sleep and rise with waking. When the team boosted the norepinephrine level in anesthetized birds, the RA responses dropped. Margoliash notes that other as yet untested signaling molecules, such as dopamine, may contribute to the effect as well.

To Margoliash, the wide-open communication between HVc and RA during sleep suggests that that's when the birds learn to refine their songs. He speculates that even though a sleeping bird doesn't normally hear its own song, as the birds did in the experiment, its HVc neurons might spontaneously fire in the same pattern that is induced by the song while the bird is awake. That information would pass freely to RA neurons, which could use it to fine-tune the commands they give to the singing muscles the next time the bird sings. His team, he says, is now studying HVc firing patterns during sleep to see whether they do mimic the song response in awake birds.

Without such evidence, Mooney argues, the wide-open circuitry during sleep may be a "red herring," the result of the fact that the brain has little else to attend to. What makes the new work "profoundly important" in his view are the results obtained with birds that are awake, in which, he points out, RA's response to the HVc activity elicited by the song recordings is "throttled down," but "not shut down entirely." That "in-between state," he says, makes the circuits sensitive to modulating influences such as attention, which could regulate the information channels to control when song learning can occur.

Mooney finds the results tantalizing for another reason as well. They may provide a clue to a well-known human phenomenon: the loss of ability to learn new languages fluently at puberty. At puberty, bird songs become less responsive to auditory feedback. Mooney notes that sex hormones affect the turnover rates of norepinephrine in ways that could locally increase its levels, and he speculates that increases of sex hormones at puberty could reduce the bird's ability to self-correct its song. If so, he adds, it would "not be a big leap" to consider that a similar mechanism may be responsible for the problems humans have learning to speak a language like a native after puberty.

Those ideas remain to be tested, but to Nottebohm, that's another benefit of the new results. "What opportunities for future work," he enthuses. Indeed, just as the tenor and the zebra finch use feedback to fine-tune their songs, song researchers will likely be tweaking their hypotheses in response to these results and the new experiments they are bound to inspire.

—MARCIA BARINAGA

CREDITS: (TOP) KEN HEINEN; (BOTTOM) ARMED FORCES INSTITUTE OF PATHOLOGY

BIOETHICS

Panel Proposes Tighter Rules for Tissue Studies

Clinical researchers have received a bioethics package for Christmas, and some may be afraid to open it. It appeared on 3 December in the form of a draft report from the president's National Bioethics Advisory Commission (NBAC) (posted on the Web at www.bioethics.gov) arguing for tighter controls over research on stored samples of human blood and tissue to protect the donors' privacy.

The "tissue issue," as Yale bioethicist Robert Levine calls it, has become a hot topic. Stored tissue can contain a gold mine of information for researchers tracking the spread of disease, hunting disease genes, and studying human genetic variation. And it's a huge resource: NBAC calculates that U.S. institutions hold more than 282 million samples of archived human tissue today. Although those who donated the material

Potential gold mine. Tissue bank at the Armed Forces Institute of Pathology.

probably gave broad consent for its use in research, ethicists believe that more specific consent may be needed for certain studies that could identify and stigmatize donors.

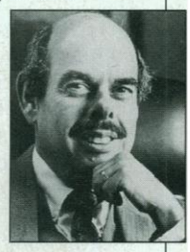
NBAC—a 17-member group of lawyers, ethicists, and medical professionals chaired by Princeton University President Harold Shapiro—began picking its way through this dense thicket 2 years ago. A draft report in late 1997 was withdrawn after it drew flak from clinicians and NBAC members. The new version, completely rewritten, is still likely to be controversial. Even before he had seen the details, pathologist John Trojanowski, an Alzheimer's disease specialist at the University of Pennsylvania, objected that its proposed new reviews and consent requirements would be so burdensome that they "would bring research to a standstill." But others were more accepting.

Judith Greenberg, who oversees the operation of a large human tissue collection for the National Institute of General Medical Sci-

ScienceScope

NIH TO REVIEW CONFLICT POLICIES

The National Institutes of Health (NIH) will take a closer look at the outside consulting fees earned by its scientists. This week, in response to a congressional query about an NIH scientist who received thousands of dollars in drug company fees, NIH director Harold Varmus requested a review of his agency's conflict-of-interest policies.



On 7 December, the *Los Angeles Times* reported that Richard Eastman, chief of the diabetes division at the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), had received speaking fees for several years from the Warner-Lambert Co. of Morris Plains, New Jersey. Eastman told the *Times* that he did not take part in decisions affecting company products while he was a consultant, but he was in charge of a clinical trial that included a Warner-Lambert diabetes prevention drug called troglitazone. Last summer, after a patient taking the drug died, the NIDDK dropped the drug from the trial.

The story prompted Representative Henry Waxman (D–CA, above) to send Varmus a two-page list of questions about the case on 7 December. A "concerned" Varmus responded by asking the inspector-general of the Department of Health and Human Services to examine whether NIH staff involved in the case complied with federal conflict-of-interest guidelines. His staff is also reviewing how NIH's two dozen institutes and centers apply the rules, with an eye toward clarifying them.

ACADEMIC INBREEDING ATTACKED

South Korea wants to imbue its universities with a little fresh blood. The National Assembly is expected to pass a bill this session that would prohibit universities from filling more than half of new faculty openings with their own alumni.

Inbreeding has been a hallmark of top Korean schools. At the prestigious Seoul National University (SNU), for instance, 95.6% of the faculty are alums. Now, government officials want to reduce the in-house promotions in an effort to spread around the scholarly talent.

But some SNU administrators oppose any quota, arguing that SNU's star students are also the most-qualified professors. "The best candidates happen to be our alumni," says Lee Jung Jae, an SNU education professor. Electrical engineer Park Young Joon, however, favors the change. The current system, he says, makes it too hard to bring in new talent.

ty. For example, says Rousse, at such high speeds, close to that of light, the mass of the electron increases, changing completely the interaction between light and matter. "It will be very interesting to see what happens if we can increase the energy of the laser even further," he adds.

Umstadter believes that the feat will also lead to new laboratory x-ray sources. If the pump laser is powerful enough, the electrons should reemit most strongly in the x-ray region of the spectrum, he explains, "so we presumably will be able to convert 1 micrometer [infrared] light into 1 angstrom x-rays." The dance of electrons might ultimately lead to a tabletop laser producing very short x-ray pulses, useful for snagging a glimpse of other quick moves such as the molecular choreography of photosynthesis.

—ALEXANDER HELLEMANS

Alexander Hellemans is a writer in Naples, Italy.

BIOETHICS

Britain Urged to Expand Embryo Studies

Biologists in Britain who want to use human stem cells to develop new medical therapies say the chances for government support are looking brighter. They're encouraged by an opinion issued in London by a senior advisory panel urging the U.K. government to enact a new law to ban "reproductive cloning" of humans while permitting a limited type of cloning for research on new methods of treating disease.

The recommendations, written by a joint working group of the two agencies that regulate the use of human reproductive technology in the country—the Human Genetics Advisory Commission (HGAC) and the Human Fertilisation and Embryology Authority (HFEA)—are expected to carry substantial weight in the U.K. The report could also become a model for other countries, say U.S. researchers, including developmental geneticist John Gearhart of Johns Hopkins University in Baltimore, who has cultivated human stem cells from fetal tissue.

Limited approval. Advisory committee chair Sir Colin Campbell.

CREDIT: UNIVERSITY OF NOTTINGHAM

The joint HGAC and HFEA working group, headed by the Reverend Dr. John Polkinghorne—an Anglican minister and mathematical physicist—began reviewing U.K. policy last January at a time when the press was full of speculation that humans might soon be cloned. The working group drew up a summary of key issues and sought public comment. On cloning for reproductive purposes, the outcome was "conclusive," says legal philosopher Sir Colin Campbell, HGAC's chair and vice chancellor of the University of Nottingham: "86% of the people who commented supported a ban on human reproductive cloning." The working group also endorsed a total ban.

But a fraction of respondents also favored limited research that involves DNA transfer into oocytes, the process that produced the sheep Dolly. Besides offering a way to copy an organism, cloning might enable researchers to transfer DNA from a defective to a healthy embryo, and it might also allow them to create new tissue for transplants. The working group, says Campbell, supports research in these two areas.

In the first, aimed at studying diseases rooted in the mitochondria—the cells' energy-producing organelles—DNA might be transferred from a cell with deficient mitochondria into a healthy oocyte, creating an embryo that could develop into a healthy child. The goal of the second line of research would be to clone a patient's DNA in stem cells derived from an embryo and coax those cells to develop into tissues that would be accepted by the patient's immune system. "The eventual clinical use of such [transplantation] procedures," the report notes, "would be to provide immunologically compatible tissues for the treatment of degenerative diseases of, for example, the heart, liver, kidneys, and cerebral tissue, or repair damage to skin or bone." The potential medical value, it adds, is "enormous." The report recommends that research licenses be granted for these areas of research.

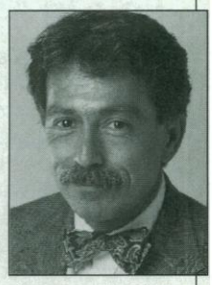
"This seems like a very positive signal that may open the door to research" on new methods of human cell therapies, says developmental biologist Austin Smith of Edinburgh University in Scotland. Existing U.K. guidelines allow researchers to obtain a license for research on human embryos up to the 14th day of development, but only for narrow applications such as improving fertilization methods. (At present, Britain has licensed 24 such projects at 18 centers.) Under the proposed new rules, however, these early embryos could be used for broader purposes, such as developing stem cells that can grow into a full range of specialized tissues—one of Smith's goals.

The HGAC-HFEA report lets agencies know that they should now give serious consideration to grant requests in these areas, says Smith. In the past, he says, restrictive legal policies have made it difficult to obtain funding even for research that would lay the

ScienceScope

SCIENCE EDITOR-IN-CHIEF TO STEP DOWN

Science is looking for a new editor. Editor-in-Chief Floyd Bloom (below) last week told the board of directors of the American Association for the Advancement of Science (AAAS), which publishes *Science*, that he will not seek a second 5-year term when his current appointment expires in May 2000. He said he wants to spend more time doing research at The Scripps Research Institute in La Jolla, California, where he is chairman of the Department of Neuropharmacology.



During Bloom's tenure, *Science* regularly published research reports that ranked among the most cited papers of the year. The journal also underwent a major redesign and made the leap onto the World Wide Web. Bloom "brought the vision, energy, and focus necessary to make it happen," says *Science* Publisher Richard Nicholson. The AAAS board plans to appoint a search committee within a few weeks, with hopes of naming Bloom's successor sometime next year.

NOT-SO-CRITICAL TECHNOLOGIES

Japan's industrial might in the 1980s created a bull market for studies assessing whether U.S. industry was falling behind in the race to master so-called "critical technologies" such as x-ray lithography. But a new White House report suggests that the once-hot topic has become cold, thanks to a healthy U.S. economy and Asia's financial crisis.

The report, based on interviews with 39 industrial titans from the likes of Merck, Motorola, and Lockheed Martin, is largely an exercise in chest-pounding. "Most speakers expressed their belief that the U.S. has regained its edge," the authors note. At the same time, the industrialists register grave concern with the state of U.S. public school education, a finding that the authors admit seems far removed from anyone's definition of a critical technology.

Perhaps the best gauge of how far techno-fears have ebbed is the affiliation of the authors. The report is from a federally funded think tank called the Science and Technology Policy Institute. Until recently, Washington insiders knew it by another name: the Critical Technologies Institute.

Contributors: Eliot Marshall, Michael Baker, David Malakoff, and Jeffrey Mervis