

The Age of the ‘Anosovka-Tel’manskaya Culture’ and the Issue of a Late Streletskian at Kostënki 11, SW Russia

By ROB DINNIS¹, ALEXANDER A. BESSUDNOV², NATASHA REYNOLDS³, KATERINA DOUKA⁴, ALEXANDER E. DUDIN⁵
GENNADY A. KHLOPACHEV⁶, MIKHAIL V. SABLIN⁷, ANDREI A. SINITSYN² and THOMAS F.G. HIGHAM⁴

Triangular, concave-base ‘Streletskian points’ are documented in several assemblages from the Kostënki complex of Upper Palaeolithic sites in south-western Russia. Some of these assemblages have been argued to evidence very early modern human occupation of Eastern Europe. However, Streletskian points are also recorded from younger contexts, notably at Kostënki 11, where examples are attributed both to Layer V and the stratigraphically higher Layer III. The apparent relatively young age of Layer III has led some to view it as the latest manifestation of the Streletskian, although its assemblage has also been compared to the non-Streletskian Layer I of Kostënki 8, with the two described together as the Anosovka-Tel’manskaya Culture.

Radiocarbon dates of 24–23,000 BP (c. 28,500–27,000 cal BP) for a wolf burial associated with Layer III of Kostënki 11 confirm the layer as younger than other Streletskian assemblages at Kostënki. New radiocarbon dates for Kostënki 8 Layer I show that the two layers are broadly contemporary, and that both are close in age to assemblages of Kostënki’s (Late Gravettian) Kostënki-Avdevo Culture. In the light of these new radiocarbon dates the context of the Streletskian point from Kostënki 11 Layer III is considered. Although firm conclusions are not possible, unresolved stratigraphic problems and the lack of technological context for this single artefact at the very least leave a question mark over its association with other material from the layer.

Keywords: Upper Palaeolithic, Streletskian, Sungirian, Kostënki, Eastern Europe, Russia, wolf burial, radiocarbon dating

KOSTËNKI-BORSHCHËVO & STRELETSKIAN ASSEMBLAGES

Close to 40 km south of Voronezh in south-western Russia (Voronezh Oblast) an exceptional complex of 26

¹The British Museum, Franks House, 56 Orsman Road, London N1 5QL, UK.

Email: rdinnis@britishmuseum.org

²Institute for the History of Material Culture, Dvortsovaia naberezhnaia 18, 191186 Saint Petersburg, Russia

³UMR 5199 PACEA, Université de Bordeaux, Bâtiment B8, Allée Geoffroy Saint Hilaire, CS 50023, 33615, Pessac Cedex, France

⁴School of Archaeology, University of Oxford, 1–2 South Parks Road, Oxford OX1 3UB, UK

⁵Kostenki Museum-Preserve, 56a Kol’tsovskaya Str., 394030 Voronezh, Russia

⁶Museum of Anthropology and Ethnography, Russian Academy of Sciences (Kunstkamera), Universitetskaya nab. 3, 199034 Saint Petersburg, Russia

⁷Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1, 199034 Saint Petersburg, Russia

open-air Upper Palaeolithic sites is situated around the villages of Kostënki and Borshchëvo. The archaeological sites are located near the Don river, positioned above and within a series of ravines that cut the chalk plateau meeting the Don’s floodplain (Fig. 1). As well as being individually named, each site is referred to by a number: Kostënki 1–21 and Borshchëvo 1–5. Many of the sites have yielded rich assemblages of worked flint, worked bone/ivory and items of personal ornamentation, as well as sometimes large faunal assemblages (Rogachëv 1957; Boriskovskii 1963; Klein 1969; Praslov & Rogachëv 1982). Several burials have been found at Kostënki, including the earliest known modern human burial in Europe at Kostënki 14 (Debets 1955; Rogachëv 1955; Sinitsyn 2004; Marom *et al.* 2012). The more recent layers at some of the sites contain evidence for large bone constructions, historically thought of as dwellings (Rogachëv 1970; Sinitsyn 2015).

Around half of the 26 Kostënki-Borshchëvo sites contain multiple archaeological layers (Praslov &

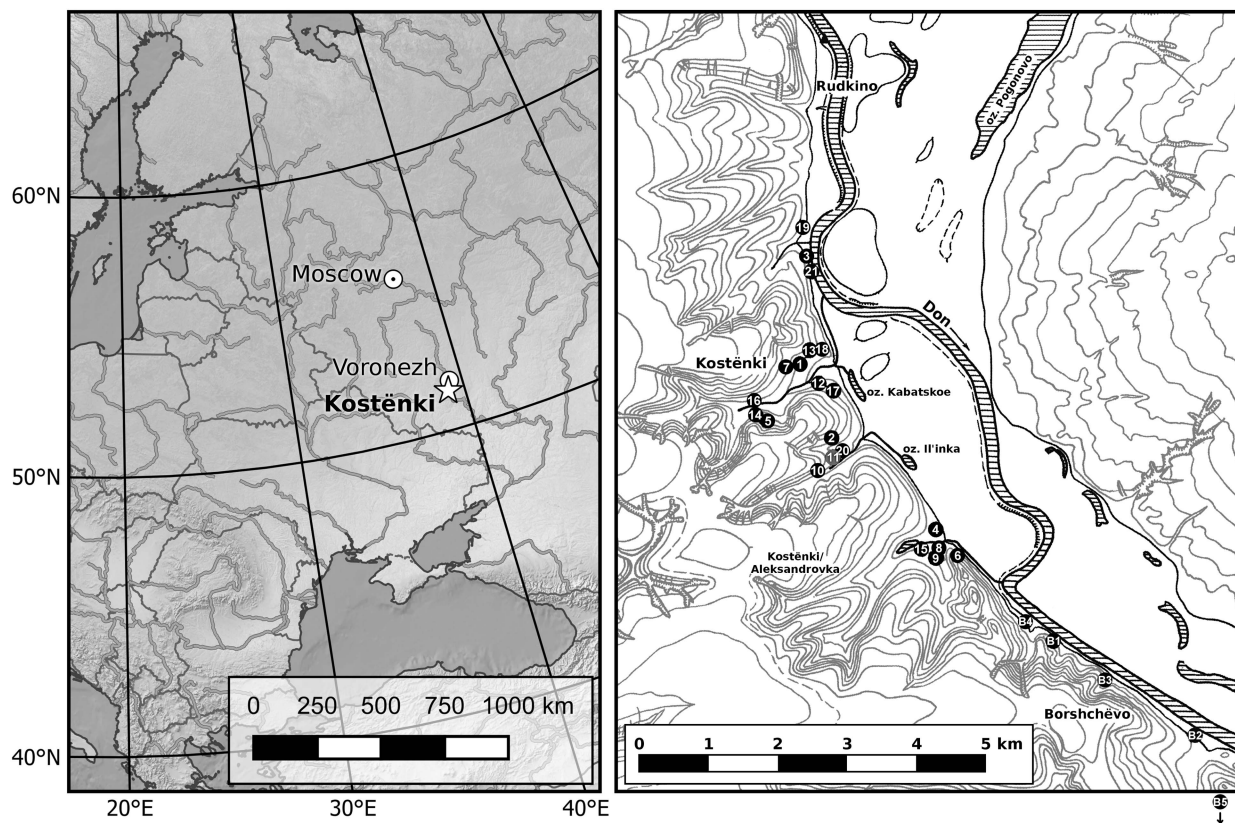


Fig. 1.

The location of Kostënki within Eastern Europe and the location of Kostënki 11 within the Kostënki-Borshchëvo complex

Rogachëv 1982). As a result, the complex has facilitated construction of long Early/Mid-Upper Palaeolithic culture histories, which have then served as the basis from which the wider record of European Russia has been understood. Assemblages at Kostënki-Borshchëvo have been attributed to a variety of archaeological cultures, some of which are familiar to archaeologists working on western European material (eg, Aurignacian, Gravettian) and others that are without parallel in the west (eg, Streletskian, Spitsynian, Gorodtsovian).

Kostënki's Streletskian record is particularly important, as some assemblages have been argued to date to the very beginning of the Upper Palaeolithic, potentially left behind by some of Eastern Europe's earliest modern human occupants (see for instance, Vishnyatsky & Nehoroshev 2004; Anikovich *et al.* 2007; Bosinski 2013; Otte 2014, 2589). The technological composition of Streletskian lithic assemblages is decidedly variable. They show preference for

either flake- or blade-based blank production, but commonly contain small, rounded end-scrapers and artefacts that historically have been classified as side-scrapers. All Streletskian assemblages, however, share one defining lithic marker: the bifacially-worked, triangular, concave-base 'Streletskian point' (Anikovich 1977; Praslov & Rogachëv 1982; Bradley *et al.* 1995). Assemblages that include Streletskian points have been recovered from Kostënki 1 (Layer V), Kostënki 6, Kostënki 11 (Layers V & III), and Kostënki 12 (Layers III & Ia) (Praslov & Rogachëv 1982). Elsewhere in Russia they have been found at Sungir'¹ (Bader 1978), Biriuch'ia Balka 2 (Matyukhin & Sapelko 2009; Matyukhin 2012), and Garchi 1 (Pavlov & Indrelid 2000, 166; Svendsen *et al.* 2010), and beyond Russia at Vys' in Ukraine (Zaliznyak *et al.* 2008; 2013).

Some of Kostënki's Streletskian assemblages – Kostënki 6, Kostënki 12 Layer III, and Kostënki 1 Layer V – are currently thought to pre-date 40,000 cal BP

(Praslov & Rogachëv 1982; Damblon *et al.* 1996; Sinitsyn 1996; Sinitsyn *et al.* 1997; also Haesaerts *et al.* 2013; but see Anikovich *et al.* 2006). However, other sites and layers yielding Streletskian points, both within and beyond Kostënki, are thought to be younger, sometimes significantly so. This is notably the case at Sungir' (Pettitt & Bader 2000; Kuzmin *et al.* 2004; Dobrovolskaya *et al.* 2012; Marom *et al.* 2012; but see Bosinski 2013), and within the Kostënki complex at Kostënki 11.

KOSTËNKI 11: EXCAVATIONS, GEOLOGY, ARCHAEOLOGICAL SEQUENCE

Kostënki 11 (Anosovka II) (Fig. 1) was discovered in 1951, and the main excavation of the site was undertaken by A.N. Rogachëv during the 1950s, '60s and '70s (Vekilova 1977). Construction of the Kostënki Museum around one of the site's famous mammoth bone structures was completed in 1979 (Rogachëv & Popov 1982). Following Rogachëv's work, smaller-scale excavations were directed by N.D. Praslov (1978–9 & 1981) and V.V. Popov (2003–4, 2013) (Praslov 1979; 1981; Praslov *et al.* 1978; Popov *et al.* 2004). Recent excavations (2014–15) on the western side of the site have been directed by one of us (AD) and I.V. Fediunin (Fediunin 2015; 2016).

The site's geological sequence is typical of the Kostënki sites, although at Kostënki 11 the full sequence was observed only in some test-pits and not in the main excavation area. At the base of the excavated sequence are two humic beds (the Lower Humic Bed and the Upper Humic Bed), which are overlain by thick deposits of loess-like loam containing more weakly expressed humic horizons (Rogachëv & Popov 1982; Haesaerts *et al.* 2004; Holliday *et al.* 2007; Lazukov 1982; Sedov *et al.* 2010). As at other Kostënki sites, the Upper and Lower Humic Beds are separated by a loamy deposit containing lenses of volcanic ash, which has been identified as the Y5 tephra (Campanian Ignimbrite), currently thought to date to 39–40,000 years ago (Fedele *et al.* 2008; Giaccio *et al.* 2008; Hoffecker *et al.* 2008; Pyle *et al.* 2006; d'Errico & Banks 2015).

A total of seven, or possibly eight, archaeological layers have been identified within the Kostënki 11 sequence, although the number found in different excavation areas is not consistent and stratigraphic uncertainties remain (Rogachëv & Popov 1982; Popov *et al.* 2004; see also below and Fig. 8). Found stratigraphically highest,

directly below the Holocene chernozem soil, were Layers Ia and Ib, with the former containing the large mammoth bone accumulation now preserved within the museum pavilion (Iakovleva 2015; Fig. 2). From Layer Ia Rogachëv recovered a worked stone industry totaling *c.* 17,000 pieces, including cores, small blades and bladelets, splintered pieces, burins, and end-scrapers (Rogachëv & Popov 1982; Popov 1989). The assemblage is often attributed to the Zamiatnin Culture (along with Kostënki 2, Kostënki 3, and Kostënki 19), which is thought to be the youngest manifestation of the Upper Palaeolithic at Kostënki, and has no analogy outside the Kostënki-Borshchëvo area (Rogachëv & Anikovich 1984; Popov 1989; Anikovich *et al.* 2008; Bessudnov 2013; Rodionov 2016).

Layer II, a dense concentration of archaeological material (worked stone, bone fragments, burned bones, etc) was found within a dark humic loam underlying Layers Ia and Ib (Rogachëv 1961). Due to the presence of backed lithics, including a particular type of backed point, the assemblage has been compared to those from Pushkari, Klyusy, and Layer III of Kostënki 21 (Sinitsyn 2013). The layer is also notable for a series of small animal figurines (Abramova 1995).

Positioned in a brown loess-like loam above the Upper Humic Bed (Rogachëv & Popov 1982; Popov & Dudin 2004; Anikovich *et al.* 2008), Layer III was found at a depth of 2.65–2.80 m from the modern-day surface. Its uppermost part was generally 20–30 cm lower than the base of Layer II (Rogachëv 1961; Rogachëv & Popov 1982, 128); the two layers were separated by an archaeologically sterile loam layer, which gave Rogachëv (1956b) confidence in the attribution of most material to these respective layers. Layer III was first discovered in 1956, and was excavated during that year in the main excavation area (squares Л–III–38–49). Most material was found in squares М–Ч–38–43, although it was clear that Layer III material extended north and east beyond the limits of the excavation area (Rogachëv 1956b; Rogachëv & Popov 1982, 128) (Fig. 3). In this area the layer was generally 15–20 cm thick, and yielded worked stone, charcoal fragments, ochre, and bones (Rogachëv & Popov 1982). The remains of a hearth (squares P–45–46) were found close to an oval, flat-bottomed pit containing the remains of two adult and two juvenile wolves (squares P–42–43), suggested by Rogachëv (1956b) and later by Anikovich *et al.* (2008) to represent ritual burial or to be associated with early attempts at wolf domestication (Figs 3 & 4). Both of



Fig. 2.
Excavation of the upper part of the Kostenki 11 sequence, July 2014

these features were peripheral to the part of Layer III that was richest in finds (Fig. 3). Rogachëv (1956b) argued on stratigraphic grounds that the deposition of the wolves related to Layer III, rather than being intrusive from Layer II, emphasising that the archaeologically-sterile loam found overlying Layer III elsewhere was also found above the depression that contained the wolves. The depth measurements given by Rogachëv (1956b) for the lowermost remains of Layer II and the uppermost recorded part of the pit with wolf bones are consistent with his stratigraphic interpretation. As discussed below, later test-pits away from the main excavation area also yielded material attributed by Rogachëv to Layer III.

In the most complete study of the Layer III lithic assemblage Popov (1989; Popov & Dudin 2004) recorded 622 lithic pieces, of which 142 are retouched artefacts or fragments thereof. (These counts exclude material attributed to ‘Layer IIIa’ – see discussion, below.) The assemblage includes typically Upper

Palaeolithic types such as end-scrapers, burins, and splintered pieces (Fig. 5), and is dominated by good quality flint that has facilitated the production of large and often pointed blades. Some of these pointed blades have been shaped ventrally (eg, Fig. 5, nos 3, 4, & 8). Due to a shared presence of ventrally shaped blades and lack of backed pieces, as well as perceived raw material similarities, some have compared the assemblage to Layer I of Kostënki 8 (Tel’manskaya) (see below), grouping them together in the ‘Anosovka-Tel’manskaya Culture’, within which the smaller assemblage from Layer II of Kostënki 5 is sometimes also included (see Rogachëv 1961; Rogachëv *et al.* 1982; Popov 1989; Anikovitch 2005a; Anikovitch *et al.* 2008). However, due to the presence of a single Streletskian point (Fig. 5, no. 2) the assemblage has also sometimes been classified as Streletskian/Sungirian (see for instance Debrosse & Kozłowski 1988, 48 cited in Flas 2015, 56; Djindjian *et al.* 1999, 149, 430; Noiret 2004, 441; Sinitsyn 2010; also see

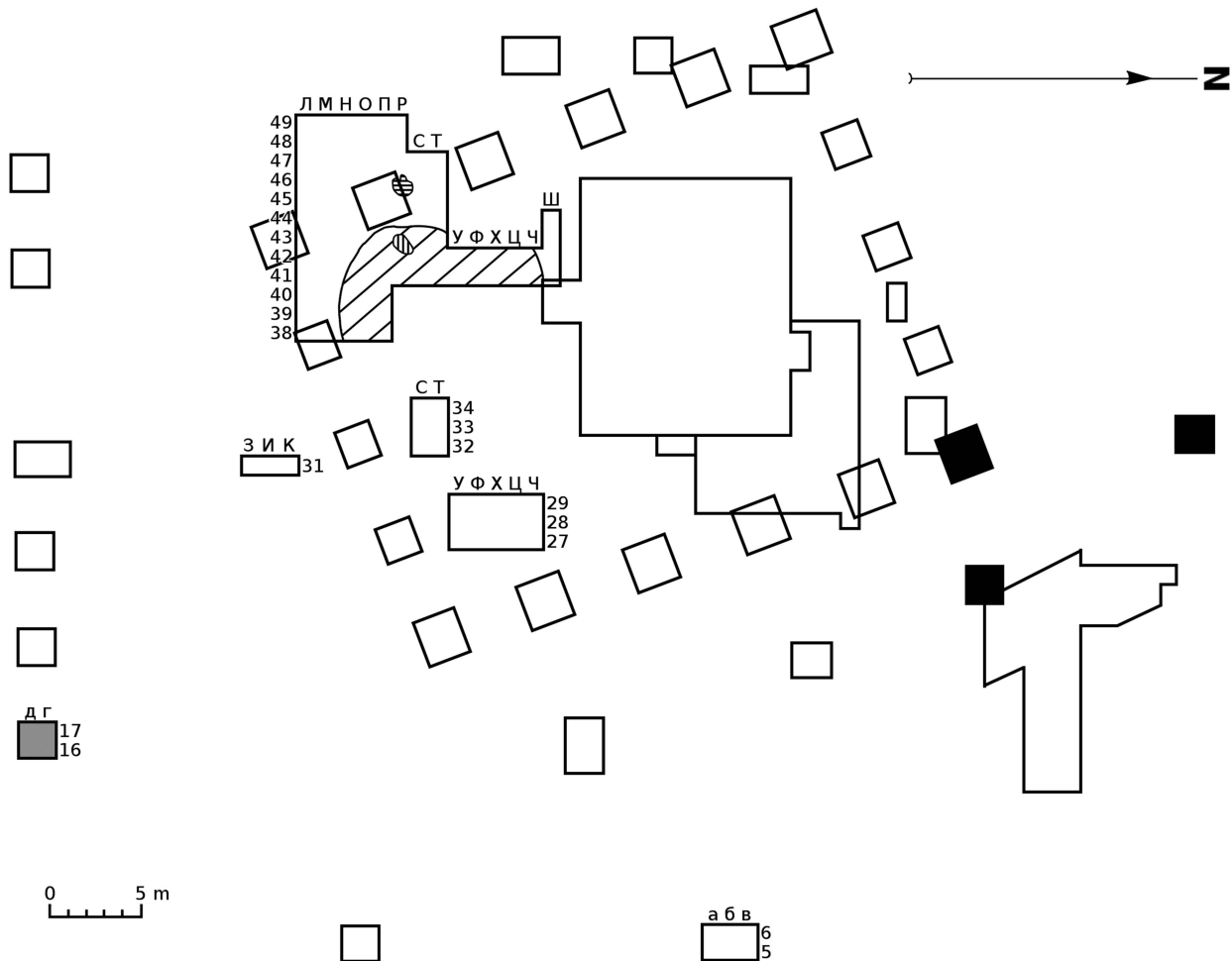


Fig. 3.

Plan of excavations at Kostënki 11 carried out prior to 2003, showing: the extent of Layer III in Rogachëv's main excavation area (squares Л-Ш-38-49) (diagonally striped area); the location of Layer V in three test-pits (shaded black); the location of test-pit д-г-16-17 (shaded grey); the location of test-pit С-Т-32-34 and the locations of the wolf burial (vertically striped area) and hearth structure (horizontally striped area) in Layer III. (Modified from Rogachëv 1956a and Popov & Dudin 2004, 9)

Popov 1989), despite the lack of other artefact types also usually considered characteristic of Streletskian assemblages.

Layer IV has been discovered in 11 test-pits in different parts of the promontory. It is represented by lithic artefacts, bone fragments, and charcoal pieces found in the lower part of the loess-like loam, which overlies the Upper Humic Bed, and lenses of the Upper Humic Bed itself (Rogachëv 1961; Popov 1989). In the opinion of Popov (1989) the layer was redeposited. Layer IV's lithic assemblage totals 175 pieces, of which 25 are retouched, including burins, splintered pieces, end-scrapers, side-scrapers, and a backed

bladelet; the collection is insufficient to attribute it to a particular archaeological culture (Rogachëv & Popov 1982; Popov 1989; Popov *et al.* 2004).

Archaeological material allocated to the 'Northern Point' (= 'severnyi punkt') has been found on the northern side of the promontory, close to the base of a ravine. The stratigraphic position of the Northern Point assemblage remains unclear: according to Rogachëv and Popov (1982) it lay in the loess-like loam, but for Popov *et al.* (2004) it was associated with the upper part of the Upper Humic Bed. Of about 1800 lithics 261 are retouched, including end-scrapers, burins, splintered pieces, and a series of backed



Fig. 4.

Wolf remains from squares P-42-43, associated with Layer III (see text). Photo: Archive of IHMC RAS, No. O.2051-54

bladelets and points. For Rogachëv and Popov (1982) the stratigraphic position of the lithic assemblage was broadly comparable to that of Layer IV, although some techno-typological characteristics of the lithic industry were closer to those of Layer Ia. The stratigraphic and cultural attribution of the Northern Point material clearly requires further clarification.

Layer V, the lowermost layer, has been identified only in small test-pits in the north-eastern part of the promontory (Fig. 3), positioned in the lower part of the Upper Humic Bed (Rogachëv 1968; Anikovich 1977; 2005b; Lazukov 1982; Rogachëv & Popov 1982; Popov 1989; Popov *et al.* 2004; although Velichko & Rogachëv 1969 instead placed Layer V in the Lower Humic Bed). Layer V is generally referred to as Streletskian (eg, by Anikovich 1977; 2005b; Bradley *et al.* 1995; Anikovich *et al.* 2008; Sinitsyn 2010; Djindjian *et al.* 1999; but see Matiukhin 2012, 216) on the basis of one complete and one broken Streletskian point (Fig. 5, no. 1). However, the meagre size of the archaeological assemblage – 40 pieces, of which only five are retouched (Popov 1989; Popov *et al.* 2004) – makes further characterisation of the assemblage difficult.

KOSTËNKI 8 LAYER I & THE ‘ANOSOVKA-TEL’MANSKAYA CULTURE’

Kostënki 8 is located in a small ravine (Aleksandrovskii Log) *c.* 2 km south-east of Kostënki 11 (Fig. 1). The site was discovered by A.N. Rogachëv in 1936 and excavated in 1937, 1949–52, 1958–9, 1962–4, 1976, and 1979 (Vekilova 1977; Rogachëv *et al.* 1982). More recent excavations (2005–13) were led by V.V. Popov, A.Iu. Pustovalov and one of us (AD) (Anikovich *et al.* 2015; Dudin *et al.* 2016).

Five archaeological layers have been identified at Kostënki 8, numbered from top to bottom I, Ia, II, III, and IV (Rogachëv *et al.* 1982). Rogachëv’s Layer I lithic collection comprises *c.* 6000 pieces, including burins (especially dihedral types), retouched blades, pointed blades, bifacially-shaped blades and points, endscrapers, and sidescrapers (Rogachëv *et al.* 1982; Flas 2015). While acknowledging some differences, Rogachëv *et al.* (1982, 99) described perceived similarities between the Kostënki 8 Layer I and Kostënki 11 Layer III lithic assemblages that, in their view, warranted their classification together as the ‘Anosovka-Tel’manskaya Culture’. These included a predominance of semi-abrupt retouch, an absence of abrupt retouch (and therefore of backed pieces), the presence of similar points and end-scrapers, comparable ratios of different burin types and the presence at both sites of points reworked into burins.

A much smaller lithic assemblage of *c.* 100 pieces was found in the underlying Layer Ia, including at least one backed piece (Rogachëv *et al.* 1982). In contrast, Layer II has yielded a large collection of more than 25,000 lithic artefacts (including material from the most recent excavations), which recent radiocarbon dating has confirmed as the only early Gravettian assemblage known in Russia (Rogachëv *et al.* 1982; Reynolds *et al.* 2015; Dudin *et al.* 2016). The lowermost Layers III and IV provided only small assemblages of uncertain cultural affiliation, containing *c.* 500 and *c.* 30 lithic artefacts respectively (Rogachëv *et al.* 1982).

RADIOCARBON CHRONOLOGY

Kostënki 11 Layer III

The corpus of previously published radiocarbon dates for Kostënki 11 (Table 1) is problematic. Three dates have been published for Layer III; all are in poor agreement, despite the fact that two were produced from the same bone. The oldest of the three

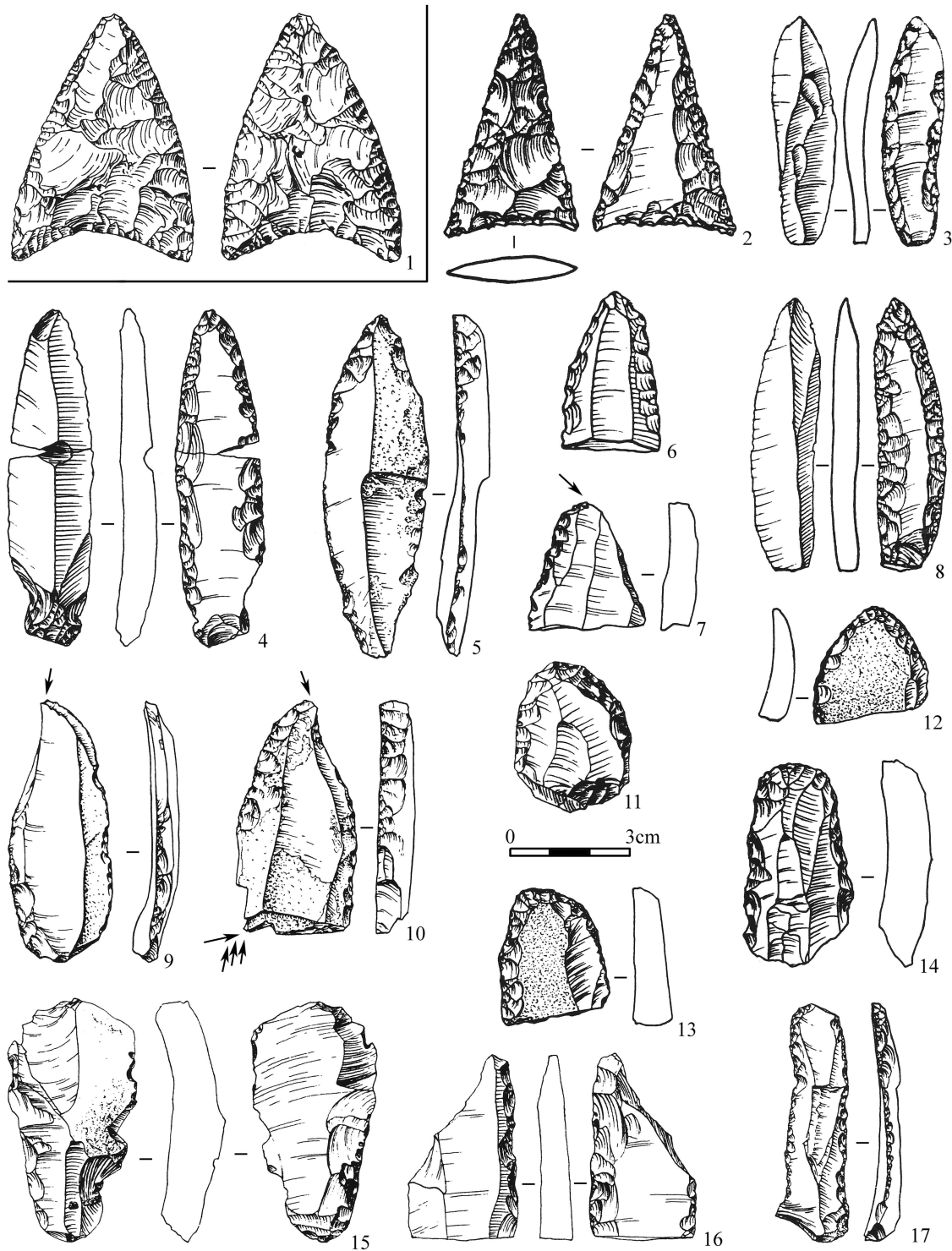


Fig. 5.

Lithic artefacts from Layer V (1) and Layer III (2–17) of KostĚnki 11, including Streletsian points (1, 2) and ventrally shaped blades (3, 4, 8). Illustrations from Popov (1989)

TABLE 1: PREVIOUSLY PUBLISHED RADIOCARBON DATES FOR KOSTËNKI 11

<i>Lab. code</i>	<i>Cultural layer</i>	<i>Sample</i>	^{14}C <i>age BP, $\pm 1\sigma$ error</i>	<i>Remarks</i>	<i>Source</i>
Le-1403	Ia	Mammoth bone	12,000 \pm 100		Rogachëv & Popov 1982; Sinitsyn <i>et al.</i> 1997
Le-1637	Ia	Mammoth bone	14,610 \pm 120		Rogachëv & Popov 1982; Sinitsyn <i>et al.</i> 1997
Le-1704a	Ia	Bone	16,040 \pm 120	Same bone as Le-1704b	Rogachëv & Popov 1982
Le-1704b	Ia	Bone	17,310 \pm 280	Same bone as Le-1704a. 17,310 \pm 200 according to Damblon <i>et al.</i> 1996	Rogachëv & Popov 1982
GIN-8079	Ia	Mammoth bone	18,700 \pm 80		Praslov & Soulerjytsky 1997
GIN-2532	Ia	Burnt bone	19,900 \pm 350		Rogachëv & Popov 1982
TA-34	II	Burnt bone/ bone	15,200 \pm 300	'Burnt bone' in Rogachëv & Popov 1982. 'Bone' in Damblon <i>et al.</i> 1996 & Sinitsyn <i>et al.</i> 1997	Rogachëv & Popov 1982
GIN-2531	II	Burnt bone	21,800 \pm 200		Rogachëv & Popov 1982
Le-1638a	III	Bone	16,040 \pm 120	Same bone as Le-1638b. 'Cultural layer III sup.' in Damblon <i>et al.</i> 1996	Rogachëv & Popov 1982
GIN-8080	III	Mammoth bone	20,500 \pm 300		Sinitsyn <i>et al.</i> 1997; Praslov & Soulerjytsky 1997
Le-1638b	III	Bone	22,760 \pm 340	Same bone as Le-1638a. 'Cultural layer III sup.' in Damblon <i>et al.</i> 1996. According to Sinitsyn <i>et al.</i> 1997, is published as Cultural Layer II in Svezhentsev 1993	Rogachëv & Popov 1982

(Le-1638b: 22,760 \pm 340 BP) has generally been seen as more reliable, particularly given the existence of a date of 21,800 \pm 200 BP (GIN-2531) for the overlying Layer II. Based on the overall chrono-stratigraphy of the site, most have considered Layer III to date to *c.* 24,000–22,500 BP (ie, *c.* 28,500–26,500 cal BP) (eg, Popov & Dudin 2004; Anikovich 2005a, 83; Anikovich *et al.* 2008), although due to its poor radiocarbon chronology and stratigraphic uncertainties, some have suggested that the layer may be older (eg, Sinitsyn 2010).

The right humeri of the four wolves found in a pit associated with Layer III (Figs 2 & 3, see above) were identified in collections held at the Zoological Institute (Russian Academy of Sciences), Saint Petersburg, and sampled for radiocarbon dating. Radiocarbon dates were produced using current methods at ORAU (University of Oxford), including ultrafiltration (Brock *et al.* 2010). The results (Table 2) were calibrated against the IntCal13 curve using OxCal version 4.2 (Bronk Ramsey 2009; Reimer *et al.* 2013). Probability distributions for the four calibrated dates are given in Figure 6a.

The archaeological context of the dated wolves from Kostënki 11 allows the conclusion that they

represent a simultaneous (anthropogenic) burial event. We therefore attempted to model the four results as a single event using the Combine function in OxCal 4.2, which flagged both the oldest and youngest dates as having poor agreement values ($A = 34.4\%$ and 33.9% respectively). Presuming that the youngest age obtained is the most likely to be inaccurate (as tends to be the case for samples from the earlier part of the Upper Palaeolithic: Higham 2011), we removed OxA-32591 from the series and re-ran the Combine function. This time the data passed the test of agreement, producing a modelled age of 27,850–27,700 cal BP (68.2% probability) or 27,930–27,630 cal BP (95.4% probability) (Acomb = 91.9%) (Fig. 6b). (It can be noted that the test is also not failed if the oldest date, OxA-32665, is omitted instead.)

Kostënki 8 Layer I

Previously published radiocarbon dates for Kostënki 8 Layer I (Table 3) are similar to the more ancient dates already published for Kostenki 11 Layer III (Table 1), supporting perceived similarities between their lithic assemblages (see above).

TABLE 2: NEW RADIOCARBON DATES FOR THE WOLF REMAINS ASSOCIATED WITH LAYER III OF KOSTËNKI 11

Lab. code	Sample	Sample stored under label	Pre-treatment method ¹	Used (mg) ²	Yield (mg) ³	%Yld ⁴	%C ⁵	$\delta^{13}\text{C}$ (‰) ⁶	C:N ratio ⁷	¹⁴ C BP	Calibrated age range (68.2% probability) ⁸	Calibrated age range (95.4% probability) ⁸
OxA-32591	Bone, <i>Canis lupus</i> , right humerus	A II P 43 28381	AF*	520	32.8	6.3	44.1	-18.9	3.4	23,190 ± 160	27,610–27,340	27,730–27,190
OxA-32592	Bone, <i>Canis lupus</i> , right humerus	A II P 43 28381	AF*	490	14.2	2.9	42.4	-19.4	3.3	23,630 ± 180	27,880–27,600	28,070–27,450
OxA-32593	Bone, <i>Canis lupus</i> , right humerus	A II P 43 28381	AF*	470	25.3	5.4	44.0	-18.7	3.4	23,520 ± 170	27,800–27,540	27,930–27,410
OxA-32665	Bone, <i>Canis lupus</i> , right humerus	A II P 43 28381	AF*	570	30.2	5.3	43.1	-19.1	3.4	23,940 ± 180	28,170–27,790	28,430–27,680

¹AF* refers to solvent extraction (here, sequential extraction in acetone, methanol and chloroform) followed by routine ABA pretreatment and ultrafiltration (Brock *et al.* 2010).

²Starting mass of bone sample used.

³Mass of gelatin extracted.

⁴Mass of gelatin extracted as percentage of starting mass of sample.

⁵Percentage mass of carbon in combusted sample.

⁶C isotopic ratio relative to VPDB.

⁷C:N atomic weight ratio of combusted sample.

⁸Calibrated age ranges as calculated against the IntCal13 curve using OxCal version 4.2 (Bronk Ramsey 2009; Reimer *et al.* 2013).

TABLE 3: PREVIOUSLY PUBLISHED RADIOCARBON DATES FOR KOSTËNKI 8

Lab. code	Cultural layer	Excavation square	Sample	¹⁴ C age BP ± 1σ error	Remarks	Source
GIN-7998	I	Д-44	Mammoth rib	22,000 ± 160	Sometimes cited as GIN-7988. Square cited as 'E-44' in Praslov & Soulerjytsky 1997 because of decision to re-name squares using Latin alphabet: see Sinitsyn <i>et al.</i> 1997	Praslov & Soulerjytsky 1997; Sinitsyn <i>et al.</i> 1997
GIN-7997	I	Г-45	Tooth & mammoth rib	22,900 ± 120	Square cited as 'D-45' in Praslov & Soulerjytsky 1997 (as above)	Praslov & Soulerjytsky 1997; Sinitsyn <i>et al.</i> 1997
GrA-9283	II		Charcoal	21,900 ± 450		Sinitsyn 2004
OxA-7109	II		Burnt human cranial bone	23,020 ± 320		Sinitsyn <i>et al.</i> 1997
CURL-15816	II		Charcoal	23,340 ± 150		Anikovich <i>et al.</i> 2015
GIN-7999	II		Horse bone	24,500 ± 450	Sample from 1959 excavations	Praslov & Soulerjytsky 1997
CURL-15797	II		Charcoal	25,640 ± 210		Anikovich <i>et al.</i> 2015
OxA-30197	II	в-49	Bone (<i>Equus</i> sp.)	27,620 ± 270	C:N ratio: 3.3 $\delta^{13}\text{C}$ (‰): -19.53	Reynolds <i>et al.</i> 2015
OxA-30198	II	ж-53	Bone (<i>Equus</i> sp.)	27,670 ± 270	C:N ratio: 3.3 $\delta^{13}\text{C}$ (‰): -19.63	Reynolds <i>et al.</i> 2015
GrN-10509	II		Charcoal	27,700 ± 750		Rogachëv <i>et al.</i> 1982

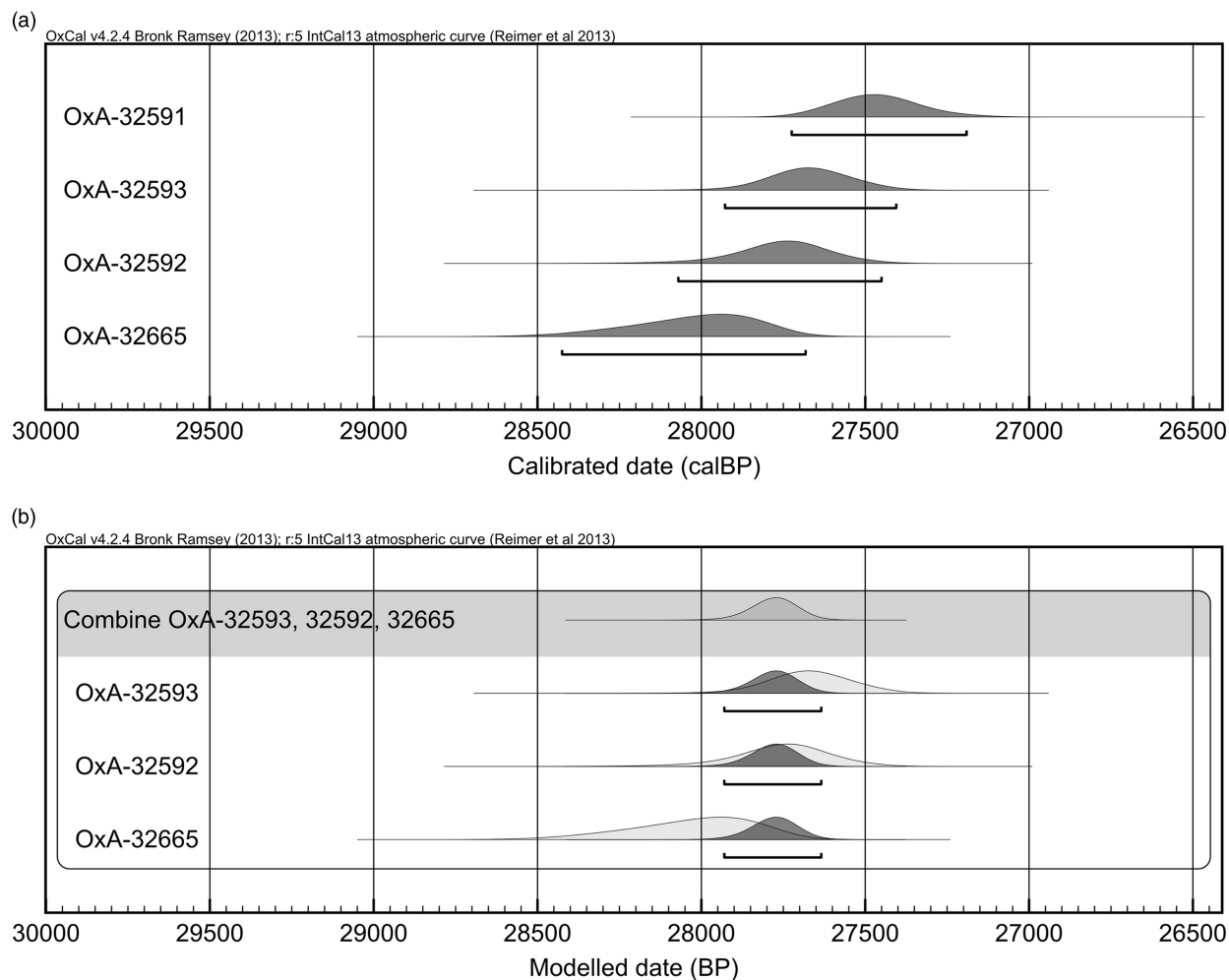


Fig. 6.

Modelled ages for the new radiocarbon dates from Kostënki 11 Layer III given in Table 2: a) all four dates calibrated separately; b) the three oldest dates calibrated and modelled as a single event using OxCal's Combine function. All results were calibrated against the IntCal13 curve using OxCal version 4.2 (Bronk Ramsey 2009; Reimer *et al.* 2013). Brackets below plots indicate 95.4% probability ranges

Three new radiocarbon dates (Table 4; Fig. 7) were produced from certainly or possibly humanly-modified bones from Layer I of Kostënki 8, housed at the Peter the Great Museum of Anthropology and Ethnography (Kunstkamera; Russian Academy of Sciences), Saint Petersburg. The dates were obtained using ORAU's current methods (Brock *et al.* 2010). The similarity of the new results from Kostënki 8 Layer I and Kostënki 11 Layer III (Tables 2 & 4) is consistent with the proposed link between the two archaeological layers; however, as explained below, further work is needed before this chronological

similarity can be considered to more conclusively support a cultural link.

DISCUSSION

Kostënki 11 Layer III and Kostënki 8 Layer I in the Kostënki-Borshchëvo sequence

Our results place both the Kostënki 11 Layer III wolf burial and the assemblage from Layer I at Kostënki 8 at *c.* 24–23,000 BP (= *c.* 28,500–27,000 cal BP). Both are therefore significantly younger than Kostënki's Spitsynian, Aurignacian, and Gorodtsovian occupations

TABLE 4: NEW RADIOCARBON DATES FROM KOSTËNKI 8 LAYER I

Lab. code	Sample	Sample stored under label	Pre-treatment method ¹	Used (mg) ²	Yield (mg) ³	%Yld ⁴	%C ⁵	$\delta^{13}\text{C}$ (‰) ⁶	C:N ratio ⁷	^{14}C BP	Calibrated age range (68.2% probability) ⁸	Calibrated age range (95.4% probability) ⁸
OxA-27220	Bone (cutmarked)	1818-1839/ TД 43-44/T-1830	AF	1200	42.5	3.5	48.6	-20.4	3.2	24,200 ± 180	28,450–28,010	28,640–27,850
OxA-27221	Bone (possibly cutmarked)	1818-1839/ TД 43-44/T-1837	AF	1200	40.5	3.4	46.2	-20.7	3.2	23,980 ± 170	28,200–27,830	28,440–27,720
OxA-26762	Bone (worked)	1862-1874/ TД 45-46/T-1866	AF*	1100	51.6	4.7	41	-18.8	3.2	23,800 ± 170	28,010–27,710	28,270–27,590

¹AF refers to routine ABA pre-treatment and ultrafiltration; AF* refers to solvent extraction (here, sequential extraction in acetone, methanol and chloroform) followed by routine ABA pre-treatment and ultrafiltration (Brock *et al.* 2010).

²Starting mass of bone sample used.

³Mass of gelatin extracted.

⁴Mass of gelatin extracted as % of starting mass of sample.

⁵% mass of carbon in combusted sample.

⁶C isotopic ratio relative to VPDB.

⁷C:N atomic weight ratio of combusted sample.

⁸Calibrated age ranges as calculated against the IntCal13 curve using OxCal version 4.2 (Bronk Ramsey 2009; Reimer *et al.* 2013)

(eg, Kostënki 17 Layer II, Kostënki 14 Layer in Volcanic Ash and Layer II, Kostënki 1 Layer III, Kostënki 15) as well as the Gravettian assemblages from Kostënki 8 Layer II, Kostënki 4, and Borshchëvo 5 Layer I (Praslov & Rogachëv 1982; Damblon *et al.* 1996; Sinitsyn *et al.* 1997; Reynolds *et al.* 2015; Sinitsyn 2015). The dates are instead closer to the age of the Kostënki-Avdeevo Culture (=Late Gravettian 'Kostenkian') sites of Kostënki 1 (Layer I), Kostënki 18, and Kostënki 14 (Layer I) (Praslov & Rogachëv 1982; Sinitsyn *et al.* 1997; Sinitsyn 2015; Damblon *et al.* 1996; Amirkhanov 2000; Abramova *et al.* 2001; RD, unpublished data), placing the assemblages in Sinitsyn's (2015, 165) chronological group IV.

The dates for Kostënki 11 Layer III and Kostënki 8 Layer I are similar, appearing to support the proposed cultural link between them. However, we prefer to reserve judgement about the similarity of these assemblages. The lithic industries from the two layers have largely been linked on typological grounds, with some similarities unlikely to be culturally informative (eg, the perceived similarity of technologically simple burins). A more thorough technological assessment of Kostënki 11 Layer III is needed – comparable to the recent study of Kostënki 8 Layer I by Flas (2015) – before the relationship between the assemblages can be properly understood. Flas (2015) remained non-committal over their connection for similar reasons, but did raise the possibility that Kostënki 8 Layer I, Kostënki 11 Layer III, and the Kostënki-Avdeevo Culture assemblages may all be connected. Future work could usefully focus on comparing blade production and the techno-typology of ventrally retouched blades in these broadly synchronous assemblages.

As noted above, Kostënki 11 Layer III has also been described as Streletskian/Sungirian, or has been seen as culturally linked to other Streletskian sites, due to the presence of a Streletskian point (Fig. 5. no. 2) (eg, Debrosse & Kozłowski 1988, 48, cited in Flas 2015, 56; Anikovich 2005b; Anikovich *et al.* 1997, 161; Djindjian *et al.* 1999, 149, 430; Noiret 2004, 441; Sinitsyn 2010; see also Rogachëv & Anikovich 1984; Popov 1989). The layer's apparently more recent age than assemblages with Streletskian points reported from the Lower Humic Bed (Kostënki 1 Layer V, Kostënki 6, Kostënki 12 Layer III) and Upper Humic Bed (Kostënki 11 Layer V, Kostënki 12 Layer Ia) means that it has sometimes been viewed as the last manifestation of the Streletskian at Kostënki; or,

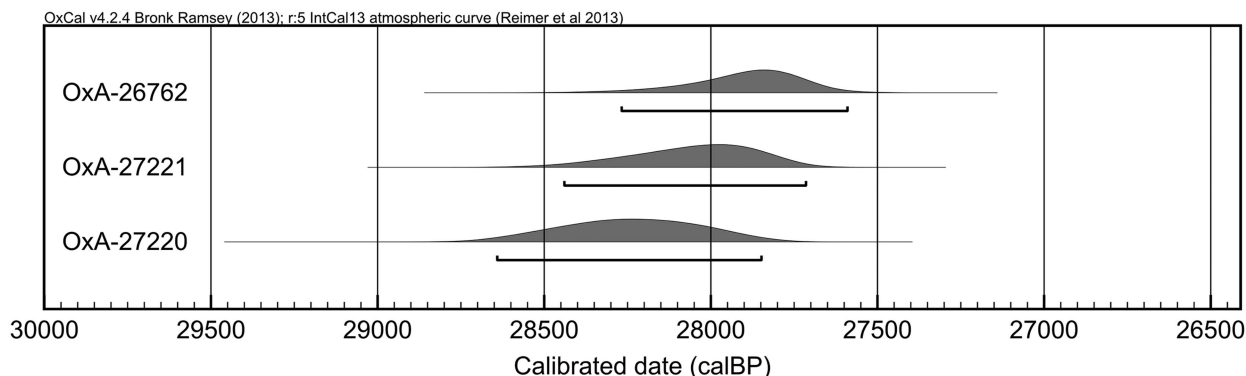


Fig. 7.

Calibrated ages for the new radiocarbon dates from Kostënki 8 Layer I given in Table 4, as calibrated against the IntCal13 curve using OxCal version 4.2 (Bronk Ramsey 2009; Reimer *et al.* 2013). Brackets below plots indicate 95.4% probability ranges

alternatively, that the Kostënki 11 Layer III and Kostënki 8 Layer I assemblages, while not themselves satisfactorily described as Streletskian, may have arisen out of Streletskian cultural traditions (see for instance Rogachëv & Anikovich 1984; Anikovich 2005b; Anikovich *et al.* 2008). Even those preferring not to argue for a cultural relationship with other Streletskian sites understandably saw the presence of the Streletskian point in the Layer III assemblage as necessitating discussion (eg, Anikovich 1977, 12–15; Rogachëv & Popov 1982, 130; Lisitsyn 2014, 92).

Kostënki 11 Layer III: stratigraphic issues

The radiocarbon age of the wolf burial in Rogachëv's main excavation area (ie, squares II–III–38–49; see Fig. 3) is consistent with a young age for Layer III relative to Streletskian assemblages elsewhere. However, stratigraphic uncertainties exist in relation to Layer III as found more widely across the site. Rogachëv and Popov (1982, 118) were explicit about the problematic stratigraphy of Kostënki 11 overall, recognising the impact of solifluction and slope processes (see also Anikovich *et al.* 2008). In particular they highlighted the problem of securely correlating different excavation areas (Rogachëv & Popov 1982, 128), and it is noteworthy that 'Layer III' was marked at two different stratigraphic positions in their schematic section (Fig. 8; Rogachëv & Popov 1982, 118, fig. 37-B). Popov (1989; Popov *et al.* 2004) used stratigraphic and techno-typological evidence to isolate the 'Layer III' material from test-pit д–г–16–17 (see Fig. 3), which was found at the lower part of the

loess-like loam (ie, above the Upper Humic Bed) and partly in lenses of the Upper Humic Bed itself. Popov (1989; Popov *et al.* 2004) allocated the д–г–16–17 assemblage to 'Layer IIIa', along with material from other test-pits thought to be stratigraphically problematic, in order to distinguish it from the Layer III lithic industry of Rogachëv's main excavation area.

Layer III in Rogachëv's main excavation area (ie, squares II–III–38–49) was stratigraphically thin, and the wolf remains shown in Figure 4 are good evidence that this area had not been heavily affected by post-depositional deformation. However, Layer III was not similarly coherent across the whole of Kostënki 11. In test-pit C–T–32–34, to the east of the main excavation area (see Fig. 3), the cultural layer was thicker (*c.* 50 cm) (Rogachëv 1956a; 1956b; 1965). Recent excavations to the west of the Rogachëv's main excavation area have demonstrated a similar situation, with a stratigraphically thick Layer III occupying two lithological horizons, in some places up to 80 cm thick, and with some evidence for post-depositional movement of artefacts (Fediunin 2015; 2016). Although these excavations failed to firmly establish a separate Layer IIIa within Layer III *sensu lato*, some techno-typological and raw material patterning of lithic artefacts between the top and bottom parts of the layer was observed (*ibid.*).

Evidently, the stratigraphy and coherence of Layer III *sensu lato* are still incompletely understood, and we would caution against concluding that the radiocarbon dates presented here date lithic material from all parts of Kostënki 11 previously attributed to this layer. These issues are obviously of particular

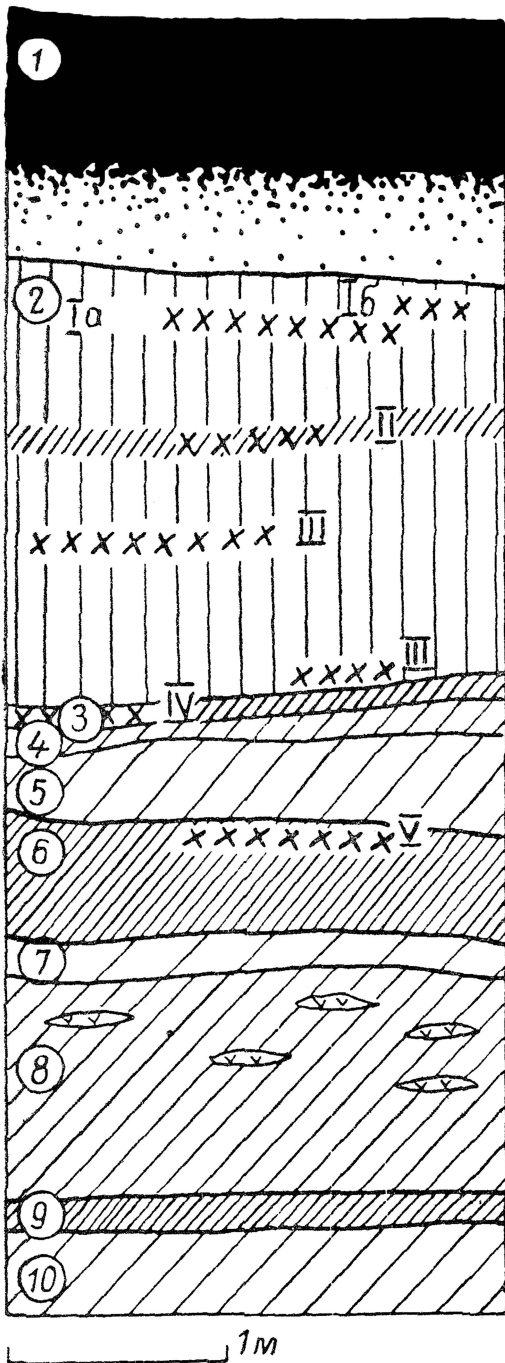


Fig. 8.

Schematic section of Kostenki 11 (Rogachev & Popov 1982, 118). The numbers in circles are geological descriptions: 1. modern soil; 2. grey-brown loess-like loam; 3, 6, 9. humic loam; 4. marl loam; 5. whitish loam; 7. brown loam; 8. layered loam with lenses of volcanic ash; 10. layered loam.

Roman numerals denote archaeological layers (see text)

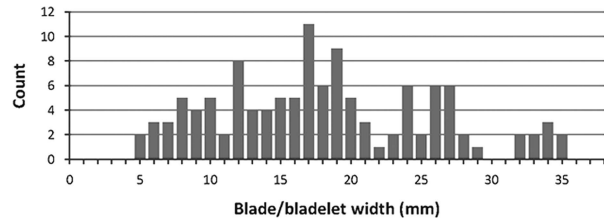


Fig. 9.

Width measurements to the nearest millimetre for blades and bladelets from Kostënki 11 Layer III (n = 119) (material from test-pit д-г-16-17 is not included: see text)

importance when assessing the significance of the Streletsian point ostensibly from Layer III.

The Kostënki 11 Layer III Streletsian point as part of the 'Layer III' assemblage

The Streletsian point was found in square C-33, during excavation of test-pit C-T-32-34 in 1965 (Rogachëv 1965), and not from the main excavation area (see Fig. 3). Given the known stratigraphic uncertainties outwith Rogachëv's main excavation area, the Streletsian point's allocation to 'Layer III' is therefore probably insufficient on its own to conclude that it belongs with the remainder of the Layer III assemblage. Instead it is necessary to consider whether the artefact is consistent with the assemblage's overall technological profile.

Like the majority of the Kostënki 11 Layer III lithic assemblage, the Streletsian point is made on good quality Cretaceous flint. There is therefore no obvious reason to separate it from the other Layer III lithics on the basis of raw material (Rogachëv 1965; Popov & Dudin 2004). Popov and Dudin (2004) suggested that the large, wide blade or thin flake blank selected for its manufacture is consistent with blanks produced in the Layer III assemblage. The Cretaceous flint in Layer III was clearly used for blade production (Popov 1989) and, as Figure 9 shows, some of the blades produced were large. However, no blade in the Layer III collection would have been large enough to produce the Streletsian point which, even after shaping, retains a maximum width of 37 mm (see also Fig. 5). It is more likely that a large, thin flake was used to manufacture the point, as was seemingly the case at other Kostënki Streletsian sites (eg, Kostënki 1 Layer V, Kostënki 6: see Bradley *et al.* 1995). Excluding cores and core fragments, only one piece in the Layer III lithic assemblage (n = 1 of 522 [excludes material

from test-pit д-г-16-17; see text]) has a length and width greater than the Streletskian point (ie, >58 mm and >37 mm), and this is a large flake of quartzite, a material which makes up only 1% of the lithic assemblage (n = 6 of 536 [excludes material from test-pit д-г-16-17; see text]). It is therefore difficult to consider the point's blank as typical of the Layer III assemblage. Anikovich *et al.* (1997; 1998; also Bradley *et al.* 1995; Popov & Dudin 2004) concluded that the Kostënki 11 Layer III Streletskian point was shaped using the same secondary thinning technique used for Streletskian points at other Kostënki sites, but this technique is not apparent on any of the other artefacts previously classified as points in the Kostënki 11 Layer III assemblage (Anikovich *et al.* 1997; 1998; Popov & Dudin 2004). Furthermore, characteristic thinning flakes found in other Streletskian point assemblages have not been found in the Kostënki 11 Layer III assemblage (Anikovich *et al.* 1997; 1998; also Bradley *et al.* 1995), leading Anikovich *et al.* (1997; 1998) to propose either that these flakes exist in an unexcavated area of the site, or that the point was manufactured elsewhere. Rogachëv and Anikovich (1984) even suggested that the Streletskian point may have been found, collected, and transported to the site. There is precedent for such behaviour at Kostënki; indeed, at Kostënki 11 itself the occupants of Layer Ia collected wide blades from Layer II to create bladelet cores (Popov 1989; Rodionov 2016). Although we remain open-minded about the similarity of the Kostënki 11 Layer III lithic industry to that from Kostënki 8 Layer I (see above), we can note that the latter also contains no evidence for Streletskian points or their manufacture (Rogachëv *et al.* 1982; Anikovich *et al.* 2008, 153).

There is therefore no technological feature that helps to tie the Kostënki 11 Layer III Streletskian point to the rest of the layer's lithic assemblage. Of course, one can easily imagine a scenario whereby a Streletskian point created elsewhere was discarded at Kostënki 11; nevertheless, when considered alongside Layer III's unresolved stratigraphic issues, particularly beyond Rogachëv's main Layer III excavation area, the point's association with other material from the layer should presently be treated as undemonstrated. As this single Streletskian point is the sole reason for comparison of Layer III with Streletskian assemblages elsewhere at Kostënki and beyond, it follows that invoking cultural connections with these other assemblages is injudicious.

CONCLUSIONS

New radiocarbon dates of 24–23,000 BP (= *c.* 28,500–27,000 cal BP) for a wolf burial associated with Layer III of Kostënki 11 demonstrate its association with Sinitsyn's (2015, 165) chronological group IV, hence confirming its recent age relative to Kostënki-Borshchëvo's Spitsynian, Aurignacian, Early Gravettian, and Gorodtsovian sites and layers. The dates are instead similar to new dates for Kostënki 8 Layer I, with which the Kostënki 11 Layer III lithic assemblage has previously been grouped as the 'Anosovka-Tel'manskaya Culture'. These two assemblages are also chronologically close to Late Gravettian Kostënki-Avdeëvo Culture sites such as Kostënki 1 Layer I and Kostënki 18. A new study of the Kostënki 11 Layer III lithic assemblage would enable meaningful comparison with Kostënki 8 Layer I, and assessment of blade production at all of these sites should help to elucidate the relationships between them.

A single Streletskian point from Layer III at Kostënki 11 has previously been used to propose a cultural link with Streletskian sites and assemblages at Kostënki and beyond. However, there is reason to question the association of this Streletskian point with other lithic material from Layer III. Stratigraphic uncertainties relating to Layer III remain unresolved, including those in the test-pit that yielded the Streletskian point. There is also currently no technological context for the Streletskian point in the remainder of the Kostënki 11 Layer III lithic assemblage. The blank from which it was made is unusual for the layer, the secondary thinning technique used for its manufacture is not evident on any of the layer's other artefacts, and no characteristic thinning flakes have been found, despite their presence at other Streletskian sites at Kostënki. These issues make it unwise to place too much significance on this single artefact, and therefore unwarranted to describe Kostënki 11 Layer III as Streletskian or to evoke a cultural link with Streletskian sites elsewhere.

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Endnote

¹ 'Sungirian' is often used to stress perceived chrono-cultural differences between Sungir' and assemblages elsewhere, particularly some of the more ancient Kostënki sites (eg, by Bader 1978, 224). In other cases Streletskian and Sungirian are used interchangeably as synonyms (eg, Djindjian *et al.* 1999, 148–9; Otte 2014, 2589). However, as far as we are aware nobody has suggested that the shared presence of Streletskian points is without cultural meaning.

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RÉSUMÉ

L'âge de la culture *Anosovka-Tel'manskaya* et la question d'un *streletskien* à *Kostenki 11*, Russie du sud-ouest, de Rob Dinnis, Alexander A. Bessudnov, Natasha Reynolds, Katerina Douka, Alexander E. Dudin, Gennady A. Khlopachev, Mikhail V. Sablin, Andrei A. Sinitsyn, et Thomas F.G. Higham

Des pointes *streletskiennes* triangulaires à base concave sont documentées dans plusieurs assemblages de sites du paléolithique supérieur du complexe *Kostenki* en Russie du sud-ouest. On a argumenté que certains de ces assemblages mettaient en évidence une très précoce occupation humaine moderne de l'Europe de l'est. Toutefois, des pointes *Streletskiennes* sont aussi enregistrées dans des contextes plus jeunes, en particulier à *Kostenki 11*, où des exemples sont attribués à la fois à la couche V et à la couche III stratigraphiquement plus hautes. L'âge apparemment relativement jeune de la couche III a conduit certains à la considérer comme la dernière manifestation du *streletskien*, bien que son assemblage ait aussi été comparé à la couche I, non *streletskienne*, de *Kostenki 8*, toutes deux ensemble étant décrites comme la culture *Anosovka-Tel'manskaya*.

Des datations au C^{14} de 24–23 000 BP (env. 28 500–27 000 cal BP) pour une sépulture de loup associée à la couche III de *Kostenki 11* confirment que la couche est plus jeune que d'autres assemblages *streletskiens* à *Kostenki*. De nouvelles datations au C^{14} de la couche I de *Kostenki 8* montrent que les couches sont grosso modo contemporaines et que toutes deux sont proches en âge des assemblages de la culture *Kostenki-Avdevo* (Gravettien tardif) de *Kostenki*. Le contexte de la pointe *streletskienne* de la couche III de *Kostenki 11* est examiné à la lumière de ces nouvelles datations au C^{14} . Bien qu'il ne soit pas possible d'arriver à des conclusions solides, des problèmes stratigraphiques non résolus et le manque de contexte technologique pour cet objet isolé laissent, pour le moins, un point d'interrogation sur son association avec tout autre matériau de cette couche.

ZUSSAMENFASSUNG

Die Zeit der "Anosovka-Tel'manskaya-Kultur" und das Problem eines Späten Streletskiens in Kostënki 11, Südwest-Russland, von Rob Dinnis, Alexander A. Bessudnov, Natasha Reynolds, Katerina Douka, Alexander E. Dudin, Gennady A. Khlopachev, Mikhail V. Sablin, Andrei A. Sinitsyn, und Thomas F.G. Higham

Dreieckige "Streletskaya-Spitzen" mit konkaver Basis liegen aus mehreren Inventaren spätpaläolithischer Fundplätze des *Kostënki-Komplexes* im Südwesten Russlands vor. Von einigen dieser Inventare wird angenommen, dass sie auf eine sehr frühe Besiedlung Osteuropas durch den modernen Menschen hinweisen. Jedoch liegen *Streletskaya-Spitzen* auch aus jüngeren Kontexten vor, insbesondere von *Kostënki 11*, wo Exemplare sowohl der Schicht Layer V als auch dem stratigraphisch höher liegenden Layer III zugeschrieben werden. Das offensichtlich relativ junge Alter von Layer III wird manchmal als die letzte Manifestation des *Streletskiens* gesehen, obwohl sein Ensemble auch mit der Nicht-*Streletskien*-Schicht Layer I von *Kostënki 8* verglichen wird und beide gemeinsam als *Anosovka-Tel'manskaya-Kultur* zusammengefasst werden.

Die Radiokarbonaten einer Bestattung eines Wolfes von 24–23.000 BP (ca. 28.500–27.000 cal BP), die mit Layer III von *Kostënki 11* in Verbindung steht, bestätigen, dass diese Schicht jünger ist als andere *Streletskaya*-Inventare in *Kostënki*. Neue Radiokarbonaten für Layer I von *Kostënki 8* zeigen, dass die beiden Schichten tatsächlich in etwa gleichzeitig sind, und dass beide den Inventaren von *Kostënkis* spät-gravettienzeitlicher *Kostënki-Avdevo-Kultur* zeitlich nahe sind. Im Licht dieser neuen Radiokarbonaten wird der Kontext der *Streletskaya-Spitze* aus Layer III von *Kostënki 11* erörtert. Auch wenn sichere Schlussfolgerungen noch nicht möglich sind, setzen ungelöste stratigraphische Probleme und das Fehlen eines technologischen Kontexts für dieses einzelne Artefakt zumindest ein Fragezeichen hinter seinen Zusammenhang mit anderem Material aus dieser Schicht.

RESUMEN

La cultura 'Anosovka-Tel'manskaya' y el Streletskiense tardío en Kostienki 11, SO de Rusia, por Rob Dinnis, Alexander A. Bessudnov, Natasha Reynolds, Katerina Douka, Alexander E. Dudin, Gennady A. Khlopachev, Mikhail V. Sablin, Andrei A. Sinitsyn, y Thomas F.G. Higham

Las puntas streletskienses triangulares y de base cóncava se documentan en numerosos conjuntos del complejo Kostënki del Paleolítico Superior en el suroeste de Rusia. Algunos de estos conjuntos se han propuesto como la evidencia más antigua de ocupación de humanos modernos del Este de Europa. Sin embargo, las puntas streletskienses se documentan también en contextos más recientes, especialmente en Kostënki 11, donde estos ejemplares están adscritos tanto al nivel V como al estratigráficamente superior Nivel III. La aparente cronología relativamente más reciente del Nivel III ha provocado que ésta sea considerada como la última manifestación del Streletskiense, aunque su conjunto también ha sido comparado con el Nivel no Streletskiense de Kostënki 8, ambos depósitos descritos como Cultura de Anosovka-Tel'manskaya.

Las dataciones de radiocarbono obtenidas de un enterramiento de lobo asociado con el Nivel III de Kostënki 11, 24–23.000 BP (*ca.* 28.500–27.000 cal BP), confirman que este nivel es tan reciente como otros conjuntos Streletskienses de Kostënki. Nuevas dataciones del Nivel I de Kostënki 8 muestran que los dos niveles son, en líneas generales, contemporáneos y que ambos están cronológicamente cercanos a los conjuntos de la Cultura Kostënki-Avdevo (Gravetiense Final) de Kostënki. A la luz de estas nuevas dataciones de radiocarbono se analiza el contexto de las puntas Streletskienses del Nivel III de Kostënki 11. Aunque no es posible extraer conclusiones definitivas, los problemas estratigráficos y la falta de contexto tecnológico para este artefacto permite plantear, al menos, dudas sobre su asociación con otros materiales documentados en el nivel.