archaeology

Early civilization in Illinois

Five years ago, archaeologists began excavating a site on the Koster farm in southwestern Illinois. Since that time, the site has become one of the most popular and perhaps one of the most important ongoing digs in North America. Every summer, large numbers of archaeologists and students (mostly from Northwestern University in Chicago) flock to the Koster site and unearth new evidence about early civilization in Illinois. The site is believed to consist of at least 12 horizontal layers—each containing evidence of a different civilization. The deepest level, 35 feet below the modern surface, is probably a minimum of 12,000 years old.

During the summer of 1973, a major area of the village that existed on horizon 11 was excavated. A series of flat terraces were found, each stepped back along the banks of a creek. Large post holes in the terraces suggest that substantial structures were built on them. To date, four structures containing hearths and food-storage pits have been unearthed. These finds make the site especially important; archaeologists did not expect to discover a civilization living in Illinois more than 6,000 years ago with the sophistication to alter the landscape by constructing terraces and erecting large structures on them. Stuart Streuver, head of the project, explains: "We used to think that permanent villages and a sedentary life only came about after people had developed agriculture. But in the Lower Illinois River Valley agriculture did not become a way of life until several hundred years after the birth of Christ. These ancient houses were built by people who relied on a hunting-gathering economy."

Previous summers have revealed that the inhabitants of the Koster site had knowledge of squash, pumpkin and gourd more than 2,500 years ago. But there is no evidence that they became agriculturists until 1,000 years ago—about the same time that collective violence first appeared on the scene. Next summer's dig will continue work on horizon 11 and attempt to get below horizon 12.

The North American farmer

There is good evidence to support claims that agriculture was a way of life in North America almost 1,000 years ago. But some recent evidence indicates that a few civilizations around the Great Lakes may have been involved in growing corn or maize almost 1,500 years ago. David M. Stothers of the University of Toledo presented his own and other findings to support this date at the recent meeting of the Iroquois Research Conference in Albany, N.Y. The evidence consists mainly of radiocarbon determination of the age of charred maize kernels and corn cobs found in the area.

The return of the boomerang

In 1962 a wooden boomerang was unearthed in the coastal dunes near Velsen, Netherlands. Radiocarbon dating showed it to be a relic of the Iron Age, 2,300 years old. Felix Hess of the Department of Applied Mathematics at the University of Groningen in the Netherlands has recently conducted field experiments with a plywood copy of the 39-centimeter instrument. He found it is capable of performing return flights. Objects resembling boomerangs have been found in many parts of the world outside Australia. But this, says ANTIQUITY (Vol. XLVII, No. 188), "appears to be the first instance in which a boomerang of non-Australian origin is shown to be returning."

technology

Antimissile laser a reality

Despite earlier reports to the contrary (SN: 1/5/74, p. 8), high-powered, conventional lasers have apparently developed to the point of achieving antimissile capabilities. According to recently released, highly censored testimony from the House Appropriations Committee, reported in the Jan. 21 AVIATION WEEK AND SPACE TECHNOLOGY, the Navy has requested $29.1 million to begin outfitting fleet demonstration models of antimissile lasers. The Air Force has requested $35 million, and is understood to be working with the test model of an airborne laser for bomber protection. The Department of Defense's Advanced Research Projects Agency (ARPA) has requested $18.5 million for basic research in the field.

SCIENCE NEWS has learned that the new generation of weapons has resulted from "major breakthroughs" in high-energy laser technology, and that they operate at relatively close range by attacking an oncoming missile's homing devices. The Air Force is reportedly working with gas dynamic lasers, in which ordinary combustion is used to excite carbon dioxide molecules enough to lase. The resulting 10.2-micron-wavelength radiation works well at high altitudes, but is easily dissipated in low-altitude, moisture-laden air. To overcome this problem, the Navy is reportedly switching to a "chemical laser," in which highly reactive substances, such as deuterium and fluorine, are combined to lase at shorter wavelengths that are not so easily absorbed near the ocean's surface.

A film of successful ground-to-air laser weapons, bringing down drones over the New Mexico desert, was also reportedly shown recently to some congressmen. Russian laser technology is generally considered well advanced and the Soviet Union is known to be pursuing its own vigorous program of high-energy laser development.

Water and power for free?

It sounds almost too good to be true: Stick a pipe covered at the bottom with a semipermeable membrane deep enough into the ocean and out comes fresh water with enough force to drive a generator—automatically. Such "osmotic pumps" have, of course, been known for a long time, and the underlying principle is instrumental for transferring fluids in many bodily processes. But now two chemical engineers, writing in the Jan. 18 SCIENCE, speculate about what would be necessary to put the idea to practical use to solve the world's power and fresh water shortages.

A semipermeable membrane lets water pass through but excludes any salts. The fresh water inside the pipe then rises until its weight equals the osmotic force across the membrane. In the ocean, this alone would bring fresh water up to within 231 meters of the sea's surface. But fresh water is lighter than salt water and is thus buoyed up further the deeper the pipe is inserted into the sea. In theory, anyway, the combination of osmotic pressure and flotation would bring fresh water streaming out the top of the pipe if the bottom were below 8,750 meters. (The process only works if the salt content of the sea is the same at the surface and at great depth—which requires energy input from the sun for mixing. So it's not getting something for nothing.)

Unfortunately, the initial capital costs are high, but if superior membranes can be developed, the authors, Octave Levenspiel and Noel de Nevers, say, "the devices might merit further consideration for practical application." Energy from the ocean will probably first come by other means.