



Hunting haven? Cut marks on animal bones (*inset*) suggest that Olduvai Gorge hominins weren't scavengers.

excavated by the Leakeys—that, he says, argues against the scavenging hypothesis. Adding new data to an argument presented in the *Journal of Human Evolution (JHE)* last year,

Dominguez-Rodrigo reported an analysis of more than 1000 pieces of animal bone from four hominin occupation layers at BK, including the remains of about 30 wild cattle from the genus *Pelorovis* and two *Sivatherium*, a large ruminant related to the giraffe. Both of these now-extinct animals weighed at least 400 kilograms. The team found 181 bones with cut marks apparently made by hominins and 172 percussion marks from hammering on the bones with stones or other objects, but only 45 carnivore tooth marks. Moreover, Dominguez-Rodrigo said at the meeting, the cut marks, especially on the cattle, were all over the animals' bodies, suggesting that the carcasses had been butchered whole by hominins at the BK site. If they had been scavenged, only the meatiest parts of the carcasses would have been transported to BK from carnivore kills farther away. "We are finding cut marks in anatomical areas that should not be found if hominins had only secondary access to the remains," Dominguez-Rodrigo said.

Score One for Hunting at Olduvai

Many anthropologists think meat eating was essential for the evolution of bigger human brains (*Science*, 15 June 2007, p. 1558). But were early humans mighty hunters, or did they get their pound of flesh from scavenging carcasses left behind by carnivores such as hyenas? The answer has implications for everything from our ancestors' subsistence strategies to their social structure.

Louis Leakey, who with his wife, Mary, excavated Tanzania's fossil-rich Olduvai Gorge in the 1950s and '60s, concluded from finds of human and animal bones closely associated with stone tools that hominins had been active hunters there at least 1.8 million years ago. But beginning in the late 1970s, other scientists began to argue that the pat-

terns of cut marks and tooth marks on the animal bones were more consistent with scavenging (*Science*, 25 May 1984, p. 861).

The argument is far from settled. Over the past several years, two teams currently working at Olduvai, one led by prehistorian Manuel Dominguez-Rodrigo of Complutense University of Madrid and the other by anthropologist Robert Blumenshine of Rutgers University in New Brunswick, New Jersey, have sparred in journals over the issue. In Paris, the hunting partisans, led by Dominguez-Rodrigo, fired their latest salvo.

Dominguez-Rodrigo presented evidence from a 1.3-million-year-old Olduvai site called BK—which was explored but not fully

Burying Man's Best Friend, With Honor

Dogs are famously loyal to their masters, and many dog owners repay this loyalty by burying their pets carefully in backyards or in pet cemeteries. According to the first-ever systematic literature survey of dog burials, this practice may have roots deep in prehistory. In a talk greeted enthusiastically, graduate student Angela Perri of Durham University in the United Kingdom suggested that the practice might be correlated with the use of dogs as hunting partners when the world warmed in the post-Ice Age Holocene period about 10,000 years ago.

Researchers have debated just when dogs were domesticated, but most agree that it had happened by 14,000 years ago. Yet the earliest dog burials are dated only to about

9000 years ago, at least a millennium after the Holocene began. So far Perri has identified more than 400 sites that comprise a total of more than 1200 reported dog burials. To be sure that she counts only instances when dogs were given special treatment in their own right and weren't incidental to human internments, Perri is considering only "primary" burials, during which dogs were buried separately from humans or other animals. For example, at the famous 7000-year-old site of Skateholm in Sweden, hunter-gatherers dug a pit and arranged a dog in it on its side (see photo); there were several such burials at that site.

So far Perri has come up with 263 cases, all clustered in three geographic areas: the southern United States, northern Europe, and Japan. In each area, Perri said at the meeting, primary dog burials came to an end in prehistory once agriculture was adopted,

even though farming appeared at different times in each region. Perri is now exploring the hypothesis that dogs gained special status as hunting partners when forests in these areas expanded in the Holocene warmth, and



Top dog. Prehistoric hunter-gatherers at Skateholm in Sweden buried their canines carefully.

As for who was doing the hunting, Domínguez-Rodrigo said that during the 2010 field season the team found some skeletal remains tentatively identified as *Homo ergaster*, the African version of *H. erectus*. How the BK hominins, who were armed with stone tools such as flakes, handaxes, and hammerstones, hunted these imposing beasts is unclear, but Domínguez-Rodrigo noted that they might have cornered the animals rather than chased them across the landscape. And he suggested that by 1.3 million years ago, cultural and demographic changes, such as larger social groups, might have enhanced their ability to hunt larger animals.

Sabine Gaudzinski-Windheuser, an archaeozoologist at Johannes Gutenberg University in Mainz, Germany, says that Domínguez-Rodrigo made a “convincing case” that hominins did indeed hunt at Olduvai. Scavenging proponents were not at the meeting, including Blumenschine, who was in the field and could not be reached for comment. But anthropologist James O’Connell of the University of Utah in Salt Lake City—who has debated the issue with Domínguez-Rodrigo in the pages of *JHE*—told *Science* he’s not persuaded by the new bone analyses. He says they do not rule out “aggressive scavenging,” in which hominins chase off the predators that killed a large animal and take the carcass. Living hunter-gatherers, such as the Hadza people of Tanzania, acquired much of their meat in just this way, he notes, citing studies by him and others. The debate is likely to go on as new data accumulate; Domínguez-Rodrigo said his team will continue digging at BK “for quite a few years.”

—M.B.

forest prey became available to their hunter-gatherer masters. But when hunter-gatherers turned to farming, the role of the dog might have been downgraded or shifted.

Although Perri stressed that her work is preliminary, she was peppered with queries about various burials during the question-and-answer session and mobbed by researchers wanting to talk after she stepped down. “It is very interesting that no one has seen this pattern or suggested this hypothesis before now,” says archaeologist Virginia Butler of Portland State University in Oregon. “It is a great example of [archaeological] records ... staring us in the face, but we simply didn’t put all the pieces together.” Butler adds that if the geographic pattern holds up, climate change and human adaptations to it, rather than local cultural practices, might explain the rise and fall of dog burials in prehistory.

—M.B.



Climate clues. Excavations at Syria’s Tell Sabi Abyad show changes in animal use after 8200 B.P.

In a Cold Snap, Farmers Turned to Milk

Today, the threat of global warming hangs over humanity and our planet, but prehistoric humans often faced the opposite problem: global cooling (*Science*, 22 January, p. 404). One much-discussed climate event took place about 8200 years ago, when a sudden shift of North Atlantic currents plunged the Northern Hemisphere into a short cold and dry spell. Many researchers have argued that this so-called 8200 B.P. event affected cultures around the globe, in different ways depending on locale.

But the evidence has not been clear-cut, and archaeologists have long debated the role of climate, in part because few sites offer a continuous record before and after 8200 B.P. At the meeting, archaeologist Anna Russell of Leiden University in the Netherlands presented what is perhaps the best case yet for the cold snap’s effect on human activity, finding a marked shift in how farmers at a site in northern Syria exploited animals after 8200 B.P.

The 8200 B.P. event was short-lived—perhaps no more than 200 years—but it shows up in Greenland ice cores and other proxy indicators of climate change, lowering winter temperatures an estimated 2° to 4°C and triggering aridity throughout the Northern Hemisphere. In the Near East, where agriculture was getting started, archaeologists have found tantalizing suggestions of the event’s impact: New farming sites sprout in central Turkey, although they are relatively small, and on Cyprus farming disappears entirely for a millennium. Meanwhile, farmers began for the first time to move into southeastern Europe, possibly seeking more favorable conditions.

To explore the event’s effects, Russell

analyzed 15,000 animal bones from the early farming site of Tell Sabi Abyad, where Leiden archaeologist Peter Akkermans leads excavations. The site was occupied between about 8900 and 7300 years ago and is one of the few to fully straddle the event.

Russell said at the meeting that after 8200 B.P., pig farming, which had been a major source of subsistence, gave way to cattle raising, and the number of domesticated sheep and goats rose. In addition, milk products—detected by traces of lipids in pottery—suddenly showed up in the archaeological record, and the number of spindles, used to spin animal fibers into textiles, increased as well. The people apparently began to rely more on so-called secondary products, such as milk and textiles, which can be stored longer and might have helped them cope in a time of climatic stress, Russell said.

She pointed out that a few other Neolithic sites in the Near East also show changes in subsistence around 8200 B.P. At Çatalhöyük in Turkey, for example, residents apparently abandoned one settlement and founded a smaller, less dense one across a river.

Archaeobiologist Melinda Zeder of the Smithsonian National Museum of Natural History in Washington, D.C., cautions that the 8200 B.P. event may have been one of a “wide range of factors”—including possibly increased social stratification—that led to changes in animal use. But archaeologist Virginia Butler of Portland State University in Oregon says that although she agrees that “correlation is not causation,” Russell’s talk was “a great example of trying to link changes in the faunal record to a known global [climate] event.”

—MICHAEL BALTER