AUSTRALIA

Science Holds On in New Budget

MELBOURNE—Australia's research community breathed a little easier last week after the newly elected conservative government issued a budget that protected science from the wholesale cuts many had predicted. Even so, most research institutions will be squeezed by reductions in administration and other costs, and universities—which are responsible for a large part of the country's research effort—are preparing for a 5% cut in total government support over the next 3 years.

One agency that will escape the ax is Australia's national science agency, the CSIRO (Commonwealth Scientific and Industrial Research Organization). Its research programs will actually receive $90 million more in base funding for research over the next 4 years. At the same time, CSIRO officials must find room in their budgets for "efficiency dividends"—cutbacks in administration and other nonresearch costs—that amount to $9 million in the 1997 fiscal year, which began last month, and will rise to $17 million by 2000.

"At the very least, this leaves us no worse off than now," CSIRO Chief Executive Malcom McIntosh explained in a memo to staff. "It should be possible to contain the net cut within our administration, largely through the measures already initiated—such as reductions in central office units, abolition of institutes, mergers of divisions—with no adverse effect on our science."

The budget is the first for the Liberal-National coalition government of Prime Minister John Howard, which ended the 13-year reign of the Labor administration by winning a sizable parliamentary majority in March. Its overall allocations for general research will increase in 1997 by 8.6%, to $900 million, and rise another 5.2% in 1998 and 3.1% in 1999 before falling 3.2% in 2000, according to budget documents. Senior research officials expressed relief that their budgets had been spared the sort of cuts many had expected as a result of the new government's determination to reduce public spending by some $6.1 billion, or 6.4%, over the next 2 years to eliminate the budget deficit.

That's also true for universities, which had been bracing for as much as a 12% cut. Even so, the news was not good: Cuts to operating grants, higher fees for undergraduate and postgraduate students, and further postponement of long-overdue salary increases will tighten already lean budgets. (In Australia, almost all universities are state-owned and survive on grants given according to enrollment.) The universities had their overall funding cut by 1% in 1997, with another 3% in 1998 and 1% in 1999. The budget also stipulates that institutions maintain levels of undergraduate places, and for the first time raises the student charges for science and medicine courses above those for other degrees.

"The government has been quite underhanded in the way they've presented this budget," says John Rice, president of the Australian Council of Deans of Science. "People underestimate the impact this will have on research. Salaries are going down and tuition costs are going up, while funding is retreating. It's basically telling people to forget it if they want a career in science."

A reduction in the research and development tax concession to industry is likely to slow corporate investment in research, which is still low by Western standards, according to commentators. The Howard government has already abolished the R&D syndication program, in which companies could pool investments for tax purposes, and replaced it with a program of research grants and soft loans to industry for collaborative projects. That effort is known as START (Strategic Assistance for Research and Development).

Other science agencies such as the Australian Geological Survey Organization, the Australian Institute of Marine Science, and the Australian Nuclear Science and Technology Organization generally suffered cuts, mostly through "efficiency dividends." The winding back of tax concessions for corporate research may also affect earnings from joint ventures as companies withdraw or scale back joint research.

As expected, the government declined to fund Australia's previously agreed-upon participation in the Very Large Telescope being built at the European Southern Observatory site in Chile, although it has held out the prospect of rejoining if the budgetary situation improves. But to the surprise of many, the austerity budget set aside some money for a reactivation of the country's space program, with a commitment to build and launch a series of research satellites starting in 2001.

The biggest winners were the nation's high-profile Cooperative Research Centers, a government-initiated nexus between industry, academia, and science agencies. The program was given an additional $8.5 million over 3 years to create two new centers, bringing the total number to 64. The budgets for such funding bodies as the National Health and Medical Research Council and the Australian Research Council were held to current levels.

–Wilson da Silva

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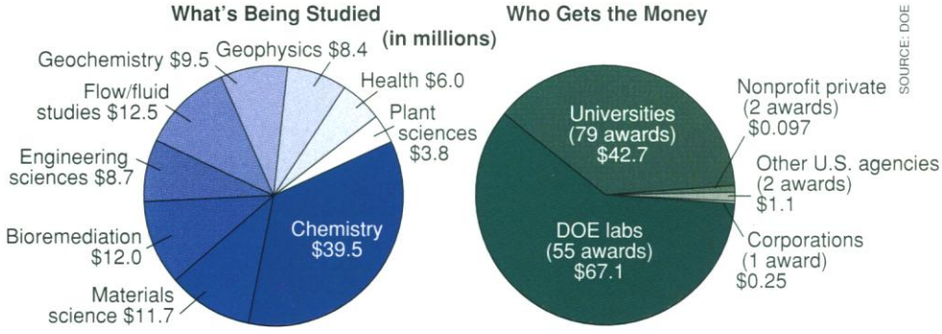
NUCLEAR CLEANUP

DOE Gives $47 Million for Core Research

The Department of Energy (DOE) last week took what it hopes will amount to a giant step toward solving its massive nuclear waste cleanup problem by funding the first round of 139 grants for basic research at universities and DOE labs. The $47 million Environmental Management Science Program, created last year by Congress, has been embraced by DOE as a fresh approach to a mind-boggling problem—the billions of liters of chemicals, radioactive waste, tainted water, and polluted soils, and hectares of contaminated buildings left by 50 years of weapons research at DOE sites. DOE officials hope that these grants are only the first installment in a long-term effort to tap the best scientific minds to solve real-world environmental problems.

The 3-year awards, from $200,000 to $2.9 million, cover projects ranging from the dynamics of plume flow and the cleansing characteristics of sound waves to the genetics of waste-eating microbes and metal-absorbing plants. DOE expects to give out $112 million over the 3 years; university researchers will receive their entire grants up front.

By DOE's own estimate, cleaning up its 3700 sites in 34 states could take $230 billion and 75 years. The department spends $350 million a year to develop existing



Fresh approach. DOE hopes a range of disciplines and labs will help clean up its nuclear waste sites.

cleanup technologies, but critics, including last year's Galvin Commission, have blasted DOE for the poor quality of science and technology behind these efforts (*Science*, 27 January 1995, p. 446). That assessment led Congress last year to direct DOE's Office of Environmental Management to spend $50 million on a new basic research program to be managed jointly with DOE's Office of Energy Research, which already runs basic science programs. DOE also enlisted the National Research Council (NRC) to set up a temporary Committee on Building an Environmental Management Science Program to offer suggestions. "There was a concern that DOE's technology-development programs were focused on near-term development and technology demonstration," says a Senate staffer. "But in order to [complete the cleanup], R&D will be necessary."

When DOE put out a request for proposals for the program last February, citing the need to "bridge the gap between broad fundamental research ... and needs-driven applied technology development," it caused a scientific traffic jam: 2200 preproposals and 810 proposals. The ideas were peer-reviewed first for scientific merit, then screened by DOE managers for relevance to actual problems. "The committee is pretty impressed with how [DOE was] able to carry this off," says Kevin Crowley, study director for the NRC panel. "It was a crash effort from beginning to end."

The projects being funded are aimed at understanding fundamental processes that have direct ties to the problems DOE faces. Ceramics engineer Delbert Day of the University of Missouri, Rolla, for example, will use his $625,000 grant to look at new kinds of glass for vitrifying nuclear waste. Day says he has used seed money to show that the work could have practical use, but that such results, although preliminary, might scare off the National Science Foundation because it might be seen as applied research. Columbia University radiation biologist Howard Lieberman, whose work has been funded mainly by the National Institutes of Health, has received a grant to extend to human systems his yeast studies of genetic markers for susceptibility to DNA damage. The results, he says, could be used to screen cleanup workers to find those at high risk for cancer. "We really needed to get it off the ground in a big way, and now we've got it," Lieberman says of his $750,000 grant.

This summer the House and Senate have separately proposed spending $50 million for the 1997 fiscal year, which begins on 1 October; that is $12 million more than the Administration had requested. DOE officials are optimistic that the program will continue over the next decade. Such sustained support, they say, is essential to attract the topnotch researchers they are seeking.

The academy panel is now working with DOE on the next solicitation, which officials hope will generate ideas from a broader range of topics. Carol Henry, of DOE's Office of Science and Risk Policy, says that while plenty of preproposals targeted traditional kinds of environmental problems such as chemical contamination, too few focused on problems unique to DOE, such as the 177 tanks at the Hanford site filled with mixtures of chemical and radioactive waste. "Some scientists found [the solicitation] very difficult to respond to," notes environmental engineer Frank Parker of Vanderbilt University in Nashville, Tennessee, who is heading an advisory board set up by DOE to carry on the academy panel's work. In addition to tapping into the top tier of academic scientists, DOE officials hope to find a way to involve young investigators, perhaps with special grants.

At the same time, DOE wants to make sure that the basic research ends up being used to solve problems on site. Parker says his group has taken on the "extraordinarily difficult" task of finding ways to measure whether the research is yielding practical payoffs, as well as examining ways to translate results into technologies, perhaps by building in links with the Office of Environmental Management's technology programs. How these efforts play out will determine whether science can provide the answers to one of this country's biggest technological problems.

–Jocelyn Kaiser

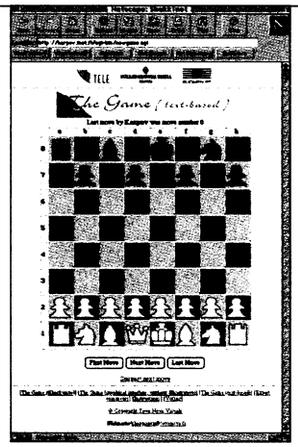
CHESS

Web Pits One Against the World

While one world chess champion, Gary Kasparov, gears up for a widely anticipated rematch with IBM's Deep Blue, the world's most formidable chess computer, a rival champion has been engaging in some techno-chess of his own. On 26 August, grandmaster Anatoli Karpov used the World Wide Web to take on everybody in the world—and drubbed all comers. Karpov's opponents didn't play individually; instead, they played one game collectively. That made the result of "Karpov v. World" a foregone conclusion, say chess experts.

The masses made each move with the help of a computer provided by Telecom Finland, the Finnish telecommunications company in Helsinki, which sponsored the match. Anyone with access to a Web browser could suggest a move; after 10 minutes, the computer tallied the responses and picked the most popular one. Although more than 400,000 Web-surfers watched the spectacle, only about 200 people voted for each move. Karpov then keyed in his response from a terminal at the Helsinki Intercontinental Hotel.

Although Karpov won handily, the world, playing by committee, managed a competent if humdrum game. "It was a quite normal game," said Eero Raaste, a Finnish chess commentator. "A national master could lose this way ... or a candidate master." Not, however, a champion grandmaster.



Bits and gambits. Chess on the Web; world is white.

Karpov, playing black, opted for his favorite Caro-Kann defense. In move 6, the world voted, by a mere 2% margin, to defend a vulnerable knight rather than attack with it. White played conservatively, and Karpov took the offensive. A blunder on the 16th move sealed the world's fate. From then on, there was little room for white to maneuver; it was forced to parry threat after threat. Eventually, Karpov's attacks tore a hole in white's harried defenses. After move 32, the world surrendered. The duel had lasted more than 4 hours.

Technology has provided more powerful opponents for Kasparov, who won the world championship from Karpov in 1985, then surrendered it to him by default after becoming embroiled in an argument with FIDE, the ruling body of chess. (Kasparov then founded his own chess association and now holds its title.) Deep Blue, the latest in a steadily improving train of silicon opponents, handed Kasparov a surprising defeat during a series of six games in February (*Science*, 2 February, p. 599). Kasparov finally mastered the upstart computer—but not before Deep Blue became the subject of innumerable magazine articles on the ascendancy of machines over humans.

That's still an open question, although Kasparov's encounter next May with an even more powerful version of Deep Blue may settle it, at least as far as chess goes. But Karpov has proven one proposition: Democracies can't play chess.

–Charles Seife

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