support functions will be spun off. Outside companies are expected to take over such nonresearch services as transportation, and a separate office is planned to handle state issues such as Communist Party affairs, trade union membership, and family planning. Institutes would no longer provide apartments or medical care for their employees, although they would still partially subsidize the cost of housing and health insurance.

CAS plans to appoint the directors of all the new megafacilities as well as the heads of individual institutes. But it is treading carefully around a proposal to create an outside board of directors that would set broad policy for the Shanghai academy and serve as a model for other clusters. "The government needs to think it over, and that takes time," says CAS's Yan, noting that the proposal involves the use of state assets.

But time is a precious commodity. The government grant covers only the first of a scheduled three phases of reform through 2010. And funding for the rest of the restructuring depends on a successful transition to a more productive, merit-based system of managing research. Deng knows that the clock is ticking and that his youth and lack of scientific stature are seen as disadvantages. But he believes his 10 years' experience as a manager has prepared him for the task.

"Good scientists do not necessarily make good administrators," he says. "To enliven research, the most important thing is to allow a freer mobility of researchers. And I promise to make that happen in my institute." **–LI HUI**

Li Hui writes for *China Features* in Beijing.

GENETICS

Which Jefferson Was the Father?

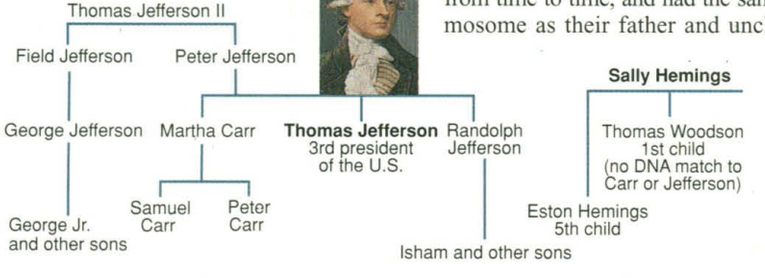
The claim that Thomas Jefferson fathered at least one child by his slave Sally Hemings got a big boost in credibility last November when scientists published some stunning new data. A U.S. pathologist and a group of prominent European molecular biologists announced in *Nature* that they had found DNA sequences in the Y chromosome of the Jefferson family that matched DNA from the Hemings family. The finding set off a flood of news reports declaring that the third U.S. president had, as rumored, fathered an illegitimate child by Sally Hemings. But now the authors of the report say the evidence for that is less than conclusive.

In responding to letters in this week's issue of *Nature*, lead author Eugene Foster—a retired pathologist in Charlottesville, Virginia—and co-authors make it clear that the data establish only that Thomas Jefferson was one of several candidates for the paternity of Eston Hemings, Sally's fifth child. However, they argue that, because Jefferson was Hemings's owner and lived with her at the Monticello plantation outside Charlottesville, "the simplest explanation" is that he was indeed the father.

Meanwhile, the Jefferson data have taken on a political spin. Reed Irvine, director of the conservative organization Accuracy in Media, based in Washington, D.C., claims that the news media purposefully distorted the results of Foster's study. In his current newsletter, Irvine says the news was released with "impeccable timing" to give comfort to President Bill Clinton on the eve of the U.S. national elections last November. Irvine thinks that journalists used the report to suggest that Jefferson "also had a problem with sex," thereby minimizing Clinton's affair with Monica Lewinsky.

Foster describes the conspiracy theory as "ridiculous," but he and his colleagues decided, he says, that they needed to respond publicly to several other points made by critics. One of these is Herbert Barger of Fort Washington, Maryland, a genealogist and husband of a Jefferson family descendant. He helped locate living members of the Jefferson family and persuaded them to donate blood to the DNA study. Not only did the authors neglect to mention his help, Barger says, they completely ignored a plausible theory he advanced.

Barger argues that the most likely father of Eston Hemings is not Thomas Jefferson, who was 65 at the time Eston was conceived, but Jefferson's brother Randolph, 12 years his junior, who lived 20 miles away. Other candidates, Barger suggests, are Randolph's sons, all of whom lived near Monticello, visited from time to time, and had the same Y chromosome as their father and uncle. Barger



CREDITS: (TOP) NASA; (BOTTOM) STOCK MONTAGE

Paternity dispute. DNA analysis ruled out Samuel and Peter Carr, but established that one of the Jeffersons was the father of Eston Hemings.

ScienceScope

See You in Court Six women—including a scientist and several technicians—say that Lawrence Livermore National Laboratory discriminates against its 3000 female employees by paying them less than men and denying them promotions. On 23 December, they filed suit in California state court against lab director C. Bruce Tarter and the Board of Regents of the University of California, which operates the nuclear weapons facility for the Department of Energy. "The regents and management at the lab have known about this problem for a very long time and have simply refused to take appropriate action," claims lead plaintiff Mary Singleton, a chemist who worked at Livermore for 22 years before retiring in 1997. Lab officials aren't commenting on the suit, which will get a first hearing later this year.

An AXAF By Any Other Name NASA has given its tongue-twisting Advanced X-ray Astrophysics Facility a more user-friendly name. The $2 billion space observatory, due to be launched this spring, has been christened the Chandra X-ray Observatory, after the late University of Chicago astrophysicist and Nobel laureate Subrahmanyan Chandrasekhar. An Idaho high school student and a California teacher independently suggested the name, which means "moon" or "luminous" in Sanskrit.

Tritium to Go Some researchers and arms control advocates aren't happy with Energy Secretary Bill Richardson's decision to use two commercial nuclear power plants to produce the tritium gas needed to keep U.S. nuclear weapons potent. On 22 December, Richardson announced plans to start producing tritium by 2005, if needed, at the Tennessee Valley Authority's (TVA's) Watts Bar and Sequoyah plants in Tennessee. The plants would rebuild the U.S. stockpile, which has been dwindling by 5% per year since production ended in 1988. But critics say the move undermines a long-standing policy against using civilian reactors to make military materials. It also dashed the dreams of some scientists, who had hoped Richardson would reopen a mothballed research reactor in Washington state or build a new linear accelerator in South Carolina (*Science*, 4 April 1997, p. 28). Richardson said that the TVA facilities were the cheapest option and would allow the government to buy tritium on an as-needed basis.

cake and eat it too?" he asks.

Shay and Calvin Harley, chief scientific officer of Geron, respond that it may very well be. To make sure that telomerase-containing cells aren't malignant, they are doing further tests, such as seeing how many additional mutations it takes to make the cells cancerous. And as a further safeguard, Harley says, Geron plans to put telomerase on a tight leash in replacement cells for damaged tissue: Rather than using a perpetually active telomerase, the company plans to add regulatory sequences to the gene that would enable it to be turned on and off at will by drugs.

Another obstacle besides possible malignancy may limit the use of the technique, however: Telomerase may not immortalize all cell types, Weinberg and other experts say. But Harley says preliminary results suggest that the enzyme can do the job once researchers figure out how to grow the cells properly in culture.

Clearly, much more work will be needed to find out whether telomerase-expressing cells will prove useful in the clinic. But if they do, then using them to overcome tissue damage would result in more than a Pyrrhic victory. **–DAN FERBER**

Dan Ferber is a writer in Urbana, Illinois.

ORIGINS OF LIFE

RNA Study Suggests Cool Cradle of Life

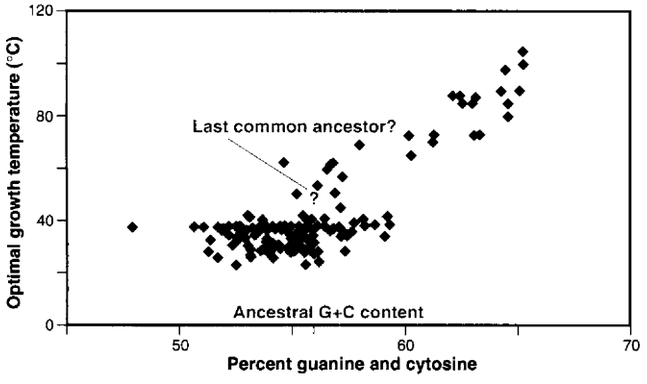
Debate on the origins of life has lately centered on a simple question: Was the cradle of life hot or cold? Many researchers argue that the first cells arose in the scalding waters of hot springs or geothermal vents, while a small but prominent band of holdouts insists on cool pools or even cold oceans. With no fossils to go by, the argument has circled a variety of indirect clues, with recent evidence favoring hotter environs. But now on page 220 comes good news for the cold camp: Evidence from the genes of living organisms suggests that the cell that gave rise to all of today's life-forms was ill-suited for extremely hot conditions.

To probe the temperature preferences of early cells, Nicolas Galtier, now of Edinburgh University in Scotland, Nicolas Tourasse of the University of Texas, Houston, and Manolo Gouy of the University C. Bernard in Lyon, France, analyzed 40 living organisms for two genes that act as a sort of thermometer for an organism's ideal growing temperature. Their work suggests that in the ancestral cell, these genes could not have withstood temperatures above about 70°C—a more moderate temperature than many have proposed. Although the evidence is indirect, other biologists say the work is a clever approach that will reinvigorate the debate about the conditions in which life began.

The notion that the last common ancestor of all life lived in very hot conditions has recently gained followers (*Science*, 2 May 1997, p. 700), in part because some of the organisms that populate the lowest, earliest branches of the tree of life live in extreme environments today—the so-called hyperthermophiles thrive between 80° and 90°C. And most geologists believe the early Earth was racked by volcanoes and asteroid impacts, which create hot environments.

Galtier decided to test this theory by tracking the evolution of two temperature-sensitive RNA molecules in the cell's protein-making factory, the ribosome. The ribosome is in part made of RNA—which is itself composed of nucleotide bases—and so depends on the bonds between the bases to work properly. But those bonds are temperature sensitive: Some withstand high temperatures better than others. For example, the bases guanine (G) and cytosine (C) form a strong bond, while adenine (A) and uracil (U) form a weaker bond. Other studies have shown that the ribosomal RNA of heat-loving organisms has more G and C than A and U, presumably because the G-C bond holds up better in the heat.

Using the two ribosomal RNA molecules, Galtier's team constructed a phylogenetic tree for 40 living organisms ranging from bacteria to mammals. They then used a computer model to find the most likely proportion of G and C in the RNA molecules of the ancestor of all 40 organisms. To their surprise, the model



Cool ancestors? Heat-loving organisms tend to have more guanine and cytosine in their RNA, but the ancestral cell apparently had only a moderate amount of these bases.

ScienceScope

Particle Projects Fused Japanese physicists hope that combining plans for two new accelerators will improve the chances of getting them built. One, the Neutron Science Project, is a linear accelerator that would break down nuclear waste by pelting it with neutrons. The other, the Japan Hadron Facility (JHF), would create the world's most powerful proton synchrotron to generate kaons and other subatomic particles for basic research.

Japan's Science and Technology Agency had championed the neutron project, while the JHF was being pushed by the education ministry. But the two bureaucracies, themselves to be merged in 2001, have joined forces to reduce the projects' combined $2 billion price tag.

Saving money will force some compromises: Neutrons will move a little slower, dragging out nuclear waste studies, and physicists must abandon plans to build the JHF in an existing tunnel at the High-Energy Accelerator Research Organization (KEK) in Tsukuba. The new plan—which promoters hope will get its first funding next year—calls for building the JHF, then the neutron accelerator, at a research center in Tokai, 150 kilometers north of Tokyo. "If this is the only way [to get funding], we have to accept it," says Sakue Yamada, a KEK director.

Short-Lived Comeback? The SOHO saga has taken a turn for the worse. On 21 December, just 3 days after earning *Science*'s Comeback of the Year award for its miraculous rescue after a June 1998 accident (*Science*, 18 December 1998, p. 2156), the Solar and Heliospheric Observatory (SOHO) apparently lost its last stabilizing gyroscope. The breakdown has put the $1 billion sun probe into sleep mode and is forcing it to burn precious fuel to remain stable. Now, engineers are racing to write software that will allow the joint European–U.S. craft to limp along without the navigational aid—all before the craft burns its remaining fuel, which could last just 6 months. Even if they succeed, SOHO will be out of action for at least a month and its reduced mobility will limit the use of several instruments, says Joe Gurman of NASA's Goddard Space Flight Center in Greenbelt, Maryland. The setback is "no fun," he says, "especially after all that's been done to save it."

Contributors: David Malakoff, David Kestenbaum, and Dennis Normile