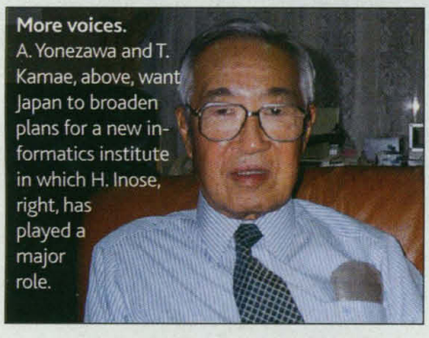
flected in the plans for this new institute." But Inose says that the established process provides ample opportunity for those interested in speaking up. "There is always some controversy between different views," he says, leaving some to feel that their opinions "aren't fully reflected" in the final plans.

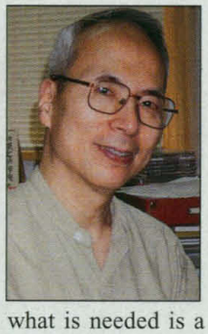
The critics emphasize that they are not criticizing Inose personally but rather are trying to reform a process that places too much authority in the hands of a few senior scientists. Indeed, they readily agree that Inose has earned his place at the top of Japan's scientific establishment. A graduate of the University of Tokyo, he spent several years in the late 1950s at Bell Laboratories in Murray Hill, New Jersey, where he began work on a key digital switching technology now at the heart of nearly all digital telephone switches. He returned to the University of Tokyo's engineering department, eventually becoming dean. Upon retiring from the University of Tokyo in 1987, he became the founding director-general of the National Center for Science Information Systems (NACSIS), which operates database systems and the computer network linking universities and national labs of the Ministry of Education, Science, Sports, and Culture (Monbusho). His long list of honors includes one of Japan's highest—designation as a Person of Cultural Merit—and he serves on numerous governmental advisory committees.



**More voices.** A. Yonezawa and T. Kamae, above, want Japan to broaden plans for a new informatics institute in which H. Inose, right, has played a major role.

The new institute is intended to bolster Japan's efforts in information sciences. In May 1997 the Science Council of Japan, an elected body that represents the interests of the scientific community, used a report by a subcommittee as the basis for urging the national government to set up an informatics research institute. Last January, Monbusho received a more detailed analysis of the idea from a subcommittee of its advisory Science Council, which Inose chairs.

Monbusho then assembled yet another ad hoc committee to make more detailed recommendations. Given the current fiscal crisis, the panel said, it would be better to expand and upgrade the 11-year-old NACSIS rather than to build a new institute. But even before this committee finalized its recommendations, Monbusho had won approval from the Ministry of Finance for eight new research positions at NACSIS as a step toward creating the new institute. Inose filled the slots earlier this year.



The hiring set off alarms within the community, in part because Inose ignored a pending recommendation from the ad hoc committee that positions be advertised and that a selection committee review the applicants. "The old top-down mechanism is being recreated when what is needed is a new regime in which younger researchers can play an important role," Kamae says. Computer scientist Akinori Yonezawa of the University of Tokyo, who served on the ad hoc committee, says "the committee had recommended a more open appointment process," although he concedes that NACSIS followed the letter of the law in its hiring practices.

Inose argues that there was nothing unusual about the hirings, however. "It is the same process you have at American universities" if they are trying to recruit a particularly prominent scientist, he says.

In the coming months Monbusho will assemble yet another committee to firm up the research agenda and set staffing policies for the new institute. Critics worry that the committee members will be drawn from a narrow circle of people, many with personal ties to Inose. They also worry that key decisions will be made without outside input, and they expect Inose will be appointed as head of the new institute. Inose says that there are many qualified candidates for the job and that, therefore, his selection is "unlikely."

In an attempt to influence those decisions, Yonezawa and his colleagues plan to ask Monbusho to fund yet another study. They want to assemble a panel of 15 to 20 information scientists to study the country's needs in information science. Yonezawa admits it is an indirect approach. But the group hopes it will serve notice to Monbusho that the process is being closely watched, as well as generate suggestions that the official committee will feel bound to consider.

Kamae worries that this won't be enough. "By the time they finish this new study, all the key decisions will already have been made," he says. Still, he is encouraged by the growing number of researchers who are willing to challenge the established order. "Scientists of my generation really have a responsibility to speak up and make these practices more democratic," he says. **–DENNIS NORMILE**

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ASTRONOMY

## A Gray Day on a Brown Dwarf

It's too early for detailed weather forecasts, but two astronomers claim to have detected clouds in the atmosphere of a nearby brown dwarf star. In a paper submitted to the *Monthly Notices of the Royal Astronomical Society*, Chris Tinney of the Anglo-Australian Observatory in Epping, New South Wales, and Andrew Tolley of Oxford University describe subtle color changes in the faint glow of LP 944-20, a brown dwarf only 60 times as massive as the planet Jupiter. They interpret the variations as evidence that clouds of titanium oxide are sweeping across the disk of this failed star. "Theirs are the first data suggesting the variability we expect for cloudy atmospheres," says theoretician Adam Burrows of the University of Arizona, Tucson, although he cautions that the variability might be due to star spots or calibration errors instead. But if the color changes are real, they fit with other recent evidence that even brown dwarfs, reclusive though they are, have active private lives.

The existence of brown dwarfs—stars not massive enough to sustain hydrogen fusion in their cores—has been suspected for decades, but the first bona fide detections of these dim objects came only a few years ago. Now, write Tinney and Tolley in their paper, "this field can finally move beyond the Guinness Book of World Records phase and into a period where real understanding of brown dwarf properties is possible." One insight appears on page 83 of this issue of *Science*, where Ralph Neuhäuser of the Max Planck Institute for Extraterrestrial Physics and Fernando Comerón of the European Southern Observa-

**Cloudy outlook.** Brown dwarf star LP 944-20 shows signs of weather.

tory, both in Garching, Germany, announce that they have picked up x-rays from a very young brown dwarf. The x-rays are probably produced in the outermost layers of the brown dwarf, as a result of strong magnetic activity. The finding suggests that the brown dwarf is rotating very rapidly; otherwise there would be no strong dynamo effect to generate the magnetic field.

Above the restless surface of a brown dwarf, astronomers expected to find an equally changeable atmosphere. The heat of a normal star would break up most compounds, but the relatively low temperatures around a brown dwarf, below 1500 kelvin, allow many more compounds to form and condense into solid particles. "We expect a very rich cloud physics in brown dwarfs," says Burrows. According to Jonathan Lunine of the University of Arizona's Lunar and Planetary Laboratory, the clouds could consist of heat-resistant silicates, plus a host of trace compounds, including ones containing sulfur and chlorine. "The chemistry can be complex," says Lunine. Burrows calls it "a fascinating mess."

Tinney and Tolley caught a glimpse of this mess using a novel instrument on the 3.9-meter Anglo-Australian Telescope to look for clouds of titanium oxide, chosen because it absorbs light strongly as a gas. The instrument, called the Taurus Tuneable Filter, enabled them to make accurate brightness measurements of a brown dwarf in two very narrow wavelength bands, one of which coincides with the absorption wavelength of gaseous titanium oxide. If clouds of titanium-bearing condensates were forming in the atmosphere of the brown dwarf, the depletion of gaseous titanium oxide would increase the brightness in this wavelength band relative to the other.

A faint brown dwarf called DENIS-PJ1228-157 did not show the effect, but observations of the much brighter brown dwarf LP 944-20, made in February and August, both revealed telltale variations of a few percent in the ratio of the two brightnesses, sometimes over just a few hours. The observations say nothing about the actual cloud structure, such as the thickness or extent of the clouds or whether they are scattered randomly or in equatorial bands as in the atmosphere of Jupiter. But Tinney and Tolley calculate, from the brightness variations they observed, that if clouds covered 5% of the visible disk of the star, the cloud tops would appear 400 degrees cooler than the surface of the star.

Burrows cautions that the researchers' conclusions are not yet conclusive. But he says that as observers continue to cast a weather eye on brown dwarfs, "we should soon know whether this exciting variability is real." **–GOVERT SCHILLING**

Govert Schilling is an astronomy writer in Utrecht, the Netherlands.

GENETIC DISEASES

# RAC Confronts in Utero Gene Therapy Proposals

A National Institutes of Health (NIH) advisory committee last week began what could be a long debate over whether to permit the next step in gene therapy: correcting genetic defects in a fetus before birth. Researchers say they may be ready to attempt such an experiment in 2 or 3 years, but fetal gene therapy carries potential new risks and ethical implications—including the possibility that transplanted genes could end up in sperm or egg (germ) cells and be passed on to future generations.

NIH's Recombinant DNA Advisory Committee (RAC) began to confront those issues at a 2-day meeting on 24 and 25 September when it discussed two "preprotocols" for in utero therapies submitted by W. French Anderson, a geneticist at the University of Southern California in Los Angeles. Anderson was part of an NIH team that performed the first gene therapy experiments on humans 8 years ago. Although Anderson says he needs to do more animal studies before he draws up a solid protocol, he submitted his preliminary proposals to the RAC to force discussion of the risks early on. "It is imperative to do everything possible" to reduce the chance of germ line gene transfer, says Anderson.

**Fetal therapy.** W. French Anderson catalyzes a debate.

Anderson is hoping to test in utero gene therapy on two potentially fatal diseases: homozygous α-thalassemia, a hemoglobin disorder so severe that it kills the fetus before birth, and a severe immunodeficiency caused by lack of the enzyme adenosine deaminase (ADA). The protocol for treating α-thalassemia involves mixing fetal blood with a retroviral vector carrying a functioning copy of the gene missing or defective in α-thalassemia, which makes the protein α globin, and then transfusing the treated blood back into the fetus. The hope is that the virus will insert the gene into stem cells—the blood cell precursors—which are more prevalent in fetal than adult blood. This procedure might only partially correct the defect, in which case the child could be born with developmental abnormalities, or with transfusion-dependent thalassemia. But because the genetic manipulations would be performed outside the womb, it would pose little risk of the gene entering the fetus's germ line.

The likelihood of that happening would be much greater, however, with Anderson's proposal for correcting ADA deficiency. The preprotocol calls for injecting a retroviral vector carrying the ADA gene directly into the fetus's peritoneal cavity. Based on studies in sheep, he expects the vector to carry the gene into the rapidly dividing stem cells of the bone marrow, which produce the cells of the immune system. But the vector could also find its way into germ line cells.

That prospect raised concerns among the 15 regular RAC members and the eight ad hoc participants invited to review the preprotocols. "This is a lightning-rod issue," says LeRoy Walters, director of the Kennedy Institute of Ethics at Georgetown University in Washington, D.C., and an ad hoc reviewer. The big worry is that the transferred gene could cause deleterious mutations that could be passed to future generations. "Nobody knows quite what's going to happen," says RAC Chair Claudia Mickelson of the Massachusetts Institute of Technology.

Anderson acknowledged that the risk of germ line transfer can't be eliminated. But he expects it to be very low—one in a million sperm might be affected, he guesses—and it could have positive effects or none at all. Most committee members seemed convinced. Evelyn Karson, an ad hoc reviewer and director of the Division of Reproductive Genetics at Washington, D.C.'s, Columbia Hospital for Women, noted that relatively few people would receive fetal therapy, and the number of mutations would be far outpaced by those occurring naturally. "Our genes just get picked up and tossed like a big tossed salad every time we undergo reproduction," she says.

For now, committee members called for more experiments to assess both the risks of the proposed protocols and their chance of success. As even Anderson concedes, "we do not have data to answer" whether in utero gene therapy will succeed. "There's a whole lot of work that needs to be done," says committee member Philip Noguchi, director of the Division of Cellular and Gene Therapies at the Food and Drug Administration.

The committee proposed that long-term studies on in utero gene transfer in sheep and many generations of mice be conducted to supplement the thin and somewhat ambiguous animal data that now exist. It also suggested that different diseases be considered as candidates, such as other immune deficiencies that are even harder to treat than ADA-deficiency. Until those experiments are done, RAC members say they are keeping an open mind about in utero gene therapy. **–JENNIFER COUZIN**