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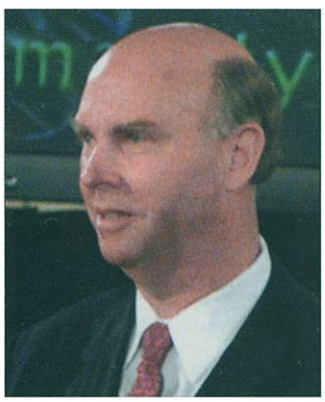
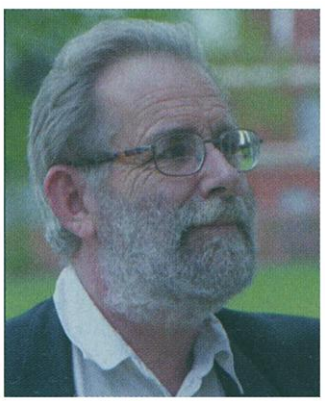
HUMAN GENOME

Storm Erupts Over Terms for Publishing Celera's Sequence

If Celera Genomics—the biotech firm in Rockville, Maryland, that has sequenced the human genome—had decided never to publish its work, nobody would have kicked up a fuss, says company president J. Craig Venter. But last week, when Venter and his team submitted a paper on the human genome to *Science*, a major row ensued.





At odds. Michael Ashburner (*right*) says J. Craig Venter wants both commercial advantage and academic kudos.

The focus of the dispute, which has been raging behind the scenes for weeks, is the conditions under which Celera is prepared to make its data publicly available. The argument went public on 6 December, when geneticist Michael Ashburner of Cambridge University e-mailed an open letter to *Science*'s board of reviewing editors and members of the press. He slammed an agreement on data release that *Science* had reached with Celera as a condition for accepting its paper for review. Ashburner's letter prompted *Science* to issue a statement* spelling out the terms of the agreement: Celera would make the entire sequence available free of charge through its own Web site, but place conditions on some uses of the data. Ashburner said he was "outraged and angry" that *Science* was not forcing Celera to deposit its sequence data in GenBank, a public repository whose data anyone can access and use without restrictions.

This spat is the latest round in an intense rivalry between Venter and leaders of the Human Genome Project, a publicly funded consortium that has produced its own draft human genome sequence. Some researchers involved in the public effort have been among the most vehement critics of Celera's data release policies; Ashburner's open letter expressed concerns many of them have voiced in private. The letter also came at a critical time: The day after Ashburner went public, leaders of the public project met to decide where to submit papers on their work. According to one geneticist, who asked to remain anonymous, they sent them to *Nature*.

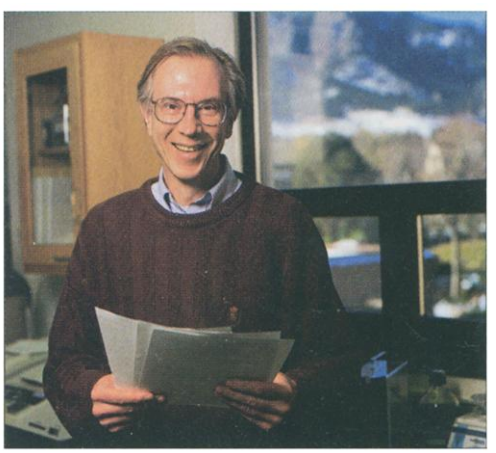
Science Editor-in-Chief Donald Kennedy says the agreement with Celera is the product of months of negotiations conducted in part by intermediaries in the scientific community. "This was a tough call," he says. The easy way out would have been to set a standard for publication that Celera could not meet, Kennedy says, but that would have been "the moral equivalent" of rejecting the submission arbitrarily. He argues that Celera has a right to protect its investment in generating the sequence; the new data release agreement takes this reality into account while allowing researchers to use a wealth of data that might otherwise be kept private.

The statement *Science* released says academic users may access the entire sequence on Celera's site, "do searches, download segments up to one megabase, publish their results, and seek intellectual property protection." For downloads of more than 1 megabase, scientists must submit an agreement, signed by an institutional representative, not to redistribute the data. Commercial users have many of the same rights but must sign a Material Transfer Agreement promising not to commercialize their results or redistribute the sequence data. Alternatively, companies may subscribe for a fee or seek a license.

Kennedy noted that *Science* has a longstanding policy of asking authors to deposit DNA sequence in a publicly accessible database, and he argues that the agreement with Celera fully upholds that principle. The journal, he says, "has never stipulated a particular database," although by tradition, it has sent authors to GenBank. *Nature*'s policies don't appear to be much different. Asked whether he would consider a paper from a company that would release data on its own Web site, *Nature* Editor Philip Campbell said he'd prefer "not to rely on databases at all." But he acknowledged that "there will be circumstances where it's unavoidable, and I can imagine circumstances where the only database available might be privately owned. ... If the community judged the database to be well curated and supported for the long term, and if access conditions were appropriate—as stated in our current policy—we'd accept [the use of a private database]."

Kennedy also noted that the plan includes a "unique departure from our normal procedures": *Science* will hold a copy of Celera's data in escrow to reassure the community that the information will remain accessible if Celera should later change its policies.

These assurances don't appease Ashburner, who wrote in his open letter that allowing Celera to avoid depositing its sequence in GenBank will "fragment" genomic data "across many sites." He predicted that "today's ease of searching [genomic data] will be gone, and gone forever." He said he has



Almost there. HHMI chief Thomas Cech says he expects the terms for academics will be acceptable.

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* www.sciencemag.org/feature/data/announcement/genomesequenceplan.shl

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"nothing whatsoever against the idea that Celera sequence the human genome and sell it," but he said the company also wants "the academic kudos that goes with it." A former member of *Science*'s board of reviewing editors, Ashburner urged current members to quit and refuse to review Celera's paper.

Other critics of the agreement have been more restrained in their public statements. Harold Varmus, former director of the National Institutes of Health and now president of Memorial Sloan-Kettering Cancer Center in New York City, confirms in an e-mail that he was one of about 15 scientists who wrote to Kennedy in November to express concerns about the *Science*-Celera discussions. "I remain concerned about the new precedent that may have been set," Varmus now says. Other people may demand exceptional treatment, he warns, and asks: "What will *Science* magazine do next time?"

Several biomedical leaders who have been involved in backstage negotiations over the agreement—including Thomas Cech, president of the Howard Hughes Medical Institute (HHMI) in Chevy Chase, Maryland; David Baltimore, president of the California Institute of Technology in Pasadena, California; and Bruce Alberts, president of the National Academy of Sciences (NAS)—now see merits in the agreement, at least for academic users.

Baltimore says he has reviewed the terms as they apply to academic institutions and, "in my amateur opinion," they are acceptable. He adds that Kennedy has "done a great service to craft an agreement that allows the door to be opened" to privately held data. Cech, responding to questions by e-mail, said the terms for academics are "very close to being acceptable," adding that some "vague passages" need to be clarified before HHMI investigators would be permitted to sign up to see the data. But "we do not expect these to be controversial." At NAS, Alberts says he's been assured by scientists whose judgment he trusts that the data-sharing provisions for academic researchers are satisfactory. He adds that it makes sense to try to work with private companies, partly because they will be doing a "massive amount" of DNA sequencing in the future.

Terms for commercial users of Celera's data are another story, says Cech, who argues that they are so restrictive they might "exclude users in the for-profit arena." Similar concerns were raised by one leader in the public consortium, who asked to remain anonymous.

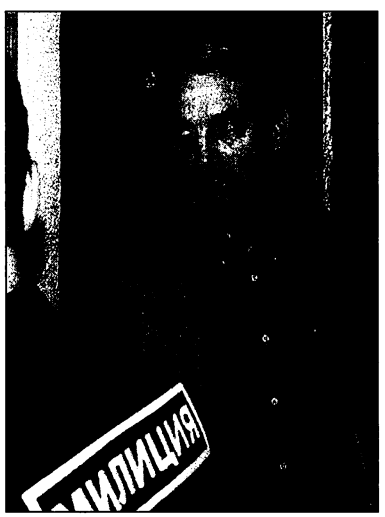
At some point, the arguments over access to Celera's data could become moot. Alberts suggested in a public statement that the sequence *Science* will hold in escrow should be turned over to GenBank "once a sufficient amount of time has elapsed to allow Celera to protect its legitimate business interests." Venter says he's willing to consider that option. In the next couple of years, says Venter, "we will definitely revisit that suggestion and see if it makes sense."

–ELIOT MARSHALL

U.S.–RUSSIA TIES

Spy Conviction Strains Science Collaborations

CAMBRIDGE, U.K.—The conviction last week in Russia of U.S. businessman Edmond Pope on charges of espionage may add to already growing tensions in scientific collaborations between the two countries, according to officials on both sides. The recent strains appear to be a reaction to a broad range of national security concerns in each nation.



On edge. Edmond Pope's trial is seen as a symptom of deteriorating U.S.–Russian ties.

In Russia, pressure is coming from the increasingly assertive Federal Security Service (FSB), the successor to the Soviet KGB. In the United States, security breaches at the national laboratories and throughout the intelligence community have led to restrictions on visiting scientists from a handful of countries, including Russia, that are deemed "sensitive."

The heightened concerns have put a crimp in U.S. efforts to reduce Russia's proliferation threat by linking U.S. scientists with Russians at dozens of once top-secret defense research centers. These efforts include programs such as the Department of Energy's Initiatives for Proliferation Prevention and the multinational International Science and Technology Center. "Many of the programs that [Defense Department researchers] are involved in are stopped. Many visits to Russia are postponed indefinitely," says one U.S. government official who spoke on condition of anonymity. Added another official, "We are concerned about the situation and its dampening effect on scientific cooperation."

Scientific exchanges have also been affected. The State Department's Bureau of Consular Affairs, for example, imposed a 2-month clearance of all Russian participants—twice as long as it took last year—for an October workshop on dangerous pathogens held at the Sandia National Laboratories' Cooperative Monitoring Center in Albuquerque. The new policy "has led to the cancellation of many foreign visitors," says one official. "We may be seeing some tit for tat," adds a second official.

U.S. scientists visiting Russia, meanwhile, face more delays in entering institutes or areas closed to the general public. They are also experiencing more incidents in which the FSB or border guards have confiscated equipment deemed sensitive, such as Global Positioning System receivers. Nonprofits that work with defense scientists have also noticed a chillier climate. "The rules have changed," says Gerson Sher, director of the Arlington-based Civilian Research and Development Foundation. "We're seeing a trend toward more rigor" in how applied, market-oriented projects are administered in Russia.

The 20-year sentence meted out to Pope, imprisoned for 8 months after being accused of buying secret information on a high-speed torpedo that Western experts say has been sold openly to other countries, has added to the strains. Pope, who is in poor health, was expected to receive a presidential pardon and be released from prison soon after *Science* went to press. However, his treatment has riled U.S. officials, who have asserted Pope's innocence from the start.

The Pope case highlights the FSB's resurgence under Russian President Vladimir Putin. The security service suffered a pair of blows in the last year, when Russian ecologist Vladimir Soyfer and former Navy officer Alexander Nikitin, both accused of revealing classified data, won

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