans cette décoration corporelle, est renforcée encore plus, par une série de perles en ivoire figurant la longue queue d'un animal, qui a été trouvé dans le dos de cet adolescent.

Pour prendre en compte tous ces éléments de parures corporelles et leur position sur le corps humain, on peut penser que leur vêtement richement orné évoque une représentation anthropozoomorphes homme - lion - chasseur. La position des deux statuettes d'herbivores (cheval et mammoth) à proximité du visage du garçon, avec la griffe de lion près de la bouche, renforce cette signification complexe de caractère zoomorphe. La présence importante d'armes et d'outils de chasse dans la sépulture des deux adolescents peut être liée avec la représentation d'un jeune chasseur dans son vêtement du caractère anthropozoomorphes en relation avec la période d'initiation des chasseurs.

Suivant cette hypothèse, la richesse exceptionnelle de cette sépulture des deux adolescents englobe tous les types d'objets utilitaires et symboliques comme une représentation d'un code socio-symbolique d'un groupe de chasseurs de Sungir.



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## Sungir: the choice between Szeletian and Aurignacian

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### Abstract

the article deals with the problem of cultural attribution of the Sungir site. The investigation based on the classification and typology of stone tools. It confirmed the presence of the Aurignacian types in Sungirian toolkit. The same trait is seen in Final Szeletian sites both in Central and Eastern Europe. The conclusion is that of Sungir and Streletskian in general are the regional manifestation of the final Szeletian in Eastern Europe.

**Keywords:** Early Upper Palaeolithic, Sungir, Streletskaya culture, the Final Szeletian.



Figure 1: The map of location of the sites, mentioned in the article.

### Introduction

The stone industry of Sungir traditionally associates with thin bifaces – triangular and leaf points. In the European context this feature means analogies between Sungir and final Szeletian sites of the Central Europe. But G.P. Grigoryev (Grigoriev, 1990) and M.V. Anikovich (Anikovich *et al.*, 2007) urged that the Sungir industry should be incorporated in Aurignacian. A. E. Matyukhin also noted the presence Aurignacian types in the stone inventory of Sungir. He believed that this site may not be included in the Streletskaya culture (Matyukhin, 2006).

The problem consists in, whether so radical revision of cultural specifics of Sungir is possible.

G.P. Grigoriev was the first, who recognized Aurignacian types among the stone tools in Sungirian collection. At first there was a discussion between G.P. Grigoriev and M.V. Anikovich about the specifics of Sungirian industry. It was important to them at least for two reasons. First, the proportion of the Sungirian bifaces differed from the classic Streletskian. Second, typological features of sungirian industry are not limited to only this characteristic, but also affect others. For example, stone industry of the Sungir is characterized by a significant representation of the piece ecailee and relatively high percentage of blades. In the 1990s, the specificity of the Sungir traditionally attributed to its late age within the chronology of the Streletskaya archaeological culture (Anikovich *et al.*, 1998). However, recent studies that have led to the increase in the number of radiocarbon dates do not support this position. At the end of the 1990s, radiocarbon chronology of the Sungir was stretched. The range of dates from the GIN lab was within the following figures: the most ancient rate –  $28800 \pm 240$  (GIN-9028), the youngest –  $20360 \pm 900$  (GIN-9585) (Sulerzhitski, Pettitt, Bader, 2000). It is characteristic that the oldest radiocarbon dates of the mammoth bones, obtained in the GIN laboratory, coincided with the same ones of the fifth layer of the Kostenki I, also got the bones of a mammoth (Sinitsyn *et al.*, 1997). Radiocarbons dating of charcoal from this layer exceed 32,000 BP. Unfortunately, we can't compare charcoal dating of Kostenki I/5<sup>th</sup> layer and Sungir because samples from the Sungir hearths were not subjected to radiocarbon analysis. Anyway, Sungir may be considered as a site, which is synchronous with the middle chronological group of the Kostenki-Borshchevo settlements, including streletskian. New radiometric dates of the Oxford lab and the results of the excavations in Sungir during last years have stimulated a new analysis of a collection of stone tools. It is necessary to consider the degree of typological homogeneity of the Sungirian collection. But the main goal of the typological analysis of sungirian stone tools is a revision of the cultural specificity of this site.

### Materials

Analyzed part of Sungir collection consists of 2403 stone artifacts, including 1624 tools with regular shape and 779 irregularly retouched/notched flakes and blades (tab. 1). The total size of the collection of stone objects is over 51000 items. Sungir tools made of different varieties of boulder and pebble chert, silicified limestone, quartz, quartzite and slate. But the vast majority of tools are made of flint (Bader, 1978: 114-117).

Category	N.	%
Burins	123	7,6
Scrapers	355	21,9
Core burins	12	0,7
Core scrapers	6	0,4
Piece ecailee	281	17,3
Tools with trimming ends	27	1,6
Bifacial points	16	1,0
Unifacial points	7	0,4
Bifaces	18	1,1
Points on flakes	27	1,6
Points on blades	28	1,7
Points on micro-blades	6	0,4
Blades with retouched end	2	0,1
Borers	16	1,0
Side scrapers	52	3,2
Backed knives	3	0,2
Combined tools	10	0,6
Blades with regular retouch	260	16,0
Flakes with regular retouch	375	23,1
<b>Formal tools</b>	<b>1624</b>	<b>100,0</b>
<b>including:</b>		
<b>Tools made of blades</b>	<b>499</b>	
<b>Tools made of flakes</b>	<b>1125</b>	
Blades with irregular retouch and notches	488	
Flakes with irregular retouch and notches	291	
<b>TOTAL</b>	<b>2403</b>	

*Table 1: Sungir. Stone tools.*

The collection is stored in the Vladimir-Suzdal Museum-Reserve. The inventory of the Museum's collection contains information about the location of objects on the squares and horizons in the excavations O.N. Bader. Unfortunately, precise information on the ratio of the excavation horizons and real stratigraphic units of the cultural layer of the site in these materials is missing. It is need to revise field drawings of excavation for the reconstruction of the spatial structure of the site. This task is one of the most urgent for study of Sungir in the near future.

## Classification and typology of stone tools

Stone tools belong to the following categories: burins and scrapers, including nuclei-forms, chisel-shaped tools (piece ecailee) and chips with trimming of different sections, triangular and leaf-shaped points with bifacial and unifacial retouch, bifaces, points on flakes, blades and micro-blades, borers, side scrapers, backed knives, combined tools, and retouched blades and flakes. Piece ecailee, scrapers and burins are the most numerous tools, in addition to blades and flakes with retouch. Other categories

are few in number, but very significant. There are, first of all, bifacial points, scrapers and points made on the blades and the microblades.

Flake was the predominant type of blanks for the making of formal tools (69.3 %, tab. 1). However, the percentage of flakes in the whole studied collection is less (58.9 %). Blades dominate among the pieces with irregular retouch and notches— 488 blades and 291 flakes, respectively. However, after revision of the total collection, these figures may change in the future. Both flakes and blades are massive, with curved profile, large bulbs and striking platforms. Last ones, in most cases, are flat, but a single piece have a dihedral or multifaceted butts. Edges and dorsal surface are usually irregular. Dorsal ridges very often do not coincide with the longitudinal axis of piece. Burins, scrapers and piece ecailee do not differ from each other in size radically. We did not trace a special selection of flakes or blades in this case. Blanks for these tools are characterized by a width of 16 to 45 mm, a length of from 24 to 62 mm and a thickness of 4 to 13 mm. Big massive flakes in width from 27 to 52 mm, length from 26 to 72 mm and a thickness of 8 to 11 mm being preferred by people of Sungir for making side-scrapers. Parts of side-scrapers, in addition, were made on large fragments of flint and silicified limestone. The microblade was used as the workpiece in only two cases: for making micro-point and microblade with retouched end. Those items, which seem to backed bladelets, that were illustrated earlier (Bader, 1978, p. 140 Fig. 93: 11-16; see also Rogachev, Anikovich, 1984, p. 2446, Fig. 82: 1, 2) are actually burin spalls with retouched edges.

Most formal tools were shaped by using the technique of trimming, a large scraper retouch, or flat bifacial retouch. Abrupt and semi-abrupt as well steep retouch of large and medium sizes are also used for shaping the edges of tools. The ends of bladelets were processed with fine semi-abrupt retouch. Some of the microblades have also a small irregular marginal retouch (Fig. 7: 26, 28). There is one piece with large reflected retouch (Fig. 1: 3) and another one with small abrupt retouch (Fig. 7: 18-20). The kostenkian-like technique of trimming were used twice also (Fig. 2: 15; Fig. 3: 5).

*Burins* (Fig. 1: 1-13). The total number count 123 artifacts (7,6% of the toolkit). This number includes six burin-like products. Their working edge is formed by the intersection of surfaces, which were not negatives of burin spalls, but others regular blanks. Combined burins are only 8 pieces, four of which are made of flakes. Five items belong to the double angle burins on a break (Fig. 1: 7), three ones demonstrate a combination of dihedral and angle burins on a break. More than 68 % among burins (105 copies) refers to angle forms on a break (72 items; Fig. 1: 1-3, 5, 6, 13). Dihedral burins consists eight samples. One of them is made as the result of renewal of truncation burin (Fig. 1: 10). There are rare multiple forms among the burins – six copies. Burin spalls quite often cover the ventral surface, but the flat burins are just two copies among the angle items on a break. Burins on retouched truncation are six items (Fig. 1: 4, 11, 12). One

of it is double transverse burin on notch (Fig. 1: 8). This form not previously identified in the toolkit of Sungir, whereas it is found among artifacts of 5th layer of Kostenki I (Rogachev, 1957, Fig. 13: 2; Rogachev, Praslov et al., 1982, p. 63; Fig. 22: 13; Rogachev, Anikovich, 1984, p. 245; Fig. 81: 9, 14).

In general, retouching of the edge is not typical for burins. Only single angle burin is made on the blade with large retouch on the edge, which is partly reflected abrupt (Fig. 1: 3). It is not excluded that this burin is the result of the renewal of some other tool. 60,2 % of burins are made on flakes, and 28,5 % - on blades.

*Scrapers* (Fig. 2: 1-8, 11-15) are more numerous than the burins. There are 355 items (21,9 % of toolkit), including fractions, which are represented by fragments of working parts. Most scrapers (231 pieces, 65,0 %) made of flakes. Flakes with a width of 30 to 40 mm are often used for making scrapers, in contrast to the burins. Items that have retouch on one or two edges are few (77 copies, 21,7%). Most scrapers has a single working edge (77 items., 21,7%) and short proportions. However, miniature fan-shaped scrapers with retouched edges that emphasizes by M.V. Anikovich for streletskian, are not recorded in Sungirian toolkit. There are few scrapers with working edges, renewed by trimming technique and flat transverse spoll. 72 scrapers are the dual and multiple ones. Almost all of these artifacts except five items, made of flakes.

*Core burins and core scrapers* (Fig. 1: 14, 15; Fig. 2: 9, 10). Tools of these categories are few – 12 (0,7 %) and 6 (0,4 %) items, respectively. One of core burin made on flake and perhaps is an utilized nucleus (Fig. 1: 15). There is also one transversal core burin (Fig. 1: 14). Core scrapers made on massive short flakes (Fig. 2: 9), single item – on fragment of piece ecailee (Fig. 2: 10). There is one piece à museau among core scrapers.

*Piece ecailee* (Fig. 3) is one of the most characteristic categories of Sungirian toolkit. This is the most numerous series of objects (281 items, 17,3 % of tools), which in most cases made of flakes. It is 93,2 % of the total number of tools in this category. Massive flakes often used for making piece ecailee and rarely to be found among scrapers and particularly the burins.

Single-end and double piece ecailee are 109 (38,8 %) and 147 (52,3%) items. Blanks of the single-end piece ecailee have quite massive platforms with traces of impacts. Triple and four-ended tools are very few. The last one is so heavily processed that its external shape is similar to bifacial forms (Fig. 3: 7). 37 items belong to the group of the core-shaped piece ecailee. These artifacts are produced on massive flakes, which dorsal surface is completely covered with negatives from the microblades. As a result, they look like miniature flattened cores (Fig. 3: 2). It should also be noted that eight pieces made of thin flakes (Fig. 3: 10, 13). M.V. Anikovich attributed this type as characteristic forms for Gorodtsovian culture (Anikovich, 1991).

*Bifacial points* (Fig. 4; Fig. 5: 3), despite its small numbers (16 items, 1,0 %), are the brightest category in Sun-

girian toolkit. Morphologically these artifacts can be divided into two groups.

The first group consists of so-called streletskian/sungirian forms (11 items, Fig. 4: 1-7). These points have a triangular shape and doubly-convex profile. Points are divided into equilateral-shaped with a straight base, equilateral with a slightly concave base and elongated with a straight base.

The second group consists of leaf elongated points (5 copies, Fig. 4: 9, 10). All the listed points belong to thin bifaces (Anikovich et al., 1998).

There is one unique point among triangular forms (Fig. 5: 3). It is made on a massive flake and has equilateral proportions with oblique base.

*Unifacial points* (Fig. 5: 1, 2, 5). Tools of this category, as well as bifacial ones, are divided into groups of triangular (6 copies) and leaf (1 copy) points. The leaf point has a sub-oval asymmetrical shape and plano-convex cross-section (Fig. 5: 2).

One piece from the excavation unit II can be attributed to the tanged point (Fig. 5: 4). This item is made on the blade and has slightly asymmetrical shape and straight profile of retouched edge. Its tanged part is formed by small marginal retouch on one edge and blade is shaped with ventral retouch on the same edge.

*Bifaces* represented by a series of 18 items (Fig. 5: 6, 7). Six pieces are disc-shaped objects, one of which is massive enough and core-like. Bifaces made of massive flakes.

*Flakes with trimming ends* differ from piece ecailee by using of less intense, and mostly ventral, trimming technique for finishing only one end (Fig. 5: 11).

*Points on flakes* (Fig. 6) are also few (27 items, 1,9 %). Flakes of various sizes used for making of these tools, including very small (Fig. 6: 11, 12). However, points made on fairly large and heavy flakes are dominated in the series (Fig. 6: 1-3). Points in most cases have one edge with flat retouch, including seven items with edge fully covered by flat retouch. There are only 3 items with both retouched edges. One of the point made of shale, with the edge fully shaped by ventral retouch of medium size.

*Points on blades* (Fig. 7: 1-5, 7-12) are also not numerous. There are only 28 items, mostly in fragments. It is difficult to trace any kind of standardization among the tools of this category. Five points have a curved profile, but most is too fragmented. The retouch is flat, large and medium in size, slightly emarginate. Thirteen points are shaped by retouch along two edges. Two pieces were presented by massive, asymmetrical points, one of which is combined with a scraper (Fig. 7: 1). One tool is double massive point (Fig. 7: 3).

*Points on micro-blades* (Fig. 7: 18-20, 23). Items of this category are rare (6 artifacts, 0,4 %), but very meaningful. These points are made on a massive micro-blades with a slightly curved profile and width from 3,5 to 6 mm. The distal ends of these tools were pointed by small marginal

or semi-abrupt retouch. One point has a symmetrical shape and two retouched edges on the end. Other points are asymmetric. The symmetrical point has slightly oblique retouched base, and the asymmetric one has a transverse base (Fig. 7: 18, 19).

*Borers* (Fig. 8: 1-11) include a series of sixteen pieces (1,0 %). Half of it is made on flakes with short triangular points on the angle (Fig. 8: 8-11). One of the borers made on a large blade with retouched edge (Fig. 8: 1). Six other tools made on the blades, which points are located at the distal end and have an asymmetrical sub-triangular form.

*Side-scrapers* (Fig. 5: 8, 9; Fig. 9) of the Sungir are quite numerous (52 copies, 3.2 % of tools). These artifacts were made in most cases on large massive flakes. However, the collection includes six pieces of even larger fragments, including tiles of slate and silicified limestone. Nucleus was used as a work piece for one side-scrapers. Most of these tools (33 items, 63, 5 %) are single straight and convex scrapers. Three single side-scrapers have thinned ends with the trimming technique. There are 11 items of double side-scrapers, two of which are convergent. The collection includes also three scrapers with three working edges. Large, including stepped, retouch has been used most often for shaping these tools.

*Combined tools* consist of ten items. Three tools were made on the blades, and the rest of flakes. Items on the blades are represented by combinations of the scraper and borer with large vertical symmetrical stinger, and the scraper and the point with the retouching of the edges. One tool refers to the combination of the angle burin and borer with short oblique point. As a whole, the following forms are presented by the objects of this category:

- scrapers	7
- piece ecailee	2
- borers	3
- angle burins on a break	3
- points on blade	2

There are also micro-blade and blade with truncation retouched end (2 items, Fig. 7: 24, 27), and three naturally-backed knives. Among the latter, one piece is produced on the blade, and two of flakes.

*Blades and flakes* with retouch are the most numerous series in the toolkit of Sungir - 260 (16,0 %) and 375 (23,1 %) items, respectively. Any standardization among these products is nonexistent. In our view, four pieces among the blades with retouch are particularly interesting. The first of these ones is micro-blade with regular dorsal surface and straight profile, a very flat bulb and a narrow striking platform. Its proximal end is retouched along an oblique arc by ventral abrupt retouch, and the upper section of the right edge has small marginal retouch (Fig. 7: 26). One blade has one edge that was shaped by ventral notched retouch of medium size. The third artifact is asymmetrically notched Aurignacian blade (Fig. 8: 12). The left edge has a large flat retouch, the right one is retouched by a large steep retouch. The fourth is a large blade with Aurignacian retouch of edges (Fig. 8: 14). One fragmented blade may be part of the tanged point (Fig.

7: 6). Among flakes with retouch, there are forms resembling borer (1 item), points (4 items) and scraper-like tools (3 items). The edge of one of the flakes finished with semi-abrupt retouch along the entire perimeter (Fig. 8: 16).

## Conclusions and discussion

Typological features of Sungirian toolkit are associated with several indicators. First of all, it is a thin bifaces, which are presented by leaf-shaped and triangular points. Second, Sungirian inventory differs from the classical streletskian by the following characteristics: a substantial proportion of piece ecailee, large number of burins and the presence of Aurignacian component. The latter include core burins and core scrapers, as well as the points on the micro-blades. The last characteristic is not something unexpected. In fact, the stone inventory of Sungir includes edge-faceted cores for micro-blades. There are also a pre-form of such nucleus, numerous micro-blades and the primary flake, produced from end core (Fig. 7: 13, 14, 17, 16, 25, 28). However, we can attribute Sungir as the part of Streletskian culture because of bifacial points, numerous series of side-scrapers (Fig. 9), and predominance of flakes among tools.

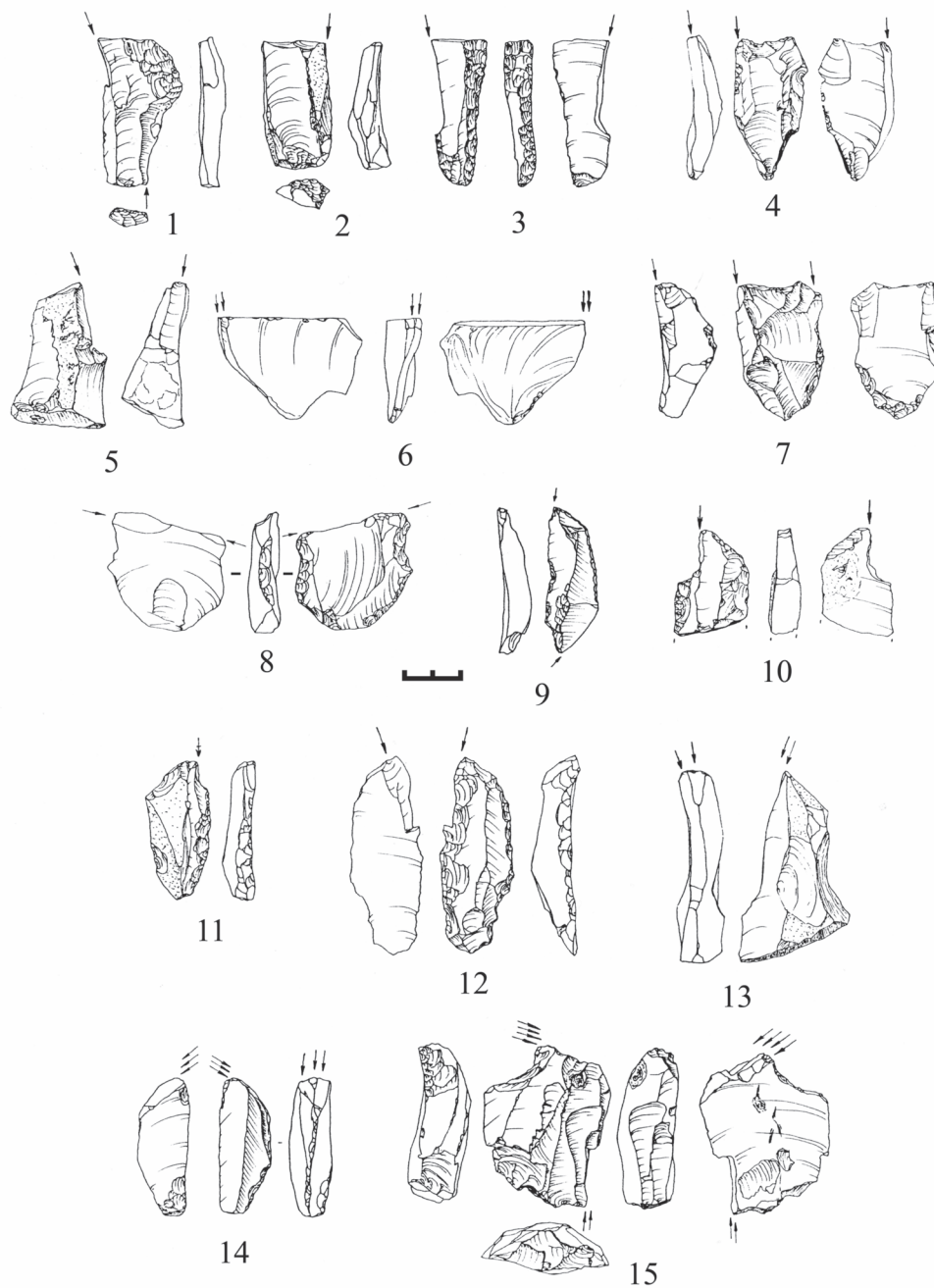
But this conclusion is not complete to determine Sungir's position in the European Palaeolithic context. The characteristics of sungirian stone inventory at the same time, allow us to compare this site with final Szeletian of Central Europe. It should be remind that O.N. Bader wrote about this in the beginning of studies on the Sungir (Bader, 1961). Now this conclusion is not refuted by the presence of Aurignacian types, because the same pattern is seen in some Szeletian sites of Central Europe (Allsworth-Jones 1986; Svoboda *et al.*, 1994). Researchers noted the uncertainty of the context of this combination (Kaminská *et al.*, 2012). However, a few sites in the last decades were excavated in Eastern Europe, toolkit of which is similar to streletskian and at the same time contains Aurignacian types. It is primarily the site of Garchi I, located in the North-East of European part of Russia and the site of Vys, located in the Central part of Ukraine (Fig. 10: 2, 5). The stone inventory of the Garchi I includes bifacial triangular points with straight and concave base, as well as leaf-shaped bifaces. This combination of forms is similar to sungirian one (Pavlov, Markarov, 1998). In addition, there are also core scrapers, end cores for microblades, and the microblades, piece ecailee made of massive flakes, side-scrapers in the Garchi I inventory. This whole set is characteristic also for Sungir. Bifacial triangular points with a concave base, and leaf-shaped points, as well as Aurignacian types of scrapers were found during the excavation of the site of Vys (Zaliznyak *et al.*, 2013). Another site, Biruchya Balka 2 (Fig. 10: 4), was excavated by E. A. Matiukhin in the lower reaches of the Seversky Donets River. Stone tools of the third horizon of this site is characterized by thin triangular bifacial points with a concave base, on the one hand, and edge-faceted cores for micro-blades, and series of micro-blades – on the other (Matyukhin, 2012).

L. L. Zaliznyak with coauthors notes that the combi-

nation of thin bifaces and Aurignacian forms is characteristic of Szeletian techno-complexes only in Central Europe (Zaliznyak *et al.*, 2013, pp. 102-103). Nevertheless, materials of Sungir, Garchi I and, in part, Biruchya Balka 2 suggest that this combination of features is typical for “szeletoid” complexes of Eastern Europe. “Szeletoid” character of Sungirian inventory in any case does not eliminate regional specificity both Streletskaya culture and Sungir, which was fixed in the 1960-ies (Grigoriev, 1963; Grigoriev, 1968; Bader, 1966). The regional specificity of the Streletskaya culture is manifested mostly in the morphology of the triangular points. For example, a triangular bifaces of the Moravany-Dlha site have a convex base. In addition, the edges of the points are connected with

the base in the form of an arc, and not at an acute angle (Barta, 1965). Actually triangular points of Streletskian types do not exist on the territory of Central Europe (Kaminská *et al.*, 2012).

Sungir is investigated in a huge area and we cannot confidently reason about the variability of Streletskian sites inventory in Kostenki Region due to the disparate small area of its excavations. Specifics of Sungirian inventory, which are identified in comparing with Streletskian in Kostenki, may reflect the functional feature of the site. In any case, Sungir and Streletskian in general can be considered as regional manifestations of the final Szeletian in Eastern Europe.



**Figure 2:** *Sungir. Burins.*

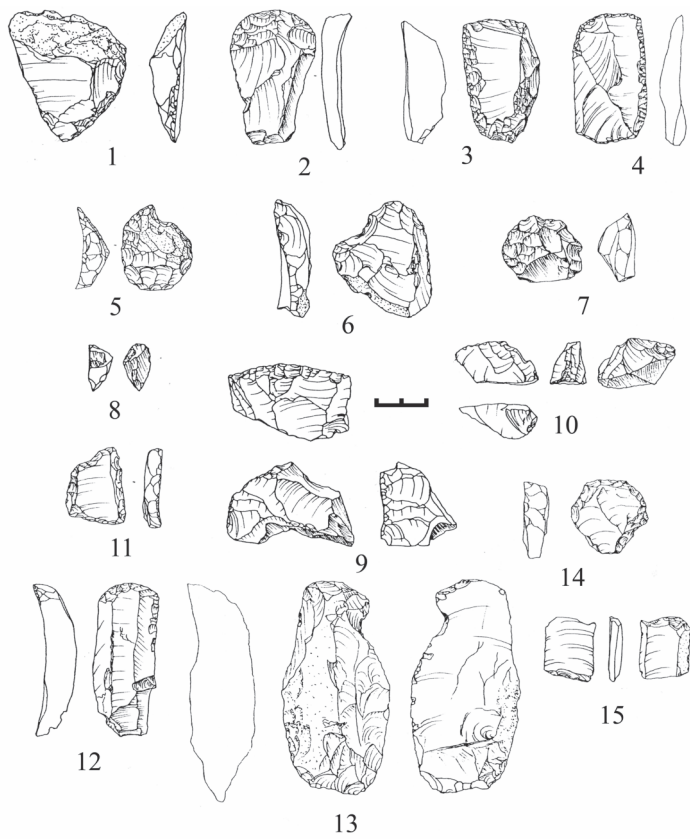


Figure 3: Sungir. The end scrapers (1-7, 11-15) and core scrapers (8-10).

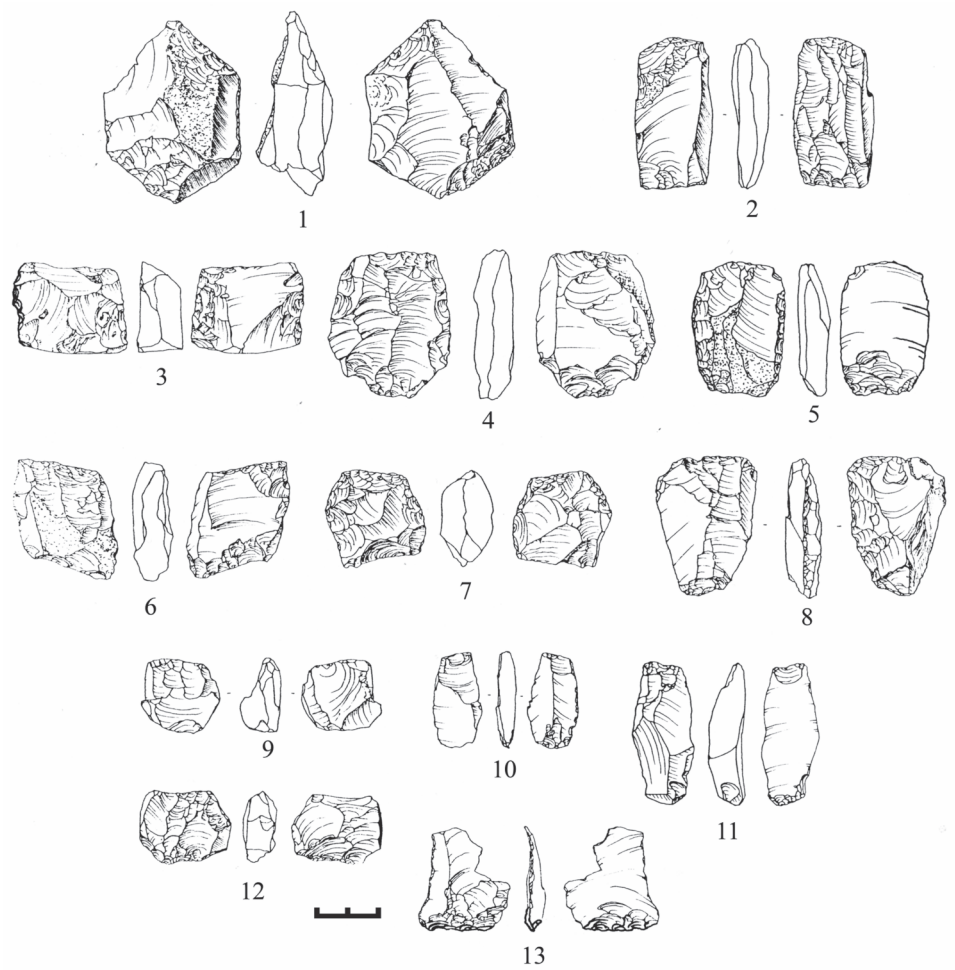


Figure 4: Sungir. Pièces écaillées



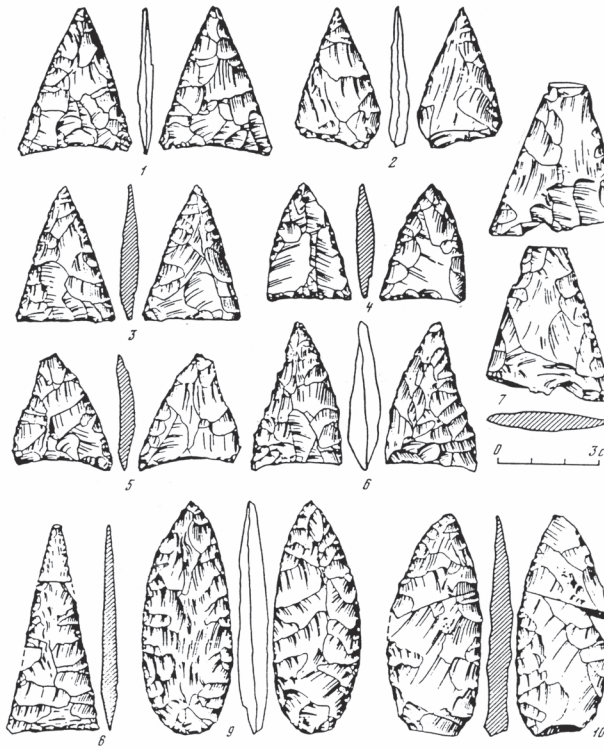


Figure 5: Sungir. Bifacial points (to: Bader, 1978).



Figure 6: Sungir. Unifacial points (1-5), biface (6), side scrapers (7-11).

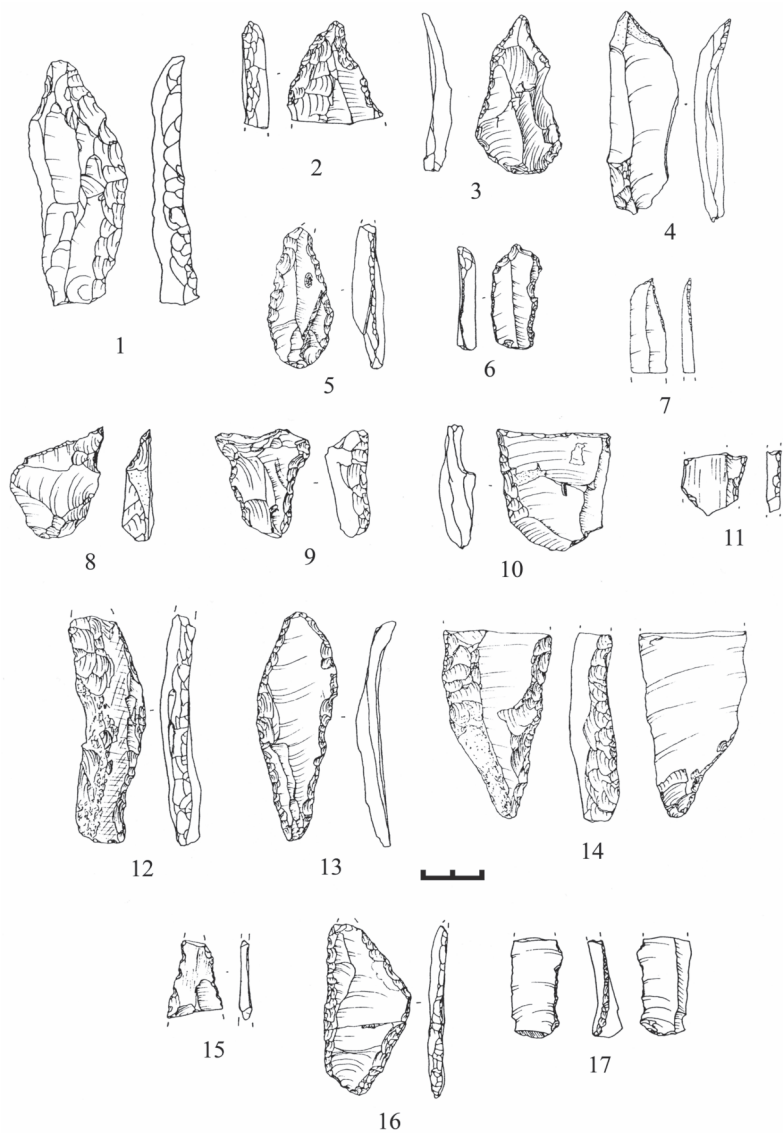


Figure 7: Sungir. Borers (1-11), retouched blades (12-17).

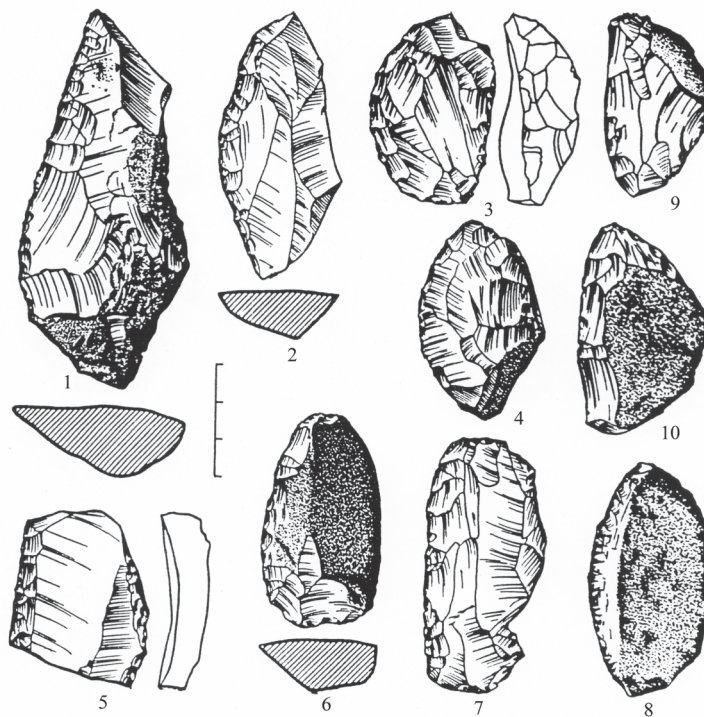
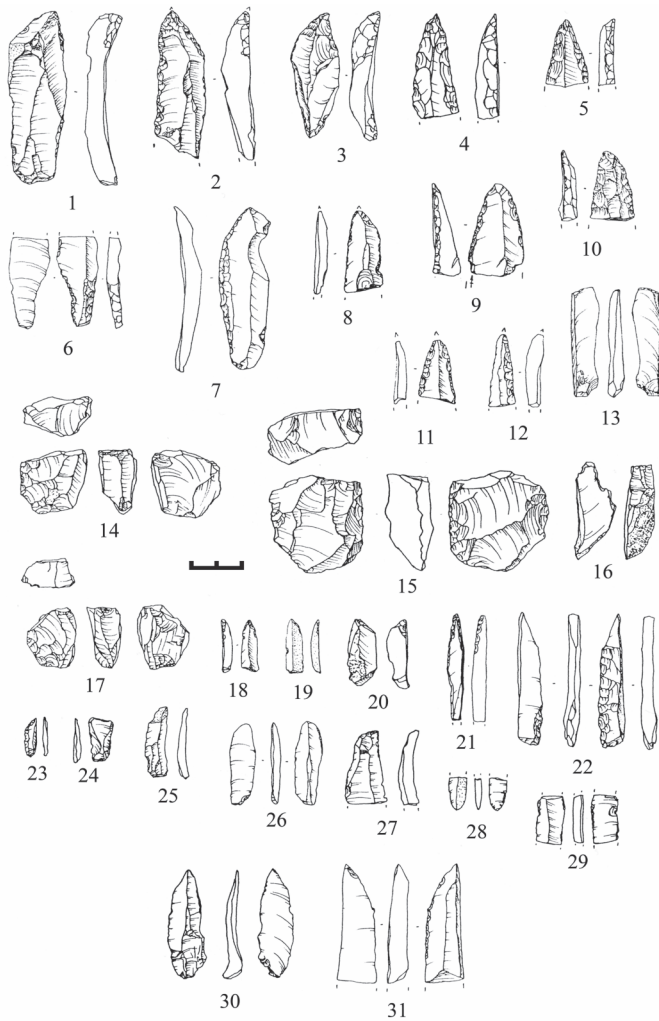
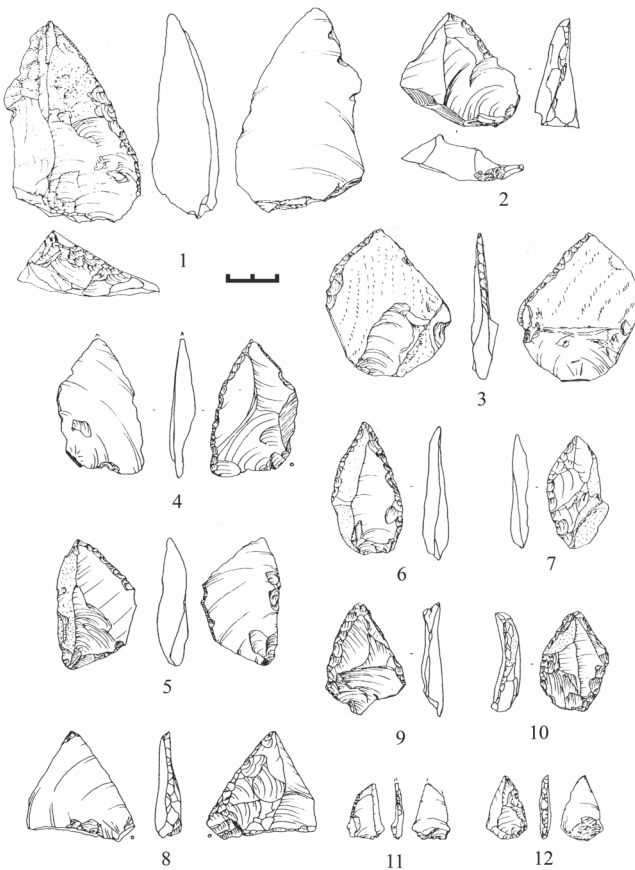


Figure 8: Sungir. Points on flakes.



**Figure 9:** Sungir. Points on blades (1-5, 7-12, 30, 31), fragment of tanged point (6), burin spalls (13, 16, 21, 22), edge-faceted cores for micro-blades (14, 17), preform of edge-faceted core for micro-blades (15), points on micro-blades and bladelets (18-20, 23, 30), micro-blades and bladelets (24, 25, 27, 29), retouched micro-blades and bladelets (26, 28, 31).



**Figure 10:** Sungir. Side scrapers (to: Bader, 1978).

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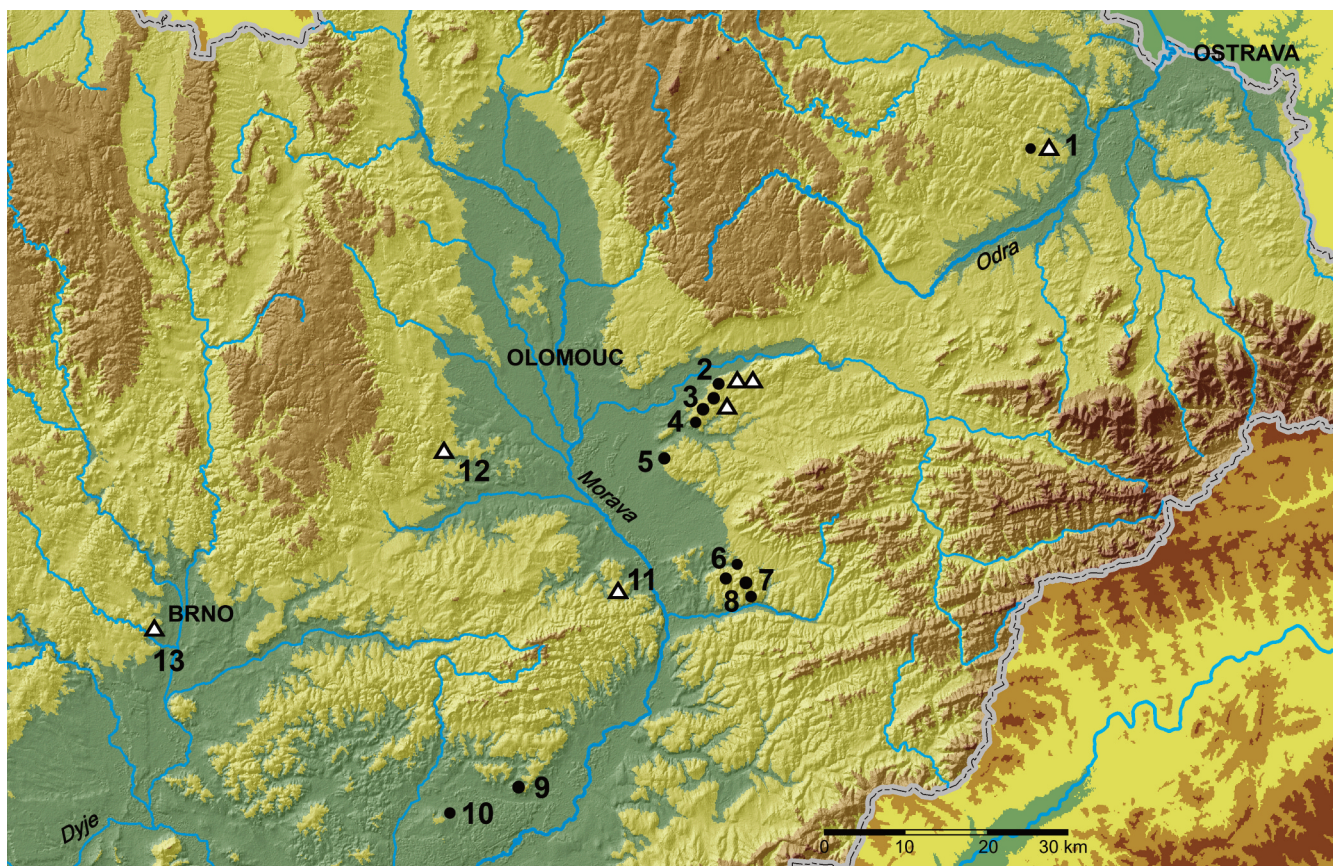


## Les pointes foliacées triangulaires et le type Míškovice

Martin Oliva

On est probablement tous d'accord que la particularité principale de la culture Streleckaya-Sungir est le type triangulaire de la pointe foliacée. Même si les études tracéologiques de celles-ci font encore défaut, d'après leur forme on peut penser qu'on a affaire presque exclusivement aux armes, tandis que les pointes foliacées dans le Szélétien sont polyfonctionnelles (Nerudová *et al.*, 2010). Les analogies de ce type spécifique d'arme sont assez rares – elle est absente p. ex. dans le Solutréen aussi bien que dans l'Altmühlien et Jerzmanowicien. Cependant, on peut trouver les analogies dans le Szélétien de l'Europe du Centre-Est. Dans cette région, les pointes subtriangulaires ont été définies par Juraj Bárta (1960) comme le type Moravany-Dlhá. Ces pointes-là sont, elles aussi, bien minces, mais pourtant avec la base plus ou moins convexe. Ce site appartient à la phase récente du Szélétien, à laquelle on peut rattacher la date Poz-29011: 33 600±300 BP non cal., acquise du charbon de bois provenant des fouilles menées pendant la guerre par Lothar Zotz (Nemergut, 2010).

Pourtant, les pointes foliacées minces et avec les bords presque rectilignes, c'est-à-dire encore plus proches du type stréleckien, peuvent être trouvées dans la Moravie de l'Est, notamment dans le cadre des industries que j'ai baptisées le type Míškovice. Certains auteurs, tel J. Svoboda (2006, 27) ou P. Škrdla (Škrdla & Schenk, 2007), considèrent que les pointes foliacées de cette région indiquent les contacts avec la sphère stréleckienne. Les industries de type Míškovice sont concentrées à l'est de la rivière de Morava et au Sud-Est du massif de Choïby (Fig. 1). Malheureusement, il ne s'agit pas pour le moment que de sites de surface, parfois très riches, ce qui augmente encore la possibilité de contaminations de différentes phases de l'occupation. En effet, ces collections montrent un caractère intermédiaire entre le Szélétien et l'Aurignacien, avec pourtant un taux d'outils à dos. Il faut cependant noter que les sites situés dans d'autres régions de la Moravie sont, eux aussi, pour la plupart de surface, et pourtant leur appartenance au Szélétien ou à l'Aurignacien est très claire dans la majorité des cas – et il s'agit aussi de très vastes collections (Oliva, 1987). Or,



**Figure 1:** Carte de la Moravie centrale et orientale avec les trouvailles des pointes foliacées triangulaires (triangles) et les sites du type Míškovice (cercles, sites d'autres cultures n'étaient pas indiqués). 1 Tisek, 2 Lhota u Lipníka, 3 Hlinsko, 4 Pavlovice u Přerova, Přestavky, 6 Míškovice, 7 Hostišová, 8 Zlín-Louky, 9 Buchlovice, 10 Osvětimany (Hostějov), 11 Kvasice II (Aurignacien), 12 Myslejovice (Szélétien), 13 Brno-Kohoutovice (Épi-aurignacien).



Figure 2: Partie du Sud de la Porte de Moravie avec les sites autour de Hlinsko et Lhota u Lipníka (photo Z. Schenk).

à l'Est de la rivière de Morava, ce caractère n'est jamais clair bien qu'il s'agisse déjà d'une douzaine de sites.

La plus vaste collection provient du site éponyme à la hauteur Kœmenná près de Míškovice, d'autres gisements très riches se trouvent au-dessus de la rive Est de la rivière Beěva dans la Porte de Moravie, à Lhota u Lipníka (Fig. 2), ou encore au sommet de l'élevation Povinná entre Buchlovice et Boršice. Sur tous les sites c'est le silex erratique qui domine, suivi de la radiolarite de Carpathes Blanches et de silexites jurassiques de la Moravie orientale. Seulement le site de Míškovice I est particulièrement riche en importations lointaines. Nous y avons constaté p. ex. le quartz limnique, la radiolarite de type Sűmeg (Fig. 3: 3-4) et l'obsidienne de la Hongrie ou de la Slovaquie (Fig. 3: 13). Un fragment de la pointe à face plane a été confectionné de silex jurassique tacheté de Ćwieciechów (Fig. 3: 5), s'il ne s'agit pas toutefois du résidu d'un artefact à la retouche plane de la civilisation des gobelets en entonnoir pour laquelle cette matière première est typique. Le pourcentage de silex jurassique de Cracovie, dont les gites sont situés entre les sources de silex erratique et celles de Ćwieciechów, n'a pas été suivi. Les matériaux de l'origine occidentale sont presque absents – on n'a pas trouvé de crystal de roche du Plateau tchéco-morave et sont présentes seulement quelques pièces de spongolite de la Moravie centrale et occidentale. A Pavlovice près de Pœrov, le quartzite local a été largement employé. Parmi les nucléus à Míškovice, le groupe des exemplaires fragmentés et épuisés (240) prédomine sur les pièces abandonnées au cours de la réduction, dont 80 montrent la réduction parallèle et 39 centripétale ou irrégulière. Les nucléus unipolaires sont au nombre de 44 plus nombreux que les nucléus bipolaires (19) et ceux avec le changement de l'orientation (17). A Buchlovice c'est pareil, mais le groupe des nucléus étroits "cunéiformes" est probable-

ment plus élevé. Malgré le fait que les matières premières lithiques ont été acheminées d'une région bien vaste, les nucléus sont souvent menus et la réduction laminaire et lamellaire est poursuivie même sur les restes miniatures.

En ce qui concerne la typologie (tab. I), les burins dominent, les pièces sur troncature étant constamment plus nombreuses que les dièdres et leur parties actives sont d'habitude fortement transformées, comme cela est courant dans l'Epi-aurignacien, p.ex. à Urèce. Les burins toujours prévalent sur les grattoirs, les burins carénés étant cependant rares et les grattoirs carénés courants. A Buchlovice, les grattoirs aurignaciens sont représentés surtout par les pièces à museau étroit, proche du type épi-aurignacien de Lhotka. Ce type particulier du grattoir paraît être typique pour tous les sites du type Míškovice (Fig. 3: 6-9) Les racloirs (5-8%) se présentent avec les formes fortement rétouchées, rappelant l'outillage szélétien (Fig. 3: 3). Les pointes foliacées ne sont pas nombreuses, mais de formes particulières. La plus typique est justement la pointe triangulaire isocèle courte, avec les bords plus rectilignes que c'est habituellement le cas dans le Szélétien. Pourtant, sa base n'est presque jamais concave, à la différence de la culture Streleckaya-Sungir. Communément à la phase récente de cette culture il y a toujours ici quelques lames et lamelles à dos, mais pas de pointes de la Gravette.

Les industries mentionnées ont été classifiées différemment selon les auteurs: pour B. Klíma (1978; 1979) ça a été de l'Aurignacien morave, pour J. K. Kozłowski (1965, p. 73) du Szélétien, pour J. Svoboda (*et al.* 1994) de l'Aurignacien ou du Szélétien et pour P. Škrdla (2005, p. 101) également de l'Aurignacien morave, au moins pour Buchlovice. Il ne reste donc pas que d'inventer un nouveau taxon, ce que j'ai fait il y a presque 20 ans (Oliva



Site:	Míškovice I	Buchlovice	Lhota u Lipníka
IG	14,5	24,1	9,7
IGA	3,8	13,4	2,6
IB	41,	25,4	41
IBD	6,6	6,8	moins
IBT	15,3	4,6	plus
IBA	1,1	0	
IR	8,3	5,1	5,8
IPf+bif	2,4	1,0	2,6
I dos	1,2	4,6	0,3
IOComp+mult	8,3	6,8	ca 10
∅	1230pcs./1356p.fonc.	410	310
Collection:	Musée de Moravie	Inst. Archéol.	Musée de Moravie
Source:	M. Oliva, in litt.	Škrdla 2005	M. Oliva, in litt.

Table 1

1988; 1990). Les ensembles "míškoviciens" diffèrent de l'Aurignacien non seulement par la présence régulière et systématique des pointes foliacées et raclours fortement rétouchés, mais surtout par la structure statistique des éléments aurignaciens propres (Fig. 4): à savoir, dans l'Aurignacien de Moravie la prépondérance des grattoirs sur les burins est toujours accompagnée par la prépondérance des grattoirs aurignaciens (carénés et à museau) sur les burins aurignaciens (busqués, carénés et des Vachons: Fig. 3: 13), ce qui n'était jamais le cas ici. Pour le Szélétien, la prolifération des burins est inhabituelle, et les pointes foliacées, au contraire, courantes, contrairement à leur représentation toujours négligée ou modeste au sein des industries du type Míškovice (Fig. 3: 1-2). En plus, dans ce dernier elles montrent une morphologie différente: il manque ici les formes bipointes, la plus typique et presque exclusive pour cette région étant la forme triangulaire mince à la rétouche bifaciale plate. Paradoxalement, ce type de pointe n'est pas présent dans le site éponyme de c, mais, en revanche, il est connu des quelques sites autrement assez pauvres: Hlinsko près de Pøerov (Fig. 5: 1) et Tísek près de Bílovec (Fig. 5: 2) dans l'embouchure Sud et Nord de la Porte de Moravie. Directement de la Porte Morave proviennent deux exemplaires les plus achevés de Lhota u Lipníka, fabriqués de silex (Fig. 5: 3) et de radiolarite (Fig. 5: 4).

Donc il semble que ce type n'est pas typique pour tous les sites du type Míškovice, mais seulement pour ceux situés autour de ce passage privilégié. Cependant, on ne les connaît pas au Nord de la Porte de Moravie, en Silésie. Par contre, j'ai trouvé un exemplaire très typique sur le site purement aurignacien de Kvasice II plus au sud (Fig. 5: 5). Il est fabriqué d'une silexite atypique, autrement inconnue dans la collection. L'autre pointe triangulaire a accompagné l'industrie du type épi-aurignacien de Kòhoutovice près de Brno (Fig. 5: 6).

Malgré le fait que ces industries combinent plusieurs traditions techniques et typologiques il n'est pas probable qu'il puisse s'agir d'un mélange secondaire des résidus d'autres cultures – s'y opposent les spectres typologiques constants, la répartition spatiale restreinte et la localisa-

tion caractéristique sur les élévations plates éloignées des rivières. Le terme "type Míškovice" possède en plus l'avantage de ne pas impliquer directement l'appartenance culturelle des ensembles en question mais d'attirer seulement l'attention sur leurs traits communs et apparition spatiale limitée. Il est cependant évident que les qualités typiques de ces industries apparaissent seulement dans une certaine structure typologique, non pas dans la simple présence ou absence des types directeurs prétendus, et ne peuvent être constatées que dans un ensemble plus important.

Comme il a été dit, toutes les collections proviennent de la surface et comme ça elles ne sont pas datées. Il est certain que ces ensembles sont les palimpsests résultant de plusieurs phases d'occupation du gisement. Pourtant, d'après les matières premières importées, la technologie laminaire et lamellaire développée et la prolifération des burins, il est probable que ces collections sont contemporaines aux stades plus récents du Szélétien et de l'Aurignacien. La présence de l'outillage à dos témoigne des contacts avec le Gravettien qui se concentrait en proximité des vallées fluviales tandis que les industries du type Míškovice sont typiques pour les régions ondulées et n'ont aucun rapport aux rivières. Si nous voulions comparer le type Míškovice avec la culture Streleckaya-Sungir, alors seulement avec sa phase moyenne et récente. Il manque en Moravie le stade incipient du début du Paléolithique supérieur, comme c'est le cas dans la phase initiale de la culture Streleckaya-Sungir, datée à Kostienki I/5 et XII/3 autour de 40 mille ans BP noncal. (Haesaerts, *et al.*, 2016). Il s'agit certainement d'un mélange des traditions szélétienne et aurignacienne déjà bien établies et développées, dans lesquelles la pointe triangulaire mince ne représente qu'une curiosité assez rare est surtout très locale. Le type mentionné a été retrouvé en 1 exemplaire dans l'industrie du Szélétien récent de Myslejovice (Moravie centrale) et dans l'Épiaurignacien de Brno – Kòhoutovice (Bassin de Brno), dans les deux cas sous une forme arrondie pas trop typique (Fig. 5: 6-8). Ceci est vrai aussi pour les pointes de Moravany-Dlhá de la Slovaquie occidentale. Les formes prononcées, toujours isolées, ne proviennent que de la Moravie orientale, des industrie au-

rignaciennes (Kvasice II) et surtout du type Miškovice, ou il s'agit des découvertes isolées. Mais justement dans les collections les plus riches du type Miškovice elles font défaut (Miškovice, Buchlovice). Il s'agit donc plutôt du type errant, notamment en Moravie orientale où elles apparaissent par accident surtout dans les industries du type Miškovice car elles y sont les plus fréquentes. Ces ensembles diffèrent par leur structure statistique de la culture Streleckaya-Sungir (Anikovich, 2005); dans le type de Miškovice, les burins prévalaient toujours sur les grattoirs et les grattoirs courts, dans cette dernière particulièrement caractéristiques, faisaient pratiquement défaut. Les pointes triangulaires de Moravie ne sont donc en aucun rapport avec l'Europe de l'Est.

La présence de ce type de pointes en Moravie met en garde contre la supposition des migrations lointaines d'après la présence, très rare d'ailleurs, d'un fossile directeur prétendu. Le cas des industries à pointes foliacées

dont l'origine est à l'unanimité supposée dans le Paléolithique moyen, ouvre une problématique beaucoup plus complexe. Le Szélézien renoue de façon continue avec le Micoquien de l'Europe centrale, et les mêmes racines sont en Europe de l'Est supposées aussi pour les industries de la culture Streleckaya-Sungir. Porteur de cette culture était sans doute déjà l'homme anatomiquement moderne, même si cela est prouvée avec certitude seulement dans sa phase récente (Sungir: Alexeeva & Bader eds., 2000). Cependant, dans la région de Kostienki, au Streleckien ancien, Homo sapiens existait déjà (sépulture de Markina Gora couche 3). Si le Szélézien renoue de façon continue avec le Micoquien du Paléolithique moyen, le néandertalien devrait être aussi son porteur. Cependant, pour la phase récente de cette culture datée de 33 000 ans et et peut-être moins, ce n'est guère acceptable (Higham *et al.*, 2014). La technologie du Szélézien évolue, bien sûr, avec l'augmentation de la proportion des nucléus laminaires

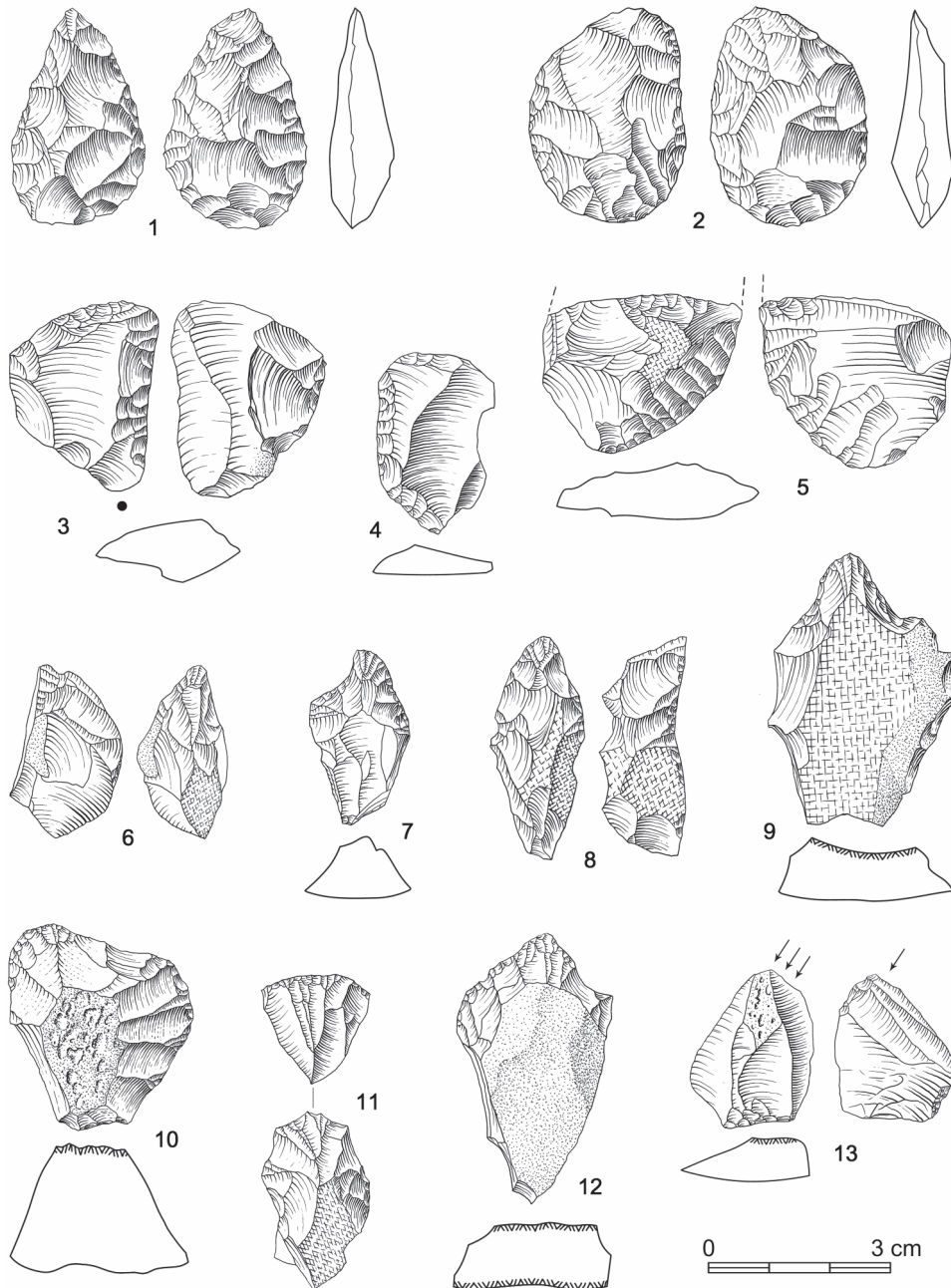


Figure 3: Les outils retouchés de Miškovice I.

et burins aux détriment des nucléus discoïdes, outils bifaciaux du type micoquien et racloirs, mais aucune rupture dans son développement ne peut être observée. Dans un tel cas une culture archéologique serait le produit non pas des "ethnies" différentes mais même des "espèces" différentes de l'homme. Ce problème, tout à fait crucial, reste totalement négligé comme une question sans issue. A mon avis, la faute fondamentale réside dans notre pré-supposition, que les technologies et les modèles typologiques mènent leur propre vie et qu'ils évoluent et sont adoptés mécaniquement sans aucune sélection. Mais en fait, le rapport de l'homme aux traditions, même celles étrangères, est très actif. Dans ce cas, l'incompréhensibilité apparente de l'adoption de la culture néanderthalienne (donc "inférieure") par les sapiens plus évolués peut être expliquée par le fait que les nouveaux venus adoptèrent de la culture précédente seulement les choses en quelque sorte intéressantes, dans le cas donné avant tous les outils bifaciaux, à cause de leur attractivité dans la sphère psychosociale. Plus que d'autres objets, la confection des pointes foliacées devint une activité de prestige de même que la possession des pièces parfaites. Il n'est pas étonnant que l'héritage néanderthalien est visible justement dans les formes bifaciales. D'autant plus qu'elles se distinguent par une qualité importante – elles ne peuvent pas être facilement transformées à la façon p. ex. des burins sur le support laminaire modifiés en perceurs ou grattoirs; le support à façonnage bifacial sera toujours identifiable. En dehors de cela, le Szélétien a vu la tradition continue de la forte retouche latérale (surtout

"racloirs") aboutissant à une forte formalisation esthétique des outils. Ailleurs, dans les industries de tradition différente, on adoptait la méthode Levallois de réduction fort intéressante de point de vue psychique, ou la méthode laminaire des nucléus prismatiques, les grattoirs carénés à la retouche microlamellaire, donc tous ce qui permet une relaxation aux chasseurs pendant leurs loisirs typiques (Sahlins, 1974); tout ce qui peut être perfectionné, présenté et éventuellement échangé.

Dans cette optique, les denticulés, encoches ou la production des éclats par la méthode clactonienne ou discoïde seraient certainement moins adoptés. Le potentiel de la transmission des éléments entre des cultures ou traditions est donc varié et dépend de l'attractivité de la production et du statut social des artefacts<sup>1</sup>. Le phénomène du développement et de la transmission des outils bifaciaux doit donc être complètement séparé des délibérations sur la survie possible de leurs producteurs d'origine. Les artefacts adoptés doivent cependant recevoir de la nouvelle communauté des rôles pratiques et sociaux – la pointe foliacée deviendra le support de plusieurs fonctions, comme dans le Szélétien, ou servira tout simplement de pointe, comme dans la culture Streleckaya-Sungir. Dans tous les deux cas, sa production et possession, éventuellement présentation, portent un aspect de prestige, c'est-à-dire un aspect social. Il s'associe toujours à sa fonction pratique et dans les cas rares des armes symboliques il peut même s'en passer. Cependant, il découle de l'argumentation que les cultures fournissant des types attractifs d'artefacts nous paraissent non seulement

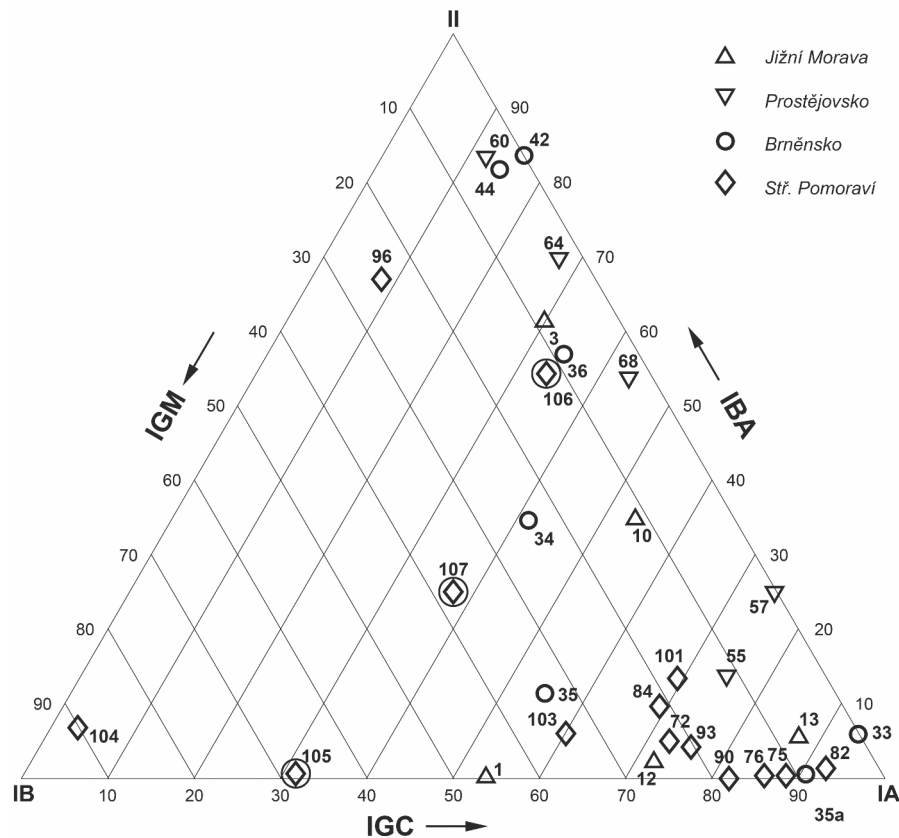


Figure 4: Diagramme triangulaire de proportions mutuelles des grattoirs carénés (IGC), à museau (IGM) et burins aurignaciens (IBA) montre une exclusivité des indices considérable (numérotage après OLIVA 1987, en plus: 35a Stránská skála Ila-4. Sites du type de Miškovice (en cercle): 105 Buchlovice, 106 Lhota u Lipníka, 107 Miškovice I.

majoritaires (car p.ex. le Moustérien à denticulés ou "typique" n'avait rien à fournir mais pouvait adopter) mais aussi progressistes parce qu'il semble qu'elles continuaient à se développer sous une forme ou une autre. En réalité, cela put être le contraire. La preuve en est le rapport susmentionné du Micoquien et Streleckien en Russie. Le Szélétien qui renoua avec le Micoquien en Europe Centrale pouvait être, au départ, l'oeuvre des deux espèces humaines sans que l'on puisse le déduire du caractère des industries taillées. Tandis que les Néanderthaliens et les hommes modernes diffèrent profondément et par la nature l'un de l'autre, les différences entre les ensembles industriels sont parfois très aléatoires et soumis aux conceptions différentes des chercheurs. Parfois, la distinction n'est point possible: l'ensemble le plus ancien du Paléolithique supérieur de Kostienki-Markina Gora

couche 4b se situe typologiquement à la limite de l'Aurignacien et des industries à pointes foliacées (Sinitsyn, 2010). A cette période-là, en Moravie, les industries à pointes foliacées sont attribuées au Szélétien, celles à la méthode Levallois au Bohunicien mais au moins la moitié d'elles présentent un caractère transitoire. Apparemment il s'agit d'un seul courant culturel, essentiellement si l'occurrence de la méthode Levallois est liée à l'approvisionnement en silexite de Stránská skála près de Brno et les deux cultures ne diffèrent que par l'adoption et transmission localement distincte d'un élément antérieur (retouche bifaciale plate, méthode Levallois). Si l'artisan du Szélétien inférieur (y compris Bohunicien) était aussi bien le Néanderthalien que l'Homme moderne, ce que je pense, on n'a aucun moyen de le reconnaître d'après le caractère de l'industrie taillée.

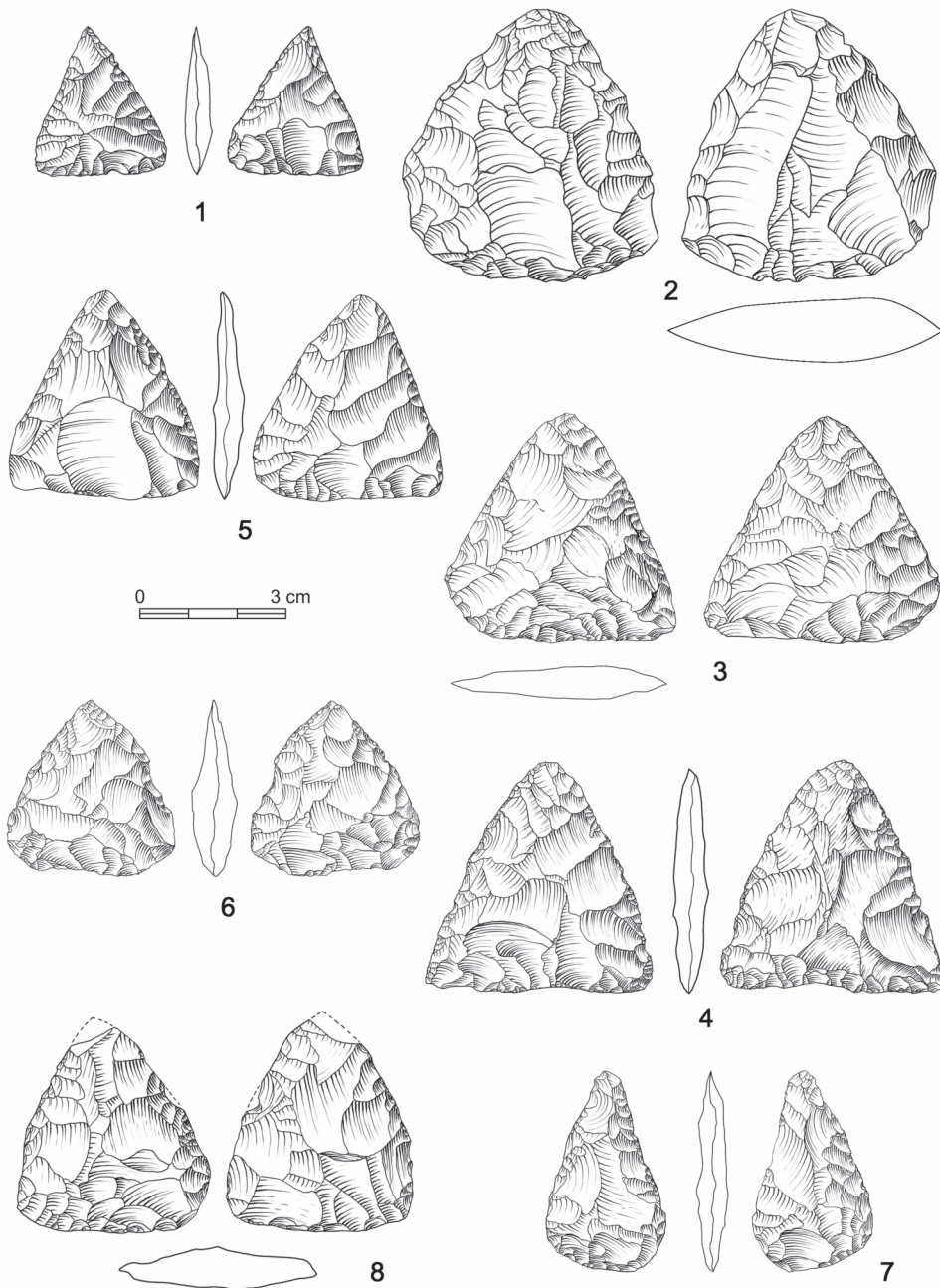


Figure 5: Les pointes foliacées triangulaires de la Moravie: 1 Hlinsko – Kouty, 2 Tisek u Bílovice, 3-4 Lhota u Lipníka, 5 Kvasice II, 6-7 Brno – Kohoutovice, 8 Myslejovice.

## Note

1. Le présent modèle ne prend visiblement pas en considération l'influence des activités pratiquées et le milieu naturel. C'est justement dans la variabilité du Paléolithique moyen qui avait été le sujet d'une discussion classique concernant l'explication "culturelle" et "behaviorale" (Bordes versus Binford), que la primauté du style sur la fonction se manifeste de façon la plus claire. 40 ans après la fin des polémiques, aucun site du Paléolithique moyen spécialisé dans une fonction ne put être prouvé, peut-être à l'exception des structures rituelles

dans les grottes (El Sidrón, Bruniquel etc.) où les outils lithiques ne jouaient aucun rôle. On ne peut pas négliger non plus que dans toutes les régions avec les vestiges du Paléolithique moyen, tous les types d'industries apparaissent – à la méthode Levallois et discoïde, aux outils bifaciaux et sans eux, à la proportion variée de pointes, racloirs et denticulés, et cela indépendamment du caractère de l'environnement naturel. Il en découle que cette variabilité est déterminée plutôt par les besoins de la vie sociale (tout au plus on peut dire de "l'adaptation sociale") que par l'adaptation de l'industrie taillée aux conditions naturelles et procédés de travail.

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## The spatial structure of the 1st, 2nd and 3rd «dwellings» of Sungir (An example of primary lithic knapping).

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Sungir is probably the only upper Palaeolithic settlement, whose area of excavation exceeds 4500 square meters. The materials obtained during the work on Sungir, allow to put the issues on the organization of the living space of the site, including on the conditions of accumulation of the cultural layer. One of the most difficult issues here is the duration of accumulation of the cultural layer, directly associated with the time of existence of the settlement as a set of person visits this place.

Excavations uncovered Sungir settlement is an oval along the slope of the spot balances cultural dimensions of approximately 130 x 50 m, oriented North-East in the direction of arrow cape between the valley of the Klyazma river and the ravine, through which flows a stream Sungir (fig. 1).

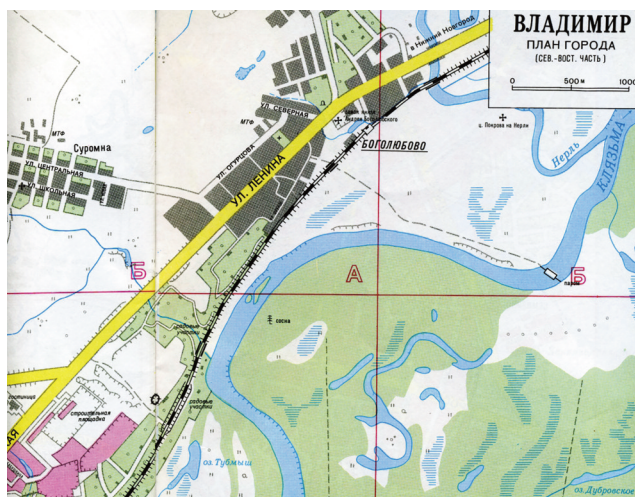


Figure 1: The Sungir settlement on the Vladimir city plan

The early radiocarbon dates of Sungir are located in the interval from 27.700 BP to 24.430 BP. In the laboratory of radiocarbon Dating (GIN) was made a large series of dates on animal bones from the excavations 1957-1977, that determined the lower chronological level of Sungir before the time of the order 29-28 thousands years ago (Sulerzhitsky L.D., 2000. Paleosoils and modern soils...).

According to the data of Bader (Bader O.N., 1978. Sungir...), the cultural layer of Sungir lies in heavily disturbed by solifluction and permafrost deformations of the buried second from the top soil of Pleistocene age, covered with three-meter layer of deluvial loess-like loam. The finds were distributed throughout the thickness of the mineral soil and in the most saturated parts began to meet again at the bottom of the loam, with the level about 20 cm above the soil surface. During the excavations observations were made about the existence of ancient dry hollow width of 5-6 m and a depth of 20-25 cm,

stretched on the spit of the Cape across the toward the mouth of the brook of Sungir (Fig. 2). Northwest hollows, on its left side was located the bulk of the cultural remains, the burials, and the overwhelming majority of fireplace pits (Fig. 2).

In the excavations 1957-1977 of the Sungir was used the technique of fixation of finds on meter squares and fixed horizons of 5-20 cm. In the excavation II 1st horizon had a thickness of 17 cm, 2nd - 20 cm, 3rd - 10 cm and 4th - to the rest of the depth. In excavation III 4 upper horizon had a capacity of 20 cm, the 5th is divided into 2 subhorizons - A and B are 10 cm each, 6th - to the rest of the depth.

According to the data of 1978 in the area of excavation №1 the finds lies mainly in upper and middle parts of cultural layer. The maximum of the finds were in the 1st and 2nd horizons, in the excavation III - in the 3rd and 4th horizons. Large animal bones were deposited mainly in the lower half of the layer. The difference in the depth of finds was due to the different nature and strength of solifluction in the upper and lower slope parts of the site. In the North-Eastern part of dry hollow less strong frosty cryoturbation has led to the fact that the location of cultural remains on the area of the excavation III closer to their initial position. In 1986 excavations of Sungir were renewed, and since 1992 the Sungir constant complex expedition of Institute of archeology of the Russian Academy of Sciences (N. O. Bader and L. A. Mikhailova) has been restored. When working on a new excavation II-a, which was defeated at the North-Western wall of the pavilion (Fig. 2,3), was applied sloping (oblique) Stripping contingent horizons with a capacity of 20 cm, with individual fixing of each find in three-dimensional space and the abandonment of the stratigraphic cuts every two meters (Pozdnepaleoliticheskoye poseleniye Sungir..., 1998).

In excavation II the Bryansk soil was divided in two litological horizons - the upper (light) and the lower (dark), which were arbitrarily defined as the top and bottom of the soil, both destroyed by solifluction (Fig. 4). The study of these horizons, held Lavrushin, Spiridonova, Gugalinskaya and Alifanov, led to the conclusion about the different conditions of their formation. The lower dark Bryansk soil with a high content of humus according to the palynological research existed in the zone of spruce forests with admixture of pine and birch, and considerable areas of bogs and grass-forb meadows, the upper light Bryansk soil - in zone of pine forests mixed with birch and willow are also meadows and boggy areas (Pozdnepaleoliticheskoye poseleniye Sungir..., 1998).

Research of 1986-1989 of Mikhailova allowed to allocate in each of the separate soil horizons horizon of the

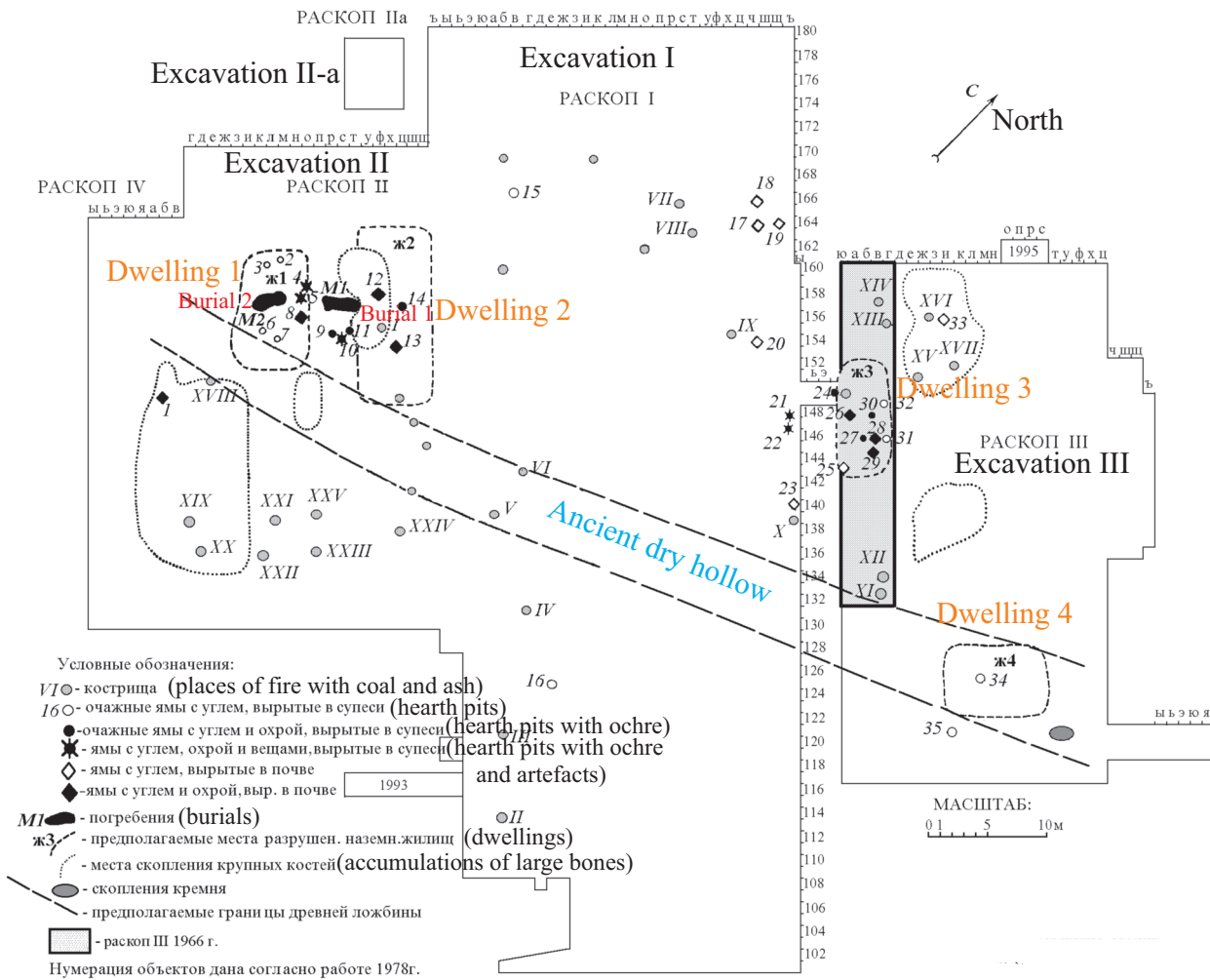


Figure 2: The Sungir settlement. Plan of excavated area in 1956-1995 (by Bader O.N., 1998).

cultural layer. Light soil consistent with the upper horizon with isolated findings, but a dark soil - the lower, the rich cultural remains, and tending to the upper half of the soil. The works of 1993 of N. Bader on the southern periphery of the site (Fig. 2), have documented a well-preserved dark horizon of a buried soil with thickness not exceeding 0.5 m, with cultural discoveries, tending to the surface or upper part. The excavation II in 1993 from the light soil remained only small lenses. As a result of excavations of 1995 of N. Bader, in the Northern part of excavation area III, it was found that solifluction disturbed buried soil with cultural remains with capacity from 0,6-0,8 m was divided, as in excavation II-a, two horizon - light and dark, between less than a clear line of transition. Small cultural finds of the excavation III 1995 met in both horizons and concentrated at two levels - at the top of horizon 1 and the bottom of the horizon 3 parts of the thickness of the cultural layer (Pozdnepaleoliticheskoye poseleniye Sungir..., 1998). Data of palynological analysis carried out on samples from the excavation III, showed the almost complete absence down here in the dark soil making the assumption that mapping material remains in the excavation III with the upper (not lower) horizons of the cultural layer than in the excavation II.

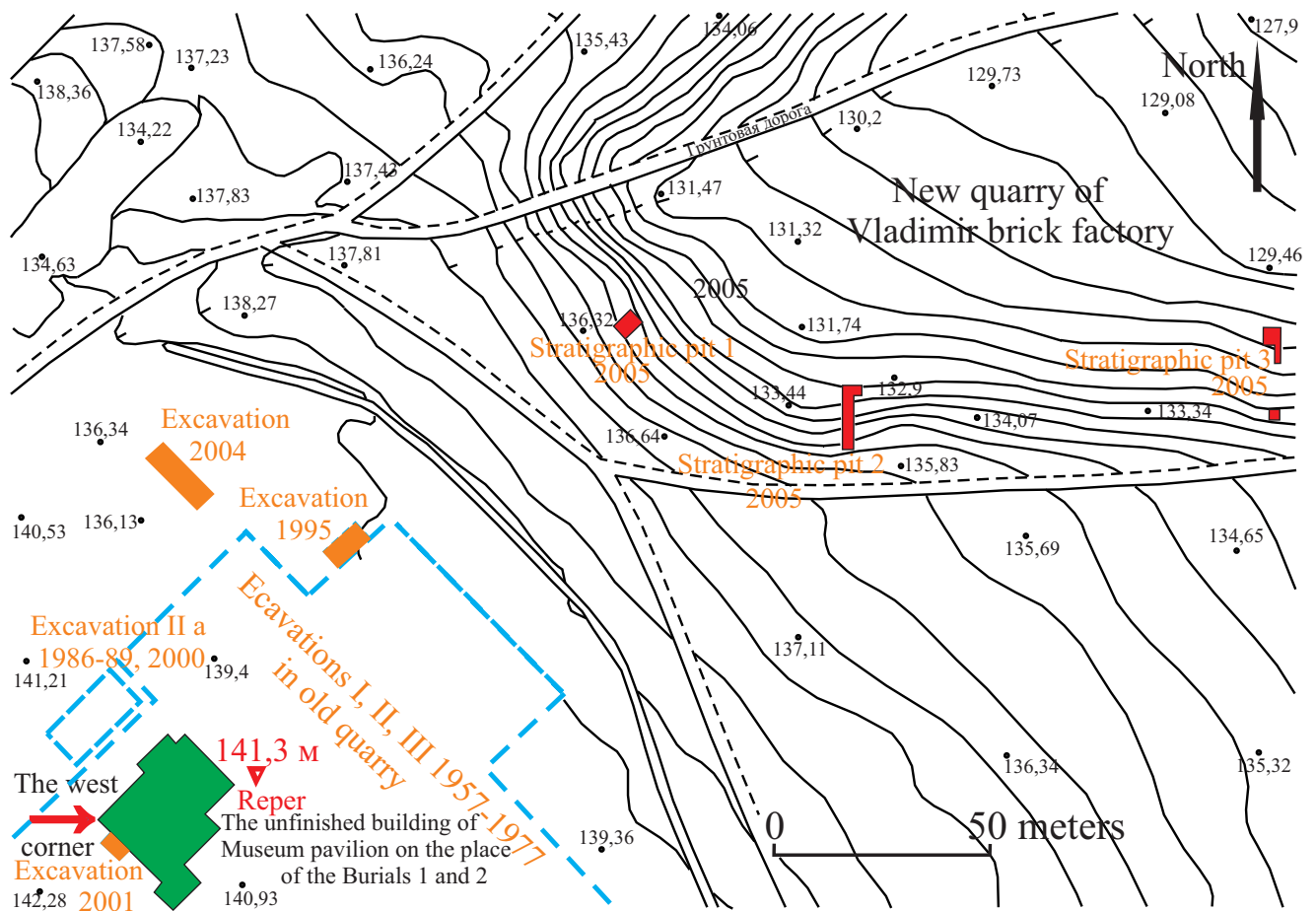
In the field season of 2000, from the newly opened North-West wall of excavation area II-a (Fig. 3,4) from

different stratigraphic horizons of the soil and the cultural layer, for the first time in the history of study of Sungir settlements 4 samples of soil material for radiocarbon Dating were selected (Sulerzhitsky, 2000). For the sample of light upper horizon of the soil was obtained – 24800 ± 2100 (GIN-10922), from the top of a dark (lower) soil horizon – 25800 ± 800 (GIN-10921), for the sample from the bottom of the dark (lower) horizon of the soil – 25800 ± 800 (GIN-10920), from lenses of black humus at the base of the dark soil – 26500 ± 1600 (GIN-10919)

Radiocarbon Dating of samples from different soil horizons, from our point of view, may indicate a relative chronological difference between the time of formation of the "light" and "dark" horizons of a buried Bryanc soil, which, as we noted above, also may be confirmed by data of palynological analysis of these horizons. As a result of field work in 2001 was found that the area was situated in 12 metres to the South-West from location of Sungir burials 1 and 2 (Fig. 3), the stratigraphic position of the horizon of cultural remains was confined to the upper part of the buried dark layer of soil is disturbed on this plot of slope processes (Seleznyov A.B., 2008. Stoyanka Sungir...).

The excavations of 2004 resulted in interesting and important observations on the stratigraphy cultureflash





**Figure 3:** The Sungir settlement. The situational plan of location of excavations and stratigraphic pits of 1986-1989, 2000, 2001, 2004 and 2005. The horizontals drawn through 0.5 meters.

sediments of the North-Western periphery of the Sungir settlement (Fig. 3), according to which the vast majority of finds was found in a horizon associated the upper light horizon of the Bryansk soil marked glandular ortsangabe (Fig. 5). The study of stratigraphy on the Northern periphery of the site in 2005, the area of stratigraphic pits 1, 2, 3 (Fig. 3) showed, in General, the stratigraphic similarity of these plots with the main area of the settlement (Bader N.O., Seleznyov A.B., 2005. Polevie raboti...).

In pit 3 (in 300 m to the north from dig III) in the loam below the Bryansk soil layer directly above the Mikulino soil was found a stone artifact from siliceous raw similar to silicified limestone, is widely used in the knapping on the Sungir (Seleznyov A.B., 2008. Stoyanka Sungir...).

Typologically, it with visible negatives of previous removals on the back could be used as a tool (Fig. 6). Here in the Mikulino soil was found a fragment of the epiphysis of the tubular bone of the animal. Today is the first such find of fauna in the more old deposits than the cultural layer of the Sungir settlement (Fig. 6).

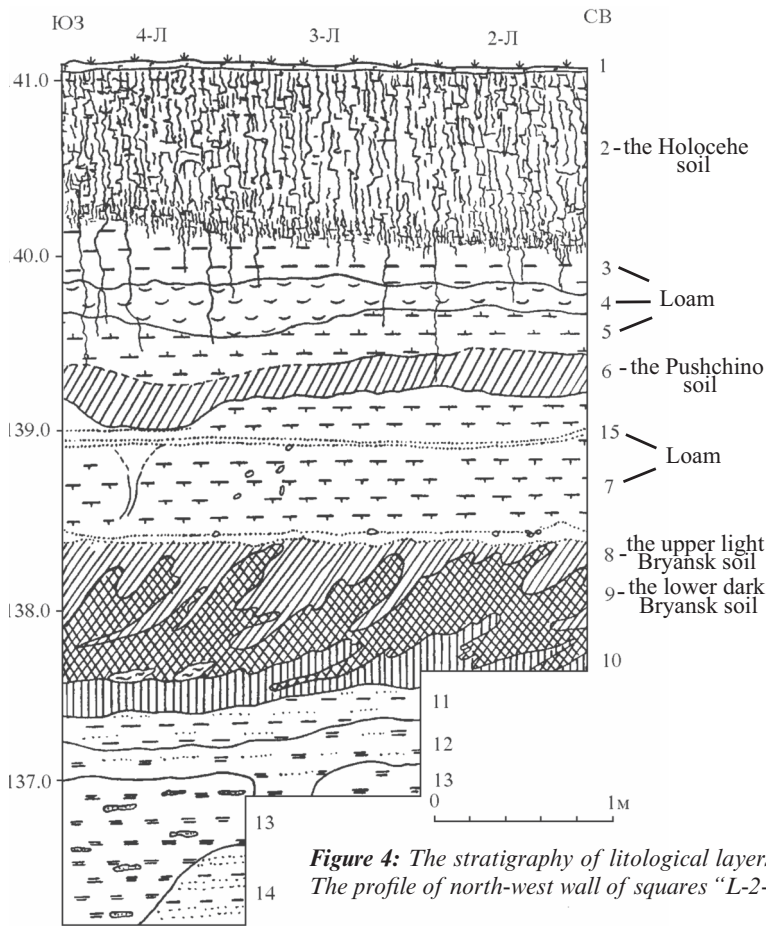
### The spatial analysis of primary knapping of the 1st, 2nd and 3rd «dwellings» of Sungir

Area of dwellings 1st and 2nd flint complex products of primary cracking at the level of the 1st horizon focus

on 3 areas where met the ruined remains of camp-fires (Fig. 7). On the squares adjacent to the Burial 1 at 1-year horizon, a fixed area diluted concentration of split rock (Fig. 8). At the level of the 2nd split horizon stone is distributed of not flint knapped rocks on the area of dwelling 2 at the level of 2-year horizon shows a tendency to their attraction to the Central and North-Western parts of the dwelling 2. A square distribution of items of all groups of a primary knapping on the area of dwelling 2 shows that the maximum concentration falls on the Central and South-Eastern parts of the dwelling.

The distribution of objects the primary knapping of stone in the area of dwelling 2 gives some data on the stratigraphic level at which there were various activities associated with splitting stone. This level applies to 2nd horizon and can be matched with the top layer of dark soil (Fig. 8). Splitting on the area of dwelling 2 was held at sites in the immediate vicinity of the fireplace pits and fireplaces. **It is important to note that the area of burials practically do not overlap intensive cultural layer saturated flint waste production** (fig. 7,8).

On the area of dwelling 1, the half products of cracking stone, as in the case of dwelling 2, on the 2nd horizon (fig. 8). But unlike dwelling 2, more than one-third of the subjects from the dwelling 1 refers to the 3rd and 4th horizons that can be mapped to data on the ma-



**Figure 4:** The stratigraphy of litological layers of Sungir of excavation II-a. The profile of north-west wall of squares "L-2-4".



**Figure 5:** The north-west stratigraphic cut of excavation of 2004. The view from the west.

jority of fireplaces and pits to the top of the 3rd horizon (fig. 9). The distribution of objects splitting of stone in the area of the 1st dwelling, on level 1 of the horizon, shows their concentration to the West of burial 2, on an area of about 10 m<sup>2</sup> (Fig. 7). At the level of the 2nd horizon, which can be associated with the top layer of dark soil, this concentration takes the form of localized clusters in the North-West of dwelling 1 to the North-West of burial 2 (Fig. 9). On the area of the burial, at the level of the upper two horizons met rare finds of split rock (Fig. 9). With the level of the lower half of the 3rd and the 4-year

horizons, the concentration of split stone is offset on the South-Eastern part of the dwelling 1 (Fig. 9).

Such uneven distribution of chipped stone on the horizons in different parts of dwelling 1, in my opinion, can talk about their different stratigraphic positions and, accordingly, non-simultaneous use of these local sites. Earlier the education level of the cultural layer of the settlement, we think, presents the dwelling 1, where in the primary processing of not flint knapped rocks were widely used slate.

We can assume that the allocated levels of maximum concentration of the primary objects of the splitting on the area of dwellings 1 and 2 could in some degree to correspond to two lithologic horizons of the soil layer. In the South-Western, upper slope of the accumulation of cultural remains (Bader, 1978) could be used 2nd phase of the dwelling 1 and the adjoining

South-East area of fireplace pits N°. 9-11, where in the primary processing not flint rocks were widely used slate. The area of dwelling 2, in our opinion, had a higher stratigraphic position and could refer to the final stage of existence Sungir settlement.

As mentioned above, the first finds in the excavation III (Fig. 9), on the area of dwelling 3, were recorded at the base of a light loam, which is mapped to the us with the horizon 1.

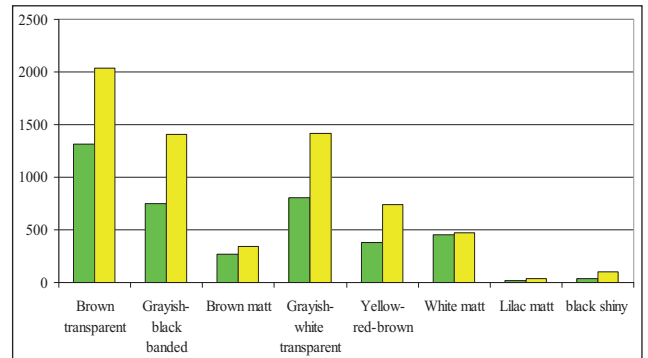
In addition, on the area of dwelling 3 have been recorded pits fireplace, flat with the surface of the buried soils, the fixation in several cases of camp-fires and emissions from the fireplace pits to the horizon 1. Also, on the site of dwelling 3, O. N. Bader was not observed stratigraphic non-simultaneity of fireplace pits and fireplaces. Here the layer formed a uniform structure, except for the release plist-ash mass from the fireplace pit N°. 31 that overlaps the fireplace pit N°. 30 (fig. 9).

Analysis of field plans of dwelling 3 shows that the vast majority of stone artifacts of the initial array knapping on the area of dwelling 3 and the adjoining areas with fire pits encountered in the 1st and 2nd horizons and is the spatial unity of concentration of cultural remains. It allows, from our point of view, to the assumption of a single genetically complex nature of cultural remains on the area of dwelling 3, which could be related to one (the latest?) the level of accumulation of the cultural layer. One may assume that the concentration level of the subjects of primary cracking at the site of dwelling 3 could correspond to the upper (light) horizon of the soil and belong to the final stage of existence of Sungir settlement.

The concentration of materials of primary knapping stone raw materials around in-depth and surface lesions on the area of dwelling 3 overall, in our view, could indicate the operations for splitting different types of stone in warm season or time of year, when it was not necessary to go beyond the enclosed space. 3 the dwelling itself, we believe, was no housing as such and was a residential site of open type where in addition to the primary cracking could be conducted and other economic activities.

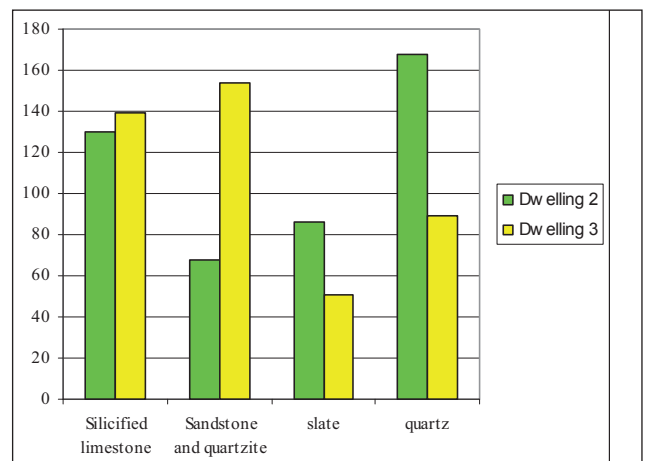
Comparative analysis of total number of products in the array splitting the primary varieties of flint used in sectors 1, 2 and 3 dwellings shows some difference in the use of different varieties of flint (within 1-4%). It can be noted that on the area of dwellings 1 and 2 more often than other varieties cracked plastic of the best quality and grades of flint brown transparent flint and grayish-white transparent flint. In the area of the home 3 more than anyone else participated in the process of splitting also brown transparent flint. 2nd place in the cleavage on the area of dwelling 3 was, in contrast to dwellings 1

and 2, lower quality grayish-black, banded flint, which took 3rd place in the flint collection from the dwellings 1 and 2. From our point of view these discrepancies may indicate the use of a Sungir settlers for knapping and making tools of various sources of moraine flint.



Comparing dwellings 1, 2 and 3 for distribution in their area of different varieties of flint in the 1st horizon, you can see that on the area of dwellings 1 and 2 is dominated by the highest quality varieties of flint. On the area of dwelling 3 is more or less plastic and coarser varieties. In our view, such a pattern may indicate various possibilities in the extraction of raw flint and its subsequent cleavage at the sites of these pits. One may assume that the area of dwelling 3 during primary cleavage can largely be used a lower-quality varieties of flint once in moraine outputs the highest quality varieties began to dry up.

Also about possible non-simultaneity of dwelling 3 dwelling 1 may indicate greater participation in the process of splitting not flint rocks: sandstone and quartzite. We think these facts, coupled with a weak saturation of the cultural layer of the primary waste splitting on the monument, where the whole cycle of operations for the splitting, can confirm the seasonal nature of individual visits Sungir settlements, reflected in the brevity of the stages of accumulation of the cultural layer. In General, the higher the concentration of primary products of cleavage of the stone raw materials around the centers of large areas of dwellings 1, 2 and 3, which, from our point of view, more correctly should be called the housing and economic platforms of open type, according to our opinion, that the strong economic activity, including transactions on the primary knapping stone, was conducted in Sungir settlement in warmer season.



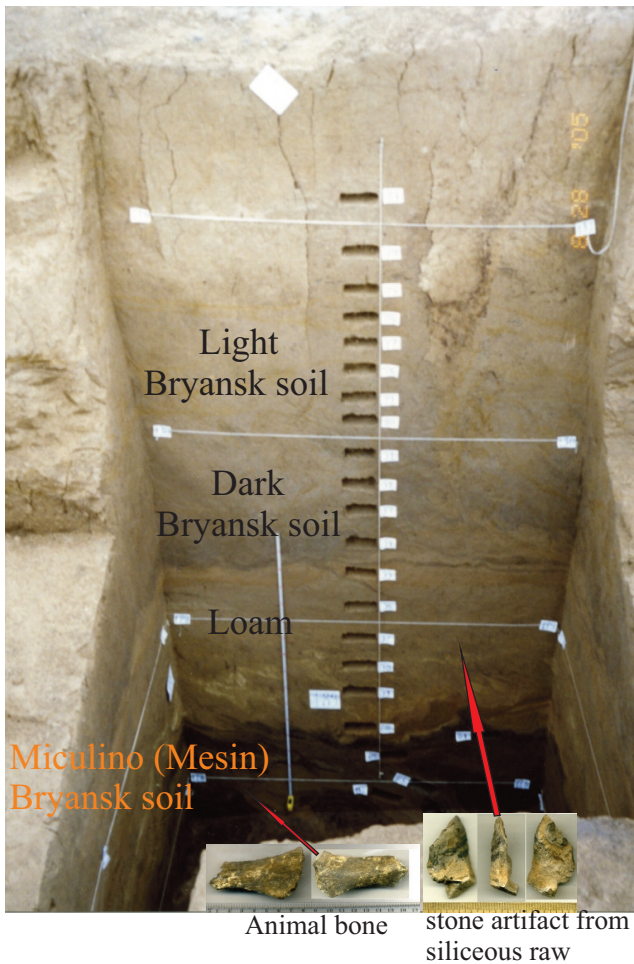


Figure 6: Sungir-2005. The south cut of stratigraphic pit № 3. The view from the north.

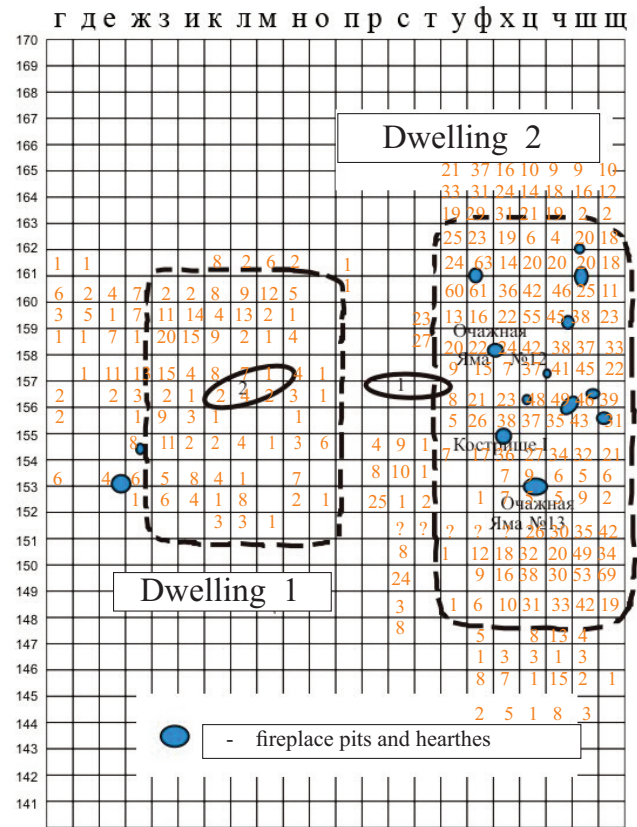


Figure 7: Distribution of products of primary knapping on the area of «dwellings» 1 and 2. Horison 1.

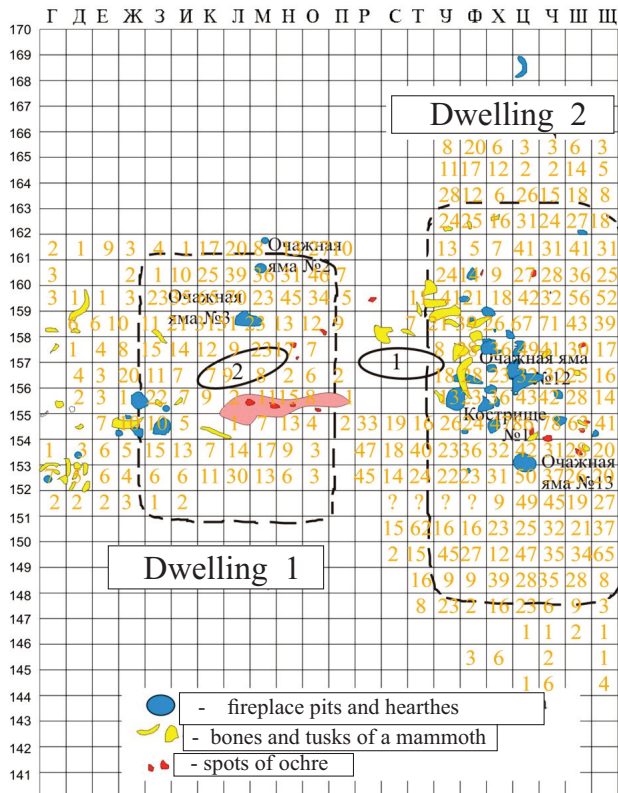


Figure 8: Distribution of products of primary knapping on the area of «dwellings» 1 and 2. Horison 2.

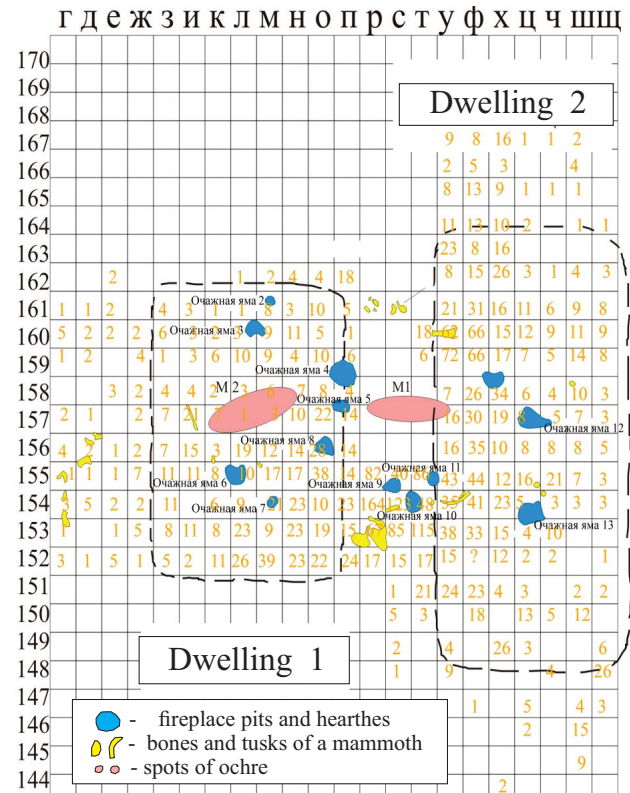


Figure 9: Distribution of products of primary knapping on the area of «dwellings» 1 and 2. Horisons 3,4.

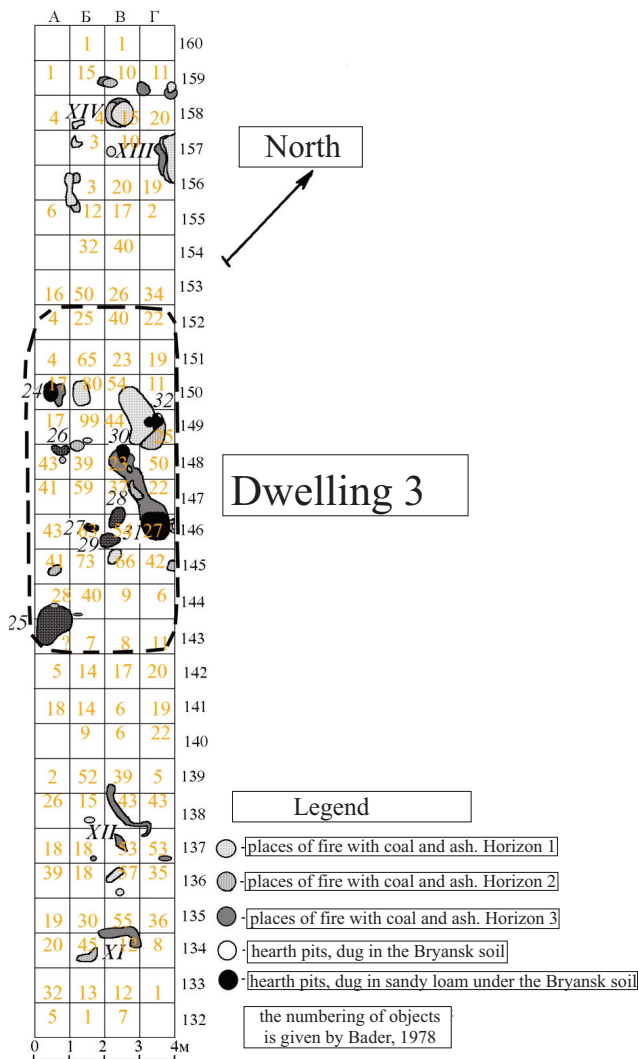


Figure 10: Distribution of products of primary knapping on the area of «dwelling» 3. Horizon 1.

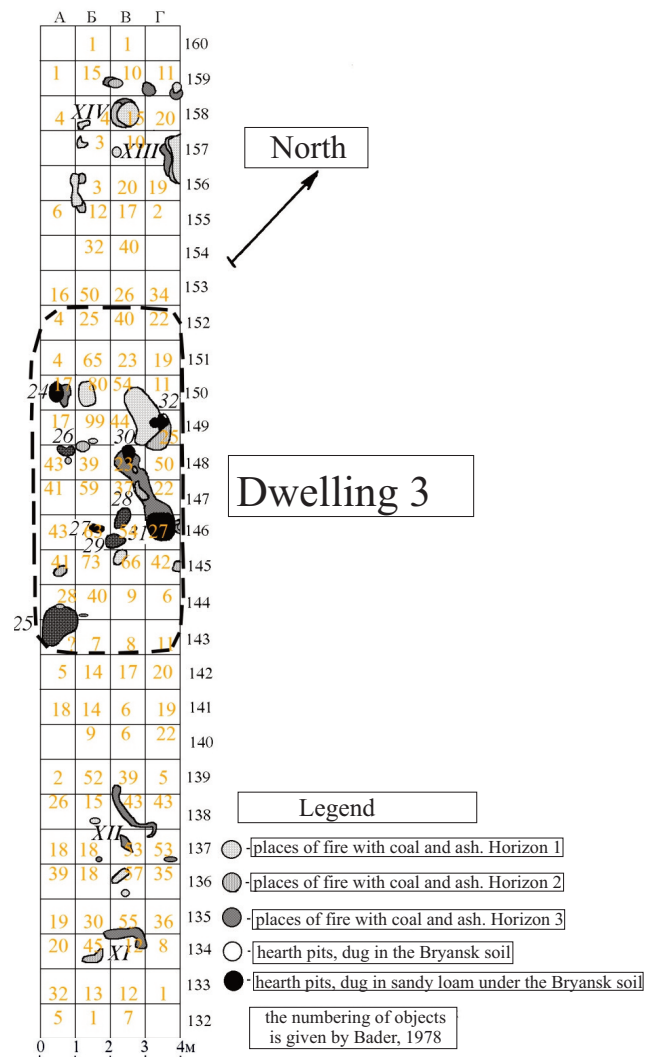
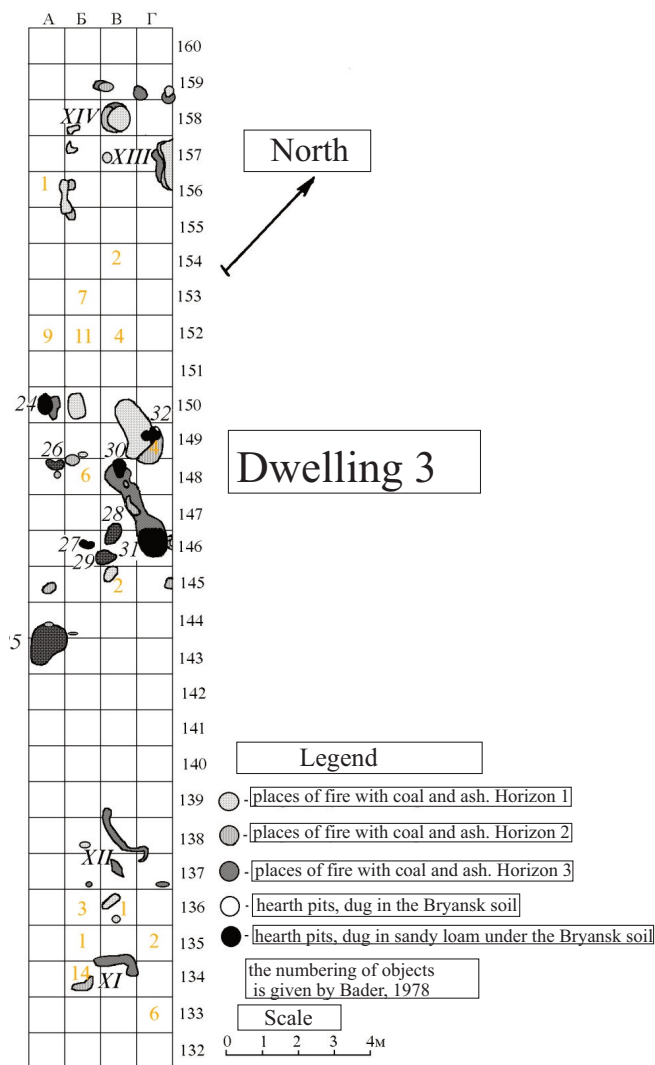


Figure 11: Distribution of products of primary knapping on the area of «dwelling» 3. Horizon 2



**Figure 12:** Distribution of products of primary knapping on the area of «dwelling» 3. Horizon 3.

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# Additional data to the stratigraphy and the chronology of the Kostenki 1 (Poliakov) sequence, Voronezh, Russia

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This study is dedicated to Nikolai Praslov (†2009). For long time he has been the memory of Kostenki. We keep in mind our fruitful discussions on various topics at Kostenki and Saint-Petersburg.

## Abstract:

Kostenki 1 is one of the many sites of the Kostenki-Borshchevo site cluster south of Voronezh, which has a long sequence covering the Early and Mid Upper Palaeolithic, including the Streletskian Cultural Layer V. Here we present stratigraphic data from our 1994 fieldwork (sections of the 1981-1982 excavations) and radiocarbon dates for the CL IV and V. For dating we used our cross-dating approach on high quality conifer charcoal with ABA and ABOx-SC pre-treatment on sub-samples of the same charcoal sample. Our results show that the Streletskian CL V dates to ~42,500 <sup>14</sup>C uncal BP and is significantly older than previously thought.

## Résumé

Kostenki 1 figure parmi les principaux sites du domaine archéologique Kostenki-Borshchevo au sud de Voronezh. Celui-ci présente une longue séquence couvrant le Paléolithique supérieur ancien et moyen laquelle comprend la Couche Culturelle V rapportée au Streletskien. Nous présentons ici les données stratigraphiques de Kostenki 1 acquises au cours de la campagne de 1994 (avec les profils mis au jour au cours des fouilles de 1981-1982) ainsi que les dates radiocarbone pour les couches culturelles CL IV et CL V. Une approche en cross-dating ABA et ABOx-SC a été mise en oeuvre sur des sous-échantillons de charbons de bois de conifère de haute qualité. Les résultats livrent des dates <sup>14</sup>C autour de 42.500 uncal BP pour le Streletskien de la couche culturelle CL V, lequel apparaît nettement plus ancien que l'âge attendu.

## 1 Introduction

The Kostenki-Borshchevo archaeological area spans several kilometres along the western side of the Don Valley, downstream of the city of Voronezh (Central Russia). Since the end of the 19th century, excavations and surveys have led to the discovery of almost 25 archaeological sites with abundant evidence of Upper Palaeolithic occupation. For the most part these sites are located on the se-

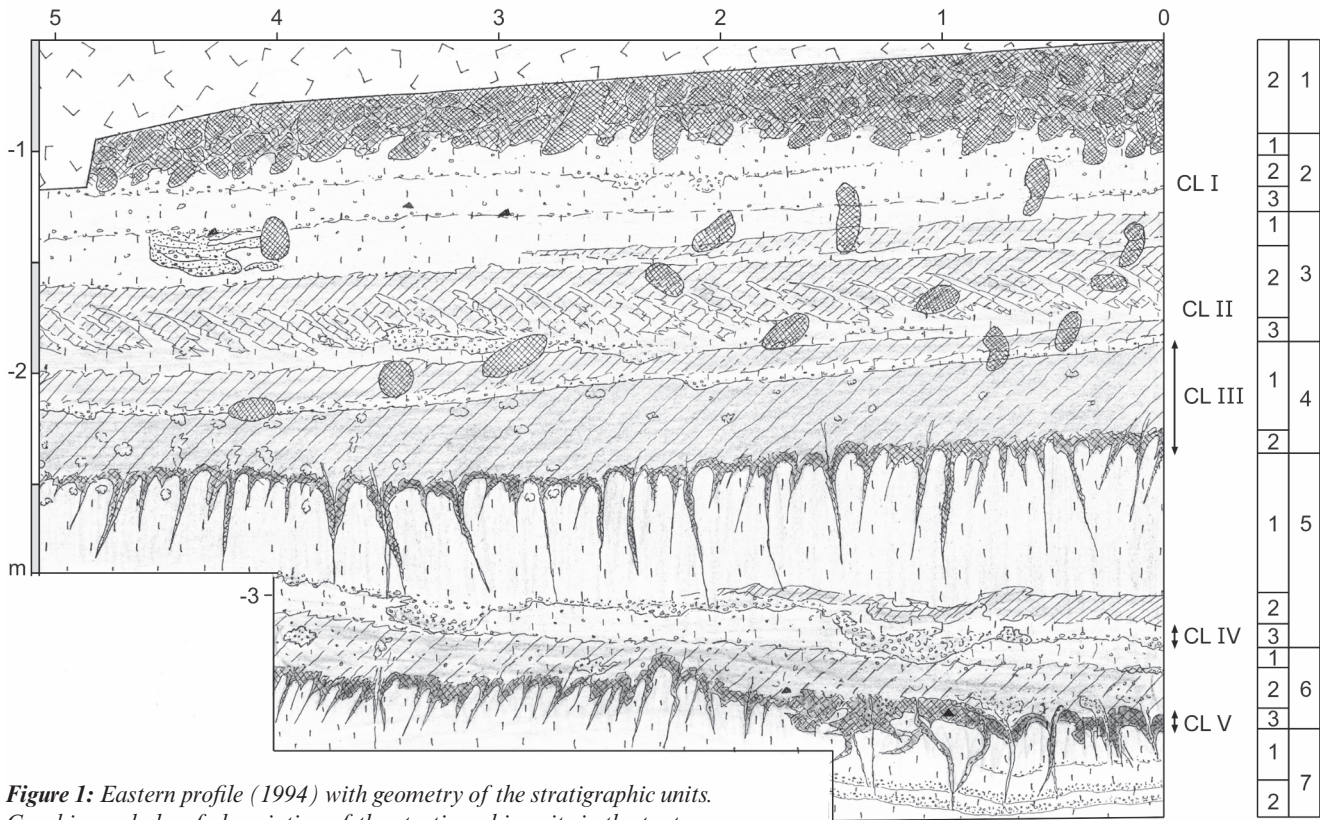
cond terrace of the Don, although there are also sites on the first terrace. Often these sites are located at the edge of small valley slopes which promote lateral sediment inputs (Sinistyn 1996; Holliday et al. 2007).

In this context, the site of Kostenki 1 (Poliakov) belongs to the group of sites on the second terrace. It is situated in an area of gentle slope, located north of the valley of Pokrovsky, about 700 m from its merger with the main Don Valley. The site is known since the 1920s (Efimenko 1958), but only the excavations by Rogachev between 1938 and 1953 worked out the main archaeological sequence of the loamy cover at the site (Praslov and Rogachev 1982). The sequence is ~4 m thick and includes three significant cultural levels: (a) the Gravettian cultural layer CL 1 with structures of dwellings and pits, located in the upper loess close to the surface chernozem; (b) the Aurignacian CL III, found in the middle part of the loamy deposits; (c) the Streletskian CL V, associated with a humic horizon towards the base of the loamy cover.

In this chapter, we mainly focus on the lower part of the stratigraphic sequence, which contains CL IV and CL V, recognized by N. Praslov during the 1981-1982 excavations in the southern part of the site. Our approach, in addition to the data published in recent years (e.g., Holliday *et al.*, 2007; Hoffecker et al., 2016), is based on the pedostratigraphic records of the sections of the 1982 excavation. We had access to these sections in 1994, after removal of the 1981-1982 excavations refill. This allowed us - in cooperation with N. Praslov - to precisely position the cultural layers in the stratigraphy (Figs. 1 and 2). This work also aimed to control the context of charcoal samples collected by N. Praslov in 1981-1982 and stored in Saint-Petersburg, later used by us to improve the chronology of the sequence.

## 2 The 1994 stratigraphic sequence

The two orthogonal profiles recorded in 1994, delineate the area excavated in 1981-1982. The eastern excavation section was studied on a length of 5 m, while the southern section was exposed on 2 m length (Figs 1 and 2). At this location within the site, the upper part of the eastern section has been linked with the upper loess cover containing CL I, which was exposed in the central part of the site, via a plot where CL III was being excavated. In such a way we got access to a detailed pedosedimentary record covering the entire sequence of Kostenki 1.



**Figure 1:** Eastern profile (1994) with geometry of the stratigraphic units. Graphic symbols: cf. description of the stratigraphic units in the text.

The location of these sections allowed to restore the geometry of the deposits. Based on this information, we subdivided the stratigraphic sequence in eight units following slight discordances (Fig. 1).

**Unit 1 (thickness ~0.50 m)**

Dark grey loam with abundant krotovinas, especially in its lower part.

**Unit 2 (thickness ~0.40 m)**

Pale yellow sandy silt subdivided into three subunits (2-1 to 2-3) by two thin sandy layers enriched in chalky fragments. Scattered lithic artefact occurred at the base of subunit 2-2 in the eastern section.

**Unit 3 (thickness ~0.60 m)**

Succession of three layers of pale yellow silt showing a parallel geometry, with a slight slope to the south (subunits 3-1, 3-2 and 3-3). Each subunit bears a clear ochre loamy horizon. The ochre horizon of subunit 3.2 is characterized by a tongued lower limit inflected to the southeast. The base of unit 3 slightly truncates the underlying unit 4.

**Unit 4 (thickness ~0.50 m)**

Pale ochre homogeneous loamy silt with some bioturbations and scattered carbonate concretions (subunit 4-1). Downwards it is passing into a ~10 cm dark brown humic horizon (subunit 4-2), slightly discordant on the underlying silty deposit (subunit 5-1). The 4-2 horizon is related to a dense polygonal network of deep wedges filled with humic sediment. It is also related to a second set

of thin wedges filled with loam which opens in the lower part of subunit 4-1. The upper part of both sets of wedges is slightly stretched to the east (Fig. 2).

**Unit 5 (thickness ~1.00 m)**

Thick, homogeneous pale yellowish brown silt (subunit 5-1) and yellowish brown loam (subunit 5-2), which is overlying a light yellowish silt (subunit 5-3) with an erosional lower limit underlined by a continuous chalky gravel.

**Unit 6 (thickness ~0.50 m)**

This unit encompasses a yellow silt layer (subunit 6-1) and a pale yellowish brown silty loam layer (subunit 6-2) with small sandy pockets, capping a dark brown humic horizon (subunit 6-3), which characterized by a triangular lower limit. Subunit 6-3 is connected with a dense polygonal network of thin brown wedges slightly stretched to the east and locally disturbed by thin silty wedges starting from above.

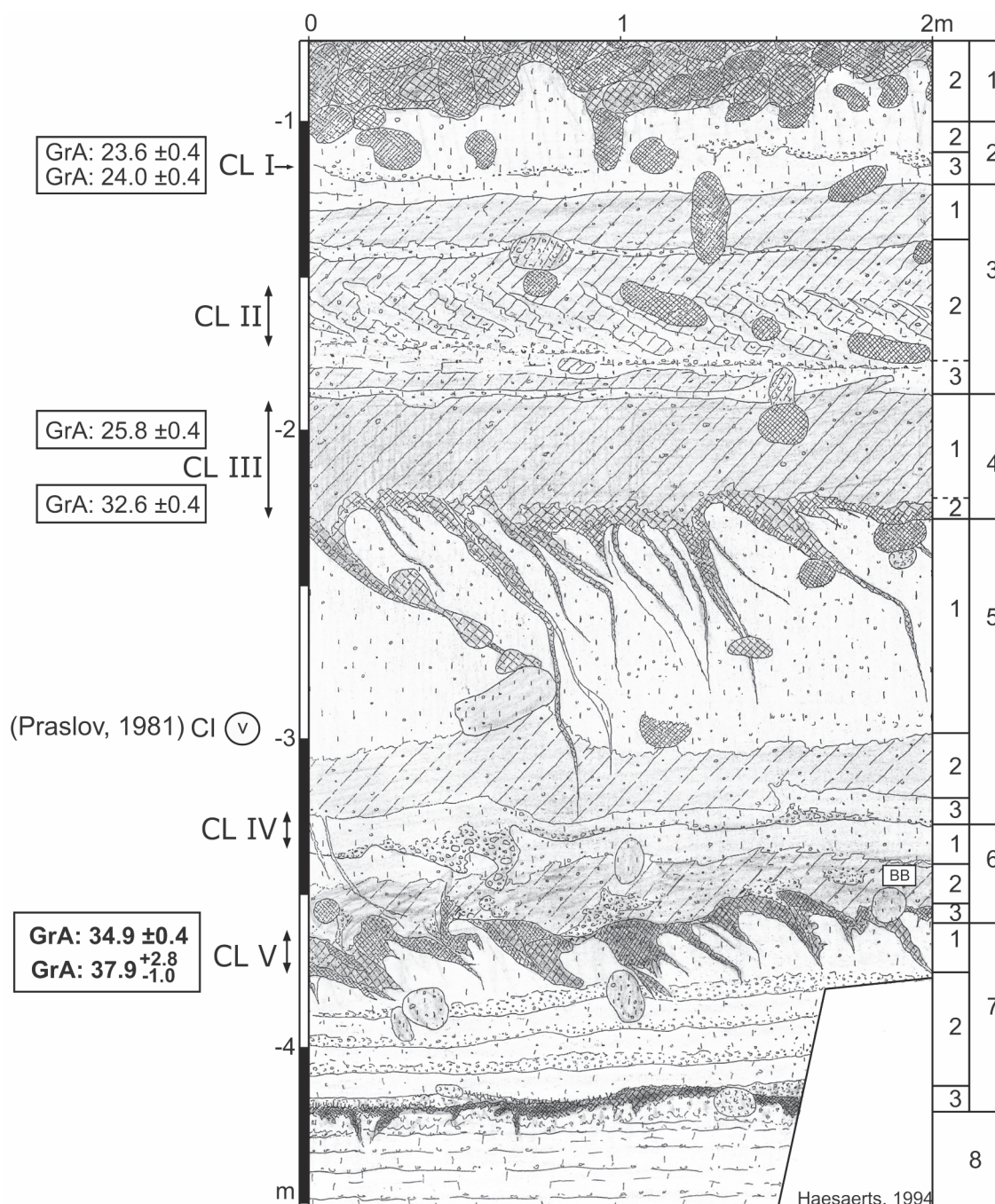
**Unit 7 (thickness ~0.50-0.75 m)**

Pale yellowish homogeneous silt (subunit 7-1) with layers of white sand in the lower half (subunit 7-2).

**Unit 8 (thickness ~1.00 m)**

White clayey loam with recurring thin layers of chalky pellets (subunit 8-2). At the top, it is wearing a centrimetric black humic horizon (subunit 8-1). Unit 8 was not exposed in the 1981-1982 excavations, but during our 1994 fieldwork.





**Figure 2:** South profile (1994). Stratigraphy with position of the cultural layers recorded by N. Praslov in 1981-1982 and with the first set of 14C dates (Sinitsyn and Praslov 1997). The lower part of the profile (subunit 7-3 and unit 8) was not recorded in 1981-1982. Depths are reported to the top-soil in 1981-1982.

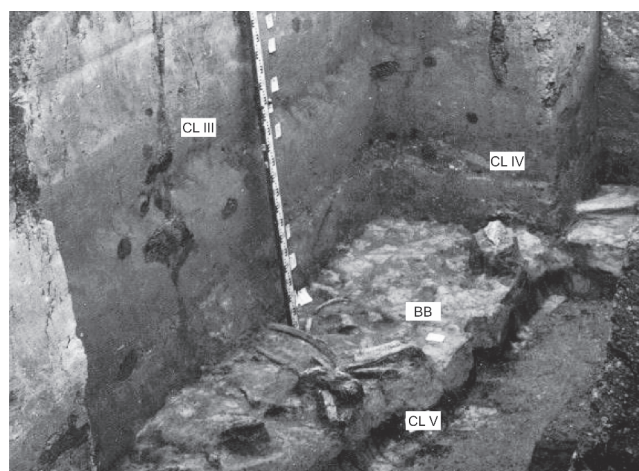
### 3 Stratigraphic position of the cultural layers

In general, the probability to cross a cultural layer within a loess record during the cleaning of a section is relatively limited, even at Kostenki. A few scattered artefacts or bones are not necessarily indicative of a cultural layer. Therefore the stratigraphic positioning of CL I to V at Kostenki 1 is mainly based on the information provided on site by N. Praslov during our 1994 fieldwork (Figs 1 and 2). They have proved to be in good agreement with the excavation reports of 1981-1982 that we consulted in Saint-Petersburg in 1998.

In this context, all available data contribute to report the Streletskian assemblage of CL V at the level of the humic horizon 6-3. This is supported by one lithic artefact at that level in the eastern profile and of a charcoal concentration in the southern profile during our 1994 fieldwork (Fig. 1).

We have to mention here the presence of an isolated lithic artefact and a fine lens of charcoal close to the base and in the upper part of the yellow-ochre loam of subunit 6-2 during our 1994 fieldwork. In 1994 it was unclear whether this material is in a secondary position or it represents an up to then unknown cultural layer. The latter

hypothesis was verified in 2004 when a test pit was excavated close to the southern 1994 section. It showed a dense concentration of bones positioned in the upper half of the loam of subunit 6-2, which was clearly separated from CL V located within the humic horizon 6-3 (Fig. 3). This concentration of bones, labelled here BB (Bone Bed), should not be confused with CL IV, which according to N. Praslov is located within the overlying loess-loam of subunit 5-3, marked by chalky debris easily recognizable in both 1994 sections.



**Figure 3:** *Kostenki 1, 2004. Lower part of the sequence with the bone bed (BB) in between CL IV and CL V.*

CL III is traditionally attributed to the Aurignacian (Praslov and Rogachev 1982). According to M. Anikovich (pers. com.), who directed the excavation of this layer in 1994, it relates rather to a ‘complex’, the lithic artefacts and bones being distributed equally across the whole loam of subunit 4-1 and without preferential levels. Some lithic artefacts probably come from the underlying humic horizon (subunit 4-2).

The Gravettian CL II is located - according to N. Praslov - in the lower part of the tongue horizon 3-2. The archaeological sequence ends with a dozen lithic artefacts present in the loess cover of the eastern profile at the base of subunit 2-2 (Fig. 1). These are laterally in the extension of Gravettian CL I, which is well documented in the central part of the site (Fig. 4).

#### 4 The radiocarbon dates

The analysis of the radiocarbon ( $^{14}\text{C}$ ) ages requires that various parameters are taken into account (Damblon and Haesaerts 2002, Haesaerts *et al.* 2010): (a) the nature and quality of the material dated; (b) the collection and conservation mode of the sample; (c) the degree of stratigraphic resolution; (d) the pre-processing of the sample before dating; (e) the laboratory  $^{14}\text{C}$  measurement method (conventional, AMS); (f) the relationship between the dated material and the event we wish to date (in this case, the human occupation); (g) the degree of coherence of the distribution of the  $^{14}\text{C}$  ages in the stratigraphic record. It is worth to point out the necessity of specific identification of the charcoal fragments after cleaning them because we cannot exclude contamination

by Holocene material from the surface chernozem by various ways, including during excavation.



**Figure 4:** *Kostenki 1, 1994. N. Praslov and A. Dodonov (Geological Institute, Moscow) during excavation of CL I.*

#### 4.1 Cultural layer I

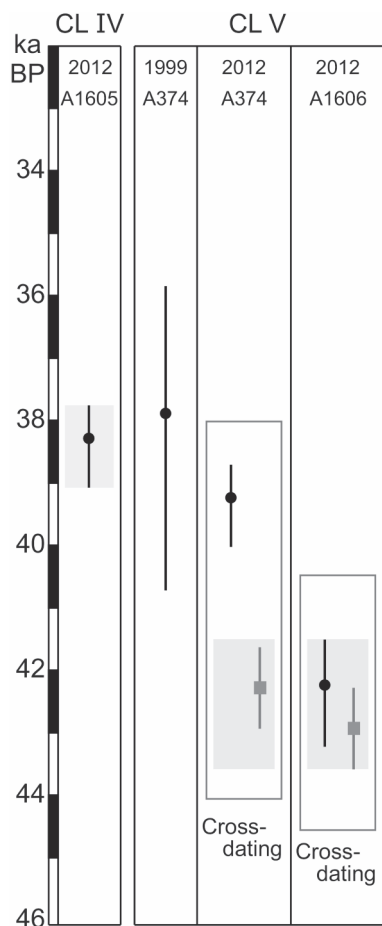
A set of 42  $^{14}\text{C}$  dates refers to this layer, obtained from the excavation area at the centre of the site. They are divided into 4 series (Sinitsyn and Praslov 1997): 24 dates on burned bones (between  $18,280 \pm 620$  BP and  $24,100 \pm 500$  BP), 13 dates on mammoth tooth (between  $19,010 \pm 120$  BP and  $23,770 \pm 200$  BP), 1 date on ivory ( $23,640 \pm 320$  BP) and 3 dates on charcoal, respectively  $22,330 \pm 150$  BP (GrN-17118),  $23,600 \pm 400$  BP (GrA-5244) and  $24,030 \pm 400$  BP (GrA-5243).

In such a way, if we take into account the oldest ages of the 4 series (with less than 500  $^{14}\text{C}$  years sigma), we obtain a chronological range of 24,000 - 23,600 BP for CL I, which matches the 2 Groningen AMS dates on *Picea* charcoal cleaned and identified in Brussels at the Royal Belgian Institute of Natural Sciences (RBINS) (GrA-5243, GrA-5244).

#### 4.2 Cultural layer III

There are 21 dates attributed to CL III, which are split in two series produced between 1980 and 1994 (13 dates) and after 1994 (8 dates), respectively. In the first series, 8 dates (between 20,900 BP and 38,080 BP) are not considered as presenting a sigma too high (between 1,100 and 5,460  $^{14}\text{C}$  years). Of the 5 remaining dates, 4 dates on burned bone and charcoal span between  $25,400 \pm 400$  BP and  $25,820 \pm 400$  BP, the latter date being obtained in Groningen on a sample of *Picea* charcoal collected in 1994 by M. Anikovich in the lower part of subunit 4-1, cleaned and identified at the RBINS. As for the fifth date, it gave an age of  $32,600 \pm 400$  BP on charcoal submitted to Groningen (Sinitsyn, 1993).

The 7 dates of the second series were obtained on charcoal from the humic horizon 4-2, collected first in 1989 and then between 2006 and 2012, during the extension of the area excavated on both sides of the central part of the site (Holliday *et al.* 2007; Hoffecker *et al.* 2015). With two dates of  $29,130 \pm 320$  BP and  $29,400 \pm 370$  BP and five dates between  $31,880 \pm 500$  BP and



**Figure 5:** Kostenki 1. Distribution of the  $^{14}\text{C}$  dates for CL IV and CL V. Black circle: Groningen ABA dates; red square: Oxford ABOx-SC dates; shaded area: accepted time range.

$32,280 \pm 500$  BP, the second series of dates is clearly distinguishable from the first series. Both series suggest a stratigraphic and chronological duplication of CL III.

### 4.3 Cultural layers IV and V

In addition to three significantly rejuvenated dates ranging from 27,400 BP to 32,300 BP attributed to CL V (Sinitsyn and Praslov, 1997), we have the doublet of dates  $34,900 \pm 350$  BP and  $37,900 \pm 2,800/2,100$  BP obtained in Groningen on conifer charcoal samples collected in 1994 in the humic horizon 6-3. Although these ages are compatible with the stratigraphic position of CL V, these two dates are, however, unsatisfactory due to their age differences and the large sigma, leaving us to suspect a problem with the quality of the sample or the pre-treatment to remove contaminants. As we still had samples of conifer charcoal collected by N. Praslov in the lower part of the sequence during the excavation in 1981-1982, we therefore decided to date them recently.

The evolution and improvement of radiocarbon AMS dating has allowed to increase precision and to refine the accuracy of the results, although the mass of available carbon material still remains a limiting factor. Accurate and precise dates require an effective pre-treatment at the AMS dating laboratory. The classic method ABA (Acid-Base-Acid) is sufficient for materials younger than 35,000 BP  $^{14}\text{C}$  (Bird *et al.* 1999), although a recent comparative

study observed up to 40,000 BP no significant differences (Haesaerts *et al.* 2013). However, for older charcoal samples approaching the limit of the radiocarbon method, a pre-treatment using ABOx-SC (Acid-Base-Oxidation - Stepped Combustion) proved more successful in elimination of contaminants (Bird *et al.* 1999). This method has already provided significant older results for the site of Kostenki 14 (Douka 2010; Wood *et al.* 2012) and also for various Palaeolithic sites in Central Europe (Haesaerts *et al.* 2013; Nigst *et al.* 2014).

In the case of Kostenki 1, and especially for the CL V (Streletzkian) it was important to test this type of dating by comparing the two methods of pre-treatment respecting the minimum requirements of carbonaceous mass used for dating. It was also interesting to compare the dates obtained in two different radiocarbon AMS laboratories (GrA: Groningen; OxA: Oxford).

The following charcoal samples were selected from the material available originating from the lower part of the Kostenki 1 sequence.

A-1605: sample labelled CL-IV, 1981 (depth 3.00 – 3.10 m)

A-1606: sample labelled CL-V, 1982 (depth 3.50 m)

A-374: rest of the sample from the humic horizon 6-3 dated already in 1994 ( $37,900 \pm 2,800/2,100$  BP)

It has to be noted that the depths mentioned on the label of the samples A-1605 and A-1606 are in good agreement with the position of the corresponding cultural layers reported in 1994 by N. Praslov in the southern profile (Fig. 2).

Therefore, in 2012, we used our cross-dating approach (Haesaerts *et al.* 2013) on the samples A-374 and A-1606, both belonging to CL V. One sub-sample of each sample was sent to Groningen for ABA pre-treatment and AMS measurement and the other one to Oxford for ABOx-SC pre-treatment and AMS measurement. The sample A-1605 of CL IV did not provide the critical mass of charcoal necessary for a cross-dating and, hence, has only been dated after ABA pre-treatment in Groningen and resulted in an age of  $38,250 \pm 700/550$  BP (GrA-53616).

As part of our cross-dating approach, samples A-374 and A1606 were homogenized by reduction to very small fragments (0.5-1.0 mm) before being divided in two sub-samples (one for ABA/Groningen and one for ABOx-SC/Oxford) in order to provide the laboratories with sub-samples considered identical. Given the aggressiveness of ABOx-SC pre-treatment, it was decided to deliver 150 mg of charcoal for this type of pre-treatment, while 100 mg were used to for ABA pre-treatment (T. Higham and J. van der Plicht, pers. com.).

A-374, ABA pre-treatment, 100 mg

GrA-53611:  $39,200 \pm 800/750$

A-374, ABOx-SC pre-treatment, 150 mg

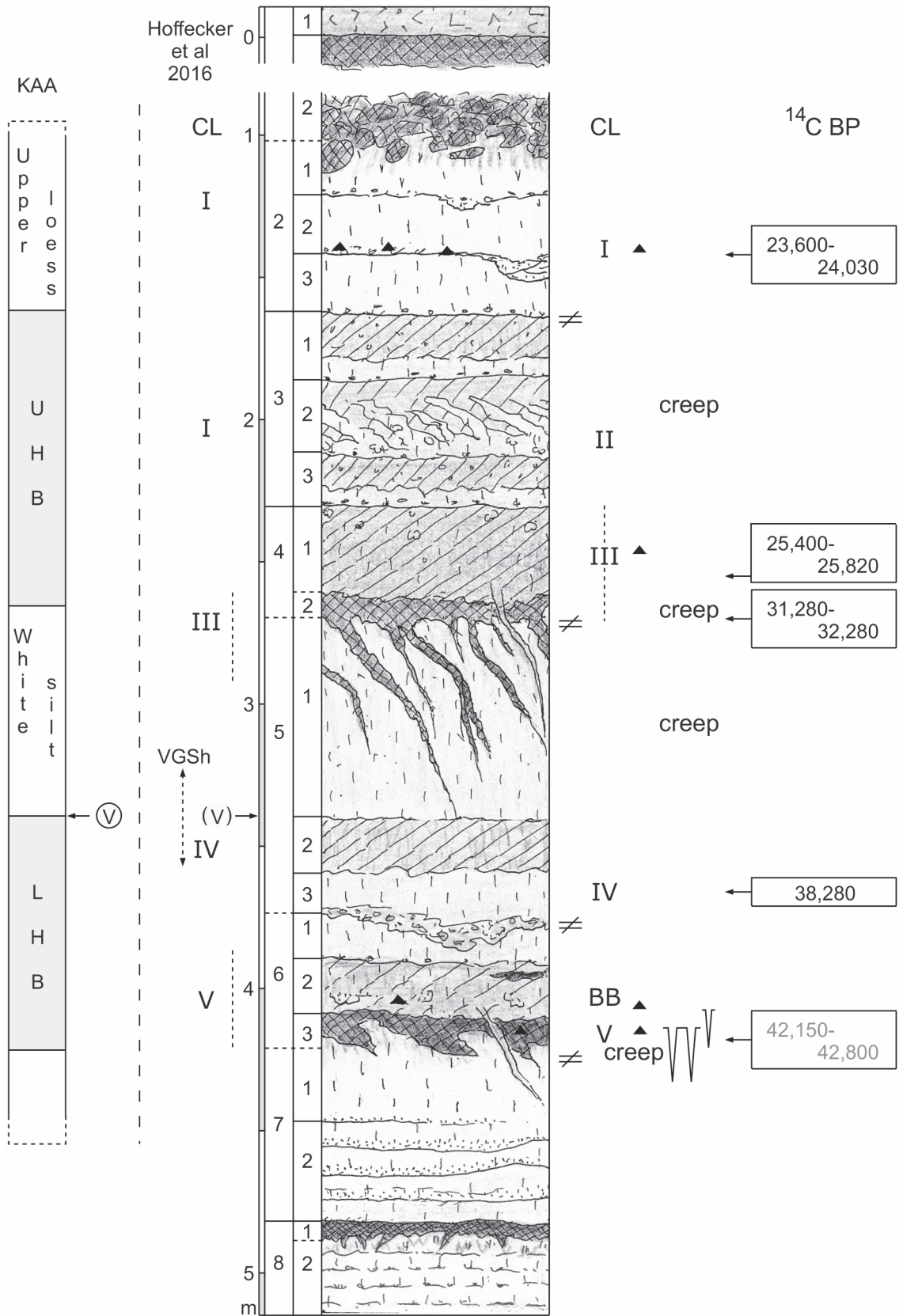
OxA-26649:  $42,150 \pm 750$

A-1606, ABA pre-treatment, 100 mg

GrA-53612:  $42,100 \pm 1,000/700$

A-1606, ABOx-SC pre-treatment, 150 mg

OxA-26650:  $42,800 \pm 900$



**Figure 6:** Synthetic pedosedimentary sequence (cumulated thickness). Abbreviations: KBA: Kostenki-Borshchevo Area (Praslov and Rogachev 1982; Holloway et al. 2007) V: CI tephra. Tr.V: traces of volcanic ash (cf. Hoffecker et al. 2016, p. 315). Right side; = with oblique bar: geometric unconformity; (V): inferred position of volcanic ash lenses in the northern part of the excavation following Praslov (1981-1982); BB: bone bed; black triangle: position of the lithics in 1994 profiles; <sup>14</sup>C BP: accepted time intervals (red: ABOX-SC ages).

The results of the two cross-dated samples are conclusive (Fig. 5). In particular, it should be noted that sample A-1606 produced two equivalent  $^{14}\text{C}$  ages for the ABA- and ABOx-SC-pre-treated sub-samples. Both the ages as well as the sigma are comparable. On the contrary, the  $^{14}\text{C}$  ages obtained for the sub-samples of A-374 present some 3,000  $^{14}\text{C}$  years of difference, with ABOx-SC-pre-treated sub-sample providing an older age. Such a difference at around 42,000 BP can be explained either by the slightest contamination in the ABA sub-sample of A-374 or by statistical variation in AMS measurement, which is very possible for the period under review (Haesaerts *et al.* 2013; Haesaerts *et al.* 2014). However, the cross-dating results show a very satisfying convergence between the GrA-53612 date of  $42,100 \pm 1000/700$  BP using ABA pre-treatment and the two OxA-26649 and OxA-22650 dates of  $42,150 \pm 750$  BP and  $42,800 \pm 900$  BP, respectively, using ABOx-SC. All three sub-samples come from CL V, which confirms the presence of the Streletzkian at Kostenki 1 between 43,500 and 41,500  $^{14}\text{C}$  BP at 1 sigma (Fig. 5). In a similar way, the age of  $\sim 38,250$   $^{14}\text{C}$  BP obtained for CL IV fits with the position of this layer in the stratigraphic sequence. This shows once again the need to work on charcoal samples of well-controlled stratigraphic origin, uniform taxonomic composition and consistent with the period considered.

## 5 Conclusion

The starting point of our approach at Kostenki 1 concerned the positioning of the cultural layers I to V within the stratigraphic sequence established by N. Praslov during his excavations in 1981 and 1982. In 1994 we got access to the remaining sections which were cleaned and recorded. The chronological background, of the upper part of the sequence (CL I to III) resulted in critical analysis of the published  $^{14}\text{C}$  ages. For the lower part of the

sequence with CL IV and V we presented new  $^{14}\text{C}$  dates based on cross-dating between ABA pre-treated samples (Groningen) and ABOx-SC pre-treated samples (Oxford).

Within the Kostenki I sequence, the humic horizons 4-2 (Aurignacian CL III) and 6-3 (Streletzkian CL V) dated respectively 31,880 - 32,280 BP and 43,500 - 45,500 BP, represent interstadial episodes under continuous herbaceous cover. They occur as major chronostratigraphic markers, allowing a better integration of the pedosedimentary record at the scale of the Kostenki-Borshchevo archaeological area, locked by the ash layer (Fig. 6). These markers may also be linked with the interstadial episodes Malu Galben 13 around 32,500 BP in Romania (Dambon and Haesaerts 2007; Haesaerts 2007), Willendorf D1 between 43,400 and 45,100 BP in Austria (Nigst *et al.* 2014) and further with GI-8 and GI-12, respectively, of the Greenland-Ice sequence (Haesaerts *et al.* 2009; 2010).

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