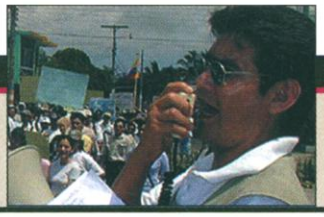


"nothing whatsoever against the idea that Celera sequence the human genome and sell it," but he said the company also wants "the academic kudos that goes with it." A former member of *Science*'s board of reviewing editors, Ashburner urged current members to quit and refuse to review Celera's paper.

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.

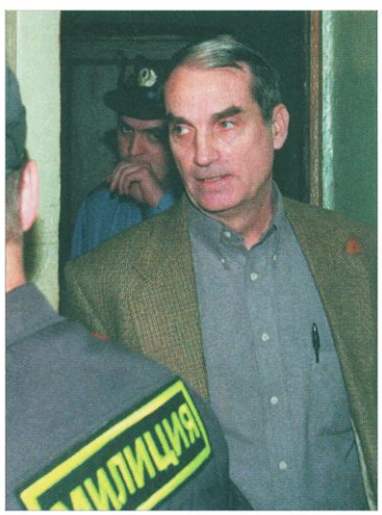
At some point, the arguments over access to Celera's data could become moot. Alberts suggested in a public statement that the sequence *Science* will hold in escrow should be turned over to GenBank "once a sufficient amount of time has elapsed to allow Celera to protect its legitimate business interests." 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

CREDIT: MISHA JAPARIDZE/AP

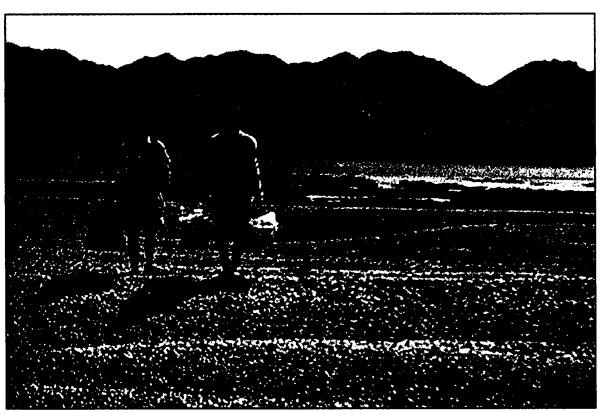
key court victories (*Science*, 10 March, p. 1729). The Pope verdict "suggests a revitalized FSB and a danger to all researchers," says Paul Josephson, a Russian historian at Colby College in Waterville, Maine.

Pope's release would ease tensions—but only a bit. U.S. officials are on tenterhooks after Russia threatened last month to resume arms sales to Iran after a 5-year hiatus on new contracts. "The worst-case scenario," says one observer, "is that all the technology cooperation programs are halted." Others have a more hopeful attitude. "I continue to be an optimist," says Lev Sandakhchiev, director-general of the State Research Center of Virology and Biotechnology "VECTOR" in Novosibirsk, Russia, a former bioweapons lab. "Russia and the U.S.A. are bound to have good relations." **–RICHARD STONE**

ECOLOGY/PALEONTOLOGY

Colorado River Clams Provide Benchmark

When naturalist Aldo Leopold explored the Colorado River delta in 1922, he found a "milk-and-honey wilderness." But 27 years later, he wrote that "I am told the green lagoons now raise cantaloupes." Conservationists have long contended, largely in impressionistic terms, that 70 years of American dam building and water diversion have destroyed the biological richness of the delta, a key nursery of marine life at the end of the Southwest's great watercourse. Now researchers have confirmed those suspicions, using an important ecological player as a quantitative marker.



Washed up. Despite the periodic accumulation of shells (above), the Colorado River now supports 95% fewer clams than in decades past.

CREDITS: (TOP TO BOTTOM) IRIDIUM; KARL FLESSA

"Basically, we've used clam shells to quantify what things were like before the dams and found they were vastly different," says Karl Flessa, a geoscientist at the University of Arizona in Tucson who led the four-university team's work, which is reported in the December issue of *Geology*. The work, says Sally Walker, an invertebrate paleontologist at the University of Georgia, Athens, "shows paleontology can be extremely useful for solving environmental questions by establishing an ecosystem's long-term past before humans altered it. That's powerful."

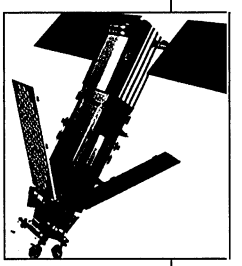
Flessa and his colleagues in Virginia and Mexico studied clams in the delta because, unlike other animals that decay and are lost to the geological record, clams leave behind hard shells to tell of past abundance. Clams furthermore stand as a "proxy" for "the whole marine ecosystem and its health," says Flessa, who notes that numerous fish, mammals, and migratory shorebirds depend directly on them for food. Flessa and his colleagues hoped that an analysis of the vast islands of gleaming white shells, using paleontological, geochemical, and geochronological methods, would allow them to estimate the delta's biological productivity both before and after the river's water was diverted.

To do so, the researchers carried out a series of simple mathematical calculations. First, they used satellite images, trenches excavated in shell-rich beaches, and field measurements of ridge density to estimate that the remains of some 2 trillion clams lay entombed in great shell ridges and islands in the delta. Then they dated 125 shells by analyzing changes in their amino acids and calibrating the results with radiocarbon dating. Virtually all those 2 trillion shells accumulated over the 1000 years from A.D. 950 to 1950, they found. Finally, they used stable isotope profiles recorded in shells to calculate the population turnover rate, which allowed them to calculate that 6 billion mollusk bivalves flourished at any given time in the area. From that number, they calculated an average density of 50 clams per square meter over the last millennium. In contrast, earlier this year seven sample areas yielded estimates of just three individuals per square meter.

Michal Kowalewski, a geobiologist at Virginia Polytechnic Institute and State University in Blacksburg and one of the project's leaders, believes that the productivity of the delta system has fallen at least 95% since the 1930s, when Hoover Dam was built. "That's a big drop, but in fact our calculations are so conservative it's probably much worse than that—maybe 10 times worse," Kowalewski says. He blames reduced fresh water and nutrient flows to the delta. About 90% of the river, or about 13.5 million acre-feet of water a year, is now diverted to support the fields and booming

ScienceScope

Back From the Dead Radio astronomers may have to cope with some unwanted static after all. The U.S. Defense Department last week announced that it will spend $72 million over the next 2 years to revive the bankrupt Iridium satellite phone network, which produces signals that interfere with radio telescopes (*Science*, 24 March, p. 2135). Last March, some astronomers quietly celebrated after Iridium and parent company Motorola announced that they would scrap the 70-spacecraft constellation after losing nearly $7 billion. Now, the Pentagon says it wants the moribund system reenergized next year for emergency communications. Says one sky watcher: "It's like a bad roommate moving back in—you just learn to live with it."



Take Your Pick The presidents of the American Physical Society (APS), the American Chemical Society, and the American Mathematical Society are offering the next U.S. president a list of recommended candidates for top science policy jobs. The names for two dozen key executive posts and four R&D–related advisory boards could go to the president-elect as early as this week.

For White House science adviser, sources say the trio favors mathematician Phillip Griffiths, director of the Institute for Advanced Study in Princeton, New Jersey; engineer and MIT president Charles Vest; or chemist Tom Meyer of Los Alamos National Laboratory in New Mexico. For defense secretary, they recommend retired aerospace executive Norm Augustine, while they hope current NASA chief Dan Goldin will stay. The groups plan to forward only the names of those candidates who express interest.

APS is coordinating the effort and has even hired Christine Niedermeier, a former congressional staffer, to direct transition-related work. The effort "could be a rallying point" for the R&D community and "a valuable service" to the president-elect, Niedermeier told *Science*, while declining to confirm specific names.

No life scientists made the cut for science adviser. "Our parochialism is showing," acknowledges one person involved in the effort. Others say biology groups were invited to join but could not respond in time. Meanwhile, other groups, including the American Association for the Advancement of Science (which publishes *Science*) and the National Academy of Sciences, may also assemble wish lists in coming weeks.