

ANTHROPOLOGY

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BUCCAL DENTAL MICROWEAR AND DIET OF THE SUNGHIR UPPER PALEOLITHIC MODERN HUMANS

Buccal microwear analysis of the deciduous molars of Sunghir 3 provides a moderate density of striations and suggests a mixed diet. The permanent teeth of Sunghir 1 to 3 present a low density of microwear, in agreement with the minimal occlusal wear of Sunghir 2 but in contrast with the more advanced wear of Sunghir 1 and 3. The Sunghir 1 and 2 scratches imply mixed diets; those of Sunghir 3 suggest a more carnivorous one. These results are in agreement with bone chemistry and stable isotope data and with the resources likely present near Sunghir.

Keywords: Diet, ecology, teeth, Upper Paleolithic, Late Pleistocene, Europe.

Introduction

The site of Sunghir in northern Russia (Bader, 1978) represents one of the more northern early Upper Paleolithic sites in Eurasia and certainly one of the more substantial ones. As a result, it is of interest to assess the paleoecology of the Sunghir early modern humans to the extent possible, from their geoarchaeological context and from the human remains themselves. The former aspects have been extensively assessed (Bader, 1978, 1998; Alekseyeva, 1998; Gugalinskaya, Alifanov, 2000; Lavrushin, Sulerzhitsky, Spiridonova, 2000), and inferences regarding their dietary profiles have been made from chemical and isotopic analyses (Kozlovskaya, 2000a, b; Richards et al., 2001; Dobrovolskaya, Richards, Trinkaus, 2011). Here we add to this mosaic of information through the analysis of the dental buccal

microwear of the three Sunghir individuals preserving teeth, Sunghir 1, 2 and 3.

The Sunghir site and human remains

The Paleolithic site of Sunghir is adjacent to Vladimir City (56°10'30" N; 40°30'30" E), 200 km north of Moscow (Bader, 1978, 1998). Excavated from 1956 to 1977, the site consists of an extended open-air settlement area, probably ~10,000 m² of which ~4500 m² were excavated. The cultural layer is a sequence of paleosols between an underlying sandy-loam and overlying loess levels, but the original levels were extensively mixed by post-depositional solifluction and ice-wedges, obscuring most of the internal stratigraphy (Bader, 1978; Gugalinskaya, Alifanov, 2000). The faunal assemblage (Alekseyeva, 1998) consists of a

mix of cold-adapted species (*Dicrostonyx* cf. *torquatus*, *Gulo gulo*, *Lagurus* cf. *lagurus*, *Lepus timidus*, *Lyrurus tetrrix*, *Mammuthus primigenius*, *Microtus* sp., *Ocotona* sp., *Rangifer tarandus*, *Saiga* cf. *tatarica*, *Spermophilus citellus*, *Vulpes lagopus*) and more temperate species (*Bison* sp., *Canis lupus*, *Equus ferus*, *Gallus* sp., *Martes martes*, *Panthera spelaea*, *Ursus* cf. *arctos*). Associated palynological samples indicate an alternation between pine (*Pinus*), birch (*Betula*) and spruce (*Picea*) dominated woods, but with evidence of more temperate tree pollen (Lavrushin, Sulerzhitsky, Spiridonova, 2000). This mix of colder and more temperate faunal and floral species, and especially the presence of a paleosol within the loess sequence of the Sunghir area, suggests a moderately warm period during the Interpleniglacial (MIS 3). It has been referred to the Bryansk Interstadial (Gugalinskaya, Alifanov, 2000) and therefore should correspond to one of the Greenland Interstadials (GI) (Svensson et al., 2008; Fleitmann et al., 2009).

A series of radiocarbon dates have been determined from the Sunghir faunal remains (mostly mammoth) (Sulerzhitsky, Pettitt, Bader, 2000; Marom et al., 2012). They range from ~29,500 to ~20,000 ¹⁴C BP, but the majority are between ~26,000 and ~29,500 ¹⁴C BP. The date of ~26,000 ¹⁴C BP is close to the Heinrich Event 3 (HE3) (Hemming, 2004) and therefore does not match the paleoclimatic indicators from the cultural layer. The GI-6 and GI-5 warm peaks are close to 29,500 and 28,000 ¹⁴C BP, respectively (Svensson et al., 2008), suggesting that the Sunghir cultural layer dates to one of these Greenland Interstadials. The most likely interstadial is GI-5, given the cluster of dates closer to 28,000–27,000 ¹⁴C BP; the post-HE3 GI-4 is too recent for the radiocarbon dates.

The Sunghir 1 to 3 human remains derive from spectacular burials (Sunghir 1 in Grave 1 and Sunghir 2 and 3 in Grave 2) that were dug into the sandy-loam sediments below the cultural layer (Bader, 1998). There have been multiple attempts to directly date the human remains

(Pettitt, Bader, 2000; Kuzmin et al., 2004; Dobrovolskaya, Richards, Trinkaus, 2011; Marom et al., 2012), and questions have arisen as to their contemporaneity with each other and the cultural layer, due largely to more recent dates for Sunghir 1. However, there was no indication of the burials being dug through the cultural layer, a culturally similar burial (Grave 2bis) was within the cultural layer, and similar artifacts are known from both contexts (Bader, 1978, 1998). Moreover, the more reliable direct dates, those from (Kuzmin et al., 2004) for Grave 2 and (Dobrovolskaya, Richards, Trinkaus, 2011) for Graves 1 and 2, place them ~27,000 to ~26,000 ¹⁴C BP. Given paleoclimatic indicators for correlation with an interstadial (and hence unlikely to have occurred during HE3) and association with the cultural layer, they probably derive from GI-5.

Sunghir 1 to 3 consist of largely complete skeletons, with damage principally to the axial remains of Sunghir 1 and loss of the left distal upper limb of Sunghir 2. The first is an adult male, with an age-at-death of 35–45 years, Sunghir 2 is an early adolescent (11–13 year-old) male, and Sunghir 3 is a late juvenile (9–11 year-old) probable female (Buzhilova, Kozlovskaya, Mednikova, 2000; Mednikova, Buzhilova, Kozlovskaya, 2000; Guatelli-Steinberg, Buzhilova, Trinkaus, 2013; Trinkaus et al., 2014). Sunghir 2 retains a minimally worn dentition, with all except the M3s in occlusion. Sunghir 3 has a dentition in transition, with the Is, Cs, M1s plus dm1s and dm2s in occlusion, and the premolars and more distal molars in their crypts or erupting at the time of death. The Sunghir 1 dentition was extensively worn, such that only the M3s retain most of the crown, but small amounts of enamel remain on most of the teeth (Fig. 1).

Microwear methods and samples

Methods. To assess the buccal microwear of the Sunghir teeth, the original teeth were cleaned with acetone, a soft

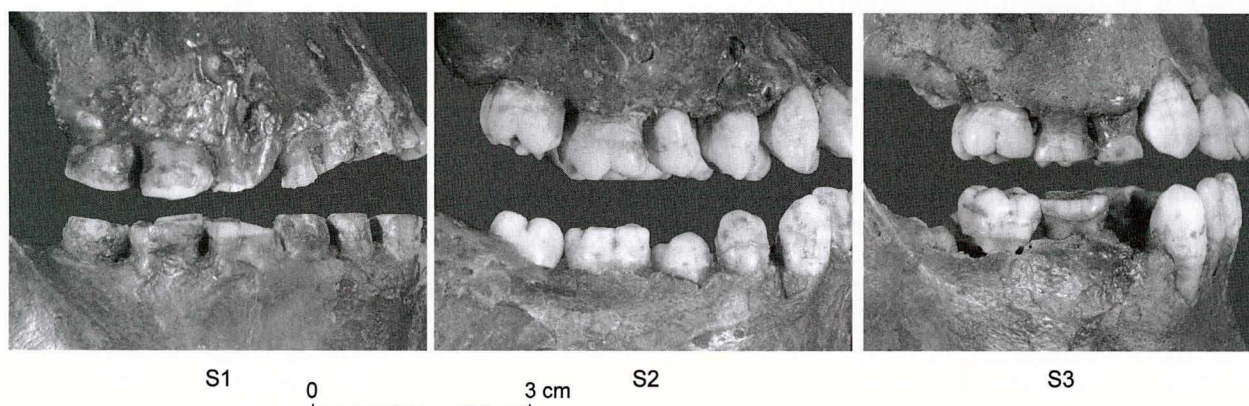


Fig. 1. Buccal views of the postcanine teeth for Sunghir 1 (S1), 2 (S2), and 3 (S3). The left mandibular dentition of Sunghir 3 is reversed.

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