Archaeology

Strands of the Stone Age

Excavations at an ancient village submerged for at least 100 years at the edge of Israel's Sea of Galilee have yielded three fragments of twisted plant fibers identified by scientists as the earliest known examples of human-made cord.

The finds, assigned an age of 19,300 years, may also represent the oldest evidence of above-ground storage, assert Daniel Nadel of the Stekelis Museum of Prehistory in Haifa, Israel, and his colleagues. The cord remains may have come from bags once used to store fish, since piles of fish bones lay near the fibers, says Nadel's team. Or plant fibers may have been used to weave fishing nets, they note.

Dating of the cord fragments appears reliable, but it is too soon to assign them a definite function, says Ofer Bar-Yosef of Harvard University, who has seen the finds.

"This is an important discovery, but it's difficult to interpret how the fiber was used," Bar-Yosef contends. "These fibers could have been part of a dress, a basket, or a wallet."

The artifacts come from Ohalo II, a site that literally surfaced in 1989 after a dramatic drop in the water level of the Sea of Galilee. Researchers conducted fieldwork annually from 1989 through 1991. Rising waters have again submerged the site.

Investigators excavated three residential structures, a waste dump, hearths, flint tools, animal bones, and one grave containing the skeleton of an adult male. While sorting through charcoal remains, researchers found the charred, twisted fibers. Identification of the type of plant from which the 19,000-year-old fibers came is not possible, Nadel and his coworkers say. But similar plant species growing near the Sea of Galilee today do not naturally form twisted fibers, they write in the August-October CURRENT ANTHROPOLOGY.

The oldest previous evidence of cord made from plant fibers, dating to approximately 17,000 years ago, comes from France's Lascaux Cave.

Europe's first settlers: Late shows

Over the last decade, an increasing number of scientists have suggested that human ancestors moved into Europe from 1 million to 2 million years ago, much earlier than previous estimates. But a reappraisal of the archaeological evidence on which they rely, described in the September ANTIQUITY, concludes that humans made Europe their home no more than about 500,000 years ago.

Members of the human evolutionary family, called hominids, left Africa and reached Asia perhaps 2 million years ago, assert Wil Roebroeks and Thijs van Kolfschoten, both of Leiden University in the Netherlands. Much later, in their view, a founding wave of hominids swiftly occupied much of Europe. Why hominids avoided Europe before that time remains unclear, the scientists note.

Virtually all European archaeological finds more than 500,000 years old come from soil disturbed by various geologic processes. No human remains accompany these artifacts, which usually consist of pebble and rock "tools" that could have been split and chipped by falling rocks or other natural forces, the researchers contend. But beginning half a million years ago, European sites included large collections of uncontested stone tools along with hominid fossils.

"The movement to push back hominid origins in Europe has needed a critical analysis," asserts F. Clark Howell of the University of California, Berkeley.

Howell suspects, however, that hominids trickled in and out of Europe for thousands of years before reaching a "critical mass" that set the stage for rapid settlement of the region. At that point, hominids began to leave behind clearer signs of their presence, Howell theorizes.

Astronomy

The quasar next door

Most quasars that astronomers detect lie billions of light-years from Earth. But scientists have now confirmed that one of these brilliant beacons resides at the heart of Cygnus A, a galaxy just 600 million light-years away.

Finding a quasar in the Milky Way's backyard should enable scientists to study in unprecedented detail a powerhouse that spews hundreds of times more energy than a typical galaxy, says Anne Kinney of the Space Telescope Science Institute in Baltimore. She and her colleagues analyzed the spectra of ultraviolet light recorded by the Hubble Space Telescope to confirm that a quasar lies at the center of Cygnus A, the brightest radio galaxy in the northern sky. Kinney and her coworkers, Robert Antonucci and Todd Hurt of the University of California, Santa Barbara, report their work in the Sept. 22 NATURE.

Astronomers have long suspected that most radio galaxies, though varying widely in appearance, have more in common than meets the eye. They theorize that these galaxies harbor a quasar shrouded by a doughnut-shaped cloud of gas and dust. Depending on the galaxy's orientation in the sky, observers on Earth either view it edge on, through the dust in the doughnut, or face on, a clear view through the doughnut's hole.

Those radio galaxies seen edge on, including Cygnus A, appear to emit only narrow bands of visible light. But seen face on, radio galaxies usually sport the brilliant, broadband emissions typical of gas swirling rapidly around a quasar.

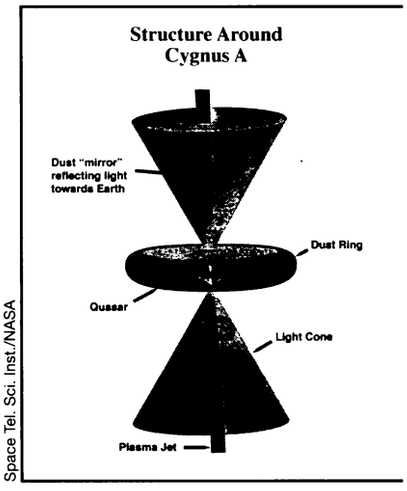
Observations over the past several years support this scenario. In studying certain edge-on radio galaxies, astronomers have found that they can peek indirectly into the core. That's because material — often electrons — sitting above the hole in the dusty doughnut acts as a mirror, reflecting some of the light emitted by the naked core into Earth's line of sight. This light has the broadband spectra characteristic of a quasar. But the spectra of visible light reflected from the core of Cygnus A have no such pattern, casting doubt on whether the galaxy truly harbors a quasar.

Rather than look in visible light, Kinney and her colleagues examined Cygnus A in the ultraviolet, using Hubble's faint-object spectrograph. They were searching for massive stars, but instead they found that some of the spectra showed the broadband emissions typical of a quasar.

Why are the telltale emissions seen in ultraviolet light but not in visible light? Kinney speculates that the material reflecting radiation from the galaxy's core is dust, not electrons. Dust preferentially reflects shorter-wavelength radiation, such as ultraviolet light, toward an observer.

The new findings, Kinney says, complement an older study by other researchers, who partially penetrated Cygnus A's dusty shroud by observing the galaxy in the infrared. Dust doesn't absorb as much infrared radiation as it does visible light, which enabled the astronomers to get a more detailed view of the galaxy's core. The infrared images showed a bright, point-like nucleus highly suggestive of a hidden quasar (SN: 6/1/91, p.343).

Together, says Kinney, results from the two studies clinch the argument over whether the Milky Way has a quasar for a neighbor.



Dusty doughnut that may surround the quasar in Cygnus A.