searchers have also come across traces of microbial life in highly acidic settings. But Edwards and Banfield are the first to collect and quantify these Archaea from a natural environment. They have since found the same or similar species at other sites throughout the mine.

If these microbes are widespread in the natural world, as these findings suggest, how they got there "is the $64 million question," says Banfield. Given their need for such acidic habitats, it's unclear how they could spread. Princeton University geochemist Tullis Onstott wonders whether such microbes found in Earth's subsurface became established when these geological formations first formed and then existed in a dormant state through geological time until conditions became suitable for them to spring back to life. Whatever the answer, the discovery of this archaeal species suggests that yet more bizarre microbes may exist out there, perhaps bugs that survive at negative pHs. Predicts Onstott, "If you keep looking, you will find them." **–ELIZABETH PENNISI**

CANADA

Strong Economy Lifts Some Research Boats

OTTAWA—Flush with revenues from an unprecedented economic boom, the Canadian government last week unveiled a series of budget initiatives that would reinvigorate academe while making major thrusts in high-energy physics, genomics, and environmental technologies. But there's no increase for the country's research councils, and that could mean continued hard times for many scientists.

The first wave of good tidings came on 28 February with news of an additional $615 million in the 2000–01 budget for refitting university labs and $109 million for a national genomics initiative (*Science*, 3 March, p. 1569). The next day the federal government nudged the high-energy physics community into the winners' circle by announcing plans to spend roughly $136 million over 5 years on operations and upgrades at the national laboratory for particle and nuclear physics.

"It's a huge vote of confidence in basic research in Canada," says Alan Astbury, director of the Tri-University Meson Facility (TRIUMF) in Vancouver, built in 1974 to develop a Canadian research capacity in particle physics. "This will allow us to do what you might call real nuclear physics." TRIUMF plans to use roughly $15 million of its windfall for a fourfold boost in the energy level of its nearly constructed Isotope Separator and Accelerator (ISAC), to 6.5 million electron volts. ISAC takes low-mass particles, evaporates the nuclei, ionizes them, and then accelerates them to higher energies. The upgrade will allow scientists to work at an energy level "which at the moment doesn't exist in North America," Astbury says, explaining that accelerators like the Relativistic Heavy Ion Collider at Brookhaven National Laboratory in Upton, New York, operate at much higher energy levels and generate "very short-lived" nuclei. Another $10 million will go toward components for the Large Hadron Collider being built by CERN, the European particle physics center near Geneva, bolstering Canada's contribution to international physics.

Stronger global ties are also expected from a national genomics initiative, first proposed in 1998 (*Science*, 3 July 1998, p. 20). Martin Godbout, acting president of the nonprofit corporation overseeing implementation of the initiative, says it will allow Canada to participate in a number of international consortia. The G-5 of genomics nations (the United States, United Kingdom, Germany, France, and Japan) "has become the G-6," he noted with pride.

Provincial governments are expected to at least match the federal contribution to Genome Canada, creating a genomics center in each of five specified regions. Each center will receive up to $15 million a year to pursue work of interest to industries such as agriculture, health, forestry, or fisheries. "They'll have to include proteomics and sequencing and genotyping, so the technology platform will be a prerequisite for each center. But the centers will be allocated by sector," Godbout says.

The $615 million for refurbishing university labs, which will be channeled through the Canada Foundation for Innovation (CFI), is seen as dovetailing with an earlier commitment to create 2000 new research chairs (*Science*, 22 October 1999, p. 651). The 3-year-old CFI program, which would have run through its initial $680 million next year, is intended to rejuvenate university research facilities, including networking and databases. With the CFI awash in applications, president David Strangway said the new monies will allow the foundation to clear its backlog, undertake more "strategic" competitions aimed at bolstering specific scientific sectors, and possibly create a $70 million pot for international joint ventures in such areas as information technology or biotechnology.

Although the government invested heavily in university infrastructure and personnel, the nation's three research granting councils received no increase in their support for basic research grants, despite skyrocketing demand prompted, in part, by the new infrastructure programs. "It's an appalling budget," complained Jim Turk, executive director of the Canadian Association of University Teachers. "The universities will be worse off."

Similarly, the National Research Council (NRC) was stiffed for the second straight budget despite Industry Minister John Manley's earlier vow to make it a top priority and an aggressive lobbying effort by NRC officials (*Science*, 18 September 1998, p. 1781). NRC president Arthur Carty says he's "devastated" and must now consider a range of cuts. His options include across-the-board reductions, closure of one of its institutes, or ending the agency's contribution to such national projects as one to develop fuel cells and another to build a synchrotron light source. "It's pretty morale-sagging," Carty noted.

–WAYNE KONDRO

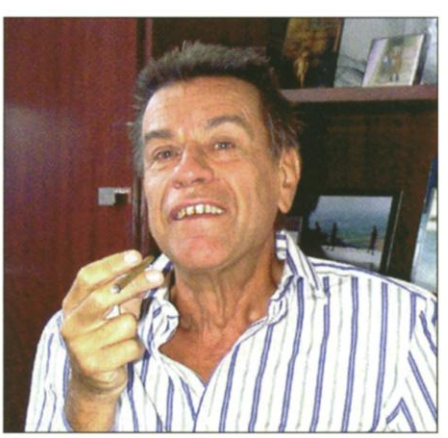
Wayne Kondro writes from Ottawa.

BIG SCIENCE

Top French Researchers Spar Over Synchrotron

PARIS—A lively and often heated debate broke out last week among some of France's top scientists over plans to scuttle a major French synchrotron radiation facility and instead back a joint venture across the English Channel. But for all their oratorical fireworks, the scientists, who spoke at a parliamentary hearing, were essentially haggling over a possible consolation prize: whether France should build a second, smaller synchrotron facility on its own soil.

Scientists use x-rays produced by synchrotrons to probe the atomic structure of proteins and other compounds. French researchers had been counting on getting an advanced x-ray source, the long-planned SOLEIL facility, until research minister Claude Allègre canceled the project last year. Instead, Allègre opted for French partnership in a new synchrotron to be built with the British government and the Wellcome Trust, the mammoth British medical charity (*Science*, 6 August 1999, p. 819). Allègre's de-



Synchrotron skeptic. Nobel laureate de Gennes questioned importance of x-ray sources. CREDIT: ESPCI

cision has become a flash point for protestors unhappy with his research priorities.

A French parliamentary commission, which has been examining Allègre's decision to pull the plug on SOLEIL, organized the 2 March roundtable at the National Assembly. The forum was the last step before the commission, headed by National Assembly deputy Christian Cuvilliez and Senate member René Trégouët, releases its report later this month. But the odds have grown vanishingly small that the panel will recommend canceling what some French researchers sarcastically call the "Franco-Wellco-British" synchrotron. "The negotiations are too far along" to put a stop to the project, Cuvilliez told *Science*.

The debate got off to a rollicking start when Nobel laureate Pierre-Gilles de Gennes, a physicist with the Collége de France, questioned the importance of synchrotron facilities. While "the machines are useful," de Gennes said, "if we are speaking of major unexpected discoveries made during the last 15 years, the result is practically nothing." These remarks drew a blistering response. Roger Fourme, head of biology at LURE, an aging x-ray source at Orsay that Allègre wants to shut down in the next few years, rattled off a list of proteins whose structures have recently been solved using synchrotron radiation. And Yves Petroff, director-general of the European Synchrotron Radiation Facility (ESRF) in Grenoble, complained that "de Gennes has not kept up with what is going on in this field," adding that research done at ESRF has been featured on the covers of *Science* and *Nature* four times since the facility went online in 1994.

Whatever the field's intrinsic value, others defended Allègre's decision to join forces with the British. "If SOLEIL had been constructed, it would have had half of the capacity the new synchrotron will have," said geophysicist Vincent Courtillot, research director at the French science ministry. Besides, he said, SOLEIL's price tag—estimated at between $160 million and $300 million—would have taken too big a bite out of the ministry's budget when it's straining to fund new positions for young scientists and to boost basic lab budgets.

On the other hand, Courtillot said, the government is "absolutely open" to the idea of building a smaller synchrotron in France, although he insisted that any such decision must be made in consultation with European partners. This attitude won approval from Nobel laureate Georges Charpak, a physicist at the CERN accelerator facility near Geneva. "It is clear that Europe is behind Japan and the United States in synchrotron radiation," Charpak said. "But does this mean we should catch up country by country?"

–MICHAEL BALTER

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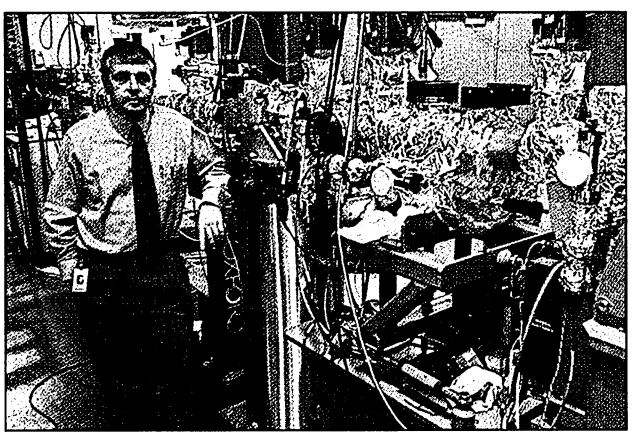
BIG SCIENCE

Prospects Brighten for Berkeley Synchrotron

Two years ago, the future looked grim for the Advanced Light Source (ALS), a premier synchrotron at the Lawrence Berkeley National Laboratory in California. A 1997 report criticized the management of the facility and the quality of the science it produced, and the Department of Energy (DOE) responded by cutting its budget. Now, things are looking up. Last week, a DOE advisory panel gave the synchrotron a glowing review, and DOE officials are now planning to boost its budget. "At last, we are out from under a very dark cloud," says ALS director Daniel Chemla, a physicist at the University of California, Berkeley.

The ALS, opened in 1993, is one of four DOE-funded synchrotrons producing x-rays used to illuminate the structure of everything from computer chips to protein molecules. Researchers have flocked to the particle accelerators cum microscopes in growing numbers over the last decade. Tight budgets during most of this decade, however, have forced DOE to make some hard choices about equipment upgrades and operating funds for the ALS; the National Synchrotron Light Source at Brookhaven National Laboratory in Upton, New York; the Advanced Photon Source at Argonne National Laboratory in Illinois; and Stanford University's Synchrotron Radiation Laboratory in California.



Turnaround. The ALS was sharply criticized in 1997, but it is winning endorsements under new head Daniel Chemla.

To help it decide spending priorities, DOE convened a team led by Massachusetts Institute of Technology physicist Robert Birgeneau. Its report, issued in October 1997, stunned ALS officials, who had expected that their $100 million machine would sail through the review. Instead, the report found that the ALS was poorly managed, relatively underused, and scientifically unproductive, and that its "soft" or long-wavelength x-rays were less attractive to scientists than the hard x-rays produced elsewhere (*Science*, 17 October 1997, p. 377). Within weeks, DOE slashed the light source's $33 million annual operating budget by nearly 10% and postponed some proposed upgrades.

Lawrence Berkeley leaders moved quickly to address administrative shortcomings identified by the report, which some felt unfairly compared the youthful ALS to its more mature siblings. They spun it off as a semiautonomous unit and hired Chemla to develop a long-range scientific plan and mend frayed relations with ALS users, who then numbered less than 250. They also made technical changes that allowed the ALS to produce the hard x-ray beamlines coveted by many scientists, increasing its appeal (*Science*, 27 August 1999, p. 1344).

By last year, the changes were having their intended effect: A review by the University of California, which runs the Berkeley lab, found that the number of users had grown nearly fourfold and that ALS researchers were regularly publishing in premier scientific journals. "The place has really turned around," says physicist Nora Berrah of Western Michigan University in Kalamazoo, who leads the ALS user committee. "We have worked very hard together to show that this is a great place for doing science."

The ALS's scientific productivity impressed members of the recent DOE review panel, led by Yves Petroff of the European Synchrotron Radiation Facility in Grenoble, France. One reviewer, materials scientist Richard Smalley of Rice University in Houston, Texas, was initially doubtful he would find much of value at the ALS. But he was "blown away by what I saw" during the team's 2-day visit last month. And Birgeneau, who was invited by ALS officials to serve on an advisory committee after releasing his report, says he "really admires the way [ALS] responded—they could have launched an attack on the report instead."

Congress will ultimately decide whether those kind words will translate into more money. Anticipating the facility's strong showing, DOE basic sciences chief Pat Dehmer had already proposed increasing its budget by $4.4 million, to $35.4 million, for the budget year that begins on 1 October. In the meantime, Dehmer says, "any lingering prejudice against the ALS should be washed away."

–DAVID MALAKOFF