Cave Clues Suggest Stone-Age Cannibalism

Since the turn of the century, archaeologists have asserted that various prehistoric sites contain evidence of human cannibalism, only to have their provocative claims later rejected as misinterpretations based on inadequate evidence. An international team of scientists now reports that modern scientific techniques have yielded the strongest evidence to date of cannibalism during the Stone Age.

The scientists, led by anthropologist Paola Villa of the University of Colorado in Boulder, excavated 13 shallow pits in a cave in southeastern France. One of the depressions contained the undisturbed remains of six humans — three adults, two children and one of undetermined age — who apparently were butchered by inhabitants of the cave 6,000 years ago.

Two other clusters of human bones were discovered at the site, known as the Fontbrégoua Cave, but they had been moved about and gnawed on by animals. The remaining pits contained bones from a variety of butchered animals, including sheep, goats, deer and boars.

"Human and animal carcasses were processed and discarded according to the same pattern of selective butchering," write the U.S., French and Italian investigators in the July 25 SCIENCE. "We believe that cannibalism is the only satisfactory explanation for the evidence. . . ."

Anthropologist William Arens of the State University of New York at Stony Brook, a leading critic of previous reports of systematic cannibalism among some tribes of modern hunter-gatherers, agrees. "This is a careful piece of research," he says, "and cannibalism is a likely explanation for the evidence." But both Arens and the Fontbrégoua researchers point out that the site contains no evidence of *ritualistic* cannibalism — the routine and systematic eating of human flesh. Instead, the remains may be the result of an isolated instance of survival cannibalism, in which people are eaten as a last resort during emergencies or hard times. Investigations of other Stone Age sites should shed light on this question, note the scientists.

Several lines of evidence led to the conclusion that cannibalism occurred at the cave, which is known to have been used seasonally by small groups of people from 5,000 B.C. to 3,000 B.C. Clusters of human and animal bones contained the same selectively butchered parts, mainly from the limbs and shoulder. Both groups of bones also bear similar cut marks, apparently made by stone axes shortly after death. When examined under a scanning electron microscope, the cut mark patterns indicate that meat was removed from the bones. Furthermore, both human and animal long bones appear to have been deliberately broken to obtain marrow.

Microscopic bone changes that appear after an outer layer of meat has been cooked were not observed, say the researchers, but these changes do not show up after low-temperature cooking.

Unlike the animal bone deposits, human remains included skull bones that may have been kept as trophies or ritual objects, suggest the scientists.

While Arens concludes that this was a case of survival cannibalism, anatomist Pat Shipman of Johns Hopkins University in Baltimore, who analyzed the Fontbrégoua cut marks, is less certain about what motivated this instance of cannibalism. "A total of 13 or 14 people were eaten at this site," she says, "and probably not at a single meal. It's not yet clear whether brains were removed from the skulls for eating."

In several prior instances, purportedly butchered bones of prehistoric humans were shown to reflect scavenging by animals or secondary burials, in which corpses were dug up and reburied after flesh was ritually removed. Reports of modern cannibalism also have stirred heated debates in the past decade. Says Shipman, "This tends to be an emotion-laden area." — *B. Bower*

Computer images: Hanging in space

Projected into space, the green, three-dimensional image of a miniature Chevrolet Camaro floats in the air. Although the 9-by-4-inch image is somewhat grainy, any viewer can pick out the car's tiny front and rear license plates. Unveiled this week at the Massachusetts Institute of Technology, this hologram is the first to be generated from pictures produced on a computer.

Two key developments led to this initial step in creating a new type of computer display, says MIT's Stephen A. Benton, the principal investigator. "We came up with a new way of making holograms to produce this kind of suspended image from computer data," he says. "And this has been paralleled by research in computer graphics, in which the image is processed in such a way as to give a realistic, undistorted, three-dimensional image."

The researchers start with enough digital data describing an object, such as a car, to build up a detailed picture on a video screen. A computer then processes the data to generate images of the car as seen from about 1,000 different angles, covering the front and back and one side. Each view is carefully photographed on 35-millimeter film. Then, with laser light, all of these views are projected at the proper angles onto a single sheet of film to produce the hologram.

Laser light passing through the completed hologram generates the final three-dimensional image. Although a viewer can't walk all the way around the image to see all sides of the object, it's still possible to get a good sense of what the solid object would look like.

This technique, the researchers say, may someday be useful for designing buildings or products. In the case of cars, computer-generated holograms may eliminate the need to carve clay models of proposed designs. Doctors and medical researchers may also find such displays useful, for example, for examining body parts before surgery.

Benton and his group are working on creating full-color and larger images (as of now, images can be projected only in the color of the laser light). They are also trying to speed up the process for converting a set of computer images into a hologram, which now takes up to a week to accomplish.

This is just the very first attempt at putting all the principles into play, says Timothy P. Browne, associate director of MIT's new Media Laboratory, where the imaging research is taking place. "It's like photography in the 1860s," he says. "There's nothing particularly clear and sharp about it, but you can see that it works." — *I. Peterson*

Biotech vaccine okayed

The Food and Drug Administration this week approved a hepatitis vaccine made by yeast saddled with hepatitis B virus genes (SN:7/27/85,p.55). The approval is the first for a genetically engineered human vaccine and for a human pharmaceutical produced by yeast. While there is already a hepatitis B vaccine on the market, it is derived from blood. According to the July 24 NEW ENGLAND JOURNAL OF MEDICINE, the efficacy of the blood-derived vaccine can drop substantially over time: 15 percent of 635 men lost all protection within five years of vaccination. □