Rockville, Maryland, galvanized the field when Celera's president, Craig Venter, announced in 1998 that he was planning to sequence the entire human genome by 2001. Venter said he would patent "several hundred" genes and offer conditional viewing rights to everything in his database. Nonprofit centers, led by NHGRI and the Wellcome Trust, responded by stepping up their own efforts. They rushed ahead with plans to generate a "draft" version of the human genome early in 2000, pumping results into public databases, which could undercut Celera's claims of exclusivity.

Some observers saw this as wasteful and urged the academics to collaborate with Celera. Celera did forge a successful partnership with one group of publicly funded researchers—those working on the genetics of the fruit fly (*Drosophila melanogaster*). Together, Celera and these university-based scientists cranked out the fly's genome with stunning speed (*Science*, 25 February, p. 1374). But attempts to collaborate on human DNA haven't gone smoothly.

After unproductive discussions on sharing data in early 1999, Celera and NHGRI let the subject drop. Then last autumn, a newcomer began mediating between the public and private labs: Eric Lander, director of one of the best funded academic sequencing centers, the Whitehead Institute/MIT Center for Genome Research in Cambridge, Massachusetts. As the talks grew more formal, Collins says, the public centers elected four colleagues to represent them. In White's recollection, Lander was "kicked off the team" and replaced by Collins; National Institutes of Health (NIH) director Harold Varmus (now president of the Memorial Sloan-Kettering Cancer Center in New York City); Robert Waterston, director of the genome center at Washington University in St. Louis; and Martin Bobrow, a medical geneticist at Cambridge University in the U.K. and a governor of the Wellcome Trust.

These four met with a Celera team on 29 December. Then, claiming to have received no serious response from Celera after that session, they sketched out their unhappiness with Celera's bargaining position in a letter to Celera dated 28 February. In a telephone interview with *Science*, Bobrow confirmed that the trust gave this letter to the press on 5 March but said, "I don't know" exactly how this decision was reached. Bobrow says that the talks "are at an end," in his view, because Celera "basically turned [its] back on the discussion."

Printed on NHGRI stationery, the six-page letter itemizes "fundamental differences" that emerged between the academics and the Celera group. The letter describes the talks as "discouraging" and suggests that the idea of combining data from the public and private efforts "is no longer workable."

The letter says that Celera sought to retain control over the human genome for as long as 5 years by requiring that everyone seeking access to data produced by the collaboration agree to Celera's licensing terms. According to White and Venter, these terms are simple: Shared company data may not be redistributed to others or used in a commercial product without Celera's permission. This would be enforced through a license that data users would agree to with a mouse click as they either start up software on a DVD-ROM or log on to Celera's Web site. According to the letter, however, Celera also wanted to control future uses of the data, including publication of a finished version of the genome produced by the publicly funded labs. And the letter mentions that Celera wanted to reach "beyond databases," controlling technical applications such as DNA chips.

The representatives of the nonprofit institutions who signed the letter claim that they offered Celera 6 to 12 months of unilateral control over merged human genome data on Celera's Web site. But Celera wanted more time, they wrote—and this, combined with other demands, was "not in the best interests of science or the general public."

But White insists that he only suggested that Celera be given 5 years' control over the DNA sequence if Celera went along with a request to share its raw data (such as "tracings" from DNA sequencing machines) with co-authors. Otherwise, he said, exclusive control might end in 2003, when the public effort to finish the genome is due to be completed. Similarly, White said, the discussion of long-term claims on DNA chips and other applications arose only in the context of sharing confidential trace data.

The authors of the NHGRI letter were especially concerned that Celera might use data from the publicly funded labs in its own sequencing efforts, and, if no agreement were reached, might publish a scientific paper on the final sequence without consulting the academics who generated the data and deposited it in public data banks. "Publication of other groups' primary data without consent is considered to be a breach of scientific ethics," the NHGRI letter scolds. Venter shoots back that NIH officials have talked about publishing data derived with Celera's help, but without seeking Celera's consent.

This part of the dispute particularly annoys White. He fumes that the whole argument seems to boil down to who will get credit for completing the human genome. No, says Collins, the real issue is whether the human genome will be locked up in a "monopoly" for the next 3 to 5 years.

–ELIOT MARSHALL

With reporting by Leslie Roberts and Elizabeth Pennisi.

ScienceScope

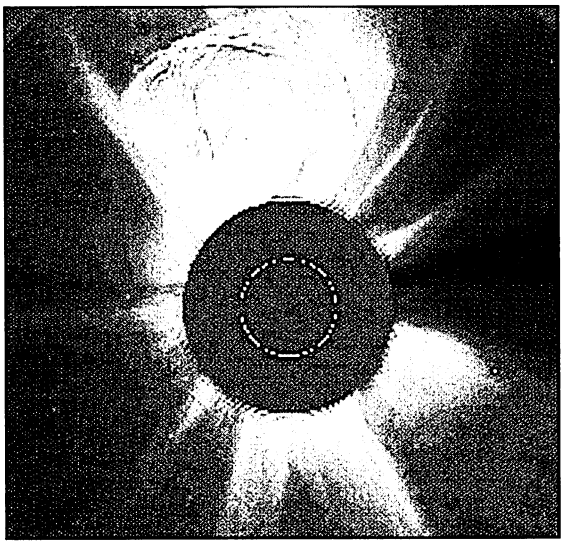
William Hamilton Dies Evolutionary biologist William Hamilton, 63, died 7 March from complications of malaria that he acquired in Africa while on an ambitious expedition to acquire new data about the origin of AIDS. "The most important thing is that he was out there doing something new in research, which is what he loved best," says Paul Harvey, head of the department of zoology at Oxford University, where Hamilton worked.

A bad malaria bout in late January forced Hamilton to rush home from the Democratic Republic of Congo, where he and co-workers had collected chimpanzee feces and urine samples. Hamilton, who is renowned for his studies of the evolution of social behavior and of sex, hoped to find HIV in the chimp samples. If some do test positive, analyzing those viruses could help clarify whether an oral polio vaccine tested there in the 1950s sparked the AIDS epidemic. The thesis, explored at length in a recent book, *The River*, hinges on the fact that the vaccine's developers had a large research chimp colony in Congo.

"Some of his ideas you thought were lunatic and some great, and it sometimes turned out that the lunatic ideas were the great ones," Harvey says. "He was the most loved and respected person we had in the department."

Make a Wish Representative Curt Weldon (R–PA, right), chair of the House Armed Services subcommittee that oversees defense research, wants more money for military R&D. At a hearing last week, Weldon told Pentagon science czars Jacques Gansler, Frank Fernandez, and Dolores Etter that although a proposed 4%, $50 million increase for basic research in 2001 is "good news," the $38.6 billion military science budget remains "overly squeezed." He is particularly concerned that the Pentagon is shortchanging studies that may not pay off for years in favor of applied projects that promise near-term results. "There needs to be a better balance," he said.

In response to questions, Fernandez and Etter admitted that they could easily spend a few hundred million dollars more on wish-list projects, from computer security to advanced robotics. And Weldon promised to do what he could in coming months to "plus up" Pentagon science spending, which is the major source of cash for university math and engineering departments.



Angry star. A new technique that reveals magnetic disturbances on the far side of the sun may give 2 weeks' advance warning of major solar storms, such as this massive ejection of gas on 27 February.

CREDIT: SOHO/LASCO CONSORTIUM/ESA/NASA

site SOHO's vantage point on 28 and 29 March. Sure enough, the travel times of certain waves sped up by about 6 seconds on those days—a mere hiccup during their 3.5-hour journeys from the near to the far side, but enough to create a splotch in the acoustic signatures. Many such analyses over the face of the sun allowed the team to construct a fuzzy hologram of the hidden plage, which covered 300 square degrees of the sun's surface.

That's a gigantic swath, but the technique can't yet visualize anything much smaller than 100 square degrees. "We're working on improving our resolution, but the larger regions are exactly the ones of most interest to space-weather forecasters," says Braun, who now works at Northwest Research Associates Inc. in Boulder. The method can detect active regions within about 50 angular degrees of the center of the sun's opposite face, Braun notes, although he is now devising ways to extend the analysis to areas near the edge of the far side.

Indeed, researchers at the Space Environment Center often see huge plages rotate into view on the sun's eastern limb "angry and ready to explode," says Hildner. That gives the forecasters no more than a week's warning before the regions may take aim at Earth with a barrage of flares and coronal mass ejections, huge belches of plasma laced with magnetic fields. Solar physicists are still struggling to understand which plages will erupt and which outbursts will affect Earth once they arrive (*Science*, 24 December 1999, p. 2438). Even so, another week of advance warning may help electrical utilities or satellite operators plan for possible disruptions and put key instruments into a safe mode. "If this technique can reveal which active regions are growing in magnetic strength as they cross the far side of the sun, that's enormously promising," Hildner says.

Protecting humans in space may be the greatest benefit, especially with astronauts due to spend thousands of hours on spacewalks during the next decade to assemble the international space station. With far-side monitoring, "we probably will be able to give a general 'all-clear' notification that we see no evidence of big active regions for the next 2 weeks or so," says William Wagner, discipline scientist for solar physics at NASA headquarters in Washington, D.C. However, such an alert system would require continuous listening and rapid analysis of the sun's acoustic symphony. That may fall to the next generation of solar satellite beyond SOHO or to a ground-based helioseismic network now being upgraded: the Global Oscillation Network Group, appropriately known as GONG.

–ROBERT IRION

PLANETARY SCIENCE

Buried Channels May Have Fed Mars Ocean

A team of geophysicists may have found a missing link in the growing body of evidence that Mars once had a major ocean. On page 1788 of this issue of *Science*, researchers analyzing gravity data from the Mars Global Surveyor (MGS) spacecraft report that they have detected a system of now-invisible, buried channels that delivered water from Mars's southern highlands into the northern lowlands billions of years ago. If they're real, these channels "greatly increase the chances of an ocean" on early Mars, says geophysicist Norman Sleep of Stanford University. But MGS geophysicist Roger Phillips of Washington University in St. Louis warns that "whatever it is, it's going to be tough to test."

Signs of an early ocean on Mars have been accumulating for years, but the evidence has been far from conclusive. First, geologists spied hints of a shoreline around the northern lowlands in 20-year-old Viking images, although preliminary analysis of more detailed MGS images has failed to confirm them. Then, after MGS topographic measurements showed the northern lowlands to be the flattest, smoothest known surface of broad extent in the solar system, planetary geologist James Head of Brown

ScienceScope

Bright Idea Indian researchers could soon share in the fruits of their labors. The Indian government last week presented Parliament with a budget proposal that would give institutions full intellectual property rights to ideas developed with public money and allow inventors to share in any profits.

The $2.8 billion R&D budget, which gives a 20% boost to civilian research and an 11% increase to military science, would reverse existing rules that allow funding agencies to patent discoveries but cut universities and scientists out of any royalties. Asis Datta, vice chancellor of New Delhi's Jawaharlal Nehru University, says the new policy could be just what "universities need to unleash their creative potential." Parliament is expected to approve the change later this year.

Warming to Hot Zone After months of delay, Canada is preparing to open its borders to some of the world's most dangerous pathogens. Last week, a community panel endorsed a plan for the Canadian Science Center for Human and Animal Health in Winnipeg to open a biosafety level 4 lab.

Shortly after the center's dedication last summer (*Science*, 18 June 1999, p. 1902), officials admitted to accidentally releasing waste water into the city sewage system without properly heating it to kill germs. A review concluded that the release posed no threat, but riled neighbors caused the government to delay issuing a permit to work with high-risk level 4 pathogens, such as the Ebola virus. To restore confidence, the lab invited local residents to join a new community liaison committee, which gave the lab's safety procedures a green light on 2 March. A thumbs-up from the government is expected shortly.

Choices, Choices After a 13-month search, the Department of Energy's Pacific Northwest National Laboratory in Richland, Washington, has named Lura Powell, a former administrator at the National Institute of Standards and Technology, as its new director. The choice pleased DOE Secretary Bill Richardson, who last fall reportedly derailed the lab's first choice, saying lab contractor Battelle had not tried hard enough to find a woman or minority to fill the post. Similar concerns have stalled the search for a new leader of DOE's Argonne National Laboratory in Illinois.

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