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 fragments 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