

Radar illuminates ancient Cambodian site

A mix of rocket science and archaeology has provided the recipe for insight into an ancient Cambodian civilization and its prehistoric predecessors. Maps generated by an airborne radar system developed by NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif., have given researchers unprecedented glimpses of massive waterworks and temple remains in Angkor.

"The flexibility of the radar technology for research purposes is extraordinary," says archaeologist Elizabeth Moore of the University of London, who directs the ongoing Angkor investigations.

Moore described her radar-inspired archaeological finds at a JPL news conference last week.

Angkor ranges over about 100 square miles of floodplain and dense forest in northern Cambodia. Its approximately 1,000 temples were built from the 8th to the 13th centuries A.D., as was its massive waterworks system. Angkor Wat, the best-known of the temples, dates to the 12th century A.D.

Three-dimensional radar portraits of moisture, vegetation, and elevation patterns at Angkor were taken in late 1996 from a NASA aircraft. Preliminary, less precise radar data for the region came from a 1994 space shuttle flight.

In December 1997, Moore explored a

modest earthen mound near Angkor Wat that the radar had identified. After clearing away vegetation, she discovered the remnants of four to six temples. Based on their architectural styles, the structures were occupied at least 300 years before Angkor Wat, Moore says. Further research will significantly alter the chronology of Angkor's occupation, she adds.

Moreover, the new maps provide a close look at Angkor's huge network of water-related structures, including moats, reservoirs, dikes, and canals. It now seems clear that most of the major waterworks were aligned from east to west,

Male sex hormone, preeclampsia link found

Doctors have long been baffled by what seemed to be a strange repercussion of preeclampsia, a complication of pregnancy. Women who have had this condition face double or triple the normal risk of developing heart disease in later years. Although the symptoms of preeclampsia—high blood pressure, protein in the urine, and swelling—largely disappear after pregnancy, the cardiovascular risk lingers for decades.

Finnish researchers now suggest that this risk may not be a consequence of preeclampsia at all. Rather, preeclampsia may simply be a harbinger of cardiovascular problems.

Their conclusion stems from the finding that women who have had preeclampsia also have higher-than-average concentrations of testosterone, a male sex hormone that is also present in women. While the female hormone estrogen seems to protect against cardiovascular disease, researchers suspect that testosterone may increase the risk. That difference would explain, in part, why young and middle-aged men have more heart problems than women of the same age. As women's estrogen production drops with age, heart disease risks even out between the sexes.

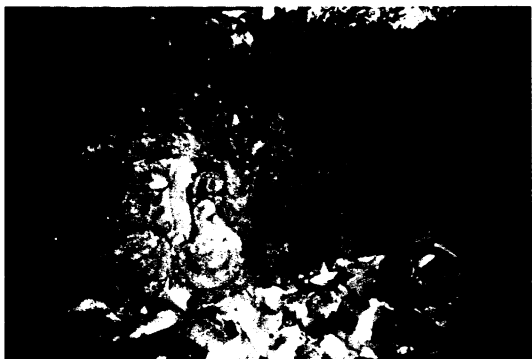
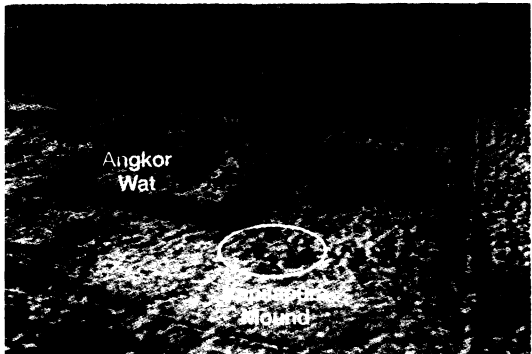
The researchers compared blood taken from 22 women who had had preeclampsia during pregnancy an average of 17 years earlier with samples from 22 women who had had normal pregnancies. Although the preeclamptic women had elevated testosterone, they did not have unusual concentrations of several other metabolic hormones, the team of Finnish researchers reports in the February *JOURNAL OF CLINICAL ENDOCRINOLOGY AND METABOLISM*. Had preeclampsia engendered a fundamental metabolic change, concentrations of the other hormones would also have been abnormal, argues study coauthor Olavi R. Ylikorkala, an obstetric gynecologist at Helsinki University Central Hospital.

apparently for religious reasons, says Moore. The ancient Khmer people who lived there revered water spirits, she notes.

Water management was essential at Angkor, which alternates between extended rainy and dry seasons.

Construction projects at Angkor melded functional concerns with the dictates of religious ritual, she theorizes. A similar pattern also may have characterized the ancient Maya civilization (*SN*: 1/24/98, p. 56).

"The new findings at Angkor advance our understanding of a very important archaeological site," remarks John Stubbs of the World Monument Fund in New York, a nonprofit organization that funds archaeological research and preservation efforts. —B. Bower



Radar image of Angkor Wat temple in Cambodia (top) shows its surrounding moat and an adjacent area that contains earlier temples. Decorated panel (bottom) in one of several newly discovered temple ruins near Angkor Wat depicts a Hindu god revered for his ability to bring rain.