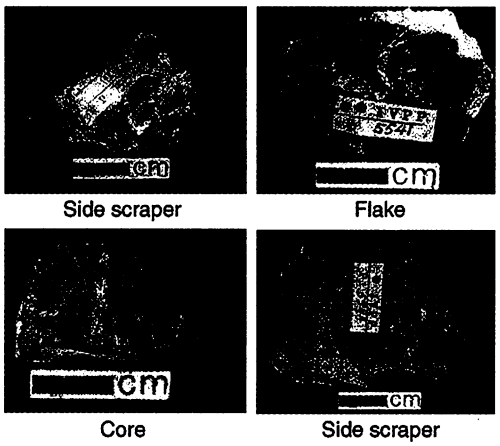


Stone ages. New dates put these stone tools from China at 1.36 million years old.

1 million years old, but dating sediments in China has been notoriously difficult because there is no volcanic material for radiometric methods. So the Chinese and American team used high-resolution paleomagnetic dating, relying on known, ancient shifts in Earth's magnetic field to tie the tools to a particular period, says Rixiang Zhu, a geophysicist at the Institute of Geology and Geophysics at the Chinese Academy of Sciences in Beijing.

The members of Zhu's team hung from ropes alongside steep hillsides at two sites in the basin, sampling soil every 25 to 35 centimeters in a vertical column that cut through the horizontal layers of sediment, including the layer of grayish-white clay in which the tools were deposited. This clay layer was laid down during a long period when Earth's polarity was flipped. Sediments bearing the signature of this reversed polarity are sandwiched between a layer indicating normal polarity—a period dated radiometrically at Africa's Olduvai Gorge to 1.77 million to 1.95 million years ago—and another normal-polarity layer dated to 1 million years ago. From the location of the clay layer in the band of reversed-polarity sediments and an estimated sedimentation rate, Zhu and his team, including geophysicist Ken Hoffman of California Polytechnic State University in San Luis Obispo, concluded that the tools were at least 1.36 million years old. The team's efforts impressed dating expert Brown, who calls it "great work" that provides a "jumping-off point" for dating other basin sites.

Although no human fossils have been found in the basin, the tools' antiquity shows that early humans had already managed to adapt to life at 40 degrees north, says coauthor Rick Potts, a paleoanthropologist at the Smithsonian Institution in Washington, D.C. But he adds, "What were they doing at the margin of the range for hominids? How did they adapt to this northern climate?"

Potts speculates that the climate may have been relatively warm at the time and that the toolmakers had to adapt to life in the north because the massive Qinling Mountains blocked them from migrating south. To reach the site, *H. erectus* had to cross the Tibetan Plateau and somehow get around the Himalayas. Regardless of how they got there, says archaeologist Kathy Schick of Indiana University in Bloomington, who has worked at tool sites in the basin since 1989, these dates show that "very early on, *Homo* had the capability to spread out of Africa and to move significantly northward across long distances with relatively simple tool kits."

–ANN GIBBONS

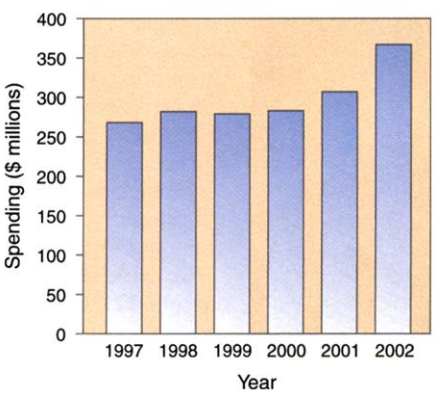
FRENCH SCIENCE

Budget Backs University Research, Job Creation

PARIS—As fears of war and economic recession sweep the world, French scientists got at least a sliver of good news last week. New budget proposals would boost grant money for long-suffering university researchers by nearly 20%, while public research agencies would be able to hire 500 additional researchers and technicians.

The big picture for science is more sobering. France's civilian R&D budget increase in 2002 would barely beat inflation, rising 2.2% to $8 billion. That modest growth would, however, put science in a better position than many other public sectors: The overall government budget is set to increase by a meager 0.5%. Not surprisingly, the mixed news is drawing mixed reviews: Whereas some French scientists welcome the spending plans, others complain that French R&D will gain little ground on R&D in the United States and other research powerhouses.

At an 18 September press conference announcing the new budget figures—which are subject to parliamentary approval later this year—French research minister Roger-



Good news. With a 19.3% increase next year, French university research would be a big winner.

ScienceScope

Self-Policing Clinical researchers at the University of Michigan (UM) are taking steps to keep ahead of ethics regulators. In a "proactive" move, says spokesperson Kara Garvin, a review of genetic and molecular medicine this year resulted in stepped-up oversight of all clinical protocols and a 3-year suspension of research privileges for Alfred Chang, a top cancer investigator.

The self-initiated audit, according to the university, turned up inadequate or late documentation of informed consent, noncompliance with protocols, and improper reporting of adverse events. Chang's suspension and a decision to quadruple spending on clinical oversight, announced several weeks ago, are designed to reinforce "the importance of the rules governing clinical research trials, particularly those protecting human volunteers," said UM vice president Gilbert Omenn.

In a Web posting (www.umich.edu/%7Enewsinfo/Releases/2001/Aug01/chang.html), Chang argues that many patients had benefited from his studies but acknowledges the need for better compliance with the rules.

Stem Cell Fight The Wisconsin Alumni Research Foundation (WARF), which holds the patent on human embryonic stem cells, has gone to court again in a bid to curb efforts by biotech company Geron to expand its claims over WARF's cell lines. The California company has an exclusive commercial license to use six types of cells derived from the Wisconsin stem cells, but it is claiming it still has an option for more.

WARF says no, it doesn't want all its cells tied up by Geron and unavailable to other researchers, and it filed suit on 13 August to get a federal court to back up its reading of its agreement with the company. This week, WARF added a stipulation to the complaint: It wants the court to declare that Geron—contrary to the company's claim—has no exclusive rights to "research products" of the stem cells, such as cell-based screening assays, except where they have been combined with Geron's own patented technology.

"We're anxious to be able to license other companies to make research products ... without the cloud of Geron claiming that we've breached the agreement," says WARF managing director Carl Gulbrandsen. A Geron spokesperson says the company doesn't comment on pending litigation.

Contributors: Jocelyn Kaiser, Martin Enserink, Eliot Marshall, Constance Holden

CREDITS: (TOP TO BOTTOM) RIXIANG ZHU; FRENCH MINISTRY OF RESEARCH

Gérard Schwartzenberg said that his "number one priority" is to create opportunities for young researchers. Decrying a lack of positions that has forced talent abroad, Schwartzenberg remarked that "France's job is not to serve as a training institute of young doctorates for the benefit of the United States or other countries." The job creation initiative, which aims to retain young scientists, has earned praise from France's National Union of Scientific Researchers, an organization that's usually highly critical of the government's priorities.

But some prominent scientists are wringing their hands. "I am not optimistic that the government has taken [sufficient] measures to make research a top priority," says cell biologist Jean-Paul Thiery of the Curie Institute in Paris. And Pierre Chambon, director of the Institute of Genetics and Molecular and Cellular Biology near Strasbourg, complains that salaries—which begin at $20,000 per year at agencies such as CNRS, the national basic research agency—are too low to hold on to the best scientists. "We are not competitive," he says. "This is scary for the future."

–MICHAEL BALTER

MAGNETOSPHERIC PHYSICS

Magnetic Storms Have Two Drivers, Not One

When the skies dance with auroral light, satellites stagger under an onslaught of charged particles, and electrical power systems on the ground collapse, you can blame the solar wind. Space physicists have long known that the gale of charged particles howling by Earth at supersonic speeds bears the ultimate responsibility for magnetic storms, but they have vacillated between two very different explanations of how the solar wind roils Earth's magnetosphere. Now, a study using the latest in magnetospheric probes—published in the 1 September issue of *Geophysical Research Letters*—may settle the sometimes contentious issue: Both explanations appear to be right.

The events that precede the storms are not in dispute: The solar wind constantly peels back magnetic field lines from the sunward side of the comet-shaped magnetosphere into the tail, loading the tail with charged particles and magnetic flux. The controversy focuses on how that excess energy is released.

In the 1960s, Syun-Ichi Akasofu of the University of Alaska, Fairbanks, and the late Sydney Chapman, a founding father of magnetospheric physics, argued that days-long magnetic storms are fed by a string of half-hour-long substorms, which appear as sudden brightenings of the aurora. When the excess energy in the tail reaches a critical point, researchers came to believe, something snaps in the maze of magnetic fields and electric currents that links all parts of the magnetosphere. That snap slings charged particles earthward, where they energize the inner magnetosphere, spawning a huge electrical current that rings the planet above the equator and wreaking havoc on humans' electromagnetic devices.

That explanation held sway in the 1970s and '80s, but in the 1990s another interpretation gained favor: magnetospheric convection. According to this view, the imbalance in the magnetosphere is redressed by magnetic flux and particles steadily drifting or "convecting" back toward the sunward side, energizing the nightside of Earth as they go.

The new study, by Anthony Lui and his colleagues at the Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, Maryland, falls squarely in the middle ground. The APL group assembled observations of a 22 October 1999 storm that had been studied by an international consortium of researchers. Observations had been made from the ground by magnetometers and arctic radars monitoring the effects of the equatorial ring current, magnetospheric convection, and substorm activity.

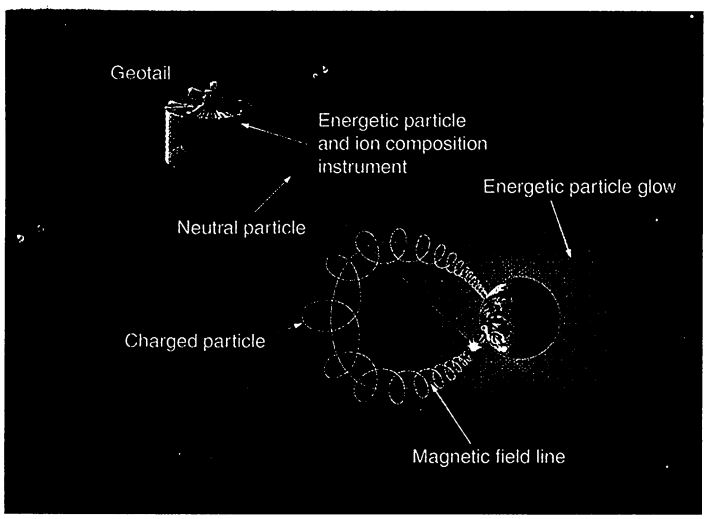
To this mix the group added energetic neutral atom (ENA) data collected by the Geotail spacecraft in distant Earth orbit. ENA is one of the first remote-sensing techniques that can "see" large parts of the magnetosphere in a single look (*Science*, 10 June 1994, p. 1531). Satellite-borne ENA "cameras" form a picture of charged particles trapped in the inner magnetosphere—especially in the ring current—by capturing the few particles that manage to escape after picking up an electron from the outermost fringes of the atmosphere. Their resulting neutrality lets them cut free of the entrapping magnetic field lines.

Lui and his colleagues found that the 22 October 1999 storm seemed to have a different driver at different times. At first, ENA data showed a sharp strengthening of the ring current as substorm activity jumped while magnetospheric convection remained subdued. That's "a very clear example of substorm contribution to storm buildup," says Ioannis Daglis of the National Observatory of Athens. A few hours later, substorms were muted, but convection and the ring current steadily intensified. "This shows enhanced mantle convection can bring the ring current [charged-particle] population up, too," says Lui.

Not everyone is convinced yet. "In the end this paper may even be correct," says Robert McPherron of the University of California, Los Angeles. "However, the data are much more difficult to interpret than the authors would have you believe. [And] the use of a single event to establish the conclusion is highly suspect."

In fact, more cases are on the way. The Imager for Magnetopause-to-Aurora Global Exploration (IMAGE) satellite, launched last year in March, has three instruments specifically designed as ENA imagers. Preliminary analyses of data from IMAGE and the Polar satellite, which also has an instrument useable for ENA, at Los Alamos National Laboratory in New Mexico show both drivers at work in other magnetic storms, says Geoffrey Reeves of LANL. These and other satellite remote-sensing results should be presented in the next few months.

–RICHARD A. KERR



Seeing the invisible. Magnetically trapped charged particles reveal themselves to an ENA instrument when a few particles are neutralized and escape.

CREDIT: JHU/APL

MALARIA RESEARCH

Two New Steps Toward A 'Better Mosquito'

BARCELONA, SPAIN—Motivated by more than a million deaths from malaria a year, scientists have long fantasized about the ultimate method of eradication: replacing existing mosquito populations with ones unable to spread the disease. At a meeting* last week, researchers presented two studies

* Third International Congress of Vector Ecology, Barcelona, Spain, 16–21 September.