

Ancient city shows where cotton was king

Anthropologists often assume that the development of agricultural techniques yielded food surpluses that spurred the growth of large civilizations throughout the world. But a research team now contends that the residents of one of the earliest major settlements in the New World spurned grain cultivation and instead pinned their fortunes on a single, inedible crop: cotton.

Recent excavations of El Paraiso — a complex of huge stone structures on the central Peruvian coast, occupied between 1800 B.C. and 1500 B.C. and covering more than 125 acres — indicate the settlement was founded as a cotton-producing center, Jeffrey Quilter of Ripon (Wis.) College and his colleagues report in the Jan. 18 *SCIENCE*. The inhabitants apparently traded cotton products, such as fishing lines, nets and clothing, for other goods from nearby communities, the anthropologists assert.

Field irrigation for growing food and the rise of a centralized political power

structure did not occur at the site until considerably after the urban flowering of El Paraiso, the research team concludes.

Ongoing excavation of trash pits and building remains at El Paraiso began in 1983. Although the settlers had knowledge of field irrigation and other cultivation techniques by the time the complex appeared, laboratory analyses of El Paraiso's garbage reveal a diet rich in easily gathered foods. Seafood, including anchovies, mussels and clams, provided the bulk of the protein consumed at the ancient site. The remains of edible wild plants, such as cattail and ground-cherry, also turned up in the refuse.

However, the trash piles held only a few bones from land animals, such as deer, and the remains of only a few domesticated plants, including lima beans and chili peppers. These plants had been cultivated for at least 100 years before El Paraiso's founding, the researchers note.

Cotton dominates the plant remains at El Paraiso. Excavators also found frag-

ments of fishing nets and other cotton products.

El Paraiso and some other early sites in South America lie at the bottom of coastal valleys with wide floodplains — an ideal location for growing cotton, the scientists point out. Cotton nets and lines not only served local fishermen but also stimulated trade with small coastal outposts lacking reliable cotton sources, they suggest. Trade with coastal and highland communities also included cotton clothing designed for everyday wear and in fancier forms signifying wealth or status, Quilter and his co-workers assert.

Although huge stone structures dot the site, extensive investigation reveals no evidence of another hallmark of emerging civilizations: a central ruler reigning over a hierarchy of politically powerful groups or bureaucracies. The investigators report that key clues to this type of power structure, such as elaborate burials of elite individuals and extensive religious artworks, remain absent.

Whereas agriculture provided the food that allowed art and industry to flourish in some European and Asian civilizations, Quilter's team concludes that easily gathered "fast foods" supported the growth of a major Peruvian city single-mindedly geared toward the production of cotton.

— B. Bower

Single-lung transplant saves failing hearts

A critical shortage of donor organs means that many people with pulmonary hypertension, which debilitates both the heart and lungs, must wait years for a heart-lung transplant — if they live that long. To shorten the delay, researchers have developed a bold new approach in which surgeons transplant a single lung along with an attached artery.

The still-experimental procedure may prove lifesaving for people with this rare disorder, which clogs the pulmonary artery with scar tissue and biological debris, including clotted blood. Scientists don't know what triggers these deposits, but they do know that the narrowing of the pulmonary artery — which carries blood from the heart's right ventricle to the lungs — puts pressure on the right ventricle. After a few years, the heart's ability to force blood through the artery begins to falter, causing breathing difficulties and threatening sudden death from heart failure.

Since the early 1980s, the only hope for a person with pulmonary hypertension has been wholesale transplantation of the heart, the pulmonary artery and both lungs. But it's difficult to find a donor in whom all of these components are disease-free, and the heavy demand for donor hearts lengthens the waiting list. Many candidates for the combined transplant die before they reach surgery.

Thoracic surgeon Joel D. Cooper of Washington University in St. Louis reasoned that transplanting a single lung, with pulmonary artery attached, would take the pressure off the right ventricle, making a heart transplant unnecessary

and shortening the waiting period. This week, at the American Heart Association's annual science writers forum in Savannah, Ga., Cooper reported on the first seven people to undergo the single-lung transplants.

Six women and one man with advanced pulmonary hypertension, their ages ranging from 29 to 41, received the transplants between November 1989 and July 1990. Before surgery, they had experienced severe fatigue and breathing difficulties. Even mild exertion, such as climbing stairs, posed a risk of lethal heart failure, Cooper says.

Despite their dire preoperative conditions, all seven volunteers survived the surgery, showed recovery of the heart and now lead active lives, he reports. Before surgery, their hearts pumped an average of about 25 percent of the blood through the pulmonary artery; about three weeks after surgery, the average rose to approximately 52 percent — within the normal range, Cooper says. All seven returned to work or school and resumed normal activities, including jogging and other exercise, he adds.

The experimental operation remains risky; Cooper notes that several people nearly died of heart failure during the postoperative recovery period. Moreover, while the volunteers seem healthy today, Cooper says he doesn't know whether the transplanted arteries will accumulate their own deposits. And, like all transplant procedures, the operation requires that patients take harsh immunosuppressive drugs to help prevent organ rejection.

— K.A. Fackelmann

AIDS vaccine: Safe, but does it work?

The first experimental AIDS vaccine to enter human testing in the United States has caused no ill effects in volunteers up to 21 months after administration and has triggered potentially protective immune responses in some of those who received the shots, according to an analysis published this week.

The study, performed on healthy men and women deemed at low risk of acquiring AIDS, was designed to determine safety rather than efficacy, leaving scientists uncertain whether the vaccine can actually protect against the AIDS virus, HIV. But the researchers express satisfaction with the trial, saying it proves they can overcome the unique challenges inherent in the design and implementation of AIDS vaccine testing.

Under the direction of the National Institute of Allergy and Infectious Diseases' AIDS Clinical Trials Network in Rockville, Md., scientists from seven U.S. universities and two private companies collaborated to test the experimental vaccine, made by MicroGeneSys Inc. of West Haven, Conn. The vaccine contains a synthetic protein fragment that mimics a protein called gp160 found on the outer surface of HIV.

The researchers saw no signs of toxicity in any of the volunteers, who received up to four doses of the vaccine

over an 18-month period. The most sensitive blood tests showed that 30 of the 33 AIDS vaccine recipients had developed gp160-specific antibodies after the third inoculation, given six months after the initial shot.

But the antibody response appears somewhat weak. And when the researchers used a different analytical method, they confirmed the presence of gp160 antibodies in only nine individuals. Disappointingly, antibody levels dropped steadily over the next year; only four recipients retained antibodies 18 months after the first injection, as measured by the most sensitive test.

Moreover, the mere presence of antibodies provides no guarantee that a person can fend off HIV. For evidence of that ability, scientists measured the antibodies' ability to "neutralize" HIV in test tubes. Only volunteers who received a fourth vaccine dose, given about 18 months into the study, showed even a hint of developing these neutralizing antibodies. By one measure, five of 24 did so, but by another measure, none did.

In a potentially worrisome finding anticipated by some researchers, blood taken from six vaccine recipients showed signs of "complement-mediated antibody-dependent enhancement." This poorly understood phenomenon, which may involve the production of "enhancing antibodies" in response to infection or inoculation, makes some viruses even more infectious than normal. In the case of HIV, the finding has appeared so far only in test tube experiments and may not have any clinical relevance. But it warrants careful study, the researchers conclude in the Jan. 15 *ANNALS OF INTERNAL MEDICINE*.

While the vaccine's ultimate usefulness remains unclear, the study goes a long way toward identifying and comparing the lab tests that may guide the evaluation of this and other AIDS vaccines, the researchers say. HIV's unpredictable and often long latency period has left scientists wondering how best to measure the value of candidate vaccines, especially when few recipients will likely encounter the virus during the relatively short course of a study.

Perhaps most important, scientists say, the study proves the possibility of recruiting appropriate volunteers for a scientifically informative AIDS vaccine trial. To do so, researchers had to screen out applicants deemed at high risk of acquiring AIDS outside the study, since development of disease would have confounded interpretation of laboratory tests. And they had to find healthy volunteers willing to develop antibodies that would falsely suggest HIV infection on later medical exams, such as those for insurance. To explain the presence of HIV antibodies, volunteers received cards verifying their participation in the trial.

— R. Weiss

New worries over non-aspirin analgesics

A 20-year study of factory workers in Switzerland links chronic use of phenacetin, a once-popular painkiller, to increased risks of high blood pressure, heart attacks and death from kidney disease, cancer and heart disease. Phenacetin — no longer available in many countries, including the United States — bears a strong chemical resemblance to acetaminophen, and some scientists say phenacetin's dangers hint at possible hidden risks for chronic users of its still-popular analgesic cousin.

In 1967, a team headed by Ulrich C. Dubach of the Medizinische Universitäts-Poliklinik in Basel, Switzerland, began following 623 healthy female factory workers who regularly took phenacetin-based painkillers and 621 women who did not. The researchers had established that many factory workers, especially women, consumed large quantities of analgesics daily to dull work-related aches and pains.

Compared with phenacetin abstainers, the chronic phenacetin users went on to suffer 12.5 times more deaths from urologic or renal disease, 1.8 times more cancer deaths and 2.5 times more deaths from heart disease, the team reports in the Jan. 17 *NEW ENGLAND JOURNAL OF MEDICINE*. Phenacetin users, especially those taking high doses, also sustained roughly twice as many nonfatal heart attacks, strokes and heart failures.

In addition, the high-dose subgroup experienced a 2.5-fold increased risk of high blood pressure, compared with abstainers. Statistics indicate that this hypertension apparently accounted for

"about half" of the nonfatal heart disease effects seen among the phenacetin users, says the study's biostatistician, Bernard Rosner of Harvard Medical School in Boston.

Phenacetin's makers pulled the drug from all U.S. products — including many popular over-the-counter remedies — when the FDA threatened in 1982 to ban the analgesic because of its link to kidney disease. In an editorial accompanying the new report, physician Paul D. Stolley says the Swiss data suggest that phenacetin's removal "is advisable in countries that still allow use of the drug." Dubach argues that phenacetin, like alcohol, "is not dangerous if you don't take it in large amounts."

Stolley, of the University of Pennsylvania School of Medicine in Philadelphia, contends the new findings should also raise a red flag on chronic use of acetaminophen. More than 130 FDA-approved drugs contain this related analgesic, including nonprescription products such as Tylenol, Anacin-3, Extra-Strength Excedrin and Comtrex. Acetaminophen's relationship to phenacetin raises a "fairly urgent" need to investigate its risks, both in animals and humans, Stolley says.

Epidemiologist Dale P. Sandler of the National Institute of Environmental Health Sciences in Research Triangle Park, N.C., echoes that concern. Sandler, who uncovered phenacetin-like renal disease in chronic acetaminophen users (*SN*: 5/13/89, p.294), says phenacetin and acetaminophen may not work in an identical fashion, but "we suspect that they will."
— J. Raloff

Quasar erupts with relativistic flair

On Nov. 13, 1989, a seemingly ordinary quasar erupted in a 3-minute explosion of energy equal to nearly a million years' worth of solar radiation.

The outburst left a telltale mark on X-ray data compiled by the Japanese Ginga satellite. After scrutinizing those data, astronomers have now concluded that this was the fastest eruption of an energetic quasar ever detected.

The blast temporarily boosted the energy output of quasar PKS 0558-504 by 67 percent along the line of sight to Earth, they reported this week at the American Astronomical Society meeting in Philadelphia. That intensity poses a puzzle. Standard theory holds that a quasar's brilliance stems from the radiation of accelerating hot gases as they fall into a massive black hole at the center of a galaxy. But the enormous jump in PKS 0558-504's luminosity, if it radiated equally in all directions, would create so much outward pressure that

gravity's tug — even from a black hole — could not contain the matter, and the gases would stream away.

Ronald A. Remillard and Bruce Grossan of MIT, along with colleagues from Japan, propose an alternative explanation. They suggest that this quasar's overall X-ray outburst was less energetic than it appeared, confining itself to a single jet of radiation — like a flashlight that just happened to beam in the direction of Earth. Such a jet would become detectable if blobs of gas inside the quasar were moving toward Earth at speeds near that of light, Remillard says. The physical laws governing such relativistic motion dictate that the emission would appear to concentrate along the direction of motion and would seem to occur over a shortened time span. Remillard speculates that if other quasars radiate as jets pointing away from Earth, they may go undetected.

— R. Cowen