Archaeology

Portuguese rock art raises ruckus

Scientific and political controversy is raging around several clusters of engraved animal portrayals found in the Côa Valley of northeast Portugal. The fate of a major dam may hinge on the resolution of widely disparate estimates of the age of this rock art.

On the scientific front, two reports in the December 1995 ANTIQUITY provide starkly contrasting estimates. One analysis suggests that the engravings date to no more than several thousand years ago; the other supports a much older, Late Stone Age origin for the figures.

An archaeologist hired by Portuguese authorities to conduct independent dating tests last spring contends that evidence gathered so far places most of the engravings at 3,000 years old or younger. Radiocarbon dates were obtained from thin mineral layers that formed on some of the engravings, says Robert G. Bednarik of the International Federation of Rock Art Organizations in Caulfield South, Australia.

In addition, a preliminary microscopic analysis of erosion on the engravings suggests that those classed initially as Late Stone Age works are, in fact, of quite recent vintage, Bednarik asserts. Finally, he adds, a number of engravings bear marks made by metal points. Farmers who inhabited the Côa Valley around 1,700 years ago may have carved some of these figures, he holds.

Stylistic comparison with other prehistoric art specimens in western Europe places the Portuguese finds squarely in the Late Stone Age, argues João Zilhão of the Institute of Archaeology in Lisbon, Portugal.

He also says that none of the data cited by Bednarik undermines the view that most of the Côa figures date to about 20,000 years ago. Radiocarbon dates obtained so far provide only minimum age estimates for several engravings, and the validity of microscopic analyses of rock art has yet to be demonstrated, the Portuguese archaeologist holds.

"I leave it to readers and, in time, to further work and to history to decide truths in the matter," writes ANTIQUITY editor Christopher Chippindale of Cambridge University in England in an accompanying comment.

Construction of a hydroelectric dam in the valley came to a halt last year amid charges that the project would submerge what some archaeologists have deemed priceless examples of Late Stone Age rock art, between 30,000 and 10,000 years old. The situation grew particularly tense early in 1995. Information surfaced that the national utility company building the dam and Portuguese government officials had known about several engravings for at least a year before announcing their existence—2 months after the expensive project had begun.

All fired up for tool making

Discolored patches on a cave floor in southwestern France provide evidence that Neanderthals who made stone tools at the site between 53,900 and 65,600 years ago intentionally set fires.

Only a few firmly dated examples of fire use exist for that time period, assert Jean-Philippe Rigaud of Bordeaux University in Talence, France, and his coworkers in the December 1995 ANTIQUITY. Measurements of accumulated radiation in burned soil samples from the French cave provided age estimates and indicated that the sediment had been heated at temperatures characteristic of controlled fires. Lichen remnants in the charred soil suggest that lichens may have been plucked from the cave's walls to feed ancient fires, according to Rigaud's group.

Rigaud suggests that the cave dwellers may have used fires to light the chamber as they fashioned stone implements typical of the era, which were also found in the cave.

Chemistry

Neutralizing neurotoxins

Chemical warfare agents—including the type of nerve gas used in last year's Tokyo subway terrorist attack—can kill quickly unless neutralized immediately after release.

Joseph J. DeFrank, a chemist at the U.S. Army's Edgewood Research, Development, and Engineering Center in Aberdeen Proving Ground, Md., reports isolating enzymes from marine microorganisms that can break down certain neurotoxic agents into harmless products.

The new enzymes can be deployed rapidly during a chemical attack and could replace existing neutralizing agents, which are corrosive, he says.

Speaking at last month's meeting of the International Chemical Congress of Pacific Basin Societies (ICCPBS) in Honolulu, DeFrank said the research team sought agents capable of decontaminating a neurotoxin rapidly. The group developed a freeze-dried enzyme that soldiers or civilians could dissolve in water and then spray into the air or onto equipment.

Since the enzymes act as catalysts, the neutralizing reaction doesn't consume them, DeFrank says. Under ideal conditions, 1 gram of enzyme can decontaminate up to 10 pounds of toxic nerve agent in 10 minutes.

The new enzymes may also prove useful to farmers treating pesticide spills. One newly identified enzyme neutralizes pesticides, which resemble nerve agents, DeFrank says.

Mining for lost silver

To recover silver from used X-ray film, Haruo Ishikawa, a chemist at Japan's University of Osaka Prefecture, and his colleagues have devised a biological technique to break down the film's emulsion, which holds the silver particles in place.

The scientists use a bacterial enzyme to attack the film's gelatin coating and release silver particles into solution. The metal then precipitates, Ishikawa reported at last month's meeting of the ICCPBS in Honolulu.

This technique produces no pollutants, recovers high-grade silver, and frees up the film's polyester base for recycling, Ishikawa says. To put the method into practice, a pilot plant to reprocess 1 ton of used X-ray film per day is scheduled to open in Osaka within 2 years, he told SCIENCE NEWS.

Production of X-ray film consumes as much as one-fifth of all silver consumed by industry worldwide.

Blue roses?

Violets are red, roses are blue,

Soon Japanese chemists may have new flowers for you.

Kumi Yoshida of Sugiyama Jogakuen University in Nagoya and her colleagues have unearthed some mechanisms by which flowers color themselves.

While scientists know that most brilliant flower colors come from the pigment anthocyanin—which, like litmus paper, changes hue when subjected to acids or bases—they had not understood how sap in flower cells controls a petal's acidity.

Yoshida's team inserted a pH-sensitive glass capillary electrode into a flower petal cell of the morning glory, *Ipomoea tricolor*. Rich in heavenly blue anthocyanin, the flower changes color from a purplish red to a sky blue as it opens.

The scientists found that as a flower opens, its sap grows more alkaline, causing the pigment molecules to change color, they said at last month's meeting of the ICCPBS in Honolulu. In a study of blue dayflowers, cornflowers, and salvia, the researchers also found that metal ions can interact with anthocyanin pigments to stabilize a flower's blue hue, Yoshida told SCIENCE NEWS.

Guided by this knowledge, she predicts that genetic engineers may eventually be able to alter the alkalinity of some flower sap cells to yield novel varieties—even a blue rose.