Fostering Communication and Collaboration

# The NIH Catalyst

A Publication for NIH Intramural Scientists

National Institutes of Health ■ Office of the Director ■ Volume 4, Issue 2 ■ March–April 1996

## The Wild World of International Sample Shipment

*by Jennifer M. King*

An African lion dozes in artificial slumber as NIH scientists work rapidly to collect its tissue, blood, and semen. From this mobile lab—a Range Rover, outfitted with microscope, liquid nitrogen, and pipettes, parked temporarily in a Tanzanian crater—the biological samples will be shipped to the laboratory of Stephen O'Brien, chief of viral carcinogenesis at NCI in Frederick, Md. Upon arrival, the materials gathered an ocean away will be examined by researchers for the presence of feline immunodeficiency virus—that is, if all the international paperwork for wildlife shipment is in order.

NIH researchers are learning, sometimes the hard way, that the U.S. Fish and Wildlife Service (FWS)

Laure Monker-Kraus (Courtesy NOAHS Center)

and foreign customs officials are serious about enforcing regulations that require proper documentation for the import and export of live wild animals, as well as of the animals' tissues and body fluids. That's doubly true if the animal is a member of an endangered species.

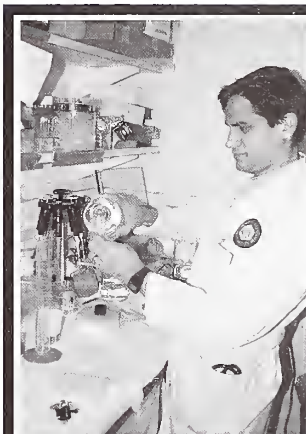
The total amount of paperwork that a scientist must fill out depends on the species of animal and its CITES designation, which refers to its category number as listed in the Con-

*continued on page 12.*

## Staff Scientists: Defining a Valuable Resource

The effort to more clearly delineate NIH's permanent scientific staff recently reached a milestone. After more than four years of discussing, drafting, and revising, NIH's scientific directors and the Office of Intramural Research finally signed off Dec. 12 on a policy defining the role of the staff scientist at NIH.

In this issue, we present the new NIH policy that the institutes, centers, or divisions (ICDs) will use to recommend to the deputy director for intramural research (DDIR) the appointment, review, and promotion of staff scientists.



Lorna Heartley

*Robert Kreitman*

*For more on staff scientists and their work, see page 11.*

People who do the work of staff scientists have been an important force behind successful research at NIH since its very beginning. Staff scientists may run state-of-the-art facilities. They are the keepers of knowledge about how to make a technique work, to get a culture to grow, or to move a postdoc off the dime when he or she gets stuck. They provide essential counsel in experimental design, statistical analysis, and clinical care. Most people who work with staff scientists agree: our labs wouldn't work without them. But there's one big difference between staff scientists and their tenured colleagues: they don't have their own independent resources.

Until NIH arrived at a firm definition and process for achieving tenure (see September-October 1995 issue), there were no clear demarcations among the job titles of mid- and senior-level scientists with doctoral degrees employed at NIH. There will now be four different job titles: tenured scientist, tenure-track scientist, staff scientist, and senior technical support personnel. Tenured scientists independently define and establish research projects using their own assigned resources such as space, money, and postdoctoral and technical assistants, and their performance is individually reviewed by a Board of Scientific Counselors (BSC).

Tenure-track scientists have been granted independent resources to run their own BSC-reviewed research programs for a defined period of time, possibly leading to tenure. Staff scientists are granted no independent resources, are supervised by tenured scientists, may work collaboratively with other scientists, and cannot expect to initiate or carry out their own independent research. Their evaluation by the BSC hinges on the scientific merit of the independent investigator who supervises them. Senior technical support personnel, not all of whom have doctoral degrees, are permanent, senior support staff who are

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From the Deputy Director for Intramural Research

# Seeds of Change: What NIH Has Sown

Michael Gottesman

MaryAnn Guerra

When Vice President Al Gore announced the National Performance Review two years ago, he called on Cabinet members to identify "reinvention laboratories" in their departments to serve as "seeds of change" for the entire government. NIH, with the strong backing of the External Advisory Committee, seized this opportunity to make changes in its administratively encumbered intramural program. The NIH Intramural Reinvention Working Group (IRWG) was formed, and in September 1994, the group submitted a proposal to the Public Health Service (PHS) outlining a framework for developing new approaches to intramural operations. This framework was designed to complement efforts spearheaded by other groups, including the Office of the Director, the NIH Reeingineering Oversight Committee, and Intramural Reinvention Laboratory Working Groups (see May–June 1995 issue).

Made up of working scientists and like-minded administrative staff, IRWG is dedicated to eliminating administrative roadblocks to scientific research and to streamlining operations to optimize use of increasingly scarce resources. Although the Department of Health and Human Services (HHS) has not formally accepted IRWG's proposal to develop an Intramural Reinvention Laboratory, our recommendations have served as a catalyst for many recent changes in procurement, personnel, management controls, and technology transfer.

## Procurement

NIH has made many concrete moves to shorten the time needed for major purchases and intramural expenses. Perhaps the most-talked-about project in scientific circles is the charge-card pilot under way at NCI and NCHGR. The test is proceding smoothly, and the process of reconciling actual charges with billing statements will be converted from a paper system to an electronic system in April. The target date for implementing charge-card use across NIH is June.

Improved ordering and budget tracking for scientific staff is also being pursued. IRWG awarded an NIH-wide Cooperative Research and Development Agreement (CRADA) to AR&T Systems of Towson, Md., to develop a seamless electronic system on the World Wide Web for locating appropriate vendors, equipment, supplies, and services. The system is intended to facilitate compliance with federal procurement and to interact with existing NIH administrative systems. We expect a pilot system to be available to interested institutes, centers, and divisions (ICDs) this summer.

NIH recently received authority to make many large purchases that in the past had to be approved at higher levels, including HHS. For example, the threshold for open-market purchases processed through DelPro has been raised to $10,000, the threshold for automated data-processing and telecommunications purchases to $50,000, and the threshold for small acquisitions to $100,000. In addition, ICDs can now order the maximum limit of supplies specified in Federal Supply Schedule Contracts. These changes should mean that rank-and-file scientists will receive supplies and equipment faster due to the reduction of time-consuming justification, competition, and processing paperwork.

As for contracts, we have eliminated pre-solicitation contract review, as well as the requirement that the NIH Office of General Counsel review contract awards of $5 million or more. NIH also received an increase in its authority to approve Justification for Other than Full and Open Competition (JOFOC), which allows for noncompetitive procurements when research requires ordering from a sole source. The station-support contract limit was raised from $1 million to $10 million, and the corresponding ceiling for research and development was raised from $2.5 million to $10 million. Chief contracting officers have also been granted increased JOFOC approval (from $50,000 to $100,000).

## Personnel

Changes in our personnel system center on improving salary scales and recognizing scientific achievement. The Senior Biomedical Research Service has been initiated with 26 intramural appointments and three recruitments to date. The NIH director is now allowed to extend Title 38 pay provisions to M.D.s, and many of our clinical researchers and staff physicians are benefitting from these substantial salary supplements. In addition, ICD directors have received authority to grant incentive awards of up to $10,000, with the option to redelegate such authority to their scientific directors and/or lab and branch chiefs. With the permission of their scientific directors, lab and branch chiefs now have the power to grant awards to fellows and approve annual pay increases for fellows within established pay bands. As for performance review, the NIH director has received the go-ahead to create a new appraisal sy[illegible]tem that may include a pass/fail process that co[illegible] also separate payment of performance awards fr[illegible] the final rating

## Management Controls

Responding to the research community's needs, NIH has succeeded in cutting some of the time and paperwork involved in the legally mandated Management Controls Review Process. PHS gave IRWG permission to develop a streamlined review process that features a methodical and uniform self-assessment by each scientific director. Although such reviews will increase oversight because they occur annually rather than every five years, the self-assessment process—set to begin this fiscal year—should be simpler because it will eliminate complex audits in each management-control area by outside reviewers.

## Tech Transfer

The National Technology and Advancement Act of 1996, which passed the Senate and is expected to be considered by the House later this year, would spell a major improvement in tech-transfer operations. The bill would allow NIH scientists to use royalty income for research, would exempt positions paid for with CRADA and royalty income from full-time employee (FTE) hiring limits, and would raise the royalty cap from $100,000 to $150,000 per inventor per year.

These achievements reflect the activities of the Office of Administration, the Office of Financial Management, and the Office of Human Resource Management, all working together to improve how business is conducted at NIH. IRWG is currently looking f[illegible] new members to fill recently vacated slots. To [illegible] involved, contact Mary Ann Guerra (e-ma[illegible] princess@nih.gov).

*Michael Gottesman*
*Mary Ann Guerra*
*Co-Chairs, NIH Intramural Reinvention Working Group*

# Catalytic Reactions

*Below are comments we received for topics that were raised in the November-December and January–February issues, along with some general reactions.*

### On being a staff scientist

The distinction between a principal investigator (PI) and staff scientist did not exist in 1980 when I was tenured. Staff scientist now appears to be a designation for scientists who are not considered to be good enough to be PIs, but nevertheless perform some essential function. Comments by some scientific directors indicate that they view this category of NIH employee with disdain, and that they consider staff-scientist appointments to be "back-door conversions to permanent positions." While tenure-track PIs get a memorandum of agreement, staff scientists have had nothing comparable in writing. Promises could be made and broken without consequences. It is essential that the staff-scientist position be defined so that those who are put into that position know exactly what the rules are. In the past, the rules have been arbitrarily made and changed. Also, it should be possible to switch from staff scientist to PI by demonstrating an ability to carry out a high-quality independent research program. Requiring competition in a nationwide search to achieve such a step seems unreasonable, and older staff scientists who are already tenured or who have permanent positions at NIH would have to compete at a distinct disadvantage.

—*Anonymous Staff Scientist*

*Mindful of the confusion and concerns raised by our previous system, the Board of Scientific Directors has completed its new staff scientist policy, described in detail in this issue. We hope to clearly define and identify all staff scientists at NIH by this fall. Because of the enormous investment in resources for our tenured staff, searches will continue to be required unless the candidate is already in a tenure-track position.*

—Michael Gottesman, DDIR

### On the Clinical Center design

Suggestion for commercial establishments in the new Clinical Center:

1. a book and record store (e.g. Borders)
2. retail pharmacy
3. post office
4. dry cleaners
5. a food court to provide competition with the cafeteria
6. a restaurant that could serve beer and wine
7. a travel agency that is happy to deal with us for personal travel (unlike Ober).

—*Peter Herscovitch, CC*

I do not support commercial development on campus—downtown Bethesda is close enough, and what is present on campus (R&W, cafeterias, bank) is also enough for the immediate needs. Rather, the day-care facilities should be enlarged, since it appears that architects can design space for non-lab and non-administrative buildings. Of course, I am not optimistic, because video stores and restaurants make more money than do investing in basic education and in improving the every-day life of postdocs on campus.

—*Rosaura Valle, CBER, FDA*

### More on postdoc concerns

As an individual who started his career at NIH as one of the visiting people, I feel I must comment on the weeping and bitter training experience by contemporary postdocs who, obviously, feel very sorry for themselves. If NIH is such a horrible place, as described by the NIH Fellows Committee, how come everybody wants to come here and stay here? It is apparent that what the NIH postdocs of the '90s need is a nanny and, perhaps, a shrink.

—*Paul Kovac, NIDDK*

### On some name changes

Your view of NIH training is excellent. Let me congratulate you! But I do want to provide an update. The Office of Education was recently merged into the Office of Science Education, whose mission includes both intramural training and science education. Michael Fordis is now the director of the Intramural Research Training Division in the Office of Science Education. Our commitment to outstanding training remains as high as before, and we anticipate that there will be some new programs to support trainees better, especially in the area of career development.

—*Irene Eckstrand,*
*Acting Director,*
*Office of Science Education*

### On the Dent cartoon

Although very humorous, the attitude [expressed in "National Institutes of Radiation Safety Blues"] is of concern. I have been involved in the radiological health field for more than 15 years. I want researchers to know that suspending you is the last thing in the world that personnel in the radiation safety community want to do. Our job is to assist you in doing your job safely and effectively, with minimal disruption in your research.

—*Shawn Googins,*
*Deputy Radiation Safety Officer, NIH*

## *Protein Folding and Design Conference*

An International Conference on Protein Folding and Design, dedicated to the life and work of Nobel laureate Christian B. Anfinsen, will be held in the Natcher Conference Center April 23–26. In conjunction with the conference, former friends and colleagues of Anfinsen will hold a memorial service in his honor on April 22 from 3 to 5 p.m. in Wilson Hall.

The free conference, which is sponsored by the FIC, DCRT, NIDDK, NCI, NICHD, and NCBI, will feature sessions on the theory of protein folding, protein folding in vitro and in vivo, the prediction of protein structure, protein design, the development of protein therapeutic agents, and computer simulation. Among those speaking are Frederic Richards of Yale University, New Haven, Conn.; Janet Thornton of University College, London; Brian Matthews of the University of Oregon in Eugene; Jane Richardson of Duke University, Durham, N.C.; William DeGrado of DuPont Merck Pharmaceutical, Wilmington, Del.; Maurice Hofnung of the Pasteur Institute, Paris; Martin Karplus of Harvard University, Cambridge, Mass.; Harold Scheraga, Cornell University, Ithaca, N.Y.; Ken Dill of the University of California at San Francisco; George Rose of Johns Hopkins University, Baltimore; and Jean Garnier of the National Institute of Agronomic Research in France.

To register, send an e-mail message with your name, institution, telephone, fax, and e-mail address to feldmans@fic16.fic.nih.gov by April 9. For more information, contact Sheila Feldman at FIC (phone: 496-2968; fax: 496-8496). Also, watch for updates on the World Wide Web in the News and Events section of the NIH home page, which is located at http://www.nih.gov ■

# Clinical Center Design, Turning a Dream Into Reality

A window for every lab ... no more than a two-minute walk from research bench to patient's bedside ... . It may sound too good to be true, but those are only a few of the research-friendly features being contemplated for the streamlined new Clinical Research Center.

NIH Director Harold Varmus announced on Dec. 20 that the Zimmer Gunsul Frasca Partnership (ZGF) had bested five other architectural firms to become the design team for the new Clinical Center. The Portland, Ore., firm was the unanimous choice of a selection committee made up of NIH scientists, clinicians, and administrators, as well as design and planning experts.

"What we have now is a concept. However, the actual building that ends up being built may be very different from the concept. No one should look at this as a final plan," says NCI Deputy Director for Clinical Affairs Gregory Curt, one of the researchers on the selection committee.

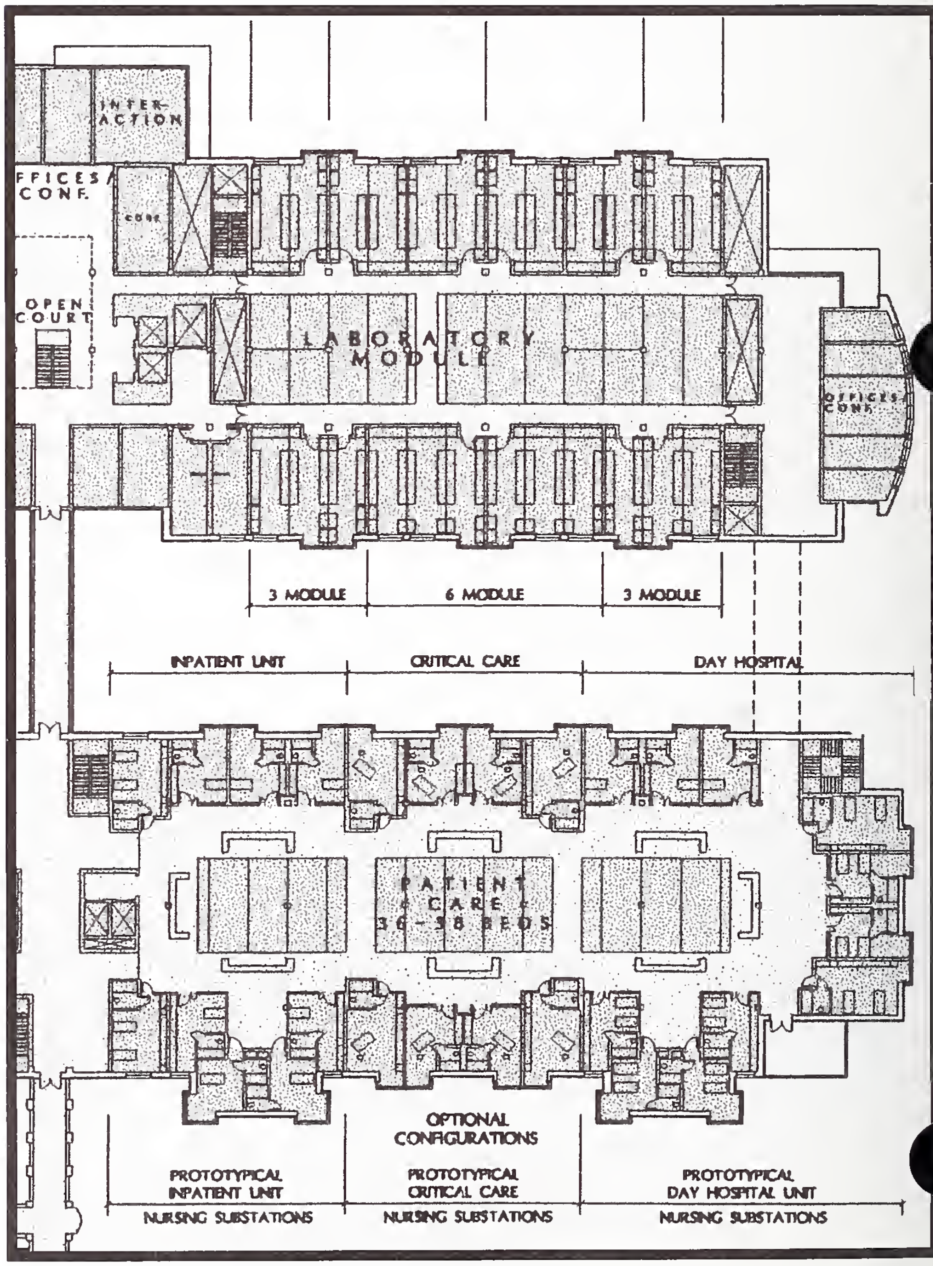
Another key question remains exactly how NIH will come up with the approximately $300 million needed to build the 850,000-square-foot facility, which will be attached to the north side of the existing Clinical Center. The year 2002 is the target opening date for the new Clinical Research Center, which will have 250 inpatient beds, down from the present 350.

"We gave very few specifications to the architects in advance. But one thing we did specify was the distance between labs and patient beds. ... We wanted them to be as close as possible," says Curt. "This was one of the most important things we could do to help translate basic research to the clinic."

Walter Armstrong, NIH's project director for the new Clinical Research Center, says ZGF was the only firm in the design finals that boasted experience in building both research labs and hospitals. The lab space that the firm has built or is planning to build includes facilities at the Fred Hutchinson Cancer Research Center in Seattle, the Johns Hopkins Medical School in Baltimore, the University of California system, and the Vollum Institute for Advanced Biomedical Research in Portland, Ore. Hospitals include a Veterans' Affairs medical center and a children's hospital, both in Portland.

Clinical Center Director John Gallin says,"The ZGF proposal is terrific because of its ability to accomodate the flexible demands that NIH has had and will have in the future. The design was also the least obtusive for the NIH campus and surrounding community. The laboratory design team that will join ZGF, Walls/Copenhagen of San Diego, is one of the world's best and we should end up with an attractive and very functional lab facility."

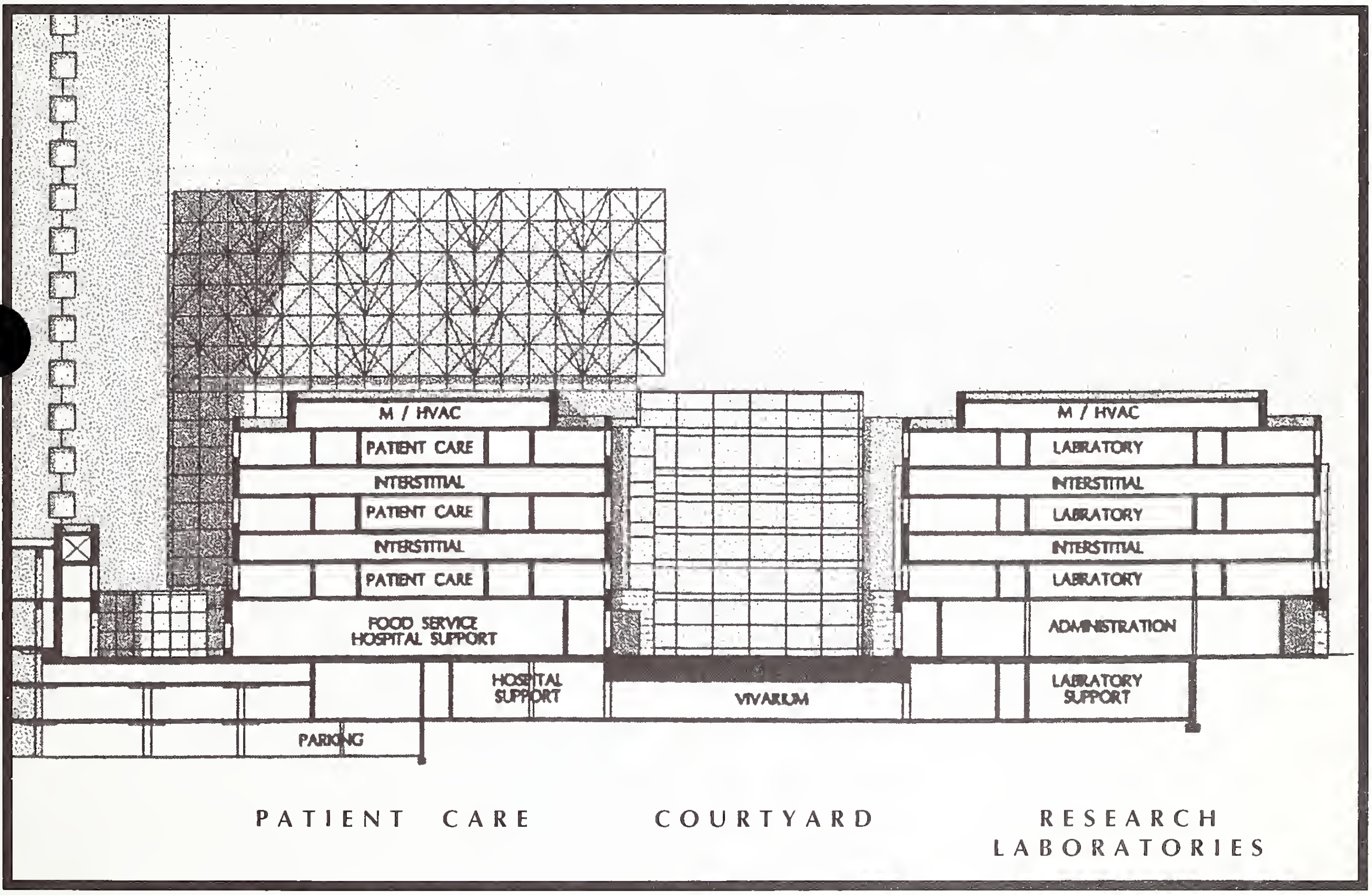
One innovative aspect of ZGF's vision of the Clinical Research Center is its "layer cake" design, which sandwiches floors of support systems between floors of labs or patient units. The support, or "interstitial," space would be used primarily to house mechanical,



*by Rebecca Kolberg*

electrical, and venting systems for lab and hospital equipment, a design that allows renovations to be made much more quickly and at a substantially lower cost than in traditional buildings. Another major plus is that renovation work can be done with no disruption to activities in adjacent labs.

In the architect's initial concept, the basic lab in the Clinical Research Center would be the 11-foot by 33-foot module prescribed by NIH. These modules increments of the patient-room modules, the designers observed that it would be a simple matter to convert lab space to patient space and vice versa. Other features that lend themselves to interchangeability are the window spacing, which provides both researchers and patients with external views, and the flexible traffic patterns, which can be arranged to meet the varied security needs of a wide range of labs and patient areas.




could either be enclosed or arranged in open lab units of up to 24 modules. Offices and conference rooms would be located at the end of each bank of labs, and an assortment of "small-group interaction areas," such as alcoves and balconies, would be arranged around a skylit open atrium connecting all lab levels with an open stairway. Because the dimensions of the lab modules are

forward to using the new facility both for bench research and clinical trials.

ZGF, which plans to set up an office in the Bethesda area, will hold a series of public meetings and conduct detailed interviews with working researchers specified by the Medical Board. "The bottom line is that the design should be for the people who occupy the building. ... The time for researchers to make their views known is now, not after ground has been bro-

Before the architects begin to draw up any final designs, they plan to seek more input from both NIH and the surrounding community. "Researchers need to identify their scientific needs for the future—and what [those needs] will require in terms of support," says NEI Scientific Director Robert Nussenblatt. As chief of NEI's Laboratory of Immunology, Nussenblatt is looking

ken," says Armstrong. A display providing monthly updates on the design process will be set up in the main lobby of the Clinical Center. Researchers are also encouraged to e-mail their suggestions for the new facility to Clinical Center Director John Gallin (jg21z@nih.gov). ■

SCIENCE ETHICS FORUM

# Training of Postdoctoral Fellows: A Shared Responsibility

*by Richard Asofsky, NIAID, and Joan P. Schwartz, NINDS*

Many U.S. scientific institutions, including NIH, are reexamining the purposes and conduct of their postdoctoral training programs. Although successful completion of postdoctoral training is now considered a prerequisite to success in science, it is no longer a guarantee of success, given the current job market. Today's postdoctoral fellows are demanding better mentorship, while their supervisors clearly feel they are offering the best possible experience [see November–December 1995 issue]. We believe that successful postdoctoral training involves a set of reciprocal responsibilities—responsibilities not only for the supervisor but also for the trainee.

Lorna Heartley

*Richard Asofsky*

Lorna Heartley

*Joan P. Schwartz*

The term "mentorship" has been used loosely to describe the duties and responsibilities of supervisors. Dictionaries define "mentor" as a wise, trusted, and influential counselor. The word has its roots in the Greek myth in which the goddess of wisdom assumed the form of a human counselor, named Mentor, to guide the son of Odysseus. Such a role is an ideal to which all supervisors may aspire, but few will have the ability, stature, and wisdom to attain. Nevertheless, all supervisors have an obligation to fulfill certain fundamental responsibilities in training their postdoctoral fellows.

Senior researchers must select their fellows with care to ensure that the fellows have—or can learn—the skills needed to perform the lab's work and have the ability to grow intellectually. Challenging goals should be set for each fellow, and resources should be provided to achieve these goals. Constructive guidance is needed for the conduct of research, the development of testable ideas, the interpretation of results, the preparation of talks and publications, and the selection of new areas for further investigation. Supervisors should allow fellows time to participate in NIH-sponsored educational activities.

Supervisors must tend to the intellectual development of each fellow, as well as to his or her practical accomplishments in the lab. The best supervisors adapt their guidance to a fellow's increasing skill, responsibility, and knowledge. They recognize when independence is warranted and know how to encourage its development. They enhance the visibility of their fellows by sponsoring presentations at local or national scientific meetings or allowing them to co-author invited reviews. Finally, one of the most important aspects of being a good mentor is the assessment and frank communication to the fellow of his or her prospects for a future career in research or elsewhere.

But postdoctoral fellows cannot be passive participants in their training. This not only means carrying out the research project, but also reading the appropriate literature and attending relevant courses and seminars. Fellows should learn to make their satisfactions, dissatisfactions, and needs known clearly and often. Assertiveness is needed for success in research; the postdoctoral training period is a good time to learn to use and temper this trait.

Postdoctoral fellows should also take the initiative in mining NIH for opportunities for professional development, including the NIH Research Festival, the Interinstitute Interest Groups, lectures on a wide variety of topics, and courses sponsored by the Foundation for Advanced Education in the Sciences (FAES) [see January–February 1996 issue, page 13].

Beyond these obligations of supervisors and trainees, NIH has important institutional obligations to ensure that training programs are as effective and productive as possible. In response to concerns raised by fellows about the quality of the training and supervision they are receiving, NIMH has proposed the establishment of an Office of Fellowship Training [see November-December 1995 issue, pages 10–11]. The director of this office would, among other things, provide career counseling and organize training opportunities on such topics as grant-writing skills. In additi[on], the director would help mediate disp[utes] between fellows and their superviso[rs]. The NIH Committee on Scientific Conduct and Ethics is currently working on a proposal to establish comparable offices at NIH institutes, centers, and divisions.

NIH should also be more active in helping fellows find employment opportunities in research, industry, teaching, and government. One initial effort, now in the planning stages, would be an annual job fair sponsored by FAES. Another effort, which began in February, is a seminar series entitled "New Careers for Young Scientists," organized by the NIH Fellows Committee.

An obvious goal for the future must be to establish methods for evaluating training at NIH. This evaluation could focus on the career trajectories of fellows after they leave NIH, as well as other aspects of the effectiveness of supervisors as mentors. However, standards to use in measuring success—either in the fellow or the mentor—have not been defined and will be difficult to establish because of the wide range in ability, ambition, and career pl[ans] of trainees as well as the rapid change[s in] employment possibilities. ■

## News at Your Fingertips

Scrounging around for a copy of an old Hot Methods Clinic? Wish you'd saved that description of NIH's tenure policy? To read back issues of *The NIH Catalyst* on Gopher or the World Wide Web, use your browsing program to go to the NIH Home Page's Campus Information section and look under Intramural Research News. You can also directly access the *Catalyst* on the Web at this Uniform Resource Locator: http://www.nih.gov:80/news/irnews/catalyst/ ■

# Talking the Talk, Communication Skills for Women Scientists

*by Linda F. Anderson, NCI*

Science may be a common language that bridges gaps between researchers, but as some female NIH scientists are finding out, women may be able to enhance their effectiveness in the scientific workplace by understanding gender differences in communication and adopting some of the verbal strategies typically used by men.

Helane Jeffreys, a consultant who recently taught communications workshops for women scientists at NICHD and NCI, says men and women often learn different communication skills as they grow up. For example, Jeffreys says, men tend to use direct language, while women are inclined to be indirect. Men generally speak out in group situations, while women are more likely to encourage discussion and consensus. And men choose words that convey confidence, while women frequently add qualifiers to their remarks, such as "maybe," even when they are certain of what they are saying.

By adding male communication skills to their repertoires, Jeffreys contends, women gain the power to communicate ideas more effectively, obtain credit and visibility, manage conflict situations, and negotiate—areas of concern for many women scientists.

However, it took some convincing to persuade some female researchers that communications can play an important role in shaping the trajectory of a scientific career. "I did not want to go to the workshop," says Kathy Partin, a postdoc at NICHD. "I had a philosophy of non-separation [of the sexes]. But after hearing so many similar comments from the other women workshop participants about communications difficulties, it seemed to me that there was some common factor that affected an ability of women to compete." A spinoff benefit, she says, was meeting many successful women scientists who are role models.

The first two workshops were organized by Peng Loh, chief of NICHD's Cellular Neurobiology Section, and Elaine Ron, a senior scientist in NCI's Division of Cancer Epidemiology and Genetics, and sponsored by Arthur S. Levine, scientific director of NICHD, and Joseph Fraumeni Jr., director of NCI's Division of Cancer Epidemiology and Genetics. Rebecca DerSimonian, a mathematical statistician in NICHD's Division of Epidemiology, Statistics, and Prevention Research, subsequently organized a second NICHD workshop, which was sponsored by Heinz Berendes, director of the division.

The feedback from workshop participants was very positive, report Loh, Ron, and DerSimonian, who are all members of NIH's Women Scientist Advisors Committee. "Our group was very enthusiastic," says Loh. "We had primarily tenured or tenure-track scientists, including GS-13 staff scientists, and some postdoctoral scientists. Everyone in all those categories said they benefited."


Lorna Heartley

*Ida Owens with David Rubaltelli*

During the one-day workshops, which included exercises, role playing, and videotaped coaching, female scientists learned how the impact of an idea is weakened by adding qualifiers or nullifiers, such as the phrase, "I'm not sure, but ...," or by framing thoughts as questions. Such tentativeness is confusing, explains Jeffreys, and can result in someone else rephrasing the same idea as a statement and gaining the credit—a situation that women researchers say has often occurred in their own experiences.

Patricia Hartge, a deputy branch chief in NCI's epidemiology and genetics division, agrees with most of Jeffreys' assessments. However, Hartge notes that women use qualifiers and nullifiers even when speaking to other women so it is more than just an issue of how men and women communicate with each other.

At the workshop, the scientists also practiced alternatives to the familiar "fight-or-flight" response to confrontation—alternatives that enable a woman, scientist to start a constructive dialogue and give her more time to clarify issues and negotiate solutions. For example, when denied a request for research resources, a woman scientist's first inclination may be to simply concede or to respond in an argumentative way. Instead, Jeffreys suggests a third approach, in which the female researcher paraphrases the essence of the negative response to prompt the speaker for more information, thus allowing an exchange to develop that may reveal the underlying problem and perhaps lead to a different outcome. "It does work," says Loh, who has since used the technique and has become more aware of when others effectively use it. "I now know how to gain more information rather than have the conversation come to early closure," adds Susan Sturgeon, an NCI postdoc.

Other exercises focused on noncombative and nondefensive communication techniques, such as a three-step process in which the woman scientist acknowledges the other speaker's remarks, articulates her own viewpoint, and then presents her rationale. The exercises brought new awareness about what transpires in conflict situations, says Ida Owens, a section chief in NICHD. "[I learned that] it's okay to disagree with someone without feeling you're being aggressive," says Helen Weiss, an NCI postdoc. However, some junior women scientists express concern about how senior scientists would respond to assertive statements from their underlings.

Another component of good communications is listening—a particularly difficult task for many researchers. Instead of listening, Jeffreys says, people often jump in with their own solutions, losing a chance to better understand the speaker's thoughts and to allow the speaker to arrive at his or her own solutions. Ron, Hartge, and other women scientists confess to being "solution leapers." However, as Ron observes, sometimes scientific colleagues genuinely *are* seeking solutions, so a researcher's task must be to determine which behavior—listening or problem solving—is desired in a given situation. Nevertheless, Ron says, "I learned the value of not interrupting, and I'm working on it. As a New Yorker, that's a problem I have. I like to finish sentences."

*continued on page 13.*

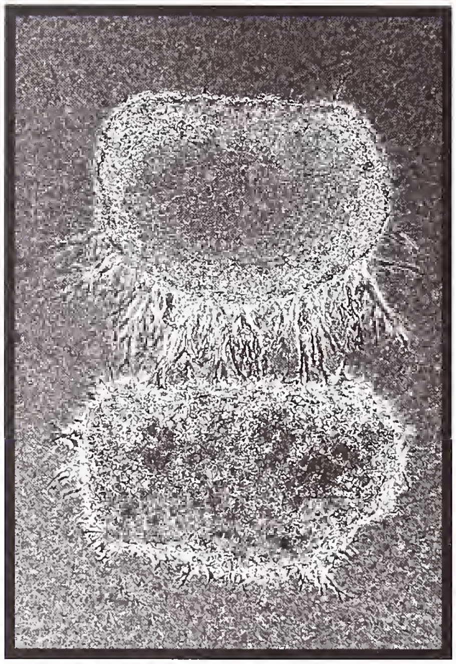
# Netrins: Signposts for Developing Neurons


## Abstract

The functioning of the nervous system is dependent on the network of connections among neurons that arise during development. This network forms when each neuron sends out an axon to its target cells during embryogenesis. One mechanism that contributes to guiding axons to their targets is long-range chemotropism: axons can be attracted by diffusible attractants, secreted by target cells and repelled by long-range chemorepellent substances, secreted by non-target cells, that create exclusion zones that the axons avoid. Our laboratory has been interested in identifying these long-range chemoattractants and repellents in order to determine their contribution to guidance in vivo and their mechanisms of action. We have focused in particular on axon guidance in the developing spinal cord, where spinal commissural axons are attracted to an intermediate target, the floor plate of the spinal cord, by a floor plate–derived attractant.

Through biochemical purification, we were able to identify a good candidate for the attractant, a novel 78-kDa protein we call netrin-1, as well as a closely related molecule, netrin-2. Netrin-1 is expressed by floor plate cells and can mimic the chemoattractant activity of floor plate cells in an in vitro assay. Direct evidence for the involvement of netrin-1 in guiding commissural axons along a dorsal-to-ventral circumferential trajectory in vivo was obtained when we found that these axons become misrouted in mice that have a mutation in the netrin-1 gene.

Remarkably, the netrins are vertebrate homologs of the UNC-6 gene product in the nematode *Caenorhabditis elegans*. Mutations in *unc-6* impair circumferential migrations of axons and cells in the nematode. The finding that *unc-6* is required for migrations in both a ventral and a dorsal direction has led to the hypothesis that UNC-6 may attract some axons while it repells others. We have found that this is true of netrin-1, because a population of axons that grow away from the floor plate, trochlear motor axons, are repelled by netrin-1. Thus, UNC-6 and the netrins define a highly conserved family of bifunctional axon-guidance molecules.

*The chemotropic effect of netrin-1 on spinal commissural axons is shown in this in vitro growth experiment. An aggregate of COS cells secreting recombinant netrin1 protein was placed slightly below tissue taken from the dorsal spinal cord of an embryonic rat. After incubation on a collagen matrix for 40 hours, the spinal commissural axons show abundant, but largely unidirectional outgrowth of bundles, or fascicles, of axons oriented toward the COS cell source of netrin-1. [Reprinted with permission from T.E. Kennedy, T. Serafini, J.R. de la Torre, M. Tessier-Lavigne,* Cell **78**, *425–35 (1994)]*

## Questions

**Q:** *What was your starting point, and how have your questions evolved?*

**A:** The starting point was in studies I performed as a postdoctoral fellow with Tom Jessell and Jane Dodd at Columbia University in New York. In collaborative work with another fellow, Marysia Placzek, we investigated the cellular interactions that are responsible for directing commissural axons and discovered and characterized a chemoattractant activity in floor plate cells. After joining the faculty at UCSF, I continued efforts to identify the active factor. My lab's initial efforts were aimed simply at identifying the factor; our focus has now shifted to determining whether the netrins account for all of the bioactivity of floor plate cells and the precise roles played by netrins in axon guidance. We also wish to determine the mechanisms through which the netrins produce their effects, and whether chemotropism is a widespread mechanism of axon guidance.

**Q:** *Which findings have been most surprising to you or to other scientists?*

**A:** The first surprise was that a relatively large protein (≈80 kDa), related to extracellular matrix molecules could function as a long-range chemoattractant. We had expected that a long-range attractant would be a smaller molecule (<10 kDa), as is the case for chemoattractants for cells of the immune system.

The second surprise was finding a close kinship between the netrins and UNC-6. Nowadays, it is perhaps not surprising that these vertebrate molecules should have a relative in *C. elegans*, nor is it particularly surprising that they are all involved in axon guidance. The surprise, however, is the fact that these molecules are involved in very similar guidance events in vertebrates and nematodes and—as shown by our collaborators in Corey Goodman's laboratory at the University of California, Berkeley—in fruit flies as well. In each organism, an UNC-6–netrin family member is expressed at the midline of the developing nervous system where the protein appears to play a role in attracting some axons while simultaneously repelling others. This degree of conservation—not just of structure but also of precise function—is still astonishing to me and prompted Goodman to quip, "The spinal cord is the worm within us."

*by Marc Tessier-Lavigne, Ph.D., Department of Anatomy, University of California, San Francisco. Tessier-Lavigne presented this report as part of NINDS's Neuroscience Lecture Series*

The final surprise is the finding that these molecules are bifunctional guidance cues—simulataneously attracting some axons and repelling others. This indicates parsimony in the elaboration of guidance mechanisms. It also suggests that we should perhaps think of guidance cues as being present not specifically to attract or repel, but rather—much like signposts on a freeway—to provide directional information that axons can act upon in different ways depending on the guidance machinery present in their growth cones.

**Q:** *What were the greatest stumbling blocks, and what new observations, techniques, reagents, or insights helped you get past them?*

**A:** The greatest stumbling block was the small size of floor plate tissue, which was the original source of chemoattractant activity. This precluded direct purification of the chemoattractant. To identify the attractant, I therefore took three approaches: expression cloning, screening known factors, and searching other tissues for a more abundant source of activity. Expression cloning involves screening a floor plate expression library for plasmids that could confer the chemoattractant activity. This approach was unsuccessful because of the low specific activity of the factor. Screening known factors—especially factors known to be chemoattractants in non-neural systems—on the assumption that the floor plate factor might be already identified also proved unsuccessful. Searching other tissues for a more abundant source of activity, which ultimately proved successful, was motivated by the hope that we could discover a similar activity in another tissue that would point us toward the correct molecule in floor plate cells. Extracts of brain tissue from defined embryonic stages turned out to possess activity similar to that in floor plate, and embryonic brain proved to be sufficiently abundant for a purification (though, in the end, we still needed 25,000 brains).

The activity from the brain tissue turned out to be due to two proteins, netrin-1 and netrin-2. While I think it was not luck that we isolated proteins related to the floor plate factor, we were lucky that netrin-1 turned out to be expressed in floor plate. I had only expected that the active component in brain extracts would be a distinct relative of the floor plate factor.

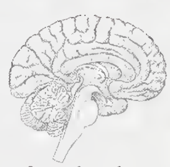
**Q:** *How can clinical scientists capitalize on this research?*

**A:** Factors that promote the growth of axons may be useful for promoting regrowth of axons (regeneration) in adults following trauma or injury to the nervous system. We are starting to collaborate with several groups to determine whether the netrins could be useful for stimulating nerve repair.

**Q:** *How are you following up this work, and what questions would you ultimately like to answer?*

**A:** Our current efforts are aimed at understanding how the netrins mediate their attractive and repulsive actions. We are thus trying to identify the receptors on growth cones that mediate the netrins' effects, as well as looking at downstream events that ultimately lead to growth cone reorientation. In addition, we have undertaken a large effort to identify other chemoattractants and repellents that guide developing axons in order to see whether chemotropism is a widespread mechanism of guidance and whether it is a unifed mechanism functioning in all cases through similar types of receptors and second-messenger systems. ■

## *NINDS Neuroscience Series April-May Schedule*



| | |
|---|---|
| **April 15** | Mary Kennedy, California Institute of Technology, Pasadena |
| **April 22** | Rudy Tanzi, Massachusetts General Hospital, Charlestown, Mass. |
| **April 29** | Marianne Bronner-Fraser, University Of California, Irvine |
| | Martin Raff, University College, London |
| **May 6** | David Anderson, California Institute of Technology, Pasadena |
| **May 13** | Robert Brown, Massachusetts General Hospital, Boston |
| **May 20** | Franz Hefti, Merck Sharp & Dohme, Essex, England |
| **May 28** | Antonio Damasio, University of Iowa College of Medicine, Iowa City |

Lectures are held at noon in Building 10, Lipsett Auditorium, except for the May 28 lecture, which is being held in Natcher Auditorium, and Martin Raff's lecture, which will be in Masur Auditorium at 3:00 p.m. Continuing Medical Education credits are awarded. For more information, call 496-9106. ■

**STAFF SCIENTIST**
*continued from page 1*

not covered by the other scientific job titles.

Today, some senior NIH scientists are confused about which of these job titles they hold. Before the institution of new tenuring policies, "tenured" was equivalent to "permanent," and many of these senior staff have never undergone a formal tenure review that would distinguish staff scientists from true tenured scientists. The only real distinction has been in the way these scientists work and in their potential career options.

For long-time permanent scientists, the process of determining who is a staff scientist and formally assigning the title will occur over the next year as the scientific directors, occasionally with the aid of their BSCs, decide on a case-by-case basis which permanent scientists have independent resources. For some, this process will be painful, but it will not change substantially what they do or the importance of their work for NIH.

## Criteria for Appointment or Promotion of Staff Scientists And Facility Heads

A staff scientist is an NIH employee with a relevant doctoral-level degree on a permanent appointment without expectations of independent research and without independent resources. For conversion to staff scientist, an employee must be working with a research team that is performing research of sufficient importance to warrant an appointment of a staff scientist, and the candidate should have the sophisticated skills and knowledge essential on a permanent basis in the laboratory to which the staff scientist is assigned. A subset of staff scientists includes facility heads, who independently manage a substantial core facility (for example, a sequencing laboratory or a nuclear magnetic resonance laboratory) that provides central support for more than one independent investigator.

**GS-13:**
This may be either the first permanent appointment for a member of the support staff with a doctoral degree after completing a training position or a promotion from a GS-12 position. This appointment will be based on the expectation that the individual will be able to function as a staff scientist with minimal supervision and, in addition, has the ability to work effectively with others, including trainees, technicians, colleagues, and supervisors. It is also expected that such individuals will promote their supervisor's research program by independently informing themselves of new approaches, technological or otherwise, and by being knowledgeable about scientific resources (both human and material) at the NIH and elsewhere.

**GS-14:**
In general, for promotion to the GS-14 level, the individual is expected to have developed a substantial record of achievement at the GS-13 level or its equivalent and to have played a major support role within a quality research program. It is expected that the individual will have made major contributions to peer-reviewed publications as evidenced by co-authorship on a reasonable number of publications in journals generally acknowledged to be of high quality, and exhibited other evidence of being held in high regard by peers, such as being consulted by others at NIH or elsewhere for advice and/or assistance. The expertise of the staff scientist and evidence of high regard by peers should be documented by at least three letters of reference. Outstanding grasp of subject material should be evidenced in a seminar presented to the ICD promotion committee. Given these criteria, promotion of staff scientists to GS-14 will be infrequent.

**GS-15:**
Appointment at the GS-15 level shall reflect exceptional achievement or other contributions that significantly promote the mission of the individual's own ICD and/or other ICDs. Such individuals will be expected to have exceeded considerably the criteria for GS-14, including evidence of an extraordinary grasp of subject material in the presentation of a seminar to the ICD promotion committee. As distinguished from a GS-14, the GS-15 may be required to supervise doctoral-level or senior permanent staff if the laboratory or facility in which they work is large. Further, the individual must have developed a record of high achievement for a substantial number of years, documented by at least five letters from referees who are not recent collaborators, including at least three letters from outside the ICD, and/or the individual must have made significant methodological or other contributions to the scientific literature. Given these criteria, promotion of staff scientists to GS-15 will be rare.

**Procedures for Recommendation And Approval of Staff Scientists at NIH**

1. The laboratory or branch chief (L/BC) requests of the scientific director (SD) permission to appoint a staff scientist.

2. The SD reviews the resources of the laboratory or branch, the latest BSC review, and the overall productivity and accomplishments of the tenured scientist for whom the staff scientist would work.

3. If the proposed candidate is on a nonpermanent appointment, or if an outside recruitment is requested, meaningful advertising as required by civil service regulations must occur. A search committee, not chaired by the supervisor, should be employed for all outside recruitments, as well as for internal appointments at the discretion of the director of the ICD and the SD. For the appointment of staff scientists who serve as facility heads, a national competitive search process is required to identify the most highly qualified candidate.

4. If a search committee is not employed, the SD shall seek the advice of an ICD promotion committee in reviewing the candidate and shall discuss the request with the ICD director, unless the authority to make such appointments has been delegated.

5. The SD shall forward the case to the DDIR, who has authority to approve staff scientist appointments, including facility heads. Cases shall include

- a recommending memorandum from the L/BC through the SD
- a curriculum vitae and bibliography
- the most recent BSC review of the tenured scientist for whom the staff scientist would work
- a profile of laboratory or branch personnel, indicating the number of tenured scientists, staff scientists, fellows, and technicians for each principal investigator
- letters of recommendation, if any, and any other reviews of the individual
- the report from an ICD promotion committee, if such a review was conducted, or report of a search committee, if one was constituted.

## *Being a Staff Scientist: The View of Two*

More than 20 biomedical researchers from a wide range of disciplines have come aboard as staff scientists since NIH first started using the job title in April 1994. Two members of that pioneering group are Chamelli Jhappan and Robert Kreitman of NCI's Laboratory of Molecular Biology, who agreed to provide some insights on how staff scientists approach their jobs—and their science.

"I think you have to be careful about labeling people. In most labs, people don't care what your title is—it's what you do that counts," says Jhappan, who came to NCI in 1986 as a postdoc and became a staff scientist in April 1995 on the strength of her skills in making transgenic mouse models of human disease. Among the creations she helped her lab to produce were several mouse strains that overexpress pig transforming growth factor (TGF) ß-1, human TGF $\alpha$, and mouse Int-3 and that serve as models of breast cancer.

*Chamelli Jhappan*

Although Jhappan would eventually like to become a tenured scientist, at this point in her career, she is content with working on collaborative research projects and providing the lab with a type of technical expertise that is vital to achieving its goals. She enjoys the freedom from the tenure-track headaches of budgets and the hiring and training of staff. "I like to do the bench work myself," she says, adding that she couldn't have done many of her transgenic mouse studies or developed difficult skills, such as making "knockout" mice, if her time had been consumed by managerial and publishing pressures.

However, Jhappan bristles a bit at the new NIH policy's assumption that staff scientists will not routinely tackle independent research projects. In fact, Jhappan says that in the 10 years she's been working with her section chief, Glenn Merlino, she's been allowed to be the lead author on papers and to "make my own decisions, plan my own experiments." Furthermore, the staff scientist emphasizes that she doesn't simply make transgenic mice for other scientists upon demand. Mostly, she trains other researchers how to make such mice themselves, and then only if they are working on projects that she finds scientifically interesting.

Robert Kreitman, an M.D. who came to NIH as a clinical associate in 1988, says his life in the lab has been pretty much the same since becoming a staff scientist in the spring of 1994. "There wasn't any huge overnight change in my day-to-day research activities," he says.

Kreitman is a key player in the Laboratory of Molecular Biology's launch of a clinical trial of an innovative treatment for leukemia and lymphoma. The trial, based on benchwork by Kreitman and other lab members, will test an agent made by hooking up a cell-killing *Pseudomonas* exotoxin with antibody fragments, called variable area fragments, or FVs, specific to cancer cells. "One thing I do that others in the lab have not done is to obtain fresh malignant cells from patients so we can test the agents... and look at their effectiveness," says Kreitman, who sees patients at the Clinical Center once a week. "Fresh cells may provide us with a better predictor [than immortalized cell lines] of what will happen to our agents in the patient."

When he compares his staff-scientist position to that of a tenured scientist, Kreitman says his job stacks up pretty well. "A major difference is that they [tenured scientists] can hire postdocs, but it's difficult to attract the best ones to NIH right now," he says. "They also can hire technicians, but with the hiring freeze, even people with tenure are having difficulties doing that." He also notes that staff scientists are permanent, just like tenured scientists; that his lab chief, Ira Pastan, has provided him with plenty of resources, and that he can set up the lab's clinical trial free from the tenure-track demands of planning independent projects and negotiating budgets.

As for the all-important issue of independence, Kreitman says he's found that most NIH scientists, tenured or not, conduct a significant amount of their research on a collaborative basis. Furthermore, noting that he and his lab chief share the common aim of developing new cancer therapeutics, Kreitman says, "If your goals are similar to those of your boss, I see no need to try to do things totally independently." ■

—*Rebecca Kolberg*

- a draft memorandum to the candidate from the SD explaining the staff scientist position

6. If the proposed candidate is already on a permanent civil service appointment, the process for appointment as a staff scientist will proceed as in steps 1 and 2 above and be summarized in a memorandum of request to the DDIR, routed through the ICD director. The DDIR will retain full approval authority for this appointment. The complete package for such an appointment will include this memorandum, a CV and bibliography, the most recent BSC review of the laboratory or branch, the personnel profile of the laboratory or branch, and a draft memorandum from the SD to the candidate explaining the position.

7. The DDIR will review the package and seek advice from subject-matter experts where special NIH-wide review committees exist (e.g., Epidemiology and Biostatistics Review Committee, Computer Scientist Review Committee, etc.).

8. The DDIR will notify the SD of his or her decision.

9. The DDIR will submit all approved cases for information and discussion retrospectively by the Board of Scientific Directors. The SDs will discuss the need for adjustments to the staff scientist policy.

10. Promotions of staff scientists will be proposed and evaluated within the ICDs by a duly-constituted promotion committee, the SD, and the ICD director. While approval by the Board of Scientific Directors is not required, the DDIR will review and approve all promotions after seeking the advice of NIH-wide special review committees (e.g., Epidemiologist/Biostatistician Review Committee, Computer Scientist Review Panel, etc.) where they have been appointed by the DDIR.... Promotion of a staff scientist to GS-14 will be infrequent, and promotion to GS-15, rare. In contrast, promotion of tenured scientists to these levels is expected in their normal career progression. Nevertheless, it is expected that facility heads and staff physicians will more often be promoted to GS-14 and GS-15 than staff scientists. ■

**Wild World**
*continued from page 1*

vention on International Trade in Endangered Species of Wild Fauna and Flora. The 1975 CITES agreement includes a species-by-species listing that designates the level of protection required by particular animal populations. The multinational pact also requires signatory countries to enforce protective wildlife regulations and to record the numbers of protected animals leaving or entering its borders.

If NIH researchers need help to "fight their way through the quagmire of red tape" involved with shipping protected and unprotected wild species, Deborah Wilson, chief of NIH's Occupational Safety and Health Branch, advises them to contact the Quarantine Permit Service Office in Building 13, Room 3K04 (phone: 496-2960). The office has all of the necessary applications on hand, as well as staff trained to answer questions about the requisite permits. Wilson is also rewriting the chapter of *The NIH Manual* covering wildlife permits to make the regulations easier to understand. This thrust for education comes on the heels of recent minor violations by two NIH scientists.

Jean Decker, a chemist at NCI, recalls having a shipment of tissues from crab-eating macaque seized upon entry into England because of a missing permit. Decker immediately contacted the FWS, which was "cooperative and willing to help but not able to do anything once the box was out of the country." A glitch in paperwork resulted in the destruction of valuable research samples. Seizure is a tragic way to lose valuable data. But Cathy Bourne, an FWS wildlife inspector, notes that "foreign countries have the right to seize and destroy samples."

Bourne states that as far as researchers go, she hasn't had to deal with too many problems. Though the government believes that most research is an honest endeavor, critical paperwork must be complete and accurate. Paperwork is what Peter Nara, a scientist at NCI in Frederick, finds a frustrating impediment to science. However, he says, "I can appreciate both sides of the fence." As a veterinarian accredited by the U.S. Department of Agriculture (USDA), Nara is sworn to protect the United States and other countries from animal disease. As a researcher, he has found that the regulations "got in the way of doing things quicker." The time needed to fill out forms and wait for approval of shipments of chimpanzee blood slowed down his collaboration with Dutch scientists. In his eyes, the process could stand some improvement. He suggests the issuance of more blanket permits to cut down on paperwork. Bourne mentioned during an


Karl Ammann (Courtesy NOAHS Center)

interview that blanket permits were being issued, especially to scientists who had demonstrated good compliance in the past.

In the United States, CITES permits are granted by the Department of the Interior's Office of Management Authority and enforced by the FWS. The permits, issued for the import or export of particular species, may be a one-time only or multiple-use permit depending on, among other things, the needs of the researcher and the available wildlife resources. These permits are required for the shipment of live endangered animals, their tissues, bodily fluids, cell cultures, genes, and proteins. Bourne suggests this rule of thumb for determining necessity of a permit: if the protected animal was invaded by any means (e.g. by a needle or electrode) when the biological sample was collected, then a CITES permit is required. By this measure, urine and fecal matter are exempt. Along with the CITES permit for shipment of endangered species, a scientist must submit an FWS Declaration of Importation or Exportation of Fish or Wildlife (Form 3-177) for any importation of wildlife. As implied by the form's title, the declaration is required for all wild animals, even those that are not endangered. Ship-

### *Steps for International Wildlife Shipment*

1. Begin process at least six weeks in advance!
2. Contact NIH's Quarantine Permit Service Office (Bldg. 13, Rm. 3K04; phone: 496-2960; fax: 402-0313) to determine documentation needed for shipment and CITES status of species to be shipped.
3. If animal is *wild* but *unprotected*, submit U.S. Fish & Wildlife Service (FWS) form 3-177 complete with air waybill or bill of lading number, which should be on the shipping ticket.
4. If animal is *wild* and *protected*, contact the Interior Department's Office of Management Authority (phone: 800 358-2104) for CITES permit application or get one from NIH's quarantine permit office. You must submit the CITES permit along with FWS Form 3-177 and air waybill or bill of lading number to Wildlife Inspection Office, 40 S. Gay St., Rm. 107, Baltimore, MD 21202.
5. If animal is *wild, protected,* and *shipped live,* see step 4 and also contact FWS inspectors (phone: 410 962-4357) for physical inspection upon arrival. At least one week's advance notice is requested to arrange inspection.

—*J.M.K.*

ments of domesticated species, including dogs, cats, pigs, laboratory mice, and laboratory rats, are exempt from both CITES permits and the declaration.

The enforcement of the CITES regulations in the Baltimore-Washington area falls to Bourne and Rick Potvin, wildlife inspectors with the FWS. According to Bourne, the inspector's role is "to enforce individual species regulations and to collect wildlife data." From the declaration forms accompanying valid CITES permits, Bourne tabulates the numbers of protected animals and their country of origin. These data are sent to the CITES Secretariat in Switzerland, where the information is logged into an international database. It is then possible to monitor endangered species populations, to evaluate the effectiveness of regulations governing the capture and killing of animals, and to determine whether guidelines need to be implemented for species not previously considered threatened.

Most shipments of blood, tissue, and cell cultures of wild species are not inspected by the FWS, but by USDA and the FDA. However, their paperwork is assiduously checked by all agencies. Live animal shipments coming into the Baltimore-Washington International (BWI) or Dulles Airports are routinely inspected by Bourne and Potvin, who check for humane treatment during transport as well as the correct paperwork. Because the government can only monitor so many ports of entry and exit in the United States, certain airports are designated for the reception of foreign goods or the departure of native materials. For this region, BWI Airport is the designated port of entry. Shipments of wild animals should be routed through this airport. Dulles Airport is sometimes used by researchers sending or receiving wildlife shipments; however, this is not a designated port of entry. Another permit is required to use this nondesignated port. The nondesignated-port permit can be obtained directly from the NIH Quarantine Permit Service Office.

If all this sounds like too much work for a busy scientist, NIH's Wilson cautions, "There are penalties for not following the rules for both the scientists individually and the NIH." Researchers run the risk of fines, seizure of samples, or even destruction of samples at both port of exit and entry. One only has to glance around the office of the two regional wildlife inspectors to see the consequences of defying the law: two terrariums house heaps of Argentinian Choco tortoises seized during illegal importation. ■

## *Wildlife Designations at a Glance*

- **Appendix I species** are endangered animals covered by the most stringent regulations. Examples include the tiger, imperial eagle, and Australian stick nest rat. Both import and export permits are required for travel, in addition to a Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) permit. Commercial shipping of these species is prohibited.

- **Appendix II species** are closely watched, but their populations are not considered endangered. All nonhuman primates that are not listed in Appendix I are included in this rating, which requires a CITES permit and proof of legal capture to be transported internationally. Other representative species include the white spoonbill and gray cuscus.

- **Appendix III species** are an assortment of animals covered by regulations set up by individual nations. Importers or exporters of Schedule III animals, such as the masked palm civet in India or the jumping pit viper in Honduras, need only meet the varying requirements set by the country of origin.

*—J.M.K.*

**COMMUNICATION**
*continued from page 7*

Hartge says the workshop helped her to crystallize a strategy that senior women scientists can use to help junior scientists gain the confidence to participate in scientific forums. In Hartge's scenario, a senior scientist would pave the way by opening the discussion and then shepherding the junior scientist, who may be fearful of criticism or uncertain of the value of her comments, into the conversation. "Rather than my taking the floor to communicate the thought alone, my job is to get the junior scientist there and show them that it isn't so bloody," she says.


Lorna Heartley

*Elaine Ron*

The workshop proved to be a confidence booster for junior scientists as well. Soon after the workshop, NCI's Sturgeon says she confidently discussed her newly published study with a renowned epidemiologist on National Public Radio, she says. And NICHD's Partin says the communications pointers have helped in her job hunt. "Every time I go for a [job] interview, I'm speaking with 15 to 20 faculty, and many of them are men," Partin says. "Sometimes they use subtle hostility or try to put my feet to the fire. I feel much more confident about the interaction."

Lest anyone think that women scientists are the only ones who need to improve their communications skills, Jeffrey adds that she also teaches courses for men: "What is wanted is women with men's skills, and men with women's skills." ■

# A World of Expertise: NIH's Record Crop of Fogarty Scholars

*by Jack Schmidt, Ph.D., FIC*

Over the next few months, NIH will be the research venue for 18 participants in the Fogarty International Center's (FIC's) Scholars-in-Residence Program—the largest number of Fogarty scholars on campus at any one time since the program began 27 years ago. The scholars will conduct collaborative research with intramural scientists, present lectures, participate in seminars, and get involved in the activities of Interinstitute Interest Groups.

**Ruth Arnon**
**March 1–July 1, 1996**

Vice-president of the Weizmann Institute of Science in Rehovot, Israel, Arnon is a distinguished immunologist and parasitologist whose research on antigens and synthetic peptides has had a major impact. Of particular note is her demonstration that antibodies to peptides of biologically active proteins can be identified, synthesized, and used both as immunogens and antigens. She is a pioneer in the development of vaccines that use synthetic peptides. Arnon was nominated by William Paul, NIAID.

**Melvin Cohn**
**March 1–June 30, 1996**

A resident fellow of the Salk Institute for Biological Studies in La Jolla, Calif., Cohn is known for his important contributions to immunologic theory, especially for adding to the understanding of the genetic basis of immunoglobulin diversification and for proposing the two-signal model of lymphocyte activation. Currently, Cohn is working on computer-generated models of immunological responsiveness. Cohn was nominated by Polly Matzinger, NIAID.

**Madhav Deo**
**April 1–Sept. 30, 1996**

Most recently the director of the Cancer Research Institute at the Tata Memorial Center in Bombay, Deo is one of India's leading biomedical scientists, specializing in the fields of mycobacterial immunology, cancer biology, and protein-calorie malnutrition. His work on an anti-leprosy vaccine, on growth factors and oncogenes in oral cancer, and on the pathogenesis of kwashiorkor has received wide attention. Deo was nominated by Ian Magrath, NCI.

**Guy De Thé**
**March 18–June 30, 1996**

De Thé is director of the Unit on the Epidemiology of Oncogenic Viruses at the Pasteur Institute in Paris. He has gained recognition primarily as the result of three major studies: demonstration of the etiological role of Epstein-Barr virus (EBV) in Burkitt's lymphoma in Africa; establishment of a close association of EBV with nasopharyngeal carcinoma in North Africa and China; and demonstration of a possible causal relationship between HTLV-1 and tropical spastic paraparesis, a neuromyelopathy endemic in the French West Indies. De Thé was nominated by William Blattner, NCI.

**Alan Fersht**
**March 1–May 30, 1996**

A professor of organic chemistry at the University of Cambridge in England and head of the Medical Research Council's protein function and design unit, Fersht is widely regarded as the leading practitioner in studies of protein folding and of the relationship between structure and function by means of site-directed mutagenesis. He has used molecular biology tools to study protein stability and transition states in protein folding, particularly with the small, globular protein, barnase as a model. Fersht was nominated by Marius Clore, Angela Gronenborn, and Ad Bax, NIDDK.

**Jean Garnier**
**April 15–June 15, 1996**

Director of research at the Protein Engineering Unit of the National Institute of Agronomic Research in Jouy-en-Josas, France, Garnier is a world-renowned expert on protein folding and protein-structure prediction. More broadly, he is widely published in the areas of thermodynamics, chemical kinetics, mechanisms of enzyme action, and X-ray-crystallographic-structure determination. Garnier was nominated by David Rodbard, DCRT.

**Peter Gruss**
**April 1–July 31, 1996**

Gruss, chief of molecular cell biology at the Max Planck Institute for Biophysical Chemistry in Göttingen, Germany, is a leader in studies of homeobox genes and the molecular biology of mammalian development, particularly in the burgeoning field of the molecular embryology of the mouse. His research on mechanisms that control pattern formation in embryogenesis, organogenesis, and cell differentiation has been seminal to work in this field. Gruss was nominated by Heiner Westphal, NICHD.

**Davor Solter**
**Dec. 28, 1995–April 30, 1996**

Head of the Department of Developmental Biology at the Max Planck Institute of Immunobiology in Freiburg, Germany, Solter has been in the forefront of research in mammalian development for many years. He defined the mechanisms that underlie the development of teratocarcinoma from normal embryos and the role of cell-surface molecules in preimplantation development. His research was largely responsible for establishing the concept of genomic imprinting, a process that marks genes in such a way

### *Making Connections*

To arrange to meet any of the Fogarty scholars or for more information on the scholars' activities, contact Jack Schmidt, director of FIC's Division of International Advanced Studies (phone: 496-4161; fax: 496-8496; e-mail: schmidtj@box-s.nih.gov). Other scholars who will be here during the spring and summer and whose profiles have previously appeared in *The NIH Catalyst* (March-April 1995 issue) include

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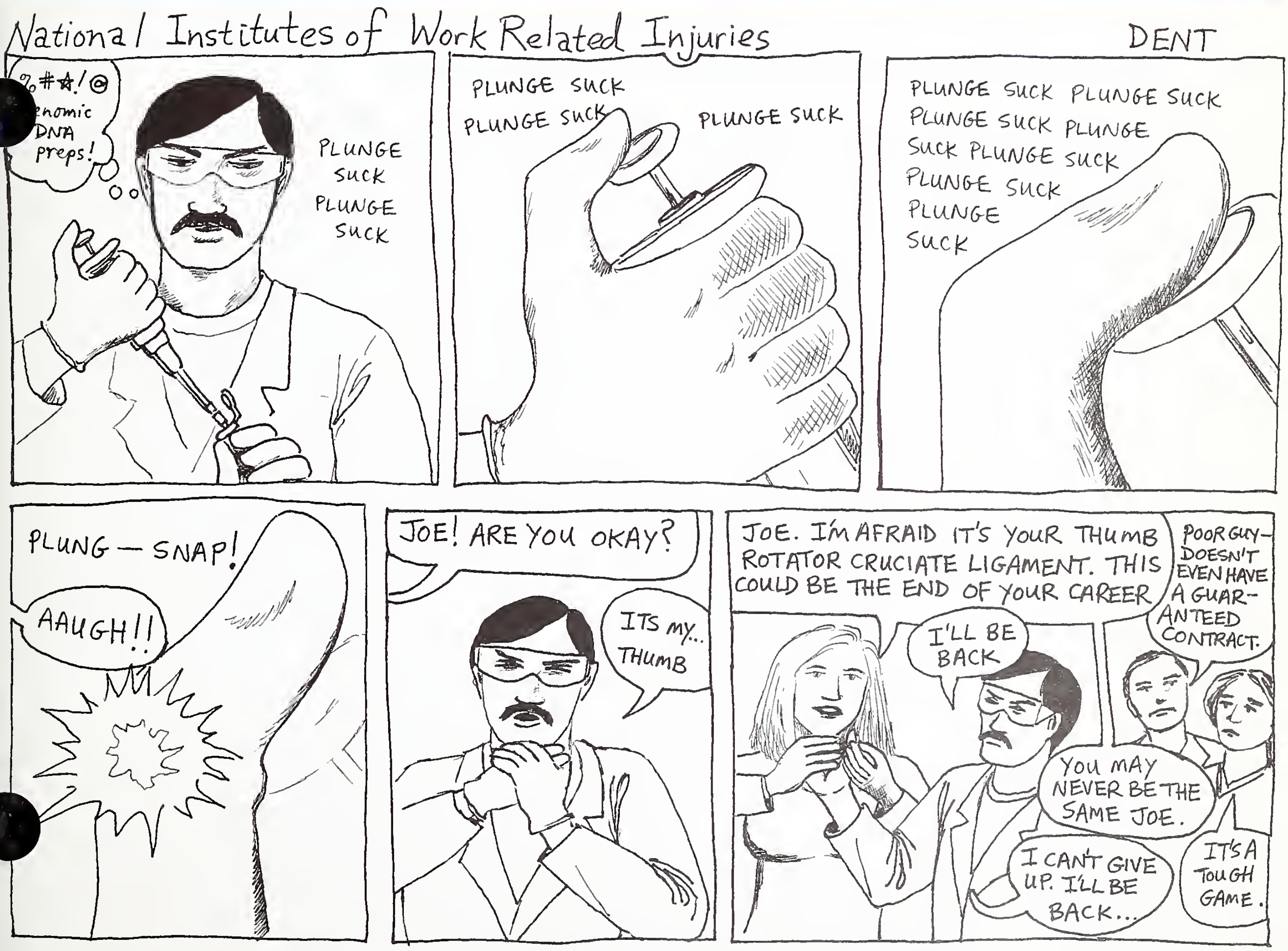
|---|---|
| Yadin Dudai | May 1–Aug. 30, 1996 |
| Benjamin Geiger | June 15–Sept. 15, 1996 |
| Illana Gozes | July 10, 1995–July 9, 1996 |
| Tasuku Honjo | July 10–Aug. 31, 1996 |
| Koji Kimata | July 1–Sept. 30, 1996 |
| Yuan Chuan Lee | March 1–July 1, 1996 |
| Suryanarayan Ramachandran | June 15, 1995–June 14, 1996 |
| Eugene Rosenberg | July 1–Oct. 1, 1996 |

that their expression after fertilization is entirely regulated by the gamete of origin. Solter was nominated by Arthur Levine, NICHD.

**Peter Wolynes**
**April 20–May 20, 1996**
A professor of chemistry, physics, and biophysics at the University of Illinois, Wolynes is widely regarded as the premier theorist in the study of chemical dynamics in the condensed phase. To investigate the effects of the environment on the rates of chemical reactions, he developed the first successful Monte Carlo methods for simulating real-time quantum mechanics, and he applied these to electron-transfer processes in proteins. Recently, Wolynes has focused his work on the application of statistical physics to studies of protein folding and predictions of the three-dimensional structure of proteins. Wolynes was nominated by William Eaton, Attila Szabo, and Robert Zwanzig, NIDDK.

**Hans Zachau**
**Feb. 11–April 20, 1996**
Zachau, co-director of the University of Munich's Institute for Physiological Chemistry in Germany, is one of Europe's most distinguished molecular biologists. He played a crucial role in elucidating the secondary structure of tRNAs and the biochemical mechanisms involved in their coupling to amino acids. His main recent interest has been in the organization of immunoglobulin genes within the mouse and human genomes—work that has provided valuable information on the generation of antibody diversity. Zachau was nominated by Gary Felsenfeld, NIDDK. ■

***Neither Rain nor Snow ...***
If the *Catalyst* isn't showing up in your mail box or are you getting too much of a good thing—two copies of each issue—we need your help. To be added to or deleted from the mailing list, or to change your mailing address, contact our editorial offices (phone: 496-0450; fax: 402-4303; e-mail: catalyst@od1em1.od.nih.gov). ■



# Catalytic Reactions

In this issue, we are asking for your reactions in four areas: research-animal services, Just Ask, Hot Methods Clinic, and scientific features. **Send your responses on these topics or your comments on other intramural research concerns to us via e-mail: catalyst@od1em1.od.nih.gov; fax: 402-4303; or mail: Building 1, Room 334.**

1) We are working on an article about research-animal services at NIH. How would you assess the quality of animal services currently being provided? What changes or additions would you like to see made?

2) In our new "Just Ask" column (see January-February issue), we are trying to find answers to scientists' questions concerning intramural research. What specific issues or problems would you like us to tackle?

3) Our Hot Methods Clinic will return next issue. What suggestions or comments do you have about techniques featured in past issues? What methods would you like to see covered in the future?

4) We are looking for suggestions for our scientific features—Commentary, Seminar Highlights, and Research Grapevine. What innovative research from NIH labs and clinics would you like to see covered by Commentaries? What recent seminars (NIH or non-NIH) have you found particularly thought-provoking?

***In Future Issues. . .***

- Hot Methods: Fiber FISH
- New Directions At Animal Services
- Medline Hits the Web
- Ethical Debate On Stored Tissue Samples

*The NIH Catalyst* is published bi-monthly for and by the intramural scientists at NIH. Address correspondence to Building 1, Room 334, NIH, Bethesda, MD 20892. Ph: (301) 402-1449; e-mail: catalyst@od1em1.od.nih.gov



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