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.

notes that one unsubstantiated account mentions that Randolph's son, Isham, spent his adolescence at Monticello, and that one contemporary recalled that Randolph liked to party in the slave quarters at night.

Foster agrees that he should have credited Barger, who was "fantastic" and "of immense help to me" in recruiting Jefferson family members to the study. His written comment now sets the record straight. Foster also acknowledges that Barger wrote a memo about a year ago suggesting that Randolph or Isham Jefferson might have been the father of Eston Hemings. Foster says he didn't credit Barger because *Nature* doesn't permit acknowledgments in the correspondence section, where his report appeared.

Asked why he failed to mention Randolph and Isham Jefferson in the initial article, Foster says it was because they weren't suspects. For years, members of the Jefferson family had claimed that sons of Thomas Jefferson's sister—Peter or Samuel Carr, who lived at Monticello—were the most likely to have fathered Hemings's children. The DNA study was intended chiefly to settle that question, Foster says: "The Carr connection was what [our article was] about." Besides, Y chromosome data cannot be used to identify individual paternity within the Jefferson clan. That's a job for historians, Foster says.

But that's not how it sounded in the headlines on the initial *Nature* report and on an accompanying comment by geneticist Eric Lander of the Massachusetts Institute of Technology and historian Joseph Ellis of Mount Holyoke College in South Hadley, Massachusetts. The Foster article was titled: "Jefferson fathered slave's last child," and the comment included a heading that said: "Now, DNA analysis confirms that Jefferson was indeed the father of at least one of Hemings' children."

Foster agrees that the headlines were "misleading" because they suggested that the data were conclusive. He attributes this "unfortunate" slipup to the haste with which his article and the Lander-Ellis essay went to press. They were hurried into print, he says, to beat the popular media, which had learned about their results and were poised to publish. "All of [the confusion over headlines] probably would have gotten straightened out if there had not been this frantic rush to beat the leaks," Foster says. *Nature* staffer Rosalind Cotter agrees that "the whole thing really was rushed through."

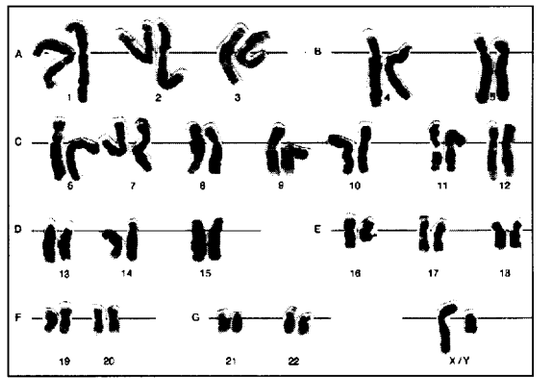
For his part, Ellis says he did not discuss the evidence for or against Randolph and Isham, because "very little is known about them" and "they had never been suggested as candidates." He adds: "It is scientifically plausible" that Randolph or Isham Jefferson was the father of Eston Hemings, "but it is a very, very remote possibility."

Historians will probably spend years trying to determine just how remote—or how plausible—that connection is. And the increasing emphasis on Thomas Jefferson's sex life rather than his political career, Ellis says, "just drives me nuts." **–ELIOT MARSHALL**

CELL BIOLOGY

Immortalized Cells Seem Cancer-Free So Far

In ancient Greece, immortality was the province of the gods, who spun the length of each lifetime. But last year it was scientists who rendered normal human cells immortal, by adding the gene for a chromosome-capping enzyme called telomerase (*Science*, 16 January 1998, p. 349). The achievement raised hopes that the telomerase-immortalized cells might be used to replace cells lost to injury or diseases such as diabetes and rheumatoid arthritis. But that promise was tempered by a big concern: Because telomerase prevents normal cell senescence—one of the cell's several safeguards against cancer—the altered cells might turn cancerous once in the body.



Old-timer. Cells making telomerase have a normal chromosome complement even after multiplying 165 times in culture.

Now, the same researchers who created the cells show that they can grow—perhaps forever, at least in lab cultures—without displaying the typical signs of cancer. Some researchers caution, however, that the new work hasn't removed all the worries about using the cells in therapy.

The researchers doing the work, including Jerry Shay and Woodring Wright of the University of Texas Southwestern Medical Center in Dallas and Choy-Pik Chiu of Geron Corp. in Menlo Park, California, turned to telomerase to try to overcome a natural barrier: Normal cells divide only a limited number of times in culture. That meant that efforts to replace tissue lost to injury, disease, or aging by removing healthy tissue, growing it in the laboratory, and transplanting it back into the body are often impractical. Researchers had traced the difficulty to the shortening of the cells' telomeres, specialized DNA structures that stabilize the ends of chromosomes. The telomeres ebb away with each cell division until the cells become senescent and eventually die.

Telomerase, which can rebuild telomeres, is not made by most normal cells. But about a year ago, Shay, Wright, Chiu, and their colleagues found that adding an overactive version of the telomerase gene to foreskin fibroblasts and retinal epithelial cells extended their life-spans by more than 25%. The cells are still going strong after three times their normal lifetimes, Shay says.

To allay fears that transplanting such immortalized cells into the body might open a Pandora's box of cancer, the Texas and Geron groups, now working independently, tested the cells for other telltale traits of cancer cells. These include the ability to continue growing when their DNA is damaged, when they are in contact with other cells, or when deprived of calf serum and the growth factors it contains—all conditions that stop normal cells in their tracks. The two groups found none of these abnormalities in the telomerase-immortalized cells, nor did they see any of the chromosomal changes, such as loss of whole or partial chromosomes, that are characteristic of cancer cells.

The cells also failed to form tumorlike colonies, as cancer cells do, when suspended in a jellylike medium called soft agar, even after two key growth-suppressing genes, *p53* and *pRB*, were inactivated. And they did not form tumors—or grow at all, for that matter—in susceptible mice. Taken together, the two groups' papers, which appear in the January issue of *Nature Genetics*, show that key checkpoints on cell growth are still intact in these cells, says cancer biologist John Sedivy of Brown University: "I think it's a very significant piece of work."

Cancer experts caution, however, that these experiments don't eliminate the possibility that the cells will become malignant in humans. "We don't know that and we can't know that from these experiments" because of the differences between mice and humans, says cancer biologist Robert Weinberg of the Massachusetts Institute of Technology. Indeed, cancer biologist Al Klingelhutz of the Fred Hutchinson Cancer Research Center in Seattle points out that while Geron and other companies are pursuing telomerase blockers as potential treatments for tumors, "these same researchers contend that immortalized cells are still normal and could be used for treatment of age-related disease. Is it really possible to have your