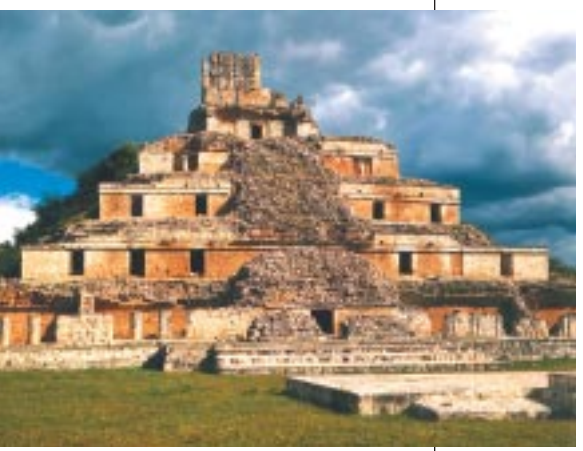
ANTHROPOLOGY

Parched Turf Battle

DID CLIMATE CHANGES CAUSE CIVILIZATIONS TO COLLAPSE? BY DANIEL GROSSMAN

The largest drought in the past 12,000 years occurred about 2200 B.C., according to an October 18 *Science* report by Ohio State University geologist Lonnie G. Thompson. The result, part of a study of ice cores drilled in a glacier on Mount Kilimanjaro, made Harvey Weiss ecstatic: the archaeologist from Yale University has been saying for years that a scorching drought around that time was so extreme that it toppled civilizations from Egypt to India. But he couldn't convince fellow ancient historians of his theory. The Kilimanjaro work, along with several other recent studies, supports Weiss's ideas and heats up the debate on climate's role in shaping civilizations.



DRIED OUT: Did drought drive Mayans from their homes and structures, such as this one in Edzna, Yucatán?

For decades, the dominant view has been that cultural factors—war, religion, trade, palace intrigue—explain civilizations' ups and downs. According to this view, if the climate changes, humans adapt. "People cope with remarkable tenacity," explains Karl W. Butzer, an archaeologist and geographer at the University of Texas at Austin.

Now the pendulum is swinging back to an earlier view that emphasizes geophysical factors. The shift is fueled in part by discoveries about the climate since the end of the last ice age, a period known as the Holocene. In 1988 the U.S. began drilling in Greenland to retrieve what would be one of the deepest ice cores ever. The ice and gases trapped in it preserved clues about the climatic conditions dating back thousands of years. The Greenland core proved definitively what earlier ice and sediment cores had intimated—that the Holocene's climate was wracked by abrupt changes in temperature and aridity. The discovery encouraged researchers to seek detailed regional climate information by drilling sea and lake sediment and glacier cores around the world. Archaeologists began matching up important transitions in civilizations with these climate records.

University of Chicago anthropologist Alan L. Kolata discovered one such match. In the early 1990s he realized that an ice core from a South American glacier substantiated his theory that the Tiwanaku civilization on the shores of Lake Titicaca was destroyed by drought. The core, drilled in the Quelccaya ice cap, Peru's largest glacier, showed a 300-year stretch of low precipitation beginning around A.D. 1100, right when Tiwanaku cities were abandoned. In his recent book, *The Great Maya Droughts: Water, Life, and Death,* Richardson B. Gill proposes that the inhabitants of the Classic Maya civilization either died of starvation or migrated elsewhere during a series of brutal droughts between A.D. 800 and 1000. His claim was bolstered by University of Florida geologists, who have found evidence in Yucatán lake sediments that during this period the region had less rain than at any time in the previous 7,000 years.

But many researchers are unwilling to cast climate in a starring role again. "It's a terribly simplified way of looking at what's going on," Butzer insists. To him, the "complex web of social interactions," like the trading of goods, explains the evolution of civilizations. David Webster, a Maya expert at Pennsylvania State University, calls climate theories like Gill's and Kolata's "a fad." He instead traces changes in Mayan culture to the incompetence and extravagance of kings and nobles in an empire stressed by explosive population growth and destructive wars. "Humans crave simple answers," Webster says of climate proponents. But "the facts of history are so complicated you can't come up with a nice, satisfying simple explanation."

Gill, an unaffiliated Ph.D. archaeologist, responds that in the case of the Maya, a simple explanation is all you need. People must have water to grow food. And where surface water supplies are unreliable, extended droughts can be catastrophic. "I have seen with my own two eyes the devastating effects of drought as a 12-year-old," remarks Gill, who grew up in central Texas in the 1950s during the state's worst drought in generations.

Researchers who stick to cultural explanations also criticize climate researchers who

BRAVING THE ELEMENTS

The idea that physical factors such as climate dictate human history dates back a century. In 1909 geographer Ellsworth Huntington led a Yale University expedition to Palestine to study past societies and during the next several decades wrote many influential books. In *World-Power and Evolution,* he concluded that "the evolution of man's ancestors ... was largely guided by climatic environment." Although the sentiment influenced a generation of social scientists, Huntington's theories were for the most part in error. Formulating his theories before carbon dating and ice or sediment core analyses, Huntington could only guess at the dates of key events and had no reliable way to estimate past precipitation or temperature. By mid-century Huntington's environmental conjectures fell out of favor, replaced by the idea that cultural factors molded the course of ancient civilizations.

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provide the fodder for proponents and who sometimes co-author anthropology papers. Butzer questions whether they understand the complexity of cultural change. "They're like a fish out of water," he says. "They should keep their mouths shut."

Michael Moseley, an archaeologist at the University of Florida, is certain that climate will continue to figure prominently in research on human history. "It will probably take another 10 to 15 years for younger people who are not so indentured to old ideas for this to shake out," he says. Yale's Weiss is less diplomatic: "Science changes one funeral at a time."

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HISTORY OF SCIENCE

Mendelmania Takes Off

THE OSTRACIZED FATHER OF GENETICS FINALLY GETS HIS DAY **BY LUBA VIKHANSKI**

Every high school biology student learns of Gregor Mendel and his classic studies of inheritance. As the importance of genetics soared in the 20th century, so did Mendel's fame—except in his homeland. He was blacklisted in the former Soviet Union and its satellites as the founder of a "reactionary" discipline, and Mendelian genetics was declared a pseudoscience. Only now are efforts under way to pay him fitting tribute in the city in which he lived and worked all his adult life.

An Augustinian monk and later abbot at the Abbey of St. Thomas in Brno—once in Austria-Hungary, today part of the Czech Republic—Mendel revealed the laws of inheritance by experimenting with pea hybrids in the walled monastic garden. His 1866 paper, rediscovered around 1900, well after his death, laid the foundations for contemporary genetics. The notion that traits are inherited, however, ran afoul of Stalin and other Communist leaders; they advocated Lysenkoism, which claimed that acquired traits, rather than genetic ones, were passed on. Even after Lysenkoism was condemned as a fraud in 1965, Mendel remained an outcast because his religious background offended the Communist Czech goverment, which would last until 1989.

"Starting in 1990, I tried to put forward the idea of commemorating him, but people were hesitant," says Emil Palecek, a professor at the Czech Academy of Science's Institute of Biophysics in Brno. "Though it's not true for scientists, many other people here still have a feeling that something was wrong with Mendel."

An international initiative launched this year aims to bring the science of genetics back to its spurned cradle. Its champions include St. Thomas's current abbot, along with local and foreign scientists, backed by such notables as Czech president Vaclav Havel and Nobel laureates Paul M. Nurse, James D. Watson and Eric F. Wieschaus.

One move has been to hold scientific conferences at the abbey. The first was a workshop called "Genetics after the Genome," held there by the European Molecular Biology Organization this past May. In September the opening sessions of a chemometrics conference took place in the newly renovated refectory, and in August 2003 the abbey is to host an international symposium on the genetic aspects of heart disease. Furthermore, an exhibition, "The Genius of Genetics," combining science with art, has opened at the abbey; it will run until May 2003 (see www.mendelmuseum.org). Plans are already being drawn up for a follow-up exhibition, a restoration of Mendel's experimental garden, a permanent museum and a life sciences center.

Much of the cash for the initiative has come from the VFG, a Viennese charity. Two Gregor Mendel trusts, in the U.K. and the U.S., have been established for larger-scale projects. The abbey's exhibition shop covers some of the costs in ways the modest Augustinian friar could never have imagined: Mendel pencils,

STEPAN BARTOS

MICROSCOPE SLIDES and other tools that Gregor Mendel may have used are displayed at the Abbey of St. Thomas.

MENDEL OFF ABBEY ROAD

The Abbey of St. Thomas isn't the only place in Brno to pay homage to Mendel. The first major Mendel museum is actually the Mendelianum. It was founded by a small group of Czech geneticists in 1965 in the white baroque compound of the abbey but has moved off those premises to a government building. The Mendelianum has two new exhibits: one, on the genetic refutation of racism, is to open in the fall of 2003; the other, called "The Scientific Milieu of Mendel's Discovery," can be viewed at a branch of the Moravian Museum in Brno's central square.