though he says, "I thought he was getting better." In Takahashi's view, Eisenberger "likes to handle [global] problems ... not as a scientist but as a politician."

Ironically, Columbia provost Jonathan Cole expressed confidence in Eisenberger's leadership in a letter to staff last December, saying that despite "bumps ... in the road," the institute was "making excellent progress." Some colleagues agree. Eisenberger "did an excellent, courageous job under difficult circumstances," says Columbia mathematician and economist Graciela Chichilnisky.

Eisenberger did not return repeated calls from *Science*. But in his resignation statement last month, he cited "differences on matters of principle and how best to proceed with the growth of the Institute, and more recently my personal health."

Crow's most pressing task will be to bring some equanimity to the institute. Crow could not be reached for comment, but Takahashi says one big issue is whether the Earth Institute and LDEO directorships, both of which were held by Eisenberger, should be offered to two people instead.

"The Earth Institute is a great idea," says Broecker. "It's just got to be done in the right way." Few would disagree—especially if somebody can figure out just what the right way is. **–CONSTANCE HOLDEN**

JAPAN

New Career Path Seen For Young Scientists

Four years ago, Japan set out a 5-year plan to create 10,000 postdoctorate positions to provide more opportunities for younger researchers. The government will meet its goal this year, ahead of schedule. That success, however, leads to the next challenge: how to find jobs for these scientists at a time when public payrolls are being reduced. The answer, according to a government advisory committee, is to loosen up the research tenure system, which traditionally bestows lifetime appointments, by offering fixed-term positions to both "superpostdocs" and more established researchers. In exchange for giving up job security, the researchers would receive greater freedom to explore their ideas. "It would be a new career path for researchers in Japan," says Ken-ichi Arai, director of the University of Tokyo's Institute of Medical Science and a member of the committee, which last week submitted its report to the Science and Technology Agency.

Young scientists typically begin their careers as lecturers or researchers, advance to associate professors or group leaders, and eventually become professors or heads of research departments. Although they have a job for life, they achieve full independence only after reaching the top of the administrative ladder. The committee's recommendations envision an alternative starting point with much more autonomy: superpostdocs for younger researchers who have finished one postdoctorate position and are ready to work on their own.

The committee—which was asked to reconcile the need for more research positions with growing political pressure to help close a budget deficit by reducing the number of public employees—says such flexibility also should extend up the career ladder. It is recommending that fixed-term independent researcher positions be created for senior people capable of directing a team. The committee hopes that these positions, filled through an open competition, will appeal to scientists who want to switch from a traditional career track. The trade-off for this impermanence, says Yuji Kamiya, a plant scientist at the Institute of Physical and Chemical Research (RIKEN) and a member of the committee, would be "more money and more freedom." Those who have completed a superpostdoc or a term as an independent researcher would be free to seek tenured positions at national universities or laboratories.

One model for such an arrangement exists at RIKEN, whose status as an independent research entity gives it greater flexibility than national institutes in personnel matters. Hitoshi Okamoto, a developmental biologist working with zebrafish, gave up a tenured position at the private Keio University for a position at RIKEN's Brain Science Institute. Okamoto says the level of financial support made it "a great chance." And he is confident that his productivity will win him a renewal of his current 5-year term. "I think a lot of Japanese young people would be willing to apply for those positions," he says.

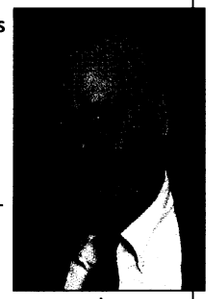
Miho Ohsugi, a postdoc in

CREDITS: (TOP TO BOTTOM) SAM KITTNER; D. NORMILE

Super idea? Miho Ohsugi says she likes the flexibility of a "superpostdoc" slot with a fixed term.

ScienceScope

Neutron Bomb The $1.3 billion Spallation Neutron Source (SNS) is facing fresh troubles in Congress. Last week, Representative James Sensenbrenner (R–WI) (below), chair of the House Science Committee, recommended wiping out next year's $214 million allotment for the high-profile Department of Energy (DOE) project, which aims to create powerful neutron pulses for studying atomic structure and the physics of materials. The recommendation follows several critical reviews of SNS management, including Sensenbrenner's own fact-finding mission last month to the Oak Ridge National Laboratory in Tennessee, where DOE hopes to build the project by 2005.



Sensenbrenner had a few kind words, giving Energy officials high marks for hiring physicist David Moncton last month to oversee the project (*Science*, 5 March, p. 1425). And if Congress were to hold up next year's funding, the legislator says, money could be restored after DOE produces a solid cost estimate and revised timetable. It could be months, however, before Congress decides whether SNS's ailments deserve Sensenbrenner's harsh prescription.

Fruit Fly Nanny Got some extra lab space and the desire to coddle a few thousand jars' worth of flies? Consider becoming the next curator of the *Drosophila* Species Center, a collection of 265 species of fruit flies. We aren't talking about your average *Drosophila melanogaster*, the workhorse of molecular genetics. Rather, the 1400 strains range from Mexican cactus-eaters to flies with a taste for only select Hawaiian fruits. No comparable collection exists for studying how species arise, says evolutionary biologist Jerry Coyne of the University of Chicago: "It would be a terrible loss to evolutionary biology if that collection were shut down."

Heeding such warnings, the National Science Foundation (NSF) is soliciting proposals for a new manager to take the reins in 2001 from Bowling Green State University's biology department, which no longer does much fruit fly work. Disabuse yourself of the idea that curating means laying out fly chow and cleaning jars now and then. The job requires "somebody really punctilious" to maintain stocks at proper temperatures and humidities and with special diets, Coyne says. Still interested? Send an application to NSF by 6 July.

the oncology department at the University of Tokyo's Institute of Medical Science, says she would be interested in the new career path. "It would be very attractive to be able to work on what you want to work on, even if the position has a limited term," says Ohsugi, who is studying proteins involved in spermatogenesis.

Many details must be worked out before Ohsugi and her peers can apply for a position, however. Ohsugi wonders how a superpostdoc would affect the government's promise to forgive most, if not all, of her graduate school loans if she joins a national university faculty. It's also not clear if superpostdocs would have access to existing equipment. And Okamoto notes that Japan's pension schemes heavily penalize those who change jobs.

There is also the question of how the new positions would be attached to existing institutes and who would pay for them. Arai says institutes would want money to cover the indirect costs of supporting a new researcher. Introducing fixed-term employment at national universities and labs might also require amendments to public servant employment laws.

The committee's recommendations will be passed along to the Council for Science and Technology, the nation's highest science advisory body, which is reviewing the results of a 5-year plan adopted in 1996 to boost the nation's scientific prowess. Any decision on a new career track is likely to be part of a broader set of R&D policies.

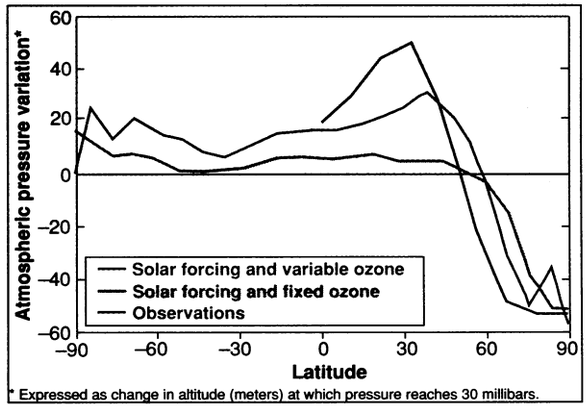
–DENNIS NORMILE

Link Between Sunspots, Stratosphere Buoyed

Everything from the stock market to climate has been linked to the 11-year cycle of sunspots—dark splotches on the sun's surface that mark an increase in solar activity. Almost all such correlations fall apart soon enough, but one has held up: For more than four sunspot cycles, the "weather" in the stratosphere has varied in time with solar activity, with atmospheric pressure peaking in a mid-latitude ring and plummeting over the North Pole at solar maximum. Yet solar output changes so little over the sunspot cycle that it's hard to see how the cycle could affect any earthly activities, even in the wispy stratosphere. Now on page 305 of this issue, a group of climate modelers presents the most promising mechanism yet for amplifying the effects of the solar cycle—and they suggest that sunspots' effects may even work their way down to the surface.

The mysterious amplifier, say modelers Drew Shindell of NASA's Goddard Institute for Space Studies (GISS) in New York City and his colleagues, is the stratosphere's much lamented ozone. By including ozone and its ability to absorb the sun's ultraviolet radiation in their computer model, Shindell and colleagues were able to mimic the high-latitude seesaw of pressure seen in the real stratosphere at altitudes of 25 kilometers. Their model runs also produced subtle climate change at the surface, including a few tenths of a degree warming of Northern Hemisphere high latitudes.

The stratospheric effect seems reasonable enough, says modeler Jerry D. Mahlman of the Geophysical Fluid Dynamics Laboratory in Princeton, New Jersey, who regards the mechanism as the first plausible means of linking sunspots and Earth's atmosphere. But "there's some skepticism" of a trickledown effect stretching all the way to the surface, says theoretician Lorenzo Polvani of Columbia University. Meteorologists have long doubted that the vanishingly thin stratosphere can affect the massive, turbulent lower atmosphere, called the troposphere. And although researchers back in 1987 reported that surface climate does vary in step with solar cycles, that correlation didn't hold up for long.



Ozone makes the match. Allowing ozone to vary with sunspots causes a model to react (red) like the real atmosphere (blue).

But a different correlation has lasted. More than a decade ago, meteorologists first reported that when sunspots hit their peak, a ring of relatively high pressure encircles a cap of low pressure over the North Pole in the winter stratosphere (*Science*, 11 May 1990, p. 684). When the sun's output falls, the pressure pattern reverses. Yet the sunspot cycle alters the sun's total output by only 0.1%, too little for any direct effect on Earth's climate. What could be causing the connection?

Modeling studies had already suggested that the answer might involve ozone. Ozone warms the stratosphere by absorbing ultraviolet light, and the sun's UV output rises and falls significantly during the sunspot cycle, varying 10 times more than does its total output at all wavelengths. Because the north polar region is cloaked in darkness during the winter, the UV-induced warming is limited to lower latitudes. That geographical disparity can drive circulation in the stratosphere, raising atmospheric pressure there and so boosting the westerly stratospheric winds that blow around the pole at 30 to 50 degrees north. And in a positive feedback that could amplify this effect, the increased UV light at solar maximum creates more stratospheric ozone from oxygen, triggering more stratospheric warming and perhaps a greater pressure difference.

Although this scenario is not new (*Science*, 4 August 1995, p. 633), earlier models left out the upper half of the stratosphere, and hence part of the ozone layer, to save computing time. Shindell and colleagues are the first to include a complete stratosphere as well as a chemical simulation that can produce more or less ozone depending on the amount of ultraviolet light. In their model, the 1% extra UV light at the solar maximum produced the characteristic stratospheric high-pressure ring and low pressure over the pole. A similar sort of pattern is seen in the Arctic Oscillation, a hemisphere-wide driver of northern climate (see p. 241).

Shindell even sees changes down at the surface. In his model, the stratosphere doesn't strong-arm the muscular troposphere but rather uses the troposphere's power against itself, creating a weak and indirect link between sunspots and surface climate. The GISS researchers found that at solar maximum, the mid-latitude, high-pressure ring deflects atmospheric waves that propagate up from the troposphere and carry energy from place to place in the atmosphere. The deflection of these waves back into the troposphere alters circulation in such a way as to produce a high-pressure ridge at 40°N that intensifies winds at the surface and redirects storms into Canada and northern Eurasia. The net result is to warm the high latitudes by a few tenths of a degree.

Even for researchers who find Shindell's sun-stratosphere connection reasonable, the step from the stratosphere to the surface is a stretch. "I'm skeptical about the models," says Polvani. "Other groups have similar models, and they haven't been able to reproduce those results." Indeed, the tropospheric changes are nearly lost in the noise, and this GISS model has been criticized as "rather crude" (*Science*, 10 April 1998, p. 202).

SOURCE: SHINDELL *ET AL.*