



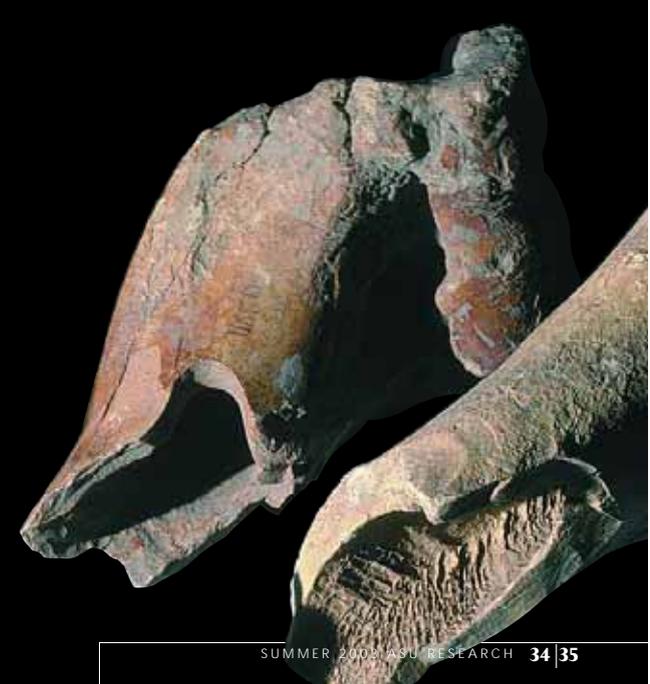
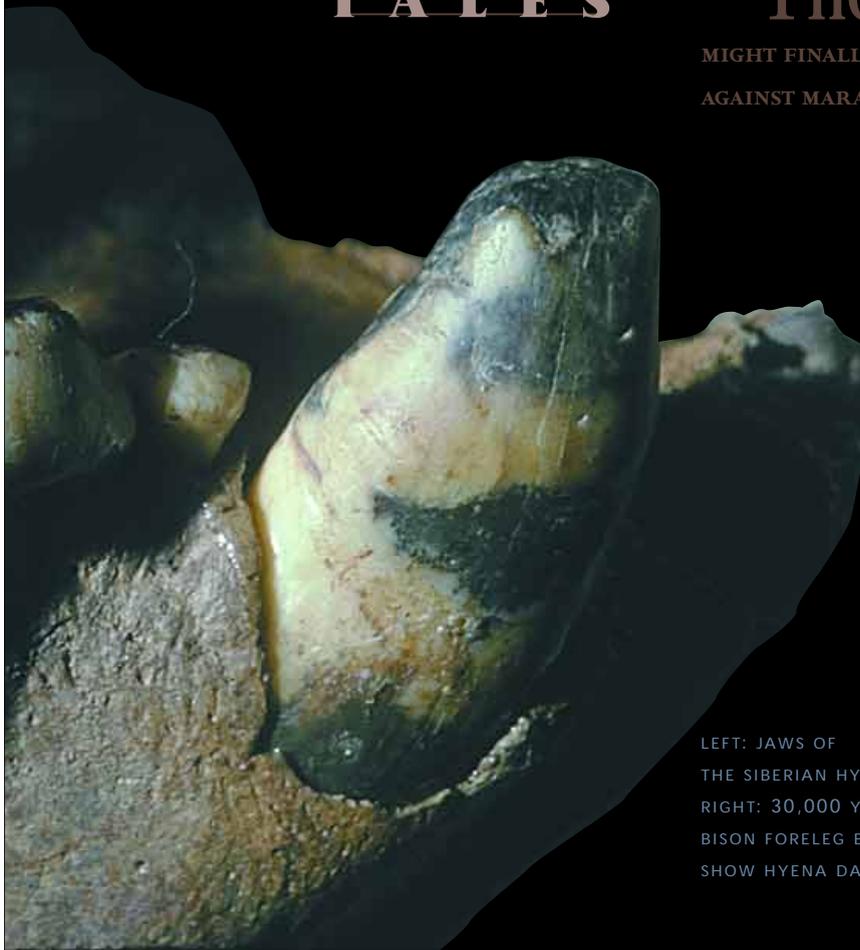
**GNAWED  
BONES  
TELL  
TALES**

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“ WE’VE WONDERED WHETHER THE PRESENCE OF HYENA PACKS AND OTHER LARGE CARNIVORES PLAYED A SIGNIFICANT ROLE IN LIMITING HUMAN NORTHWARD EXPANSION INTO THE WESTERN BERING STRAITS REGION.

# The domestication of dogs

MIGHT FINALLY HAVE AIDED HUMANS TO SUCCESSFULLY DEFEND AGAINST MARAUDING HYENA PACKS.”



LEFT: JAWS OF THE SIBERIAN HYENA  
RIGHT: 30,000 YEAR-OLD BISON FORELEG BONES THAT SHOW HYENA DAMAGE



**Food and culture go together.** We can tell quite a bit about people from what and how they eat. Much of what we know about our ancient ancestors is also tied to food. Christy Turner has spent a career studying the lives and deaths and eating rituals of the old ones.

Turner is a Regents' Professor of Anthropology at Arizona State University. He retired from the classroom several years ago, but retirement has not stopped his research efforts. Turner has been collecting and analyzing ancient bones and bone fragments for more than three decades. He is one of the world's leading experts on human bone modification.

Butchering, dismembering, and cooking are activities that damage bone. Scientists call these activities bone modification. Each has its own distinctive signature. By understanding the different signatures of bone modification, scientists have a tool to help learn about ancient ecology. Turner says that different signatures provide clues when old bones are recovered, or unexpectedly not recovered.

The ASU scientist has traveled the world in search of sites that might yield clues to better understanding the life and death of ancient humans. Turner went to Siberia in the summer of 2002, a region rich in anthropological artifacts. He's been studying sites there since 1979.

"It's very much like being in Flagstaff," Turner says of Siberia. "It is absolutely beautiful. Siberia is a place of dense pine forests, great rivers, and cool blue skies." During the summer expedition, Turner worked with interpreter Olga Pavlova and vertebrate paleontologist Nicolai Ovodov. They explored 25 Siberian caves and other fossil-rich sites.

To date, Turner and his colleagues have made more than 500,000 observations. The work is designed to reliably distinguish differences between the bone damage signatures of human and non-human carnivores. Turner is most interested in the ancient hyena—the biggest bone crusher known to humans. He says that giant ancient hyenas that once roamed Siberia closely resemble their diminutive modern ancestors.

The scientists look at bones with a critical eye. They analyze each bone or bone fragment and code it for 25 features. They look at age, size, and quality as well as the type and severity of damage.

In 1983, Turner coined the term "perimortem" to mean "at or around the time of death." Bone damage signatures can provide a kind of historic record of the events that happened at or near the time of death. In many instances, they might represent the actual cause of death. Turner uses this "death history" to piece together a more complete picture of how ancient people used to eat.

For example, ancient hunters often intentionally broke the long bones of game animals to get at the calorie-rich marrow. Burned bone may be evidence that meat was cooked over an open fire. Unblackened bones might suggest the meat was eaten raw or cooked in some type of pottery.

The art of identifying bone damage signatures is not new. Previous research suggests that one group of Neanderthals were cannibals. Scientists based that idea on the signature of bone breakage and cut marks found on specimens more than a century ago. Turner says the evidence is still being debated among scientists.

Turner's own research of ancient people in the Four Corners Region of the American Southwest has turned up bone specimens that contain the same distinctive signature. His suggestion that cannibalism was practiced there for almost four centuries sparked a firestorm of controversy.

Learning how to tell the difference between human and non-human bone signatures is key. That ability might help the ASU scientist to answer several intriguing questions. For example, if an archaeological site was continuously occupied, was it done so by humans exclusively, or were there

times when animals and humans shared or competed for the same site? Are claims of cannibalism among Neanderthals, which are based on the visible "cut" marks, really proof of cutting or butchering, or did wild animals leave the marks behind? Turner thinks that such information could also prove useful in assessing the issue of migration during the last portion of the Old Stone Age. Scientists say that this is the time when Neanderthals disappeared. Cro-Magnon man and other types of *Homo sapiens* became dominant.

Turner also wonders why it took so long for humans to reach the New World. Did the cold, harsh environmental conditions present an impenetrable barrier? What about the giant Siberian hyenas? Perhaps they played a role in limiting access to Alaska and North America for Siberian people of the late Pleistocene around 12,000 years ago. The ASU scientist thinks that understanding the relationship between those ancient humans and the beasts is a key to solving this puzzle.

"Russian scientists have not paid much attention to the damage that animals can do to bone," Turner explains. "Lots of bone has been recovered. Much of that bone is thought to be associated with ancient hyenas. When we look at the severity of destruction, even to the bones of very large herbivores, it makes us start to think more critically about ancient human-hyena relationships."

Prehistoric Siberian hyenas had an overall body mass comparable to humans. They boasted razor-sharp teeth and powerful bone-crushing jaws. Scientists say they were probably the most dangerous non-human animal in the late Pleistocene period. Some researchers think that ancient hyenas may have hunted in packs as large as 40 to 50 animals. They were the ultimate scavengers, and might easily have stolen a big game kill from human hunters.

Other scientists have different ideas. Nicolai Ovodov, Turner's Russian colleague, thinks that the giant hyenas and humans may have had some kind of positive symbiotic relationship. He thinks they may have shared food, and possibly shelter.

"We've wondered whether the presence of hyena packs and other large carnivores played a significant role in limiting human northward expansion into the western Bering Straits region," Turner says. "The domestication of dogs might finally have aided humans to successfully defend against marauding hyena packs." A dog skull dating back to 14,000 years ago supports that theory. The skull was found at Razboinichiya Cave in the Siberian Altai Mountains.

Turner can easily identify the bone damage signature on bones found at Razboinichiya Cave. Turner says the perimortem damage on the bones looks like hyena tooth marks. But other bones at the site bear marks very similar to those made by stone tool cuts. However, he says that perimortem breakage is often similar in both human and hyena. More evidence is needed.

At another Siberian site called Boshoi Yakor, the scientists found tiny bone fragments that showed a human bone damage signature. Turner thinks that those remains resulted mainly from the butchering, cooking, and bone breaking of small hare-sized, medium fox-sized, and large reindeer-sized animals.

"The fragmentation was so extensive that most of the bones could not be identified by species. Nor could we tell how many people may have consumed the animals," Turner says. "What we do believe is that the intensive processing by these ancient hunters and their families shows clearly that they were not wasting any of the nutrients."

CHRISTY TURNER'S ONGOING WORK IN SIBERIA IS SUPPORTED BY THE NATIONAL GEOGRAPHIC SOCIETY AND THE WERNER-GREN FOUNDATION FOR ANTHROPOLOGICAL RESEARCH. FOR MORE INFORMATION, CONTACT CHRISTY G. TURNER, PH.D., REGENTS PROFESSOR OF ANTHROPOLOGY, 480.965.6213. SEND E-MAIL TO CHRISTY.TURNER@ASU.EDU