

Ancient symbols surface on Israeli pebble

An engraved limestone pebble uncovered at an Israeli archaeological site in 1988 provides a rare example of abstract, symbolic artwork in the Middle East during the Upper Paleolithic, a period between 35,000 and 12,000 years ago, according to a new scientific report on the artifact.

"The pebble appears to reflect the sophisticated, abstract encoding of a message," says Erella Hovers of Hebrew University in Jerusalem, who directed excavation at the Urkan e-Rub Ila site where the engraved stone turned up. Artifacts found with the pebble belong to hunter-gatherers who inhabited the region between 19,000 and 14,500 years ago.

Only three other Middle Eastern art objects from the Upper Paleolithic have been found. A limestone plate with an engraving of a horse dates to around 30,000 years ago, a bone tool with engraved line patterns is more than 20,000 years old, and a similarly marked bone tool is about 13,500 years old. Unlike the latter two objects, the Urkan pebble has no apparent use other than the presentation of its mysterious abstract design, Hovers says.

Unlike the Middle East, forms of artistic expression — from cave paintings to engraved bones — abound in Europe's archaeological record of the Upper Paleolithic, Hovers notes in her report in the June *CURRENT ANTHROPOLOGY*.

The pebble is nearly 4 inches long and 2.5 inches wide, with a maximum thickness of half an inch. Its edges are thinned by intentional polishing. One side contains eight sets of line incisions. Three sets contain five parallel lines, two of which are connected by smaller lines or "rungs" to form "ladders." The other five groups consist of from four to six parallel lines. The pebble's opposite face contains a cross-hatch design bordered by two "ladders."

The meaning of the engraved patterns remains unclear, Hovers says. Although similar ladder patterns occur on some Upper Paleolithic objects from Europe, the signs probably held different meanings in different cultural groups, she says.

Some investigators, most notably Alexander Marshack of Harvard University, have studied line engravings on bone and stone artifacts from Europe with a reflected-light stereoscopic microscope and conclude that some marks were notations, probably made by different people over time. The notations, as well as notches carved in bones, may represent tallies of animal kills or even lunar calendars, according to Marshack, who began his study of Upper Paleolithic engraving in the 1960s.

But Marshack's interpretation is premature, reported Francesco D'Errico in the February 1989 *CURRENT ANTHROPOLOGY*.

D'Errico, of the Institute of Human Paleontology in Paris, France, studied experimental marks on limestone pebbles under a scanning electron microscope and found it possible to tell the direction in which incised lines were made, the order in which they were made and whether the same tool produced all the marks. He applied the technique to 122 engraved pebbles from French sites dating to between 12,000 and 10,000 years ago. Sequences of lines were always made by rapid tool movements, and on many pebbles all marks had been produced in a single sitting, D'Errico contends.

In his view, the incisions were not

periodic notations or lunar calendars. However, notations clearly exist on incised pieces of bone, antler and ivory not studied by D'Errico, Marshack responds.

"The marks on the Urkan pebble have some kind of meaning, but it's probably not as complex as what Marshack has suggested," says Harvard University archaeologist Ofer Bar-Yosef, who has seen the Israeli artifact. He and his colleagues recently discovered similar "ladders" and parallel lines carved into limestone slabs in an Israeli cave containing remains of a village-based culture that existed from 12,000 to 10,000 years ago.

The Middle East contains many open-air archaeological sites where Upper Paleolithic art is unlikely to be preserved, Bar-Yosef notes.

— B. Bower

Pregnancy unmasks fatal metabolism defect

When a 21-year-old woman complained of headache and confusion eight days after giving birth to a healthy baby, physicians mistakenly diagnosed her as suffering from postpartum depression and admitted her to a psychiatric unit. Three days later, the woman went into coma and a week later, she died.

This dramatic case stumped physicians until the woman's blood revealed a telltale high level of ammonia, a diagnostic clue suggesting a rare, inherited disorder called ornithine carbamoyltransferase deficiency. The disease results from a defective gene located on the X chromosome that codes for the enzyme ornithine carbamoyltransferase, which the body needs to metabolize nitrogen-containing compounds derived from protein in the diet. Without enough functional enzyme, toxic ammonia builds up in the bloodstream and can lead to vomiting, seizures, coma and sometimes death.

Physicians know this enzyme deficiency strikes male newborns who inherit the faulty gene from their mother. While a few female carriers develop the disease during childhood, most show no symptoms and up until now scientists believed asymptomatic adult carriers had escaped the disorder entirely.

Now Pamela Hawks Arn of the Nemours Children's Clinic in Jacksonville, Fla., Saul W. Brusilow of the Johns Hopkins University School of Medicine in Baltimore and colleagues report in the June 7 *NEW ENGLAND JOURNAL OF MEDICINE* that healthy female carriers may run a lifelong risk of potentially lethal episodes of high blood-ammonia levels. At the same time, another study in the same issue describes a new method of identifying such carriers.

In the first report, Arn, Brusilow and their co-workers describe five healthy women who abruptly developed toxic blood levels of ammonia and went into coma. All carried the mutant gene causing ornithine carbamoyltransferase defi-

ciency, and two of the five subsequently died.

"What we found is that there are these women who are normal under ordinary circumstances, but when faced with some sort of [physical] stress they get sick," says Brusilow. Carriers have enough functional enzyme under most circumstances but may succumb to high blood ammonia levels when the body is under extreme duress, such as the postpartum period following childbirth, he notes.

Three of the five women got sick after delivering a healthy infant who did not inherit the flawed gene, according to the report. The team speculates that in such cases the healthy fetus may metabolize nitrogen compounds that pass through the placenta from the maternal bloodstream. "We hypothesize that the fetus was handling the ammonia and when the fetus was delivered the woman had a sudden loss of this biochemical factory," Brusilow says. The scientists cannot explain the trigger that led to coma for the two nonpregnant women in their study.

The team also found evidence that carriers abnormally metabolize protein all the time, even when these women show no symptoms of the disease. More research must identify periods when such abnormalities can progress to full-fledged disease, Brusilow says. Arthur L. Horwich of Yale University School of Medicine in New Haven, Conn., comments in an accompanying editorial that at least several thousand U.S. female carriers may run the risk of developing life-threatening episodes of high blood ammonia.

In a companion study in the same issue, Brusilow, Elizabeth R. Hauser and colleagues at Johns Hopkins report a new way to identify carriers of this rare genetic disorder. The method is safer than the current test, which can trigger attacks of high blood ammonia in some carriers, the researchers say.

— K.A. Fackelmann