

## ARCHAEOLOGY

# Mystery Towers in Peru Are an Ancient Solar Calendar

Since the 19th century, archaeologists have puzzled over Chankillo, a massive, 2300-year-old ruin 400 kilometers north of Lima, with a walled hilltop center and an enigmatic line of 13 small, rectilinear towers. Scientists have variously interpreted the complex “as a fort, a redoubt, a temple, and even as the setting for ceremonial battles,” says archaeologist Iván Ghezzi of the Pontificia Universidad Católica del Perú (PUCP) in Lima.

Now, on page 1239, Ghezzi and archaeoastronomer Clive Ruggles of the University of Leicester, U.K., demonstrate that Chankillo was, in part, a solar observatory. In what Luis Guillermo Lumbreras of the

Universidad Nacional Mayor de San Marcos in Lima calls “an excellent scientific contribution, very serious and informative,” Ghezzi and Ruggles show that the sequence of towers marked the summer and winter solstices.

Jokingly dubbed “the Norelco ruin” for the distinctive shaverlike shape of its three concentric walls, Chankillo was built during the collapse of a major Andean religious center called Chavín de Huántar, in a time when many population centers were emptied and others were fortified. Among the most visible of the latter is Chankillo, which was erected between 200 and 300 B.C.E.

according to new radiocarbon dates also provided in the paper.

Chankillo’s commanding location and thick walls suggest a martial purpose, but its elegant design, many gates, and lack of water supply raise doubts that it was a fort. Working with Ruggles, Ghezzi uncovered two artificial observation points constructed about 200 meters away from and on opposite sides of the line of towers, which run along the top of a ridge east of the main complex. The eastern viewpoint was partly wrecked, but the western viewpoint was both well-preserved and, to Ghezzi and Ruggles, unambiguous in function: The two viewpoints are positioned so that on the winter and summer solstices the sun rises and sets over the towers on the opposite end of the line, establishing the beginning and midpoint of the solar year. The western viewpoint was at the end of a 40-meter-long, windowless corridor that wrapped around the outside wall of a structure filled with ceremonially displayed ceramic figurines of soldiers.

Because the heavens are filled with celestial objects, researchers often fool themselves with coincidental astronomical alignments. “When Iván said I had to come and see this site that might be an observatory,” Ruggles says, “inside I was thinking, ‘Yeah, yeah, yeah’—people are always saying this to me.” But instead, he found what PUCP archaeologist Luis Jaime Castillo calls an “absolutely clear-cut” example of a monumental calendar. “It is difficult to imagine what other function the observation structures could have served,” says Castillo. ▶



**View from the top.**  
Chankillo’s central complex was associated with a solar observatory.

## U.S. INNOVATION

## Democrats Rescue Technology Research Program

Written off as dead by critics and fans alike, the Advanced Technology Program (ATP) has been given a \$79 million lifeline from Democrats in the U.S. Congress.

Run by the National Institute of Standards and Technology (NIST), ATP was begun in the early 1990s as a way to help companies conduct research aimed at commercializing new products. It has supported everything from genomics to materials science. Republicans—including the current Bush Administration—have long derided it as so-called corporate welfare, however, and neither the Senate nor the House included money in NIST’s 2007 spending bills for the program.

But after Republicans left Democrats with the job of finishing this year’s budget (*Science*, 22 December 2006, p. 1862), staffers staved off ATP’s demise in the spending bill President George W. Bush signed 2 weeks ago.

“This was under the radar,” says lobbyist Robert Boege of the Alliance for Science & Technology Research in America in Washington, D.C., of the turnaround, which he says “defied even metaphysics.” Congressional aides and lobbyists say top Democrats on Capitol Hill, including House Speaker Nancy Pelosi (D-CA), view the program as an essential piece of the House Democrats’ “Innovation Agenda” introduced nearly a

year before they won control of Congress.

Last week, NIST officials said that details of the competition, including how much money will be available, will be announced in the spring. “I am actually very proud, as NIST’s director, to be hearing about [ATP] success stories,” NIST head William Jeffrey told a House science committee panel last week in testimony on the agency’s 2008 budget request, which once again zeroes out the program. But, he added, “the issue is, in the Administration’s viewpoint, whether or not [ATP] is the appropriate role for the federal government.”

—ELI KINTISCH

The practical need for the Chankillo observatory is evident, notes Daniel Sandweiss of the University of Maine, Orono: agriculture, which required “solar observation to know when to plant.” Along the bone-dry Peruvian coast, where farming has long depended on irrigating rivers, “people need to know the date with some precision.”

Until recently, the first complex states in northern Peru were dated to the rise of the Moche in about 400 C.E. “Now we find very sophisticated measurement techniques

600 years before Moche,” says Castillo. “It says to us that there may have been more going on than we thought.”

Most important, says Clark Erickson of the University of Pennsylvania, “this kind of discovery really begins to get into the minds of people in the past.” The long hallway to the western observation point, he notes, “only provides space for a few people to be brought there and dazzled.” Understanding this piece of architectural theater, he says, “helps make the past come alive.” —CHARLES C. MANN

## STEM CELLS

# Data on Adult Stem Cells Questioned

Just as her team is preparing some long-awaited follow-up papers on multipotent adult progenitor (MAP) cells, stem cell researcher Catherine Verfaillie is dealing with accusations that her landmark study, published in *Nature* in 2002, contains “flaws” that could jeopardize its conclusions. *Nature* has decided to rereview the work. Verfaillie, now at the Catholic University of Leuven, Belgium, says that although some data are puzzling, the problems do not affect her findings.

The accusations were raised last summer but became widely known only last week following an article in *New Scientist*. They’ve received a flurry of attention because of the big splash Verfaillie made when she originally reported that her team had cultivated a new type of cell that appeared to



**Hot seat.** Catherine Verfaillie sticks up for her cells.

have the potential to grow into most cell types in the body (*Science*, 9 February, p. 760).

Last year, two *New Scientist* reporters noticed that the *Nature* paper and another the team published at the same time in the *Journal of Experimental Hematology* contained identical data on flow cytometry—a technique for identifying cells—even though the two papers described different cell populations. They notified Verfaillie, who in turn notified the journal editors and the University of Minnesota (UMN), Twin Cities, where she did the research.

At Verfaillie’s request, UMN convened three experts to review the flow-cytometry data. They concluded last August that the duplication was an “honest error.” Verfaillie subsequently had an erratum published in the

hematology journal.

However, the panel also said it had reservations about the “validity” of the flow-cytometric analysis data in the *Nature* paper. Flow cytometry involves the use of antibodies to recognize proteins on cell membranes. Some of the fluorescent signatures generated by antibodies showed a variability “far outside what would be expected for this kind of experiment,” said the panel. If those data are unreliable, it could mean that the MAP cells do not have all the characteristics described in the paper.

The experts said they couldn’t judge whether the problem would affect the paper’s conclusions about the versatility of MAP cells. One of them told *Science* that “problems are rampant” in flow cytometry, and it would be hard to find a paper without some flaw.

UMN then asked two unnamed stem cell experts to address the validity of the conclusions of the *Nature* paper. Their comments have not been made public, but the university’s vice president for research, Tim Mulcahy, says that one of the experts felt the problematic data “weakened” the paper. The other said the data were “not critical” to the conclusions. Mulcahy says the university plans no further action and will let the scientific community judge the matter for itself.

Verfaillie says her team has “no explanation for why” the data turned out as they did. “I personally don’t think it affects the conclusion of the paper, and I’ve spoken to many people who personally don’t think so,” she says. But it’s “up to *Nature* to decide.” —CONSTANCE HOLDEN

## Ethics at Issue in China

**BEIJING**—China’s largest research body is getting serious about misconduct. Earlier this week, the Chinese Academy of Sciences (CAS) unveiled guidance on what constitutes misconduct and set up a high-level academy committee to investigate allegations.

In recent months, a series of high-profile misconduct cases has tarnished the reputation of China’s scientific community (*Science*, 9 June 2006, p. 1464). CAS this week ordered each of its 100 institutes to set up their own committees to probe allegations against their researchers and to educate staff about ethical behavior. The CAS panel will investigate higher profile allegations. With Chinese science becoming more competitive and well-funded, the new rules should deter misconduct, says Zhou Xingjiang of CAS’s Institute of Physics in Beijing. —JIA HEPENG

## Those Crafty Europeans

Next stop for the European Space Agency (ESA): Mercury, perhaps the least well known of the planets. Coming on the heels of recent missions to Mars, Venus, and Saturn’s moon Titan, ESA last week approved construction of BepiColombo, which will launch in 2013 and reach Mercury 6 years later. Only NASA’s Mariner 10 spacecraft has visited Mercury before, in 1974–75, and NASA has dispatched another craft, dubbed Messenger, to arrive in 2011. BepiColombo is designed to split into two orbiters upon arrival at Mercury: one to study the planet and the other—provided by Japan—its magnetosphere. —DANIEL CLERY

## South Africa Listens Hard

**PRETORIA, SOUTH AFRICA**—South Africa’s new proposed budget aims to improve the country’s chances of beating out Australia for the world’s most powerful radio telescope, the Square Kilometre Array (SKA). About 40% of the government’s proposed \$172 million budget increase for science and technology (S&T) would fund an upgraded pilot instrument, the Karoo Array Telescope (KAT).

The nation’s SKA project manager, Bernie Fanaroff, says an expanded version of the demonstrator array, called the MeerKAT, will “optimize the science we can do” with available funds. Although some scientists question devoting so much of the budget to KAT, zoologist Robin Crewe, who is president of South Africa’s leading science academy, predicts that a successful bid’s information network would benefit other areas of South African research.

—ROBERT KOENIG