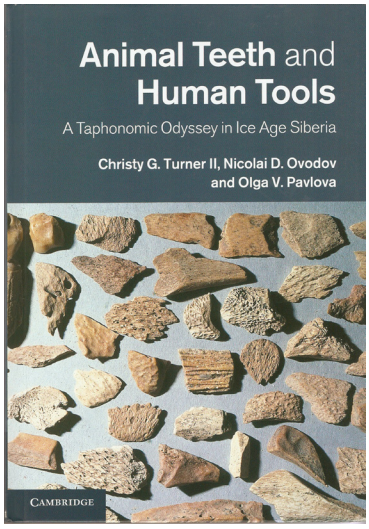
BOOK REVIEW



The Siberian Late Pleistocene Mammal Fossils in Numerical Perspective: Review of Christy G. Turner II, Nicolai D. Ovodov and Olga V. Pavlova. *Animal Teeth and Human Tools: A Taphonomic Odyssey in Ice Age Siberia*. 2013. Cambridge and New York: Cambridge University Press. ISBN: 978-1-107-03029-9; 490 + xi pages, with 269 figures and 34 tables. List price $110 US (hardback).

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This book is the work of three scholars who were assisted by numerous collaborators, colleagues, and friends (in the Acknowledgments, 52 persons are mentioned). This is also a "swan song" of the senior author, C G Turner II, who passed away on 27 July 2013. World-known for his anthropological studies since the 1960s (e.g. Turner 1976, 1991; Scott and Turner 1997; Turner and Turner 1999; see also C G Turner's Festschrift: Scott and Irish 2013), he initiated in 1984 a large-scale project on perimortem bone damage at Siberian late Pleistocene paleontological and archaeological sites. The main research phase of the project was completed in 1998–2006, and the results are presented in this volume. This is an unprecedented study in the field of paleontology and (especially) *taphonomy* ["The study of the transition of all or part of an organism and its traces from the biosphere into the lithosphere (i.e. fossilization)."; Allaby and Allaby 2003:538] of the Pleistocene Siberian mammal records, with only a handful of similar publications to date (e.g. Baryshnikov 2003).

The volume by C G Turner and coauthors consists of 5 chapters, appendices, references, and index. It is richly illustrated with photographs of archaeological sites, bones and teeth, and the people who participated in this long-term project. In Chapter 1, an introduction to the field of taphonomy and its founder, Soviet paleontologist Ivan A Efremov [Yefremov], is given. Information about the main current researchers in Siberian Paleolithic archaeology is also included. A map of sites selected for the study gives an understanding of the vast region of Siberia that is covered in this book. In Chapter 2, the history of taphonomic studies and I A Efremov's biography are shortly described. Also, the definition and a detailed description of 26 perimortem taphonomic variables used in this book are comprehensively presented (for details see p 33–51). In Chapter 3, the results of the me-

ticulous studies of 30 Siberian archaeological and paleontological sites are described; tables with all numerical information in the appendices supplement it. In Chapter 4, the main research issues that originated from this project are discussed. Chapter 5 is the Conclusion in the form of questions and answers. The appendices include 34 tables with counts of 26 variables used for the study and the related subjects; a list of scientific names for Siberian Pleistocene mammal species; and a short description of the Listvenka site with its terminal Pleistocene human fossils. The references contain an inclusive list of sources (about 460), published both in English and Russian.

The essence of the main authors' approach is given at the end of the book: "The reader may also be wondering how a study of perimortem bone damage could wind up with discussions of dogs, clothing, cults, shamans, missing burials, and human teeth. To our way of thinking the bone damage can be readily described, but for fuller understanding it has to be put into some sort of cultural, temporal, populational, and environmental context" (p 398).

One of the main merits of this volume is that the authors personally examined thousands of bones and teeth of the late Pleistocene–early Holocene animals (with ~8000 samples that satisfied the selection criteria), and recorded information in a simple but comprehensive database. This is in accord with previous work by the senior author who introduced the Arizona State University Dental Anthropology System (e.g. Turner et al. 1991). In this case, the results of the Siberian taphonomic project can be used by any scholar who is interested in Pleistocene paleontology and archaeology.

The main scientific issues in this book are (1) the numerical study of the bone damage and modification caused by animals and humans at paleontological and archaeological sites in Siberia; (2) the presence of Pleistocene cave hyena (*Crocuta spelaea*) and its role in site formation processes; (3) the type of human occupation of caves in the Paleolithic (continuous vs. discontinuous); (4) the scarcity of Pleistocene human fossils in the vast region of Siberia; and (5) the taxonomy of Siberian Pleistocene humans.

One of the main questions in taphonomic studies of Paleolithic sites is how to separate human bone damage from that produced by carnivores. The authors discuss this issue in different parts of the book, and arrive at several conclusions. Acid erosion, and tooth dints and scratches are the best criteria for carnivore damage. Chop and cut marks are the best benchmarks of human butchering; burning could also be added if it did not result from natural fire. The burning/chopping/cutting ratios for site usage by humans would be 1:9:12, while non-human activity will result in values of 1:5:5 or less (p 356). The human breakage of long bone is usually applied to shafts, and the damage of ends is more common for carnivores, with a clear example of reindeer bones at the Ust-Kova site (p 306, Figure 3.180). The important observation is that Paleolithic hunters were exploiting their prey almost completely, as evident by the presence of numerous animal bones broken to get the marrow, and the small size of animal bone remains at several Paleolithic sites.

The possible evidence of cooking (for example, by roasting raw meat on hot stones) is also discussed (p 364–5). Based on perimortem data and the presence of small amounts of burnt bones (averaged weighted mean value of 1.09% in all groups: mainly hyena; mixed archaeology and hyena; and archaeology, no hyena; see Table A1.29), the authors conclude that it was not widely practiced. Perhaps Paleolithic people cooked animals in hide bags, or just in their skin as whole bodies, which one can still observe now in Mongolia.

The cave hyena (hereafter hyena) is well-known in Siberian Pleistocene fossil records (e.g. Vereshchagin and Baryshnikov 1984), but its role in Ice Age Siberian ecosystems and its relationship with

Paleolithic humans were not previously studied in such detail. In many cases, hyenas dominate or are present in large numbers in cave records, and the evidence of prey consumption in the form of acid erosion (due to the digestion of bones and other hard parts of prey skeletal parts) is a clear indicator of hyena occupation. Hyenas are known for their burrowing activity, and this could be a very important factor in terms of mixing of cultural layers in the caves. Hyenas are found to be "a very significant source of stratigraphic disturbance and bioturbation" (p 367). The baseline of 10% carnivore activity (such as acid erosion, and tooth dints and scratches) is proposed as a signature of non-hyena damage; hyena-caused destruction gives values of carnivore activity at ~23–31% (p 361).

Hyenas may also have been responsible for carrying "fossil" bones into the caves where they were later ^{14}C dated, with ages much older than the majority of animal bones. A clear example is Kaminnaya Cave (p 122) where a tooth of woolly rhinoceros is dated to ~39,400 BP while the rest of the ^{14}C values are in the range of ~10,000–15,000 BP.

The permanent threat that hyenas represented to Paleolithic people, according to the authors, could be one of the factors explaining why the New World was colonized so late, ~12,000–15,000 BP. The idea of a "hyena barrier" is put forward (p 392, 398), with the latitude of 56°N as a "Rubicon that humans had to overcome to reach the New World, and at this latitude hyenas possessed advantages that humans lacked, most notably having the ability to hunt at night, and being climatically adapted in contrast to the 'night-blind' and 'tropical' humans burdened with their helpless and slow-to-mature infants. We propose that the fifty-sixth parallel marked the location of a significant barrier to human dispersal northward, as much as the Arctic Circle at 66.5°N latitude" (p 392). Hyenas are not present in Pleistocene faunal records of Siberia north of 56°N due to a scarcity of prey (p 398). This is a very stimulating message, and it would seem worthwhile to examine the spatiotemporal patterns of hyena-human presence in the late Pleistocene of northern Asia in the near future. It is suggested that cave hyenas finally went extinct at ~13,000–14,000 BP (p 232, 383), and this (according to the authors) may explain the very late human colonization of the Americas in relation to neighboring Siberia. The latest data, however, show that spotted hyenas in northern Eurasia extirpated at ~35,500 BP in the Urals and Siberia, and at ~26,000 BP in Europe (Stuart and Lister 2014).

Based on primary taphonomic data, the authors concluded that Siberian caves were randomly occupied by Paleolithic humans—on a seasonal basis at best (p 129, 190, 203, 215), and most probably sporadically or decades apart (p 362). The common idea of a permanent human presence in Siberian caves is most probably wrong because they were mainly occupied by large carnivores like hyenas, bears, and wolves that represented a very serious threat to people. Another important result is that the presence of burrowing animals in cave faunal assemblages, mostly hyenas, should be considered as an extremely serious factor of distortion of the cultural layers. This is directly related to the concept of the development of Upper Paleolithic lithic industries from the local Middle Paleolithic (e.g. Derevianko 2011). The authors caution readers that without taking into account the disturbance of cave stratigraphy by hyenas it is impossible to ensure that the cultural layers are *in situ* position, and a clear example of this is Denisova Cave (Figure 3.10, p 83; see also p 367). Okladnikov Cave also has strong hyena presence in all cultural layers (p 203–4, 216). The conclusion is that in the caves of the Altai Mountains in southern Siberia one can observe "a significant hyena/carnivore presence, meaning that bioturbation ruined the stratigraphic virginity" (p 220). Another important result is that "what may look like local cultural evolution based on gradual changed ways of manufacturing stone artifacts from Middle to Upper Paleolithic times was caused by hyena activity mixing sharp, distinct strata into a blur where non-evolutionary stratigraphic borders have been erased" (p 405).

Based on taphonomic studies of Siberian sites, the authors arrived at several important conclusions

related to site formation processes: (1) archaeological sites without traces of hyena occupation have a much lower level of carnivore damage than sites with abundant evidence of hyenas; (2) if the presence of hyenas is recorded, a site was commonly not used by humans, sometimes for long periods lasting decades or even centuries; (3) the disturbance of sites by hyenas' and other animals' digging can distort the stratigraphy, and give a false impression of its "unity" ("virginity," see p 220); (4) in the presence of hyenas, the taphonomic parameters of archaeological sites become closer to those of paleontological localities (i.e. without human activity); and (5) the presence of animals other than hyenas in mixed human-hyena sites may not be related to human procurement (p 363).

The issue of the extremely small number of Pleistocene human fossils in Siberia is discussed in detail (p 386–90). Currently, only about 15 such finds (e.g. Gerasimova et al. 2007) are known in the vast terrain of Siberia and the Russian Far East (~14,000,000 km^2). A possible small population size seems not to be the issue because a simple calculation shows that there should be at least 300 Paleolithic human burials in Siberia that have a high potential to be found during a survey (p 387); however, only a few actual Paleolithic burials were discovered in Siberia in more than 140 yr of research. The possible poor preservation of human fossils also does not explain their rarity (p 388). The chances for cannibalism are slim, and this issue requires more work, for example, with the human ulna from Afontova Gora (p 389). One of the most probable explanations is the scavenging of human corpses from burials by hyenas (p 218, 358, 390, 405), although the authors leave the entire question of the scarcity of Pleistocene human remains in Siberia open to further considerations.

The senior author examined several teeth and bones of Pleistocene humans in Siberia, and concluded that the remains of Neanderthals were found in the Denisova and Okladnikov caves (both in the Altai Mountains). This is in contrast to Shpakova (2001) who identified the specimens as anatomically modern humans. Turner in this book (p 89, 383–4, 405) argues that Shpakova's (2001) study suffers from methodological flaws. Further, he pointed out that the conclusion about the modernity of humans in these caves is driven by the concept of the leading Siberian Paleolithic archaeologist A P Derevianko (e.g. Derevianko 2011) concerning the continuity of lithic assemblages in the process of Middle-to-Upper Paleolithic transition (p 385–6). I would add that if the identification of the human tooth in Layer 22 of the Main Chamber in Denisova Cave by Shpakova (2001) is correct, this would be one of the oldest modern humans in the world. This is because this layer was dated by the obscure radiothermoluminescent (RTL) method (see review in Kuzmin 2000) to ~171,000–282,000 yr ago (e.g. Derevianko 2011:15–6). This, however, is in conflict with the most widely accepted views on the much younger age of early modern humans outside of Africa (e.g. Trinkaus 2005:209). The Neanderthal affinity of teeth from Okladnikov Cave was confirmed by DNA analysis of human bone directly ^{14}C dated to ~34,200 BP (Krause et al. 2007). More recently, Neanderthal DNA was retrieved from a bone found in one of the side galleries of Denisova Cave, with an estimated age of ~50,000 BP (Prüfer et al. 2014).

The human teeth from the famous Malta [Mal'ta] site in eastern Siberia were identified by Turner as modern human of European type (Figure 3.82, p 179). This is now confirmed by DNA analysis (Raghavan et al. 2014). However, the determination of the Malta population as one of the ancestors of Native Americans (Raghavan et al. 2014) is in conflict with Turner's conclusion that the Malta teeth do not resemble either Northeast Asian or Native American populations (p 179).

One of the case studies in this volume is the Razboinichya Cave in the Altai Mountains (p 229–56). Here abundant paleontological records (at least 50 species of mammals) with an excellent state of preservation allowed the authors to understand the carnivore activity in Siberian caves, and also to analyze unique samples such as the complete skull of a Pleistocene dog-like canid. It was later stud-

ied in more detail, including its DNA, and dated to ~33,500 yr ago (Ovodov et al. 2011; Druzhkova et al. 2013). We should pay tribute to the senior author of the book who had drawn our attention to this find (see Turner 2002), and after discussion with Turner in 2004 of the issues related to this skull, I decided to make more efforts to examine it; in particular, to conduct its direct ^{14}C dating. What is also unique for Siberian paleontology is the plethora of the late Pleistocene carnivore remains, mainly hyena (at least 137 individuals, including coprolites), foxes, and wolves. Based on the common presence of acid erosion on bones that passed through the hyena digestive tract (7.3% of the total), it is concluded that the Razboinichya Cave was a hyena den for thousands of years; humans rarely visited it, and actually never occupied the cave itself or its entrance part. An important methodological observation is that if the frequency of acid-eroded bones is 5–10%, this is the signature of the presence of carnivores, mainly hyenas (p 246). The burrowing activity of hyenas resulted in the disturbance of sediments and subsequent wide variation of ^{14}C dates obtained on animal bones, from ~670 to ~22,400 BP (p 236), and even to ~48,020 BP (e.g. Ovodov et al. 2011). The deliberate placing of a dog-like skull in a dark space of the cave by humans may imply a kind of cult-related ceremony, with the possibility of shamanism (p 254, 394).

As for the chronological aspect of this book, several new ^{14}C and U-series dates are reported for important Paleolithic sites (unfortunately, without lab numbers): ~17,000 and ~29,000 BP for the Dvuglazka Cave (p 96); ~41,350 and ~39,290 BP for Kamenka site (p 106); and ~33,500 yr ago for Okladnikov Cave (p 202). The authors also discuss some controversial issues in Siberian Paleolithic chronology such as the Malaya Seeya [Malaya Syia] site (p 164; see also Vasil'ev et al. 2002:523). At some sites, they mention human bones of possible Pleistocene age; for example, the Sibiryachikha VI near Okladnikov Cave (p 199, 211). This particular find provided to me by N D Ovodov—a child's humerus—was directly ^{14}C dated to 2370 ± 55 BP (AA-83721), thus showing its late Holocene age. This once again highlights the necessity of direct ^{14}C dating of presumably Pleistocene human fossils worldwide (e.g. Keates et al. 2012).

Besides serious scientific issues, this book contains several good examples of humor, just to quote this: "At a drizzly late night vodka-fueled field camp discussion, one of our 20 or so Russian colleagues replied, after being asked why the New World was colonized so late: 'Why would anyone want to leave the paradise of southern Siberia?' " (p 402–3). The epigraph to Chapter 4 is, "If you're not taking flack, you're not over the target. (US Air Force maxim)" (p 349). This makes it very vivid for non-Russian readers to get acquainted with the world of Siberian archaeology and paleontology.

The book by C G Turner, N D Ovodov, and O V Pavlova is an excellent example of a well-planned study with clearly defined criteria and approaches, full presentation of the original data, and discussion of the most important and complicated topics in Pleistocene paleontology and archaeology. It should serve all scholars who are interested in ancient animals and humans, and their relationship. I hope that this odyssey, which began in the Ice Age, will continue in the years to come.

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