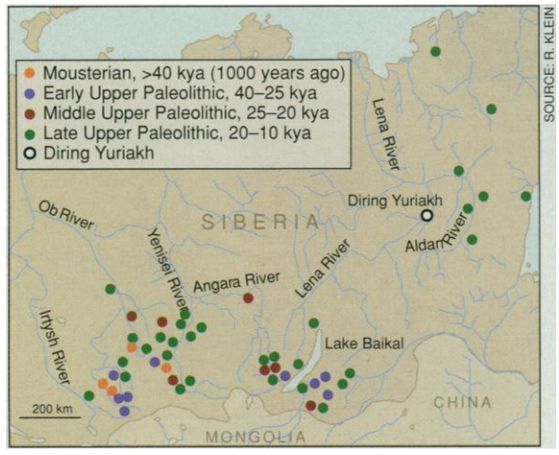
ARCHAEOLOGY

Tooling Around: Dates Show Early Siberian Settlement

Human evolution is usually considered a tropical affair, a story that unfolded in the mild African climate starting perhaps 2.5 million years ago. Most anthropologists have thought that humans didn't venture into bitter subarctic regions until at most 30,000 years ago. But a Report on page 1281 would stretch human history at the edge of the Arctic close to a mind-boggling 300,000 years ago. This "puts humans in the far north way earlier than anyone had anticipated," and suggests that these ancient people were surprisingly resourceful, says archaeologist Rob Bonnichsen of Oregon State University in Corvallis.

The evidence comes from a site on the Lena River called Diring Yuriakh, which lies at 61 degrees north latitude—the same as Anchorage, Alaska. Geoarchaeologist Michael Waters of Texas A&M University and geologists Steven L. Forman and James M. Pierson of the University of Illinois, Chicago, came up with the startlingly early dates using a technique called thermoluminescence (TL) on sediments surrounding the site's thousands of stone fragments and artifacts. The new dates, if they hold up, could trigger fresh speculation about the settlement of northern regions and even of North America. But not everyone is convinced. Although dating experts say the work looks sound, anthropologists such as Stanford University's Richard Klein are reluctant to rewrite human history on the basis of a single data point. That any of the fragments are humanmade is "unlikely," says Klein.



Siberian standout. New dates put Diring Yuriakh at 260,000 years old—far older than nearby sites.

Diring Yuriakh was discovered in 1982 when Russian archaeologist Yuri Mochanov, director of the Lena River Archaeological Expedition, came upon a 10,000-year-old burial site. Mochanov dug deeper and found an occupation surface containing chipped pebbles that looked far more primitive. Using bulldozers to unearth the stratum, he created a dig about 2 kilometers square—what Waters calls "the biggest excavation I've ever seen." About 4000 artifacts have been uncovered, including many simple choppers and scrapers.

While similar finds have been dismissed by some as nonhumanmade "geofacts," some archaeologists who have been to Diring say the site is genuine. Bonnichsen, for one, believes the stones are indeed *homo*-made. Archaeologist Robert Ackerman of Washington State University in Pullman, another visitor, says he had "no difficulty recognizing this material as artifacts."

But there has been no consensus about the age of the site because there are no materials, such as bones or volcanic matter, suitable for other dating methods such as uranium-thorium dating. Mochanov has argued that the tools may hark back to 2 million years ago, in part because they resemble the 2.5-million- to 1.6-million-year-old Oldowan stone tools found in East Africa. But many anthropologists dismissed the idea because all other high-latitude sites are much younger. For example, the stone tools and animal bones found in the Mousterian cave sites in southern Siberia are perhaps 60,000 years old, says Ackerman. Farther north, the oldest sites are those Mochanov has found near the Lena, dated by radiocarbon methods to 10,000 to 30,000 years ago.

To settle the controversy, Mochanov invited other scientists to test the Diring site for themselves, and Waters took him up on it. Because the only raw material for dating was rock and sediment, dating expert Forman used TL, which gauges how long quartz-containing rock has been buried from the number of electrons trapped in the defects of the quartz crystals. These electrons build up at a regular rate over time but are wiped out by sunlight. Samples of windblown sand covering the artifacts yielded conclusive dates ranging from 240,000 to 366,000 years, says Waters.

TL dating has pitfalls, however. One is that the sediment's clock must be thoroughly zeroed before burial by exposure to sun. That is usually not seen as a problem for wind-deposited sediments, which get plenty of light before burial. But dating expert Jack Rink, a geologist at McMaster University in Ontario, Canada, says he would like to see the dates verified with yet another method—infrared stimulated luminescence dating of the feldspar contained in quartz grains—to be sure the TL clock was properly set.

Other experts are persuaded that the work is reliable. "I have zero doubts," says Bonnichsen. That leaves him and others wondering who these ancient settlers could have been. With no human bones to go by, it's anybody's guess. "At 200,000 years [or beyond], you can put whoever you want there. It depends on which theory of human origins you believe in," says Klein. Ackerman says it could have been *Homo erectus*. These early humans are known to have existed from about 1.5 million to perhaps as recently as 30,000 years ago. They had fireplaces and built huts—and were probably intelligent enough to survive in a cold climate, he says, noting that the nearest known human remains from this time are 400,000-year-old *H. erectus* fossils from the Zhoukoudian site in northern China. Other archaeologists, such as Alan Bryan of the University of Alberta, Edmonton, think the Siberian toolmakers were more likely a transitional post-*erectus* form known as archaic *Homo sapiens*.

But whoever the toolmakers were, they raise the fascinating idea that premodern humans may have been more intelligent and resourceful than scientists had thought. That notion gains support from a report in this week's issue of *Nature*, describing sophisticated 400,000-year-old wooden spears from Schöningen, Germany.

To some researchers, having even a limited population of this antiquity in Siberia raises the question of when people migrated from Asia to the Americas. Bonnichsen goes so far as to say that the new date "sets the stage" for the migration to have occurred as long ago as 300,000 years. But most others are doubtful, because there's no undisputed evidence of humans in the Americas before perhaps 11,000 or 12,500 years ago (see p. 1256).

Indeed, the gap between the Diring date and those of other sites is simply too wide for many archaeologists to accept. Ted Goebel of Southern Oregon State College in Ashland says that the hominids of 250,000 years ago were not capable of surviving on the limited resources of the subarctic. It "doesn't fit the patterns that I see elsewhere in Northern Eurasia, where the first time you see humans above 60 degrees" is about 25,000 years ago, he says. Waters himself acknowledges that "basically Diring stands out there as an enigma." But whatever the final verdict on the Diring tools, says Bonnichsen, "it's neat stuff."

–Constance Holden