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Human Teeth from Strashnaya Cave, the Altai Mountains, with Reference to the Dental Variation in Stone Age Siberia

Human teeth found in layer 3₁a of Strashnaya Cave, northwestern Altai Mountains, in 1989, are described. The layer is related to the Upper Paleolithic and has been dated to 19,150 ± 80 BP. However, owing to the nature of sedimentation in the areas adjacent to the cave's walls, where the teeth were found, these may be either earlier or later. The objective of this study is to examine the possible biological continuity between the Upper Paleolithic and Neolithic populations of the Altai-Sayan highland because the teeth from Strashnaya may postdate their layer. In view of the chronological ambiguity, we compared them with both the Paleolithic and Neolithic specimens from southwestern Siberia. Marked affinities have been demonstrated between the Strashnaya teeth and those from the Upper Paleolithic sites of Malta, Listvenka, and Afontova Gora II in Southern Siberia, suggesting that the Upper Paleolithic population of the Altai Mountains represented the same Southern Siberian dental complex. Certain features link the Strashnaya child with people associated with the Neolithic and Chalcolithic cultures of the Altai-Sayan region, such as the Kuznetsk-Altai and Bolshoy Mys cultures, possibly evidencing evolutionary conservatism.

Keywords: *Upper Paleolithic, Neolithic, Altai Mountains, Strashnaya Cave, dental anthropology, Southern Siberian Upper Paleolithic dental complex.*

Introduction

Strashnaya Cave in the Northwestern Altai, in the middle Inya River (Charysh River basin), has been excavated several times since 1966, and has yielded rich archaeological and faunal materials (Okladnikov et al., 1973; Derevianko, Zenin, 1997; Zenin, Kandyba, 2006; Krivoshapkin et al., 2015). Thirteen lithological layers, 10 m thick in total, were distinguished in the stratigraphic profile (Fig. 1). Upper layers 1 and 2 are of Holocene age, while layers from 3 to 13 represent the Pleistocene. Layers 11–13, in the base of the profile, are archaeologically sterile (Zenin, Ulyanov, 2007).

The cave has been referred to as an etalon Middle and Early Upper Paleolithic site in Altai (Derevianko, Zenin, 1997; Rybin, Kolobova, 2009). Radial flaking, with the presence of a remarkable Levallois component and some signs of laminar flaking (represented mostly by end products), is typical of the Middle Paleolithic stone tool complexes of layers 5–10. The toolkit includes scrapers, notched-denticulate tools, and flakes with irregular retouch. The Upper Paleolithic deposits of the Strashnaya Cave (layers 3 and 4) represent several chronological and cultural shifts during the existence of the site (Krivoshapkin, Zenin, Shalagina, 2014). The origin of one of the complexes is related to the Middle Paleolithic industry. It is characterized by discoidal and Levallois flaking, and by the prevalence of scrapers and notched-denticulate tools. Another complex is associated with the Upper Paleolithic Kara-Bom tradition (blade

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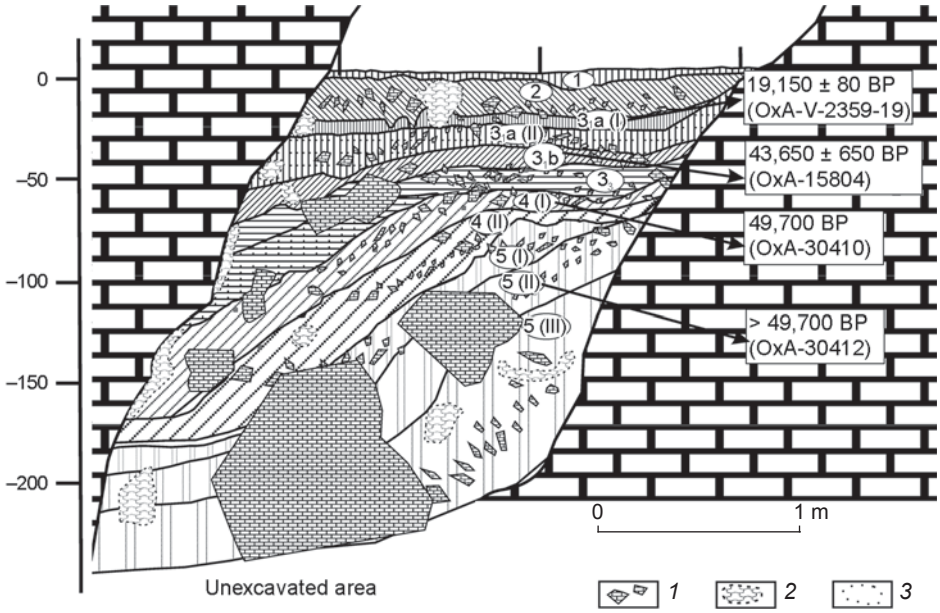

Fig. 1. Scheme of the stratigraphic section in Strashnaya Cave.
1 – debris, blocks; *2* – molehill; *3* – disruption of the layer.

flaking). Finally, one more episode of the inhabitation of the cave is represented by the Late Upper Paleolithic industry characterized by small-blade production and the availability of bone tools.

In 1989, eight teeth from a subadult individual and a fragment of the distal part of the humerus of an adult individual were found in layer 3_1a, near the northeast wall of the cave. These bones were initially studied by B. Viola, who determined the age of the subadult's teeth and assigned it to the modern human species, but pointed out its numerous plesiomorphic features (2009: 197). There has so far been no detailed comparison of the remains from Strashnaya Cave with samples from other Siberian Upper Paleolithic sites, since the stratigraphic context of the finds has not been clearly defined (Ibid.).

Layer 3_1a, where the remains were found, was dated to Upper Paleolithic times, more specifically 19,150 ± ± 80 BP (OxA-V-2359-19) (Derevianko et al., 2015: 10). But taking into account the specific conditions of sedimentation in the area of the cave that slopes down to the wall with a positive inclination (Zenin, 1998: 98–99), these fossils might be either younger (Krivoshapkin, Zenin, Shalagina, 2014) or older. At the moment, they are probably the most ancient remains of *Homo sapiens sapiens* in Altai. But even if they are re-dated to the Holocene in future, it will not make them less important for the reconstruction of the population history of southwestern Siberia. The earliest Neolithic dental specimens in this region are dated to the second half of the 7th to early 6th millennia BC (Molodin, 2001: 115), while the latest of all the Western Siberian Upper Paleolithic specimens, the mandible from Listvenka, was found in the layer dating within the range between 13,910 ± 400 and 13,100 ± 410 BP (Khaldeyeva et al., 2016). So, there is a 6000 years long hiatus between the two, and it is virtually impossible to objectively assess the degree of biological continuity between the populations of the Altai-Sayan region during that period. If the younger date for the studied samples is confirmed, it will help to partially fill this gap.

This study was focused on a detailed morphological analysis of the teeth from Strashnaya Cave and on identification of the degree of similarity between them and other Neolithic, Upper and Middle Paleolithic specimens found in Siberia and Altai.

Materials

Our sample includes deciduous lower left canine and two molars; permanent lower left incisor, canine, and first premolar; lower second molar; and an upper left second premolar. All these teeth belonged to one subadult individual, 7–9 years of age (Viola, 2009: 197). The deciduous teeth are heavily worn, signs of erosion, fractures, scratches, and post-mortem loss of enamel are observed. The permanent teeth are well-preserved unerupted buds. Only the lower second incisor has erupted during the individual's lifetime. This tooth was initially determined as an upper one (Ibid.: 183). But there is a number of features that contradict to this determination: prominent mesio-distal flattening of the root; distal groove (visible despite the post-mortem damage); bit-shaped, narrow, and tall crown, which is

flattened in the mesial plane; distal inclination of the cutting edge; more elevated position of the mesial corner of the crown as compared to the distal corner; and the indentations of the cutting edge.

Table 1. **Grade scales of the dental traits used in this study**

Trait	Grades	
	Russian dental protocol	ASUDAS
Distal accessory ridge $C_н$	+	2–5
Mesial accessory ridge $C_н$	+	2–5
Shape of the P_1	(1–2), (4–5)	0, 1–9
Cingulum M_2	+	+
$t6M_2$	+	2–5
$5M_2$	+	Hypoconulid grades 1–5
$4M_2$	+	Hypoconulid grade 0
$(+)M_2$	"+"	"+"
$(X)M_2$	"X"	"X"
$(Y)M_2$	"Y"	"Y"
Anterior fovea M_2	+	3, 4
Posterior fovea M_2	+	+
$3YM_2$	+	3-cusped M2
Protostylid M_2	2–5	2–7
Fovea of the protostylid	+	1
Tami (C7) M_2	+	1–4
Distal trigonid crest M_2	+	+
Epicristid	+	+
Deflecting wrinkle of metaconid M_2	+	2, 3
2med(II)	+	The groove distally delimiting the axial metaconid crest falls into the fissure separating the metaconid and protoconid
2med(III)	+	The groove distally delimiting the axial metaconid crest falls into the fissure separating the metaconid and entoconid

Methods

The samples were studied using an extended set of dental traits (Table 1) including: ASUDAS protocol (Turner, Nichol, Scott, 1991); conventional set of traits used in Russian dental anthropology (Zubov, 1968, 2006); complete description of the odontoglyphic pattern of the buccal teeth crowns (Zubov, Khaldeyeva, 1989); Neanderthal complex markers (Bailey, 2002); and, finally, so-called archaic markers, i.e. plesiomorphic traits marking the relationship between the Paleolithic and Meso-Neolithic population (Zubova, 2013). Based on the full set of traits, each tooth was compared at the individual level with the Middle Paleolithic specimens from Chagyrskaya and Okladnikov caves belonging to *Homo neanderthalensis* (Shpakova, 2001) (unpublished results of A.V. Zubova), the Upper Paleolithic specimens from Malta, Afontova Gora, and Listvenka sites (Zubova, Chikisheva, 2015b), Khaiyrgas (Zubova, Stepanov, Kuzmin, 2016), and the Neolithic sites of Itkul, Ust-Isha, Kaminnaya Cave, Vaskovo-4, Lebedi-2, Solontsy-5, Vengerovo-2a, Sopka-2, Protoka-1 (Zubova, Chikisheva, 2015b), Diring-Yuryakh, Kamenka-2, Matta, and Pomazkino-2 (unpublished results of A.V. Zubova).

Morphological description

Permanent upper left second premolar (Fig. 2, *3*). The vestibular cusp of the crown is larger than the lingual cusp, but in general they are of similar size. The mesial, distal, and central segments, the 1pa, 2pa, 1pr, and 2pr grooves are clearly seen on each of the cusps. The grooves of the paracone do not fall into intertubercular fissure II but they are connected by a groove of the third order, and form a separated triradius delimiting the apex of the cusp. The grooves of the second order of the protocone form a diradius that falls into the intertubercular fissure. There are elements of a strongly reduced metacone with inchoate elements of 1me and 2me in the crown pattern. In the protocone, groove 3pr is present, which delimits an accessory mesial cusp. An analogous accessory cusp on the distal side is formed by fissure II and groove 2me. Dimensions of the crown are very large (Table 2), above average sizes of the upper premolars in modern populations (Zubov, Khaldeyeva, 1993, Suppl. data, Tab. 3). The closest parallels are the premolars of the Sungir 2 individual.

Permanent lower left second incisor (Fig. 3, *4*). This tooth is characterized by a prominent lingual shoveling (Table 3) and a very weak development of the vestibular marginal ridges. Enamel of the basal part of the crown is destroyed. The mesio-distal diameter of the crown is very large (see Table 2). The closest parallels to such a morphology can be found in some Upper Paleolithic

Table 2. **Dental metrics of the teeth from Strashnaya Cave and the Upper Paleolithic dental samples from Siberia**

Variable	Afontova Gora II	Malta 1	Malta 2	Listvenka	Strashnaya
MD cor P^2	–	–	–	–	7.3
VL cor P^2	–	–	–	–	11.3
MD cor I_2	–	–	–	–	6.8
MD cor $C_н$	–	–	–	–	7.6
VL cor $C_н$	–	–	–	–	8.5
MD cor P_1	–	–	–	–	8.3
VL cor P_1	–	–	–	–	8.7
MD cor M_2	11.7	–	–	–	12.8
VL cor M_2	10.8	–	–	–	11.7
MD cor m_1	–	8.5	8.4	9.5	10
VL cor m_1	–	7.8	7.1	7.1	8
MD cor m_2	–	9.7	10.8	10.9	11.6
VL cor m_2	–	8.4	8.7	9.5	10.1
MD cor $c_н$	–	–	6.2	6.8	7
VL cor $c_н$	–	–	5.5	5.5	6.5

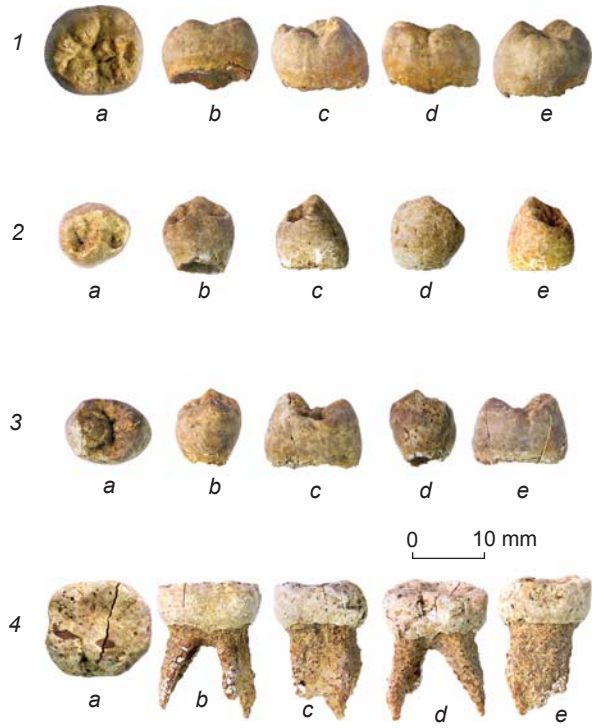

Fig. 2. Dental specimens from Strashnaya Cave.
1 – permanent left M_2; *2* – permanent left P_1; *3* – permanent left P^2; *4* – deciduous left m_2.
a – occlusal norm; *b* – lingual, *c* – mesial, *d* – vestibular (buccal), *e* – distal.

specimens from Western Europe (Lachaud, Les Rois, Paglicci-12) and European Russia (Sungir 3). Notably, in the samples from Vindija, Předmostí, Grotte des Enfants, and Les Rois, there are specimens of larger size (Voisin et al., 2012).

Permanent lower left canine (Fig. 3, *2*). A prominent shoveling and the presence of an accessory distal ridge are observed (see Table 3). The lingual cusp in the basal part is fairly developed. The tooth, like the two previous ones, is large (see Table 2). The closest analogs are found in Western Europe and North Africa (Arene Candide, Lachaud, Taforalt) (Ibid.).

Permanent lower left first premolar (see Fig. 2, *2*). The crown is asymmetrical and has an extended talonid with a hypoconid and elements of entoconid. The metaconid is located along the central axis of the crown, and it is slightly inferior to the protoconid. The two cusps are connected by a transversal ridge, which is partially disrupted by intertubercular fissure II. The degree of variation of the crown complies most with point 4 of the Zubov scale, as there is an element of its own apex observed on the lingual

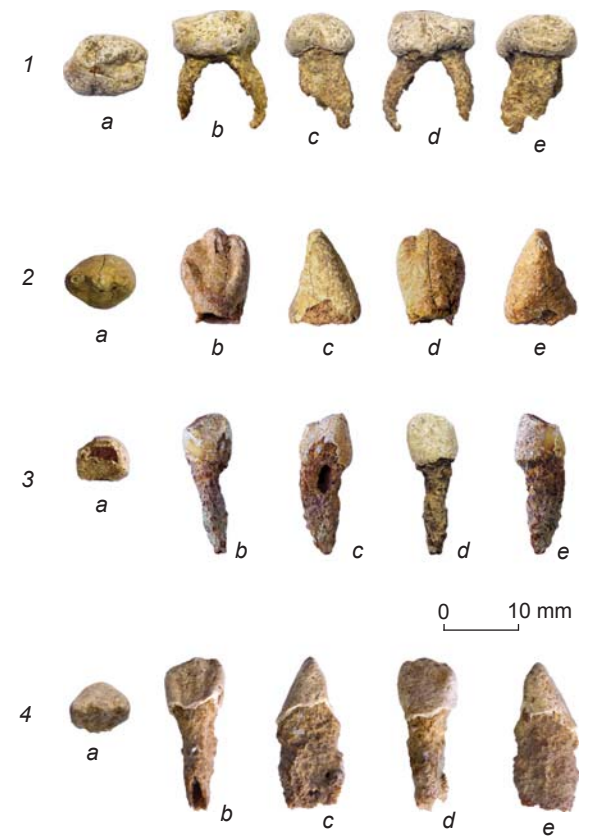

Fig. 3. Dental specimens from Strashnaya Cave.
1 – deciduous left m_1; *2* – permanent lower left C; *3* – deciduous lower left C; *4* – permanent left I_2.
a–e – see the legend for Fig. 2.

Table 3. **Dental traits of the mandibular teeth from Strashnaya Cave and the Upper Paleolithic dental samples from Siberia**

Trait	Tooth		Malta 2	Listvenka	Afontova Gora II	Strashnaya	Khaiyrgas	Malta 1
1	2		3	4	5	6	7	8
Shoveling	I2	right	–	–	–	–	–	–
	–	left	–	–	–	2	–	–
	C	right	0	–	–	–	–	–
		left	–	–	–	3	–	–
Distal accessory ridge	C	right	0		–	–	–	–
		left	–	–	–	+	–	–
Premolar shape	P1	right	–	–	–	–	–	–
		left	–	–	–	3–4	–	–
Cingulum	P1	right	–	–	–	–	–	–
		left	–	–	–	+	–	–
	M1	right	+	+	0	–	–	–
		left	+	+	0	–	–	–
	M2	right	–	–	0	–	–	–
		left	–	–	0	+	–	–
	m2	right		+	–	–	–	+
		left		+	–	+	0	+
Molar shape	M2	right	–	–	X6	–	–	–
		left	–	–	X6	X6	–	–
	m2	right	Y5	Y5	–	–	–	Y6
		left	Y5	–	–	Y6	Y6	Y6
Protostylid	M1	right	0	P	P	–	–	–
		left	0	P	P	–	–	–
	M2	right	–	–	P	–	–	–
		left	–	–	P	2–3	–	–
	m2	right		1	–	–	–	+
		left		–	–	+	–	+
Distal trigonid crest	M1	right	0	0	0	–	–	–
		left	0	0	0	–	–	–
	M2	right	–	–	0	–	–	–
		left	–	–	0	0	–	–
	m2	right	0	0	–	–	–	0
		left	0	–	–	–	+	0
Medial trigonid crest	M1	right	0	0	0	–	–	–
		left	0	0	0	–	–	–
	M2	right	–	–	0	–	–	–
		left	–	–	0	0	–	–

Table 3 (end)

1	2		3	4	5	6	7	8
Deflecting wrinkle of metaconid	M1	right	0	0	0	–	–	–
		left	0	0	0	–	–	–
	M2	right	–	–	0	–	–	–
		left	–	–	0	0	–	–
	m2	right	0	0	–	–	–	0
		left	0	–	–	–	–	0
Fa	M1	right	0	+	+	–	–	–
		left	0	–	+	–	–	–
	M2	right	–	–	+	–	–	–
		left	–	–	+	+	–	–
	m2	right	+	+	–	–	–	+
		left	+	–	–	+	0	+
Fp	M1	right	0	0	+	–	–	–
		left	0	0	–	–	–	–
	M2	right	–	–	+	–	–	–
		left	–	–	+	0	–	–
Central cusp	M1	right	0	0	0	–	–	–
		left	0	0	0	–	–	–
	M2	right	–	–	0	–	–	–
		left	–	–	0	+	–	–
Tami	M1	right	0	0	1	–	–	–
		left	0	0	1	–	–	–
	M2	right	–	–	0	–	–	–
		left	–	–	0	1	–	–
	m2	right	0	0	–	–	–	+
		left	0	–	–	–	0	+
1med/1prd	M1	right	–	1	1	–	–	–
		left	–	–	–	–	–	–
	M2	right	–	–	1	–	–	–
		left	–	–	1	2	–	–
	m2	right	3	–	–	–	–	1
		left	1	–	–	–	1	1
2med	M1	right	Fc	Fc	Fc	–	–	–
		left	II	III	–	–	–	–
	M2	right	–	–	III	–	–	–
		left	–	–	II	II	–	–
	m2	right	Fc	III	–	–	–	III
		left	II	–	–		III	III

cusp. The odontoglyphic pattern includes intertubercular fissures I and II, which separate the hypoconid and protoconid on the one side, and the protoconid and metaconid on the other side. Fissures III–V are inchoate: they originate from the basin of the talonid but do not reach the margins of the crown. The grooves of the second order 1med and 1prd are well pronounced in the mesial portion, while in the middle part, there is the 2prd, which delimits the transversal ridge from the distal side. The basins of the trigonid and talonid are deep and long. On the vestibular side of the crown, the projection of the cingulum and the presence of a moderately pronounced mesial marginal ridge are observed. There is a small fovea, highly atypically for modern *Homo sapiens*, around the place where the ridge merges with the cingulum. The crown of the tooth is very large (see Table 2), its size exceeds the dimensions of the lower first premolars not only in modern, but also in the Upper Paleolithic populations (Zubov, Khaldeyeva, 1993; Voisin et al., 2012).

Permanent lower left second molar (see Fig. 2, *1*). The crown is of oval shape and comprised of six cusps. On its lingual side, there are the metaconid and entoconid, on vestibular side—protoconid, hypoconid, and a large hypoconulid. The sixth cusp is in the center of the distal side of the crown, effectively in an extension of its sagittal axis. All the cusps display tall apexes inclined towards the center of the crown. The markedly prominent cingulum and the presence of the protostylid in the form of cingular cog, branching from the vestibular groove, are observed on the vestibular surface. A large anterior fovea is formed by the 1prd and 1'med grooves in the mesial portion. The *Tami* trait is present in the metaconid; the crown pattern is "X"; the distal and medial ridges of the trigonid, as well as the deflecting wrinkle of the metaconid, are absent (see Table 3). The odontoglyphic pattern comprises the full set of intertubercular fissures I–VI and grooves 1 and 2 of the metaconid, protoconid, hypoconid, entoconid, and hypoconulid. The 3med element and the grooves 2'med, 4hyd, and 4hld are also observed. The latter two grooves, together with fissure V, delimit the fragments of the axial ridges of the hypoconid and hypoconulid, adjacent to the central fovea, as a separate cusp. The second groove of the metaconid falls into fissure II, which is typical of the second molars of various Western and Eastern populations. The first groove falls into fissure I below the 1prd: a morphological pattern neutral in terms of taxonomic classification (Type 2). The crown is very large, its dimensions approach the upper limits of size variation of the Upper Paleolithic lower second molars. The most similar combination of parameters is observed in the Předmostí 9 and Taforalt XV-C2 specimens (Voisin et al., 2012).

Deciduous lower left canine (see Fig. 3, *3*). The tooth is very massive. The shape of the crown is sub-triangular, with a prominent vestibular cingulum. On the lingual side, the marginal ridges and the axial ridge, running from the base of the crown to its cutting edge, are well defined. Vestibular shoveling is absent.

Deciduous lower left first molar (see Fig. 3, *1*). The crown is massive, trapezoid, broadened in the mesial portion, with a very prominent cingulum and the presence of a moderately developed protostylid. The anterior fovea is divided into two elements, situated in the vestibular and lingual portions of the crown. But it is impossible to determine to what extent this separation reflects the true morphology of the tooth and to what extent it is due to attrition. The type of contact of the main cusps is "Y".

Deciduous lower left second molar (see Fig. 2, *4*). The crown is very massive, sub-rectangular, with a prominent tuberculum molare, and a strongly developed vestibular cingulum. It is formed by six cusps with the "Y" type of contact. *Tami* was probably also present in the crown pattern. A moderately developed protostylid and the fovea of the protostylid are observed in the protoconid, and a dentated cingular eminence in the hypoconid. Elements of the anterior fovea are present in the mesial portion. Fragments of intertubercular fissures II–IV, VI, and the groove of the second order 1med are observed. According to the direction of the 1med, the deflecting wrinkle of the metaconid is absent.

Results of the comparative analysis

The results of the comparison between morphology of the teeth found in Strashnaya Cave and those of Altai Neanderthals have shown the complete absence of similarity between them. As was previously shown by Viola, the teeth from this cave do not exhibit typical markers of the Neanderthal complex (2009: 197). The only feature that could be considered a sign of biological relatedness between the individual from Strashnaya and the Neanderthals from Okladnikov Cave is the presence of the central cusp on the occlusal surface of the lower molar, which was observed both in the second molar from Strashanaya Cave and in specimens 2, 4, and 5 from Okladnikov Cave. However, a detailed analysis has shown that the genesis of this feature in the former and in the latter is entirely different. In specimens 4 and 5 from Okladnikov, the cusp is located on the metaconid and formed by the accessory groove 4med. In Okladnikov tooth 2, it is delimited by the groove 4hyd as a part of the hypoconid. But in the individual from Strashnaya it has a complex genesis: it is formed by the hypoconid and hypoconulid simultaneously, which differs it from the pattern mentioned above. The metrics of the teeth that, according to the study by Viola, reach the upper limit of variation in Neanderthals, and exceed the values typical for the Upper Paleolithic *Homo sapiens* (Ibid.), cannot be considered an evidence of the biological continuity as well. The specimens from

Okladnikov and Chagyrskaya caves display small values of metric variables and, consequently, the macrodontia of the Strashnaya individual cannot be explained by his relationship with the Altai Neanderthals.

The degree of morphological similarity between the specimens from Strashnaya and the Upper Paleolithic or Neolithic dental samples from Western Siberia has been assessed in the context of taxonomic variation of their dental complexes. On the basis of results of previous research, an independent locus of dental morphogenesis, denoted as "Southern Siberian Upper Paleolithic", was described for the Altai-Sayan highlands (Zubova, Chikisheva, 2015b: 142). The populations formed in this area were different both from the Upper Paleolithic Europeans, who started showing the specialized Caucasoid complexes very early, and from the early modern humans from Asia. The dental pattern of the latter is known from finds in Fuyan Cave in Daoxian (southern China, Hunan Province) that are probably not younger than 80 ka BP. The sixth accessory cusps are not observed in the lower molars from Fuyan, but such an important marker of the Eastern dental stock as the distal trigonid crest is present (Liu et al., 2015).

The specific of the dental pattern of the Southern Siberian Upper Paleolithic specimens includes the following features: absence of shoveling of the upper incisors; the advanced variation of the crowns of the lower permanent molars; the increased frequency of the cingular derivatives in the same molars; the fovea of the protostylid and the fovea of the sixth cusp; and the absence of the distal trigonid crest and the deflecting wrinkle of the metaconid. This set of traits exhibits a certain chronological dynamics. It is least pronounced in the permanent teeth of the most ancient of the specimens—the oldest of the subadults buried at Malta (Zubova, Chikisheva, 2015b: 140–141). In the Late Upper Paleolithic samples from Afontova Gora II and Listvenka, the prevalence of the traits typical of the Southern Siberian Upper Paleolithic dental complex is increased and reaches its maximum. In the Neolithic samples, one or two archaic dental phenes can be observed in some individuals, but Mongoloid complexes of the Eastern origin dominate in the Altai-Sayan populations (Zubova, Chikisheva, 2015a: 123).

The permanent and the deciduous second molars were found to be the most informative teeth in terms of comparison of the Strashnaya individual with the population of Southern Siberia and Altai. According to the traits that were traceable on the deciduous molar, its morphology completely complies with the pattern found in the same tooth of the Malta 1 individual (the youngest child buried at the site) (see Table 3). One of his molars exhibits a six-cusped crown

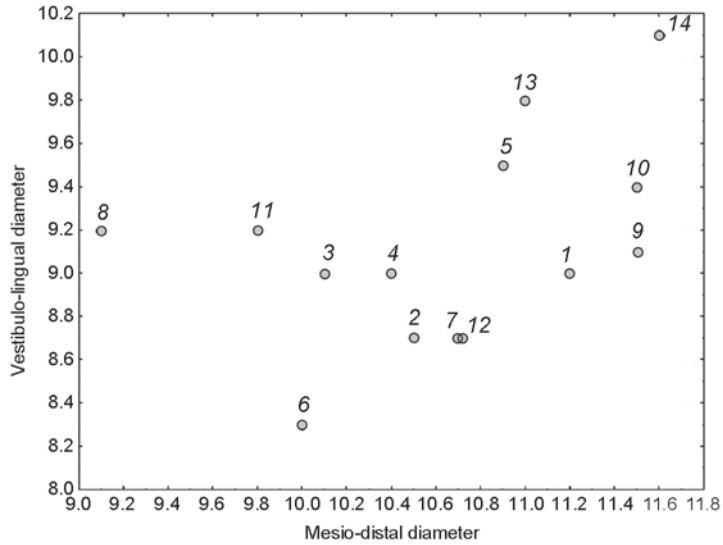

Fig. 4. Comparison of the sagittal and transverse diameters of the crowns of the deciduous lower second molars with the Upper Paleolithic and Neolithic samples from Siberia.

1, *5–8*, *12–14* – Upper Paleolithic: *1* – Khaiyrgas, *5* – Listvenka, *6* – Malta 1, *7* – Malta 2, *8* – Sungir 3, *12* – Gorodtsov site (Kostenki-15), *13* – Kostenki-14-01, *14* – Strashnaya Cave; *2–4*, *9–11* – Neolithic specimens from Yakutia and Baraba forest-steppe.

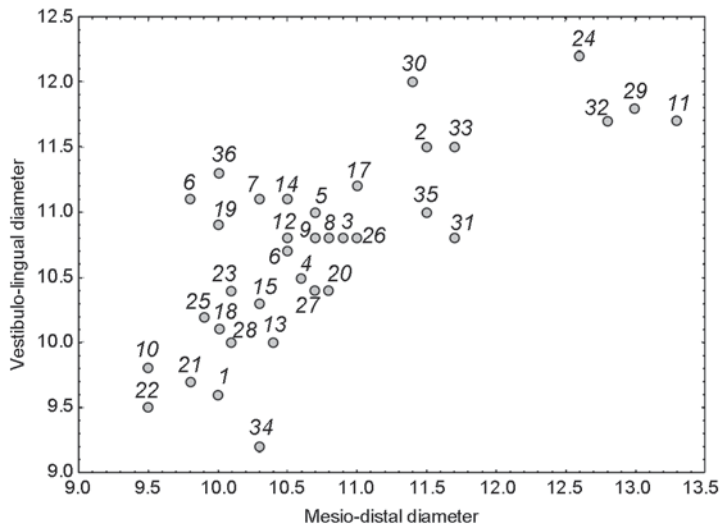

Fig. 5. Comparison of the sagittal and transverse diameters of the crowns of the permanent lower second molars with the Upper Paleolithic and Neolithic samples from Siberia.

1–30 – Neolithic specimens from Baraba forest-steppe and the Altai-Sayan highlands; *31–36* – Upper Paleolithic specimens: *31* – Afontova Gora II, *32* – Strashnaya Cave, *33* – Sungir 2, *34* – Sungir 3, *35* – Kostenki-14, *36* – Kostenki-18.

with the "Y"-pattern, anterior fovea, marked cingulum, and elements of the system of protostylid and *tami*. The observations listed above confirm the affinity of the individual from Strashnaya Cave to the Upper Paleolithic genetic cluster, which includes the Malta 2 and Afontova Gora II individuals (Fu et al., 2016), though the dimensions of this tooth (see Table 2) contrast it to most specimens of the reference sample (Fig. 4).

Morphology of the permanent lower second molar from Strashnaya Cave is similar to the pattern observed in the mandibular teeth of Afontova Gora II (see Table 3). The second molars of this mandible are also six-cusped and display the "Y"-pattern of the crown. The distal and medial trigonid crests, as well the deflecting wrinkle of the metaconid, are absent in these teeth; the odontoglyphic phene 2med(II) is present on one side, while the protostylid fovea is present on both, which is compatible with the presence of the protostylid in the Strashnaya tooth. A substantial difference between the shape of the crowns of the two specimens is observed: they are more angular in the molars from Afontova Gora. The dimensions of the tooth under study distinguish it from the other Upper Paleolithic finds (see Table 2) but align it with some Neolithic ones (Fig. 5).

In general, the comparison of the individual from Strashnaya Cave with the Neolithic samples (see data in (Zubova, Chikisheva, 2015a)) has shown it to be intermediate between the Neolithic and Upper Paleolithic populations but definitely closer to the latter. Similarity with the Neolithic samples is seen mostly in the presence of non-specific traits, which are found at the individual level in antipodal regions of Eurasia and at all times: distal accessory ridge of the canines, anterior fovea and the 2med(II) variant of the lower second molars. The concentration of archaic markers, similar to that observed in the molar from Strashnaya, has not been observed in any of the Neolithic teeth.

Conclusions

The results of our morphological analysis of the dental finds from Strashnaya Cave point towards a remarkable archaism of the dentition of the individual under study, and the presence of the key markers of the Southern Siberian Upper Paleolithic dental complex in the preserved permanent teeth. This conclusion should not in any sense be considered as an evidence of the Upper Paleolithic age of the finds, until the latter are directly dated or until the context of their position in the archaeological layer is better specified. However, our findings help to specify the population structure of the Altai-Sayan region during the final Pleistocene and early Holocene, and they also evidence that the area of the undifferentiated Southern Siberian Upper Paleolithic dental complex should be extended to include not only Sayan region but also the Altai Mountains. The question regarding the direct biological link between the Upper Paleolithic and Neolithic population of this area remains open. The similarity of dental metrics of the individual from Strashnaya Cave and some Neolithic samples can be considered more or less solid evidence for the biological relatedness between this individual and the Neolithic groups of Western Siberia.

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