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

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Triangular, concave-base ‘Streletskian points’ are documented in several assemblages from the Kostenkki 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 Kostenkki 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 Kostenkki 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 Kostenkki 11 confirm the layer as younger than other Streletskian assemblages at Kostenkki. New radiocarbon dates for Kostenkki 8 Layer I show that the two layers are broadly contemporary, and that both are close in age to assemblages of Kostenkki’s (Late Gravettian) Kostenkki-Avdeevka Culture. In the light of these new radiocarbon dates the context of the Streletskian point from Kostenkki 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, Kostenkki, Eastern Europe, Russia, wolf burial, radiocarbon dating
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 (e.g., Aurignacian, Gravettian) and others that are without parallel in the west (e.g., Streletsian, Spitsynian, Gorodtsovian).

Kostënki’s Streletsian 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 technotypological composition of Streletsian 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 Streletsian assemblages, however, share one defining lithic marker: the bifacially-worked, triangular, concave-base ‘Streletsian point’ (Anikovich 1977; Praslov & Rogachëv 1982; Bradley et al. 1995). Assemblages that include Streletsian 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; Matiukhin 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 Streletsian 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.

**KOSTѢNКI 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-Borschëvo 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 І–ІІ–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
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; Anikovich 2005a; Anikovich 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 & Kozlowski 1988, cited in Flas 2015, 56; Djindjian et al. 1999, 149, 430; Noiret 2004, 441; Sinitsyn 2010; also see
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 re-deposited. 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
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 Streletsian 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.

KOSTENKI 8 LAYER I & THE ‘ANOSOVKA-TEL’ MANSKAYA CULTURE
Kostëni 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
KOSTENKI 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)
Le-1638b: 22,760 ± 340 BP) has generally been seen as more reliable, particularly given the existence of a date of 21,800 ± 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, 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 et al. 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.)

Kostenkí 8 Layer I

Previously published radiocarbon dates for Kostenkí 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>
<thead>
<tr>
<th>Lab. code</th>
<th>Cultural layer</th>
<th>Sample</th>
<th>14C age BP, ±1σ error</th>
<th>Remarks</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Le-1403</td>
<td>Ia</td>
<td>Mammoth bone</td>
<td>12,000 ± 100</td>
<td></td>
<td>Rogachev &amp; Popov 1982; Sinitsyn et al. 1997</td>
</tr>
<tr>
<td>Le-1637</td>
<td>Ia</td>
<td>Mammoth bone</td>
<td>14,610 ± 120</td>
<td></td>
<td>Rogachev &amp; Popov 1982; Sinitsyn et al. 1997</td>
</tr>
<tr>
<td>Le-1704a</td>
<td>Ia</td>
<td>Bone</td>
<td>16,040 ± 120</td>
<td>Same bone as Le-1704b</td>
<td>Rogachev &amp; Popov 1982</td>
</tr>
<tr>
<td>Le-1704b</td>
<td>Ia</td>
<td>Bone</td>
<td>17,310 ± 280</td>
<td>Same bone as Le-1704a, 17,310 ± 200 according to Damblon et al. 1996</td>
<td>Rogachev &amp; Popov 1982</td>
</tr>
<tr>
<td>GIN-8079</td>
<td>Ia</td>
<td>Mammoth bone</td>
<td>18,700 ± 80</td>
<td></td>
<td>Praslov &amp; Soulerjytsyk 1997</td>
</tr>
<tr>
<td>GIN-2531</td>
<td>II</td>
<td>Burnt bone</td>
<td>21,800 ± 200</td>
<td>Same bone as Le-1638b. ‘Cultural layer III sup.’ in Damblon et al. 1996</td>
<td>Rogachev &amp; Popov 1982</td>
</tr>
<tr>
<td>Le-1638a</td>
<td>III</td>
<td>Bone</td>
<td>16,040 ± 120</td>
<td>Same bone as Le-1638b. ‘Cultural layer III sup.’ in Damblon et al. 1996</td>
<td>Rogachev &amp; Popov 1982</td>
</tr>
</tbody>
</table>

(Kostenkí 8 Layer I)
### TABLE 2: NEW RADIOCARBON DATES FOR THE WOLF REMAINS ASSOCIATED WITH LAYER III OF KOSTENKI 11

<table>
<thead>
<tr>
<th>Lab. code</th>
<th>Sample</th>
<th>Pre-treatment method</th>
<th>Used (mg)</th>
<th>Yield (mg)</th>
<th>%Yld</th>
<th>%C</th>
<th>δ¹³C (‰)</th>
<th>C:N ratio</th>
<th>¹⁴C yr</th>
<th>Calibrated age range (68.2% probability)</th>
<th>Calibrated age range (95.4% probability)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OxA-32591</td>
<td>Bone, <em>Canis lupus</em>, right humerus</td>
<td>AF*</td>
<td>520</td>
<td>32.8</td>
<td>6.3</td>
<td>44.1</td>
<td>−18.9</td>
<td>3.4</td>
<td>23,190 ± 160</td>
<td>27,610–27,340</td>
<td>27,730–27,190</td>
</tr>
<tr>
<td>OxA-32592</td>
<td>Bone, <em>Canis lupus</em>, right humerus</td>
<td>AF*</td>
<td>490</td>
<td>14.2</td>
<td>2.9</td>
<td>42.4</td>
<td>−19.4</td>
<td>3.3</td>
<td>23,630 ± 180</td>
<td>27,880–27,600</td>
<td>28,070–27,450</td>
</tr>
<tr>
<td>OxA-32593</td>
<td>Bone, <em>Canis lupus</em>, right humerus</td>
<td>AF*</td>
<td>470</td>
<td>25.3</td>
<td>5.4</td>
<td>44.0</td>
<td>−18.7</td>
<td>3.4</td>
<td>23,520 ± 170</td>
<td>27,800–27,540</td>
<td>27,930–27,410</td>
</tr>
<tr>
<td>OxA-32665</td>
<td>Bone, <em>Canis lupus</em>, right humerus</td>
<td>AF*</td>
<td>570</td>
<td>30.2</td>
<td>5.3</td>
<td>43.1</td>
<td>−19.1</td>
<td>3.4</td>
<td>23,940 ± 180</td>
<td>28,170–27,790</td>
<td>28,430–27,680</td>
</tr>
</tbody>
</table>

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 KOSTENKI 8

<table>
<thead>
<tr>
<th>Lab. code</th>
<th>Cultural layer</th>
<th>Excavation square</th>
<th>Sample</th>
<th>¹⁴C age BP ± 1σ error</th>
<th>Remarks</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>GrA-9283</td>
<td>II</td>
<td></td>
<td>Charcoal</td>
<td>21,900 ± 450</td>
<td></td>
<td>Sinitsyn 2004</td>
</tr>
<tr>
<td>CURL-15816</td>
<td>II</td>
<td></td>
<td>Charcoal</td>
<td>23,340 ± 150</td>
<td></td>
<td>Anikovich et al. 2015</td>
</tr>
<tr>
<td>GIN-7999</td>
<td>II</td>
<td></td>
<td>Horse bone</td>
<td>24,500 ± 450</td>
<td>Sample from 1959 excavations</td>
<td>Praslov &amp; Soulerjytsky 1997</td>
</tr>
<tr>
<td>CURL-15797</td>
<td>II</td>
<td>в-49</td>
<td>Charcoal</td>
<td>25,640 ± 210</td>
<td></td>
<td>Anikovich et al. 2015</td>
</tr>
<tr>
<td>OxA-30197</td>
<td>II</td>
<td></td>
<td>Bone (Equus sp.)</td>
<td>27,620 ± 270</td>
<td>C:N ratio: 3.3</td>
<td>Reynolds et al. 2015</td>
</tr>
<tr>
<td>OxA-30198</td>
<td>II</td>
<td></td>
<td>Bone (Equus sp.)</td>
<td>27,670 ± 270</td>
<td>δ¹³C (‰): −19.53</td>
<td>Reynolds et al. 2015</td>
</tr>
<tr>
<td>GrN-10509</td>
<td>II</td>
<td></td>
<td>Charcoal</td>
<td>27,700 ± 750</td>
<td></td>
<td>Rogachëv et al. 1982</td>
</tr>
</tbody>
</table>
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-Borschchëvo 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 KOSTENKI 8 LAYER I

<table>
<thead>
<tr>
<th>Sample stored under lifted</th>
<th>% Yld</th>
<th>δ13C</th>
<th>δ14C BP Calibrated age range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone (cutmarked)</td>
<td>1200</td>
<td>42.5</td>
<td>1818-1839/–80–1800</td>
</tr>
<tr>
<td>Bone (possibly cutmarked)</td>
<td>1200</td>
<td>40.5</td>
<td>1818-1839/–80–1800</td>
</tr>
<tr>
<td>Bone (worked)</td>
<td>1100</td>
<td>51.6</td>
<td>1862-1874/AF*</td>
</tr>
</tbody>
</table>

- **% Yld**: % mass of carbon in combusted sample.
- **δ13C**: C isotopic ratio relative to VPDB.
- **δ14C BP**: Calibrated age range.

**Sample code**: OxA-27220, OxA-27221, OxA-26762

**AF**: Routine ABA pre-treatment and ultrafiltration; **AF***: Solvent extraction (here, sequential extraction in acetone, methanol and chloroform) followed by routine ABA pre-treatment and ultrafiltration.

**Pre-treatment method**: Bone (cutmarked), Bone (possibly cutmarked), Bone (worked).

**Yield**: 1818-1839/–80–1800, 1818-1839/–80–1800, 1862-1874/AF*.

**Calibrated age range**: 28,450–28,010, 28,450–28,010, 28,010–27,710.

**Note**: R. Dinnis & et al. (2018) place the Kostenki 11 Layer III assemblages in the LATE STRELETSKIAN, KOSTENKI 11, RUSSIA.

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R. Dinnis et al. ‘ANOSOVKA-TEL’MANSKAYA CULTURE’, LATE STRELETSKIAN, KOSTENKI 11, RUSSIA

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(eg, Kostenki 17 Layer II, Kostenki 14 Layer in Volcanic Ash and Layer II, Kostenki 1 Layer III, Kostenki 15) as well as the Gravettian assemblages from Kostenki 8 Layer II, Kostenki 4, and Borshchevo 5 Layer I (Praslov & Rogachev 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 Kostenki-Avdeevko Culture (= Late Gravettian ‘Kostenki’) sites of Kostenki 1 (Layer I), Kostenki 18, and Kostenki 14 (Layer I) (Praslov & Rogachev 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 Kostenki 11 Layer III and Kostenki 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 Kostenki 11 Layer III is needed – comparable to the recent study of Kostenki 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 Kostenki 8 Layer I, Kostenki 11 Layer III, and the Kostenki-Avdeevko 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, Kostenki 11 Layer III has also been described as Streletsian/Sungirian, or has been seen as culturally linked to other Streletsian sites, due to the presence of a Streletsian point (Fig. 5. no. 2) (eg, Debrosse & Kozlowskii 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 Rogachev & Anikovich 1984; Popov 1989). The layer’s apparently more recent age than assemblages with Streletsian points reported from the Lower Humic Bed (Kostenki 1 Layer V, Kostenki 6, Kostenki 12 Layer III) and Upper Humic Bed (Kostenki 11 Layer V, Kostenki 12 Layer Ia) means that it has sometimes been viewed as the last manifestation of the Streletsian at Kostenki; or,
alternatively, that the Kostenkî 11 Layer III and Kostenkî 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).

Kostenkî 11 Layer III: stratigraphic issues

The radiocarbon age of the wolf burial in Rogachëv’s main excavation area (ie, squares Л–Ш–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 solification 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 d–t–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 d–t–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 І–ІІІ–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 (Fedunin 2015; 2016). Although these excavations failed to firmly establish a separate Layer IIIa within Layer III sensu lato, some typotechnological 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
importance when assessing the significance of the Streletskian point ostensibly from Layer III. The Streletskian point was found in square С–33, during excavation of test-pit С–Т–32–34 in 1965 (Rogachёv 1965), and not from the main excavation area (see Fig. 3). Given the known stratigraphic uncertainties outwith Rogachёv’s main excavation area, the Streletskian 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 Kostiёnkı 11 Layer III lithic assemblage, the Streletskian 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 (Rogachёv 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 Streletskian 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 Kostiёnkı Streletskian sites (eg, Kostiёnkı 1 Layer V, Kostiёnkı 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 \( n = 6 \)-16-17; see text]) has a length and width greater than the Streletsian 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 \( n = 6 \)-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 Streletsian point was shaped using the same secondary thinning technique used for Streletsian 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 Streletsian 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 Streletsian 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 Streletsian 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 Streletsian point to the rest of the layer’s lithic assemblage. Of course, one can easily imagine a scenario whereby a Streletsian 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 Streletsian point is the sole reason for comparison of Layer III with Streletsian assemblages elsewhere at Kostënki and beyond, it follows that invoking cultural connections with these other assemblages is injudicious.

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-Avdeev 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 Streletsian point from Layer III at Kostënki 11 has previously been used to propose a cultural link with Streletsian sites and assemblages at Kostënki and beyond. However, there is reason to question the association of this Streletsian 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 Streletsian point. There is also currently no technological context for the Streletsian 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 Streletsian 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 Streletsian or to evoke a cultural link with Streletsian sites elsewhere.

Acknowledgements: We are grateful to Maria Medvedeva and Natalia Lazarevskaya for their generous help with the IHMC RAS archive material. We are also thankful to several colleagues who commented on an earlier draft of this paper. Radiocarbon dates for Kostënki 8 are courtesy of the ‘Ancient Human Occupation of Britain’ project. AB’s work is supported by the RFBR grants 14-06-31134_mol-a and 17-06-00319a. NR is supported by a Postdoctoral Study Grant from the Fondation Fyssen, and also thanks the ‘PalaeoChron’
project (ERC grant 324139 awarded to TH) for time spent undertaking this research. AS acknowledges grant RFBR 17-06-00319a, and the participation of ZIN RAS (state assignment No.AAAA-A17-117022810195-3) to this research is also duly acknowledged. RD is grateful for the support of the Leverhulme Trust. This publication is a contribution to the Leverhulme Trust project RPG-2012-800.

Endnote

1 ‘Sungirian’ is often used to stress perceived chrono-cultural differences between Sungir’ and assemblages elsewhere, particularly some of the more ancient Kostěnki sites (eg, by Bader 1978, 224). In other cases Streletsian 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 Streletsian points is without cultural meaning.

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R. Dinnis et al. ‘ANOSOVKA-TEL’MANSKAYA CULTURE’, LATE STRELETSKIAN, KOSTENKI 11, RUSSIA


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. Sabin, 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 C14 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 C14 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-Avdeevko (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 C14. Bien qu’il ne soit pas possible d’arriver à des conclusions solides, des problèmes stratigraphiques non résolus et le manque d’un contexte technologique pour cet objet isolé laissent, pour le moins, un point d’interrogation sur son association avec tout autre matériau de cette couche.

ZUSAMMENFASSUNG


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-Avdeeo (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.