RADIOCARBON, Vol 49, Nr 2, 2007, p 757–766

CHRONOLOGICAL FRAMEWORK OF THE SIBERIAN PALEOLITHIC: RECENT ACHIEVEMENTS AND FUTURE DIRECTIONS

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ABSTRACT. In Siberia, the accumulation of radiocarbon dates from archaeological sites since the 1960s makes it possible to compile a general Paleolithic ^{14}C database, which contains about 440 entries as of late 2005. With these data, we can reveal the main chronological patterns of Paleolithic complexes, with a focus on the late Middle Paleolithic (Mousterian) and Upper Paleolithic. The ^{14}C dates for late Middle Paleolithic industries in Siberia are quite "young," up to about 30,000–28,500 BP and perhaps ~27,000 BP. The emergence of the Upper Paleolithic in Siberia took place relatively early compared with Eastern Europe. At about 43,000–35,000 BP, blade-dominated industries existed in the Altai Mountains and Lake Baikal region, and numerous adornments are known from several sites of that age. The late Upper Paleolithic complexes with microblade technology from the Altai Mountains are ^{14}C dated to about 35,000–28,000 BP, and represent the earliest unequivocal evidence of microblade manufacture in northern Eurasia. The end of the Paleolithic in Siberia is related to the appearance of pottery, which indicates the beginning of the Neolithic period. In northern Transbaikal, the earliest pottery complexes are dated to about 12,000–11,000 BP and in the Russian Far East even to ~13,000 BP, while in most of Siberia they date to approximately 8000–6000 BP. The most important features of the Siberian Paleolithic chronology are: a) the long persistence of Middle Paleolithic complexes, until about 30,000–27,000 BP; b) very early Middle to Upper Paleolithic transition, ~43,000 BP, closely connected with the emergence of art and symbolic behavior in the earliest Upper Paleolithic at this time; c) the very early origin of microblade complexes, at least at about 35,000 BP; and d) a gradual Paleolithic–Neolithic transition, beginning in the Russian Far East at ~13,000 BP and in Transbaikal about 12,000–11,000 BP, in most of Siberia at about 8000–6000 BP, and even later in some northern regions.

INTRODUCTION

A reliable archaeological chronology can only be constructed on the basis of radiometric dating methods. The compilation of a general chronological framework is important for all further refinements of regional archaeological chronologies. In the vast area of Siberia and the Russian Far East, covering approximately 13,000,000 km^2 (Figure 1), the accumulation of ^{14}C dates from Paleolithic cultural complexes began in the 1960s. Comprehensive lists of ^{14}C dates with general archaeological descriptions for the main subdivisions of the Siberian Paleolithic have been published in the last 10 yr or so (Kuzmin and Orlova 1998; Goebel and Slobodin 1999; Vasil'ev et al. 2002). With these data in hand, it is now possible to consider the main chronological patterns of the Paleolithic complexes in Siberia.

MATERIALS AND METHODS

To study and summarize the Paleolithic chronology of Siberia, the major method used is radiocarbon dating. About 130 sites belonging to the late Middle Paleolithic (i.e. Mousterian) and the Upper Paleolithic have been ^{14}C dated (Figure 1), and summaries published before 2006 (Vasil'ev et al. 2002; with additions in Kuzmin and Keates 2005:778–9). In total, about 440 ^{14}C dates are available from these sites, and they constitute the core of this study.

Other methods have also been employed to establish the age of Lower and Middle Paleolithic sites in Siberia: luminescence dating, including thermoluminescence (TL) and infrared stimulated luminescence (IRSL) methods (e.g. Arkhipov 1999; Waters et al. 1999; Chlachula et al. 2003); radiothermoluminescence (RTL) dating (e.g. Derevianko 2001; Lbova et al. 2003); and electron spin resonance (ESR; in some papers "EPR") dating (e.g. Derevianko et al. 1993). However, uncertainties related to the basic concepts of 2 approaches, namely the RTL method developed by Vlasov and

Proceedings of the 19th International ^{14}C Conference, edited by C Bronk Ramsey and TFG Higham
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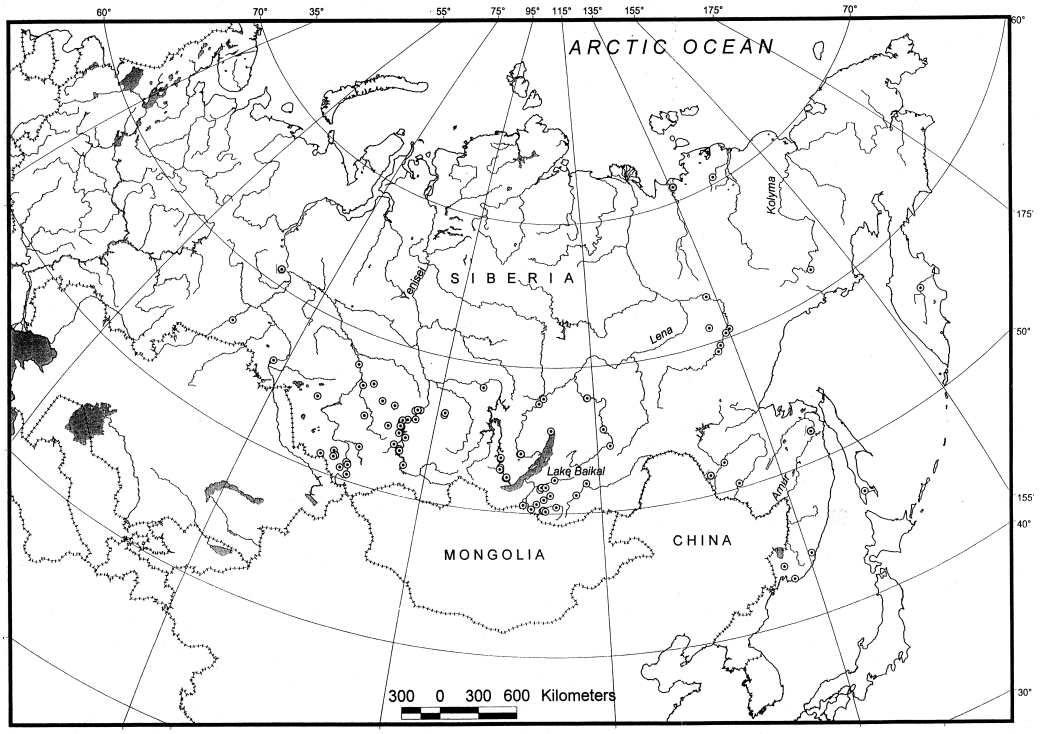

Figure 1 ^{14}C-dated Siberian Paleolithic sites used in this study

Kulikov (1989) (see Huntley 1992; Kuzmin 2000a:35–7) and the ESR method employed by Astashkin et al. (1993) (see Kuzmin 2000a), do not allow us to accept most of the age determinations produced by these techniques at face value.

There are 2 major types of Upper Paleolithic assemblages in Siberia: the macroblade complex with a dominance of blade tools and cores (early Upper Paleolithic), and the microblade complex with wedge-shaped cores and microblades detached from them (late and final Upper Paleolithic) (see review in Kuzmin and Orlova 1998). ^{14}C dates for each of the 2 complexes were combined and the temporal boundary between them was drawn (Figure 2). This allows us to compile a provisional sketch of regional chronologies for the late Middle Paleolithic and Upper Paleolithic, and for the beginning of the next phase of prehistory, the Neolithic, which is characterized by the presence of pottery (Figure 2). Recent publications on the Paleolithic archaeology of southern Siberia, especially for the Altai Mountains (Derevianko 2001; Derevianko and Rybin 2003; Derevianko and Shunkov 2004; Derevianko et al. 2003) and Transbaikal (Lbova 2002), were taken into account for the characterization of the emergence of Upper Paleolithic complexes, art, and microblade technology.

The accumulation of ^{14}C dates for the Siberian Paleolithic made it possible to begin the modeling of settlement patterns and correlation with climatic changes using the "dates-as-data" approach (sensu Rick 1987; see recent reviews of the method and its application: Gamble et al. 2004, 2005). However, by doing so, caution should be taken when ^{14}C values from the same cultural component are averaged (e.g. Dolukhanov et al. 2002, 2005). The simple averaging, in my opinion, can lead to a significant loss of original information that may be derived from ^{14}C records (see reviews: Kuzmin and Keates 2004, 2005, 2006). Therefore, the development of a consensus methodology of numerical analysis of a ^{14}C date series is an urgent task.

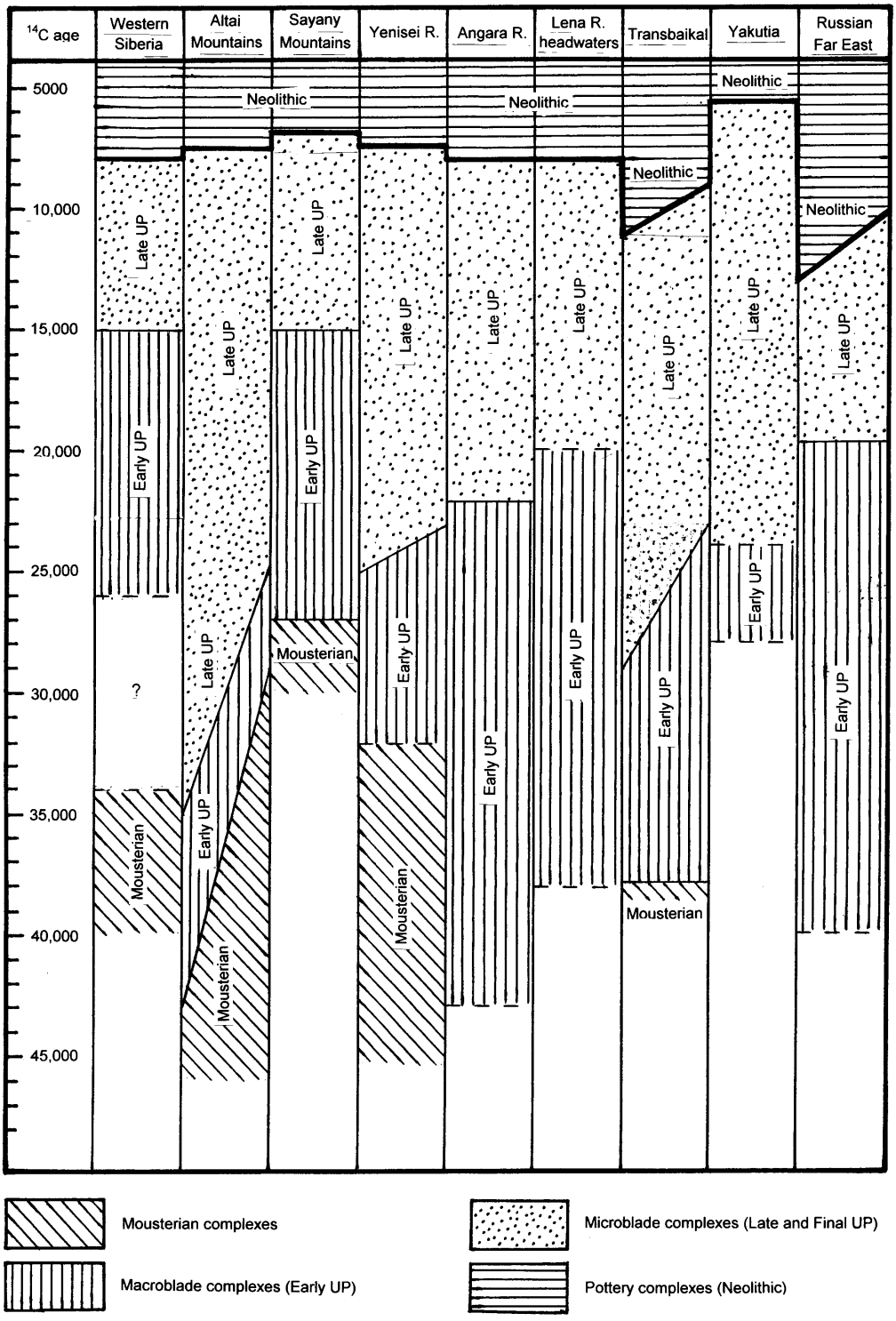

Figure 2 Chronological framework of the Siberian Paleolithic (based on ^{14}C dates and archaeological data)

RESULTS AND DISCUSSION

Lower and Early Middle Paleolithic

There is still no agreement about the radiometric ages of all the Lower Paleolithic complexes and most of the Middle Paleolithic assemblages from Siberia (see review: Kuzmin 2000a). All supposedly Lower Paleolithic sites, including Diring Yuriakh in Yakutia (Mochanov 1993) and Zasukhino in Transbaikal (Lbova et al. 2003), need either additional sampling or confirmation of their age by independent and well-established methods. The RTL method, used for dating several Middle Paleolithic sites—Denisova Cave (layers 22–14), Ust-Karakol 1 (layers 20–18) (Derevianko et al. 2003, 2005), and Khotyk 3 (layers 4–3) (Lbova et al. 2003)—does not appear reliable in terms of its basic principles. This has been shown earlier (Huntley 1992), but a more recent example is that of the Diring Yuriakh site where an RTL date from the layer underneath a cultural-bearing horizon yielded a result in excess of 1,800,000 yr (RTL-454) (Mochanov 1992), while the standard TL method gave an age of 366,000 ± 32,000 yr (OTL472) (Waters et al. 1999). All RTL age determinations need to be verified by additional methods before they can be accepted uncritically.

One of the few examples of the successful application of radiometric dating methods to pre-Upper Paleolithic sites in Siberia is the Ust'-Izhul' case (Chlachula et al. 2003). This site, in the upper reaches of the Yenisei River basin, was IRSL dated to ~125,000 yr ago. The ^{14}C dates for Ust'-Izhul', obtained on charcoal and bones of the early type of woolly mammoth (*Mammuthus primigenius* Blum.), are all older than ~40,000 BP (Vasil'ev et al. 2002; Chlachula et al. 2003). The TL age of the earlier site of Berezhekovo near Ust'-Izhul' was previously estimated between ~540,000 yr ago and ~130,000 yr ago (Arkhipov 1999; see also Kuzmin 2000a; Derevianko et al. 2005).

Late Middle Paleolithic

The typical Middle Paleolithic complexes of southern Siberia may now be dated to at least ~125,000 yr at the Ust'-Izhul' site (see above). Mousterian-type industries continued to exist in Siberia for a long time. The earliest ^{14}C dates associated with them are in excess of about 42,000–44,000 BP at the Kara-Bom site (e.g. Vasil'ev et al. 2002:521). As was shown before (e.g. Kuzmin 2000a, 2004), the latest Middle Paleolithic assemblages in Siberia are known from the Dvuglazka rockshelter in the upper Yenisei River basin (layers 5–7; Derev'anko and Markin 1998), and the Aryshevskoe 1 site on the West Siberian Plain (Zenin 2002; see also Vasil'ev et al. 2002:521). These sites are dated to about 33,600–27,200 BP (Figures 2–3). The ^{14}C ages of about 26,600–22,500 BP for layer 4 at Dvuglazka (overlying layers 5–7) provide good stratigraphic control. The use of the Dvuglazka rockshelter by hyenas as a den and possible disturbance of the cultural layers means that the ^{14}C value of layer 7 (~27,200 BP) could be a minimum age (C G Turner II, personal communication, 2004). However, there are several other late Middle Paleolithic sites in Siberia with quite "young" ages, about 30,300–28,500 BP (e.g. Vasil'ev et al. 2002), and the pattern of a long "survival" of the Mousterian technocomplex in Siberia is still evident.

The Emergence of the Upper Paleolithic and Art

Recent extensive archaeological research of the earliest Upper Paleolithic complexes in southern Siberia with blade-dominated industries, particular in the Altai Mountains and southern Transbaikal (e.g. Derevianko 2001; Lbova 2002), have brought to light information about the timing of its appearance. It is clear now that the earliest Upper Paleolithic assemblages are dated to about 43,300–43,200 BP at the Kara-Bom site (charcoal samples) (Figure 3), and to about 43,900–40,500 BP at the Podzvonkaya and Kamenka sites (bone samples) (e.g. Orlova et al. 2005). It is obvious that

the Middle to Upper Paleolithic transition in Siberia was quite a long process (e.g. Kuzmin 2004) rather than a short-term replacement (e.g. Goebel 2002), and both complexes may have coexisted for a long time, from ~43,000 BP to ~27,000 BP (Figure 3).

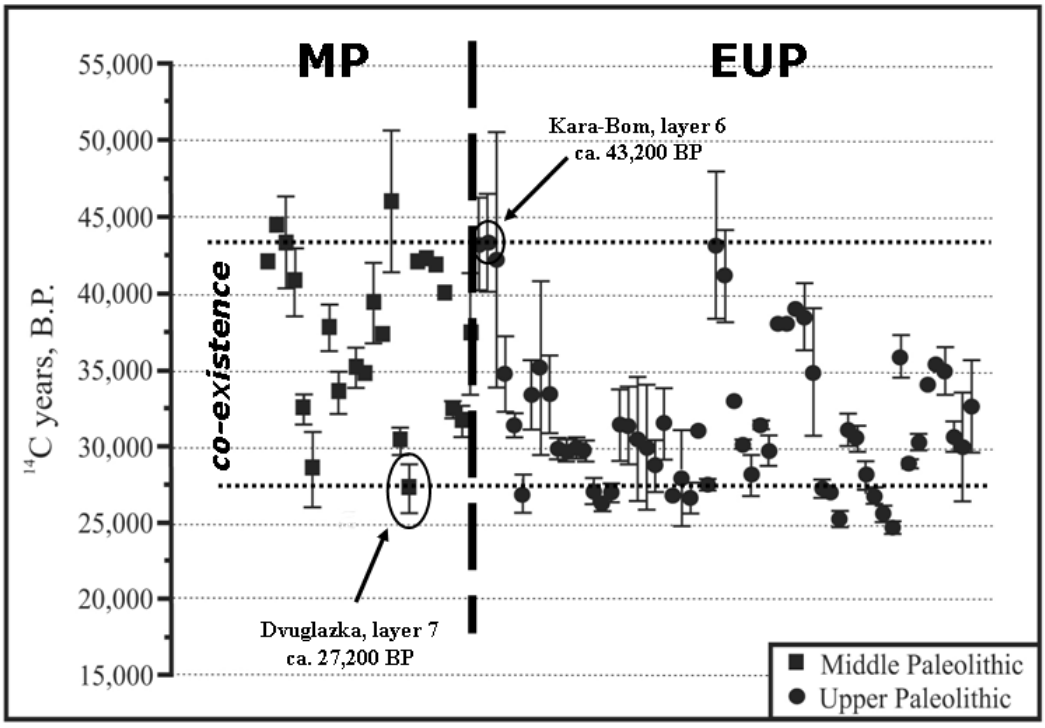

Figure 3 Relationship between the ^{14}C ages of the latest Middle Paleolithic (MP) and earliest Upper Paleolithic (EUP) sites in Siberia (after Kuzmin 2004, with additions).

The elaborate adornments—such as the pendants from the Kara-Bom site directly associated with ^{14}C values of about 43,300–43,200 BP; pendants and beads from the Kamenka and Khotyk sites that may date to about 40,000–26,000 BP (Derevianko and Rybin 2004); and numerous pendants, cylinder beads with ornamentation, and eye needles from the Denisova Cave with an estimated ^{14}C age of at least ~37,000 BP and perhaps older (Derevianko and Shunkov 2004)—strongly testify in favor of a very early appearance of art in southern Siberia, at least at ~43,000 BP. This is an important discovery for understanding the symbolic behavior in the Upper Paleolithic of Eurasia, and from now on Siberia should be considered as a region with a very early appearance of art and symbolism (e.g. Derevianko et al. 2005).

The very early age of the initial Upper Paleolithic complexes in Siberia poses the problem of their origin in the light of models assuming the emergence of Upper Paleolithic technology and behavior in the Levant and its dissemination toward Europe (e.g. Bar-Yosef 2000), and from Europe to Siberia (e.g. Dolukhanov et al. 2002:603). The fact is that in the East European Plain, the earliest Upper Paleolithic assemblage is from the Kostienki 14 site (the "horizon of hearths") ^{14}C dated to about 37,200–36,300 BP (see latest summaries: Anikovich 2003; Anikovich et al. 2007; Sinitsyn and Hoffecker 2006), significantly younger than the earliest Upper Paleolithic sites in Siberia.

The ^{14}C date of the earliest Upper Paleolithic industry from the Boker Tachtit site in the Levant is 46,930 ± 2420 BP (SMU-259) (e.g. Phillips 1994), i.e. 51,770–42,090 BP (with ±2 σ), and this overlaps with the earliest ^{14}C values from the Kara-Bom site in the Altai Mountains, layer 6: 43,200 ± 1500 BP (GX-17597) (i.e. 46,200–40,200 BP), and layer 5: 43,300 ± 1600 BP (GX-17596) (i.e. 46,500–40,100 BP) (Goebel et al. 1993; Derevianko and Rybin 2003). These are, in fact, very similar ^{14}C ages, and it is almost impossible to use the Boker Tachtit case as evidence of the Levantine Early Upper Paleolithic as the oldest in Eurasia (e.g. Bar-Yosef 2000). Therefore, the existence of Upper Paleolithic assemblages at several Siberian sites dated to prior ~40,000 BP—namely Kara-Bom, Kara-Tenesh, Kamenka (complex A), and Podzvonkaya (e.g. Derevianko 2001; Lbova 2002)—challenges the view of Siberia as a "backyard" of the Levantine-European Early Upper Paleolithic ecumene, and calls strongly for a revision of existing schemes, e.g. the model proposed by Mellars (2006a,b).

The Beginning of Microblade Technology

Recent excavations in the Altai Mountains, conducted over the last 10–15 yr, produced evidence of very early microblade complexes (Derevianko 2001, 2005; Derevianko et al. 2003). At the Ust-Karakol 1 site, microblades and wedge-shaped microblade cores were identified in layers 11 through 9 (Derevianko 2001; Derevianko et al. 2003). While layer 11 has no ^{14}C dates, the overlying layer 10 is dated to 35,100 ± 2850 BP (SOAN-3259), and layer 9 to about 33,400–29,700 BP (Derevianko et al. 2003). Another site in the Altai, Anui 2, also revealed evidence of microblade technology, dated to about 27,900–26,800 BP (Derevianko et al. 2003, 2005). Therefore, the Altai sites contain the earliest microblades in northern Eurasia, produced from wedge-shaped cores (Derevianko 2005). In southern Transbaikal, the Kamenka site (complex B) has microblades and microcores directly associated with ^{14}C dates of about 28,800–24,600 BP (Lbova 2002).

The appearance of microblade technology in Siberia manifests the beginning of the late Upper Paleolithic substage (Figure 2). It is noteworthy that the early/late Upper Paleolithic boundary varies greatly throughout Siberia, and in some regions such as the West Siberian Plain, typical microblade industries emerged quite late, at ~15,000 BP (e.g. Zenin 2002). Microblade technology in Siberia became widely distributed at about 25,000–20,000 BP (Figure 2). It is clear that the beginning of microblade manufacture in Siberia predates the Last Glacial Maximum (LGM, about 20,000–18,000 BP), contra Goebel (2002, 2004), who argues for the post-LGM age of microblade sites in Siberia (see review: Kuzmin and Rybin 2005:44–8).

The Paleolithic–Neolithic Transition and Emergence of Pottery

The end of the Paleolithic in Siberia coincides with the beginning of pottery manufacture, which in Russian archaeology means the next epoch in prehistory, the Neolithic (see reviews: Kuzmin and Orlova 2000; Kuzmin 2006). Previously, the concept of the Mesolithic, which follows the Paleolithic and precedes the Neolithic, was in use (e.g. Koltsov 1989), but since the 1990s it has been abandoned (e.g. Derev'anko et al. 1998). The earliest pottery is known from the Russian Far East, the Amur River basin, where it is well dated to about 13,300–12,300 BP (Figure 2) (Kuzmin and Orlova 2000; Derevianko et al. 2004; Nesterov et al. 2005; see reviews: Kuzmin 2002, 2006). In northern Transbaikal, at the Ust-Karenga 12 site in the Vitim River basin, the earliest pottery-associated ^{14}C dates are about 12,000–11,000 BP (Kuzmin and Orlova 2000; Vetrov and Kuzmin 2005). Thus, in the Russian Far East and Transbaikal, the end of the Paleolithic is dated to the Late Glacial, about 13,000–11,000 BP. In other regions of Siberia, the Paleolithic–Neolithic transition took place at about 8000–6000 BP (Figure 2). Finally, in some areas of Northeastern Siberia, the beginning of pottery-making is dated to an even later time, about 4500–2500 BP (Kuzmin 2000b).

CONCLUSIONS

Based on the results presented here, the main chronological patterns of cultural development in the Siberian Paleolithic may be established. The Middle Paleolithic complexes existed for a long time, since after ~540,000 yr ago and until at least ~30,000 BP, and perhaps up to ~27,000 BP. The Middle to Upper Paleolithic transition took place in Siberia very early, at least at ~43,000 BP, almost simultaneously with the Levant and definitely before the appearance of the Upper Paleolithic in Eastern Europe. The earliest art objects from Siberia are also quite old, about 43,000–40,000 BP, and they appeared concurrently with the Upper Paleolithic complexes. The Paleolithic–Neolithic transition happened progressively, beginning in the Russian Far East at ~13,000 BP and in Transbaikal at about 12,000–11,000 BP, and emerging in the west of Lake Baikal at about 8000–6000 BP.

The coexistence of different prehistoric stages (i.e. late Middle Paleolithic and early Upper Paleolithic, large blade and microblade industries in the Upper Paleolithic, and final Upper Paleolithic and Initial Neolithic complexes) in Siberia is a consistent feature. It seems that prehistoric cultural complexes developed gradually, without sudden replacement, compared with more dynamic cultural changes in Europe.

As for future research in terms of enhancement and refinement of the ^{14}C chronology, much more work needs to be done in the remote northern parts of Siberia. Recent excavations and ^{14}C dating of several sites, including Yana RHS (Pitulko et al. 2004) and Nepa (Goebel 2004), show clearly that people occupied (or at least frequently visited) the central and northern parts of Eastern and Northeastern Siberia at least at about 33,000–27,000 BP. The finds of presumably human-modified mammoth bones at 2 localities in the Siberian Arctic dated to about 33,800–22,400 BP (Duvanny Yar near the Kolyma River mouth and Wrangel Island [see Kuzmin and Orlova 2004:156]), might also testify in favor of very early human penetration to the northernmost latitudes of Eurasia. Thus, the search for pre-LGM sites in Northeastern Siberia is among the most important tasks for the next decade.

The large number of ^{14}C dates available now for the Siberian Paleolithic invites more detailed numerical analysis and, ultimately, the reconstruction of population dynamics and migrations (Kuzmin and Keates 2005), as well as the study of a possible connection between the climatic changes in the last 45,000 yr and the peculiarities of human colonization of Eurasia (Fiedel and Kuzmin, this volume). This kind of research must develop and continue once a consensus is reached on protocols for combining ^{14}C records with wider occupational evidence (see discussion: Kuzmin and Keates 2005:775–7; Gamble et al. 2005:196–7).

ACKNOWLEDGMENTS

This research was supported by grants from the Russian Foundation for Basic Science (RFFI; nos. 06-06-80108 and 06-06-80258) and US Fulbright Program (nos. 96-21230 and 03-27672). The ^{14}C dating of Siberian Paleolithic sites over the last 15 yr was conducted in collaboration with colleagues from several organizations, including the Institute of Geology and Mineralogy, Siberian Branch of the Russian Academy of Sciences (Novosibirsk), and Geological Institute, Russian Academy of Sciences (Moscow) (both in Russia); Arizona AMS Laboratory, University of Arizona, Tucson, Arizona (USA); Oxford Research Accelerator Unit, Research Laboratory for Archaeology and the History of the Art, Oxford University, Oxford (UK); Centre for Isotope Research, University of Groningen, Groningen (the Netherlands); Inter-University Center for National Science Research facility, Seoul National University, Seoul (Republic of Korea); and Leibniz Laboratory, Christian-Albrechts University, Kiel (Germany). The ^{14}C dating was supported by grants from RFFI (nos. 96-

06-80688, 96-05-64837, 99-06-80348, 00-06-80410, 02-06-80282, 03-06-80289, and 03-05-64434), US NSF (nos. EAR95-08413, EAR97-30699, and EAR01-15488), and UK Natural Environment Research Council (NERC, no. GR3/12599). I am grateful to Prof C G Turner II (Arizona State University, Tempe, Arizona, USA) for sharing his opinion about the taphonomy of some Siberian Paleolithic sites, and to the anonymous reviewer and proceedings editors for useful suggestions.

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