SCIENCE EDUCATION

A Record Grant for College Programs

The Howard Hughes Medical Institute (HHMI), best known for picking elite researchers and providing them with generous funding, announced this week that it is making a huge investment in the next generation of potential Hughes investigators. It will provide the largest grant in U.S. history to support undergraduate education in biology: $91.1 million to 58 universities.

The initiative will serve "to train the next generation" of biologists, says Joseph Perpich, HHMI's vice president for grants and special programs. "But it's also to provide very strong biology education to anyone who wants it." The new grants, which range from $1.2 million to $2.2 million over 4 years, continue an undergraduate science program Hughes launched 10 years ago. All but four of the recipients have received grants in the past.

Existing HHMI-funded programs range from a Biology Scholars Program at the University of California, Berkeley, that reaches out to women and minorities underrepresented in the life sciences, to matching undergraduates with faculty members conducting lab research at the University of Arizona, Tucson. That program has expanded from 19 participating faculty members in 1988 to more than 230 today. HHMI support for undergraduate science "has really helped change the value system at research universities," says Sam Ward, a professor of molecular and cellular biology at the University of Arizona and program manager for the HHMI grant.

One of the rookies in this year's program, Clemson University in Clemson, South Carolina, plans to spend its $1.6 million grant on a combined effort among the biology, education, and earth science departments in training middle and high school teachers in hands-on biology methods. The University of Arizona, one of two schools receiving the maximum grant of $2.2 million, will also use some of its money to support teacher training. It plans a sabbatical program in which high school science teachers will spend a year on campus studying science.

HHMI announced its new round of awards just a week after the National Research Council (NRC) released a report that pointed to a glut of life sciences Ph.D.s flooding the academic job market (*Science*, 11 September, p. 1584). Perpich says this new series of grants is not aimed at pushing more biologists into that pipeline. The intent, he says, is to produce graduates better educated in the life sciences, regardless of what career path they choose after college.

C. J. WALKER

One on one. In University of Miami program, undergrads conduct research with professors.

Shirley Tilghman, a biologist at Princeton University who chaired the panel that wrote the NRC report, agrees: "I'm 100% behind these undergraduate science grants." Tilghman, an elite Hughes investigator herself, says the Hughes grants "stimulate faculty [members by] giving them the resources" and the freedom to implement innovative teaching methods. **–JENNIFER COUZIN**

BIOMEDICAL RESEARCH

China Sets Rules for Foreign Collaboration

BEIJING—China is about to issue new rules governing the export of human genetic materials that will provide a legal framework for foreign collaborations in biomedical research. The rules strengthen the rights of patients involved in international studies and establish a formula for sharing any commercial proceeds among the collaborators. Although scientists who have read the rules generally applaud them, some worry that the additional bureaucratic procedures—including the collection of fees by local authorities at the start of a project—could raise the cost and extend the duration of many projects.

The regulations, drafted by the Ministry of Health and the former State Commission of Science and Technology (now a ministry), will tighten controls on work being done in China by outside researchers and pharmaceutical companies. Press reports of such activities, including one in *Science* (19 July 1996, p. 315), triggered concern that foreigners were plundering China's genetic resources. As a result, all such collaborations ground to a halt last year while the government drafted the new rules (*Science*, 17 October 1997, p. 376).

ScienceScope

RUSSIAN FRONT OPENS IN OZONE FIGHT

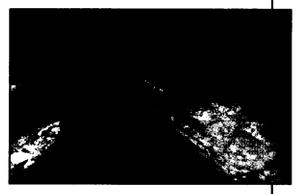
The campaign to heal Earth's protective ozone layer is shifting to a new battleground. Last week, United Nations officials marked the 11th anniversary of the 1987 Montreal Protocol—the global pact that calls for phasing out key ozone-destroying chemicals, such as chlorofluorocarbon (CFC) refrigerants—by pledging to help cash-strapped Russia make good on Soviet-era promises.

Scientists predict that Earth's eroded ozone layer, which screens out the nastiest ultraviolet radiation, can be restored by 2150 if nations adhere to the Montreal pact. But some signatories, including Russia, have missed deadlines for ending the manufacture of CFCs and other ozone eroders. Now, in an effort to put tardy nations back on track, the United Nations and the World Bank will pay to put CFC producers out of business. In Russia, for instance, the bank plans to spend $25 million to buy out Russian CFC facilities and close them down by 2000.

RESEARCHERS SEEK CONSENSUS AT MERCURY SUMMIT

A simmering debate among public officials about the health risks from eating mercury-tainted fish will soon get a public airing. In November, the White House will gather experts to review key studies in the hope of ironing out lingering disagreements.

Officials are at odds over how to interpret two ongoing studies of how mercury in fish affects the neurological development—memory and motor skills, for example—of children in the Faroe and Seychelles islands. Last December, the Environmental Protection Agency (EPA) recommended a safe level of no more than 0.1 micrograms of mercury per kilogram of fish, a level supported by the Faroe Islands study. But other agencies have set less stringent levels and say they're backed by the Seychelles results.



NEWMAN/GREENPEACE

Investigators from both studies will be at the mercury summit, hosted by the National Institute of Environmental Health Sciences in North Carolina. The plan is to "sift through the evidence ... and see if we can build a scientific consensus," says White House official Fran Sharples.

Contributors: Steve Nadis, Wayne Kondro, David Malakoff, Jocelyn Kaiser

The State Council approved the regulations on 10 June, but health ministry officials say the country's preoccupation with the disastrous flooding this summer has delayed a formal announcement.

One of the few scientists who has been given a copy of the regulations, Jiang Feng of Shanghai Medical University, says their existence is "good news. ... At least we know where we stand and what to do next." Jiang is working with Thomas London and others at the Fox Chase Cancer Center in Philadelphia on a study of the molecular epidemiology of liver cancer in men from the eastern Jiangsu city of Haimen. The study has been suspended for more than a year, and Jiang estimates that the delay has prevented early diagnosis of the disease in at least 150 patients. A colleague currently in the United States, Shen Fumin, is going over the new rules with his U.S. partners to make sure that the 5-year project, funded by the National Institutes of Health, is in compliance.

> **"We will absolutely stop those projects that do not conform to the regulations."**
>
> **—Yu Xiucheng**

The regulations will be implemented by an office, jointly staffed by both ministries, that is being set up to oversee all international collaborations involving human genetic materials—blood, tissue, organs, and so on—and to approve exports of such material. Any materials lacking the required approval will be confiscated by Chinese customs. "We will absolutely stop those projects that do not conform to the regulations," says the health ministry's Yu Xiucheng, who helped draft the rules and is scheduled to head the new office. However, he said the office will be more lenient toward projects that will not take blood samples and other sensitive material out of China.

Yu says the office plans to review applications in batches, every 3 months, using an expert panel of scientists from around the country. Before seeking approval from his office, however, potential collaborations must first submit an application and draft contract to local departments where the Chinese partner is located and include written approval from donors of any genetic materials and their relatives. "This is to show respect to local authority with the immediate access to the sources," Yu says. Local authorities would collect an as-yet-unspecified fee, he adds.

But some scientists are worried about possible delays, and they question the imposition of a fee. "Once every 3 months is too slow. It should take 4 weeks at most," says Jiang. Harvard epidemiologist Xu Xiping also worries that the government will not provide enough staff to handle the workload and that some investigators will abandon their projects out of frustration. Other scientists say that the fee gives the impression that the government is trying to make money from research and selling the opportunity to do science to the highest bidder.

The regulations also address the issue of ownership, both of the material itself and any commercial value it may have. Patent rights and any profits will be shared in proportion to the contributions of each party. Yu says the requirement for informed consent reflects the government's concern for human rights and brings China in line with Western practices. He adds that there are also plans to review the rule in 3 to 5 years.

Yang Huanming, director of the newly established Human Genome Center within the Institute of Genetics of the Chinese Academy of Sciences, predicts that the new rules "will do more good than harm." He notes that "most of these projects have already sought permission from the relevant authorities" but that "the new regulations provide uniform principles." Wu Ming, a leading geneticist in Shanghai, praises the new provisions to protect patient rights. "After all, human beings are not animals, and they deserve due respect," he says. The new regulations, he adds, should send an important signal to the global research community about working in China: "Those who used to do whatever they liked will now have something in their way." **–LI HUI**

Li Hui writes for *China Features* in Beijing.

ECOLOGY

Impact of Primate Losses Estimated

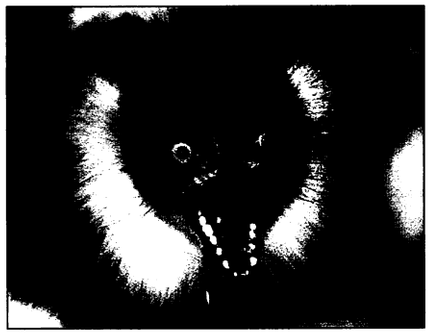
Like doctors battling a deadly disease, conservationists go about their work knowing that many species will die out despite their best efforts. A new analysis of looming primate extinctions now adds to the gloom: It suggests that the impact of extinctions in certain regions could be more damaging than one might expect from numbers alone, and that conservationists should pay more attention to the ecological value of species.

A team at the State University of New York, Stony Brook, combined data on the endangered status of primates with information on what those primates do in an ecosystem—disperse seeds, pollinate plants, or serve as prey for other animals, for example. In the current issue of the *Proceedings of the National Academy of Sciences*, they predict that in some parts of the world entire guilds of primates that perform specific and critical ecological roles will be lost, leading to deep impacts on ecosystems. "If we eliminate some of these species, there's going to be a whole hunk of ecosystem health that will be gone forever," says primatologist Patricia Wright, who did the work with her husband, evolutionary biologist Jukka Jernvall, at the University of Helsinki in Finland.

Ecologists have long noted that the loss of species that do a specific ecological job can have ripple effects across an ecosystem. Jernvall and Wright sought to quantify such impacts for primates, well-studied mammals that play key roles in many ecosystems.

The duo made their predictions using two potential waves of extinction, first removing all the endangered species, then all those now listed as threatened. Next, they examined 17 variables such as diet, habitat, tooth type, and body size and used them to characterize species' ecological roles—as predators or seed dispersers, for instance. Finally, they mapped out how the ecological diversity of the primates in a particular region would change as species die out.

The results varied dramatically by region. In South America, the set of doomed primates spans ecological niches, so the impact should be proportional to the number of species lost. But the ecological impacts will be worse in Asia, Africa, and especially Madagascar, where entire guilds of primates with similar specializations will be lost in a single clump. For example, in Madagascar the potential losses include a group of fruit-eating lemurs that disperse seeds, and in Africa they include the great apes, which also disperse seeds and eat massive amounts of foliage. "After that, no primate is doing that job in the forest," Jernvall says. Such losses might hasten the extinction of trees dependent on the seed-dispersers and so affect organisms dependent on the trees, says Wright.



D. HARDING/ANIMALS ANIMALS

Facing the future. Other species may suffer if seed eaters like this ruffed lemur die out.