member institutes, among them the DESY synchrotron in Hamburg, the German Cancer Research Center (DKFZ) in Heidelberg, and the Earth Sciences Research Center in Potsdam. Instead of each institute receiving its own grant, the federal and state governments will divide the association's $1.5 billion yearly budget into so-called program areas. A review committee will determine how to distribute each program's budget between the centers based on each center's performance and its research priorities.

New president. Walter Kröll takes over at the revamped Helmholtz Association.

In May, more than 4300 scientists and other Helmholtz employees signed a petition protesting the reorganization (*Science*, 11 May, p. 1038). They feared that the new system would give too much power to the federal government to decide research priorities and would reduce the ability of scientists to follow the hottest areas. In response, the government has modified the association's constitution, including making "basic research" a fundamental goal and bolstering the presence of scientists in the 22-member Senate, a governing body that also includes bureaucrats and politicians.

Molecular immunologist Peter Krammer of the DKFZ, one of the most outspoken opponents of the plan last spring, says the changes have satisfied many of his concerns. Particularly important, he says, the new constitution states that institutes may spend up to 20% of their total expenditures on research unrelated to their central focus—allowing scientists at the DKFZ, for example, to pursue promising research in immunology or developmental biology. "I see no basis for fundamental opposition at the moment, but let's see how it works," he says.

Albrecht Wagner, director of DESY, says his initial concerns over long-term funding for large-scale projects such as the planned TESLA linear accelerator were addressed in a letter from federal research minister Edelgard Bulmahn to Kröll promising that labs would be free to sign international agreements extending beyond the normal funding cycle.

Kröll, the head of the German Air and Space Research Institute in Cologne, said last week that the reforms will strengthen the society. "There is no getting around it; the reforms must be implemented as soon as possible," he said. "We want the Helmholtz Association to be a leading pillar of European research and to make a globally recognized mark."

Most scientists would agree, especially now that their concerns have been acknowledged. "The old system definitely had to be changed," Krammer says. "If the new system fulfills the purpose, that is, to stimulate more dynamite research, then that's wonderful."

–GRETCHEN VOGEL

CANADIAN BUDGET

Most Initiatives Stalled; Health Research Grows

OTTAWA—A 7% increase when many other budgets are being squeezed might seem cause for celebration. But to Marc Renaud, the head of Canada's Social Sciences and Humanities Research Council, the 7% boost in his 2002 budget falls so far short of what a recent parliamentary committee agreed was needed that he is thinking about heading back to academia. And Renaud might have company: Last week's budget blueprint from federal Finance Minister Paul Martin served up more losers than winners for a scientific community with a long wish list fueled by a once-robust economy.

To nobody's surprise, the biggest new wrinkle in Canada's $86 billion budget for the year beginning 1 April 2002 is $1.1 billion for counterterrorism initiatives. Those programs will gobble up a big chunk of the overall budget increase of 4.7%, putting a squeeze on the rest of the government. As a result, astronomers were shut out in seeking money for some $100 million in new facilities over the next decade. Separate proposals to create the National Academies of Canada (*Science*, 27 October 2000, p. 685), the Biomolecular Interaction Network Database (*Science*, 8 June, p. 1813), and a program to improve university information technology departments (*Science*, 20 April, p. 413) also failed to win support.

At the same time, Canada's three research councils that fund academic research fared well, at least on paper. The Canadian Institutes of Health Research, the largest of the three, will receive a 15% increase, to $353 million. "It'll allow our institutes to continue the momentum and the gains they've made over the last year," says a pleased Alan Bernstein, who took over the newly constituted body some 18 months ago (*Science*, 8 September 2000, p. 1675). The budget for the Natural Sciences and Engineering Research Council will go up 7%, to $327 million.

The new budget leaves astronomers up in the air, however. First on their list of proposed projects is a 5% stake in the $650 million Atacama Large Millimeter Array radio telescope, which the United States, Europe, and Japan are building in Chile's Atacama desert. The National Research Council still hopes to "scratch and save up" $31 million over 5 years, says NRC president Arthur Carty—but only if it can get the Canada Foundation for Innovation to chip in nearly half the total.

Even the long-rumored federal foray into providing overhead costs for publicly funded research (*Science*, 27 October 2000, p. 687) was watered down in the battle against terrorism. Dreams by university administrators of a permanent $250-million-a-year program turned into a "one-time" allocation of about $125 million. Left unresolved is whether to give small universities a bigger slice of the pie to help expand their research capacity.

Still, educators hail the government's recognition of its role in supporting the indirect costs of council-funded research. "It is a substantial start," says Martha Piper, president of the University of British Columbia in Vancouver. And they're not giving up on their campaign for a permanent fund. "We might get it all 2 or 3 years down the road," says Robert Giroux, president of the Association of Universities and Colleges of Canada.

Renaud is not so sanguine about the budget prospects for his council. Earlier this year legislators joined a consensus that the social and behavioral sciences have been chronically underfunded and proposed a rapid doubling of the council's budget. So the $6 million increase, to $91 million, was a big disappointment. "There seems to be

Heading home? Social sciences head Marc Renaud says the tight budget may drive him from Ottawa.

CREDITS: (TOP TO BOTTOM) HELMHOLTZ-GEMEINSCHAFT; SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL

nothing that can convince this government of the usefulness and the need to support the social sciences," says Renaud, a sociologist who was at the University of Montreal when he was recruited in 1997 to rescue a body embroiled in internal bickering (*Science*, 11 April 1997, p. 195). "The question for me is: Am I going to stay in Ottawa?"

–WAYNE KONDRO

Wayne Kondro writes from Ottawa.

CIRCADIAN RHYTHMS

A Time to Rest: Clock Signal Identified

Pet hamsters love to run on their wheels at night, the time when their wild cousins venture out of their burrows to scurry around in search of food. Wheel-running—or its natural equivalent—is just one of many activities and physiological states that follow a daily rhythm, cycling up and down about every 24 hours, under the control of an internal biological clock known as the circadian clock. Researchers have made tremendous progress recently in identifying the molecular gears and levers that run the clock, but they have remained in the dark about an equally important part of the clock: the signals it sends out to control circadian behaviors.

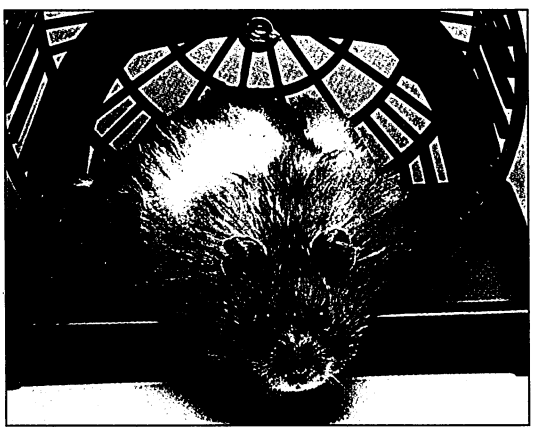
Now, on page 2511, a team of researchers led by Charles Weitz at Harvard Medical School in Boston reports that it has discovered the first known output signal from the mammalian clock, a molecule called transforming growth factor alpha (TGF-α), known for its role in cancer and embryonic development.

Clock researcher Michael Menaker of the University of Virginia in Charlottesville calls the work "a pioneering effort" that opens the way for clock researchers to begin to study the neural circuits by which the clock controls behavior and physiology. Joe Takahashi of Northwestern University in Evanston, Illinois, agrees: "One of our big gaps in understanding is how signals leave the [clock]." This paper, he says, begins to fill that gap.

Weitz's team based its quest for clock signals on work by several research teams showing that the brain's suprachiasmatic nucleus (SCN), home of the mammalian clock, secretes something that controls wheel-running. Weitz postdoc Achim Kramer searched for molecules secreted by SCN neurons, and Weitz scanned the literature for known SCN products. "About 20 secreted peptides have been documented from SCN," Weitz says, "and no one knows what most of them do."

Weitz's team took a selection of newly discovered and previously published SCN products and collaborated with Fred Davis's lab up the street at Northeastern University in Boston to test each candidate molecule's effects on wheel-running in hamsters. They infused each molecule continuously for 3 weeks into the brain near the SCN and monitored the animals' wheel behavior. Of 32 molecules they tested, TGF-α stood out: It completely stopped the animals from running in their wheels. Other experiments done with Tom Scammell across the street at Beth Israel Deaconess Medical Center showed that the hamsters weren't paralyzed or otherwise impaired. They just lost their nocturnal urge to run.

The researchers hypothesized that TGF-α may be produced by the clock during the day to inhibit running. If so, they reasoned, TGF-α production by the SCN should be high during the day and low at night—and that is exactly what they found. What's more, TGF-α would need to act on a nearby brain area called the subparaventricular zone (SPZ), which controls daily running rhythms. And when they looked in the SPZ, they found that its cells contained the epidermal growth factor (EGF) receptor, which is also the receptor for TGF-α.



To run or not to run. Hamsters and other nocturnal rodents run at night when TGF-α levels are low.

To confirm that TGF-α acts through the EGF receptor to block wheel-running, the researchers tested EGF, a molecule that works through the same receptor but is not made by the SCN. They found that it also suppressed wheel-running. What's more, Weitz's team found that mutant mice with impaired EGF receptors don't seem to register TGF-α's signal; they run during the day more than normal mice do.

The mutant mice were oblivious to external signals as well. Normal mice stop running at night if the lights are turned on. This response, called "masking," seems to work like an emergency backup system to assure

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ScienceScope

Orbach to DOE Theoretical physicist Ray Orbach, chancellor of the University of California (UC), Riverside, is slated to become the Department of Energy's next science chief. President George W. Bush on 11 December said he will nominate Orbach, 67, to head DOE's Office of Science, which oversees a $3.2 billion research program. Orbach is a veteran academic and administrator who has led UC Irvine for nearly a decade. His appointment is getting good reviews. But one congressional aide warns that Orbach will have his hands full "promoting science in an agency that seems to be losing interest."

Super Concerned Japanese researchers hope to recreate the events that led to last month's accident that destroyed nearly 6800 of the 11,000-plus photomultiplier tubes (PMTs) at the Super-Kamiokande neutrino detector (*Science*, 23 November, p. 1630). Leading theories involve the effects of water pressure, the energy released by the collapse of the 60-cm-diameter vacuum tubes, and the impact of debris from the first broken tube. "We are going to try to reproduce the disaster," says Yoji Totsuka, a professor at the University of Tokyo's Institute for Cosmic Ray Research and head of the observatory, which in 1998 recorded the first convincing evidence that neutrinos have mass.

The first test will shatter one PMT at the tank's bottom and watch its impact on others nearby. A second experiment will test the ability of prototype plastic cocoons to protect the tubes from shock waves and debris. Totsuka hopes to complete the experiments in time to present the results to an investigative committee early next month.

EPA Seeks Advice The Environmental Protection Agency (EPA) has put on hold plans to use studies in which companies dose people with pesticides while the National Academy of Sciences studies the issue. A 1996 law that requires new safety limits for pesticides on produce prompted industry to expose paid volunteers to chemicals to determine the minimum level at which a toxicant causes effects. The Clinton-era EPA barred using the human data due to ethical concerns, but last month agency officials said they were reviewing some studies (*Science*, 14 December, p. 2285). Now EPA has shelved the studies until the academy weighs in on whether some human research is "unacceptable," and on how the agency should handle studies that don't follow federal ethics guidelines.