

MIT Faculty Newsletter

<http://web.mit.edu/fnl>

this issue features letters concerning the neuroscience hiring controversy (beginning on page 4); the results of the latest *U.S. News* rankings (page 12); recollections of being a housemaster by Jay Keyser (page 14); and our Teach Talk feature concerning MIT's support for international graduate students (page 20).



Science, Technology, Ethics, and Public Decision Making

Charles M. Vest

Context and Introduction

IN UNIVERSITIES WE GENERALLY view ethics in science and technology in terms of critically important values and processes to be upheld in research and publication. Above all else, we are committed to maintaining a culture and processes that ensure scholarly integrity and scientific objectivity. As the research enterprise has become larger, more global, faster, more complex, and associated with valuable intellectual property, this commitment to scientific integrity has become more important than ever.

At a more macroscopic level, scientific knowledge is increasingly critical to major public and political decisions, e.g., about global warming, embryonic stem cells, privacy of digital communications, nanotechnology, and genetically-modified foods. I think it is worth examining three past successes of science, technology, and public policy – recombinant DNA, phasing out of Ozone-depleting chemicals, and deployment of the World Wide Web. Each of these involved people associated with MIT. None of them map directly onto today's issues, but they offer hints about better ways of proceeding.

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Editorial

The Need for Increased Faculty Involvement in Major Institute Initiatives

THE RELATIONSHIP BETWEEN UNIVERSITIES and external funding agencies, including corporations, foundations, and government, has always required a very careful balance between the need for research funding and the commitment to protect academic integrity. In some cases, such as the National Science Foundation and the National Institutes of Health, the fundamental missions of the agencies and the research universities are intimately intertwined and grew up together. In other cases we have witnessed failures in these relationships. Examples include that between Novartis and the University of California at Berkeley, the ending of the Cambridge University/MIT partnership, and the recent dissolution of the relationship between the Government of Singapore and Johns Hopkins Medical School. Others are moving forward, but under considerable criticism and with malaise, such as BMW's sponsorship of the new engineering program at Clemson University, and Boston University's construction of a federally-funded bioterrorism research facility in downtown Boston.

Particularly problematic are relationships with foreign governments. Although perhaps technically a partnership with a

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Subscriptions

\$15/year on campus

\$20/year off campus

Vol. XIX No. 1 September/October 2006

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The Need for Increased Faculty Involvement

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government agency, the emerging Singapore/MIT alliance brings MIT into a close relationship with the Government of Singapore. Such initiatives target the acquisition of substantial resources. How faculty are recruited, how funding is distributed, how research directions are prioritized, and, even more importantly, how the administrative structure is put in place require faculty oversight. We need to be sure that academic activities are not distorted by the interests of Singapore's government. Even the World Bank recently criticized Singapore's government for denial of rights to non-governmental organizations.

An MIT Steering Committee has been appointed to address these questions regarding the Singapore-MIT Alliance for Research and Technology (SMART) Center to be established in Singapore. Among the troubling issues are the proposed size of the Center, the degree of MIT's commitment to it, and the 3-month to 1-year MIT faculty commitment which is being encouraged. Certainly an assessment of the problems that undermined the Johns Hopkins Medical School/Singapore Alliance is needed. Such endeavors are matters of great concern. They are central to the intellectual mission of the Institute and the commitment of the faculty to scientific integrity and excellence. These are all significant matters that require consideration and debate among the faculty.

Is this the beginning of a long series of such relationships with foreign governments? It is critical that the Institute affect a balance between those countries who are able to pay for our services, and those that desperately need our assistance (e.g., some African and Latin American nations) but are financially unable to compete. MIT must avoid the impression of being for sale to the highest bidder. Many countries would benefit from such relationships, as would groups of interested MIT students and faculty. How about Myanmar/MIT; Brazil/MIT; Venezuela/MIT; Jamaica/MIT; Cuba/MIT; Nigeria/MIT; Uzbekistan/MIT; etc?

We appreciate the need to increase global awareness among students, faculty and staff. The international student exchange programs

such as MIT-Japan, MIT-Mexico and MIT-France are positive steps in this direction. But the resources devoted to the Singapore-MIT Center appear to dwarf the very limited resources devoted to other international collaborations. No "Centers" are being staffed by MIT in those countries to our knowledge.

Traditionally, MIT has had an administrative strategy which, for lack of better words, was bottom-up, with nearly 1,000 faculty members providing inspiration and guidance to their appointed leaders. Faculty members provided significant input regarding important administrative decisions prior to action being taken. Today the situation is different, with decisions being made by administrative fiat with little or no faculty consultation. All too often, faculty are being asked to reflect on decisions already made, rather than being an integral part of the decision-making process. Not all actions proceed along these lines, to be sure, for committees are convened with the charge to consult widely among faculty prior to actions being taken or policies written. Nonetheless, there is some degree of concern expressed about the outcome of even this procedure, not yet significant, but noticeable.

Ever since the 1949 report of the Lewis Commission (also known as the Committee on Educational Survey) warnings have been raised about the potential pitfalls of MIT receiving financial support tied too closely to government political agendas. When Jerry Wiesner returned to the Institute after his tenure as Science Advisor to Presidents Eisenhower and Kennedy, he too expressed concern that the large amounts of money received by the Institute from the U.S. Department of Defense might inadvertently distort the type or direction of potential research, emphasizing military versus civilian goals.

Steps were taken to protect the openness and collegiality of MIT, and to safeguard against intrusion of the federal government's interests and regulations. Separating Lincoln Labs and Draper Labs (formerly the Instrumentation Laboratory) from the Institute was a means of providing this protection. In addition, reinforcing the full understanding of and respect for the openness that drives MIT served to ensure our independence.

Historically, MIT's pursuit and preoccupation with funding resources was also primarily faculty driven, and played a central role in the organization and conduct of research. But over the past few years, as mentioned above, we note certain trends that are disturbing and run counter to this long-established MIT tradition. Many current research projects now require the recruitment of faculty from a variety of disciplines and departments. This multidisciplinary approach, although possibly valuable for achieving research objectives, must not be dictated by the heavy-handed constraints of an administrative order, be it from an external funding source or our own leaders. It is quite different for a faculty colleague to request support for a collaboration that is key to her or his research program than it is for a dean, laboratory or department head, or provost to mandate such as part of a scheme to dictate such interactions. The mandate is of special concern where junior faculty or non-tenured faculty are involved, since it runs the risk of stifling their creativity or placing them in a situation where they must defer to senior colleagues to remain funded.

Concerns expressed by Wiesner and others years ago about potential military influence on research are now being replaced by similar concerns regarding Institute support from major corporations and even foreign institutions (Singapore). Again, MIT must be vigilant to ensure that the research interests or programs of such units providing financial support do not distract from MIT's desired research and educational goals.

There's a story involving then-MIT President Chuck Vest who was discussing a potential major collaborative program with a company's CEO. Once they reached an understanding, the CEO stood up and shook hands with Chuck on the agreement. "When should we start?" asked the CEO. "For you, the negotiating is at an end," replied Vest. "For me it's a beginning; I now have to convince 1000 faculty members!"

We welcome input of specific examples from faculty, administrators, or even sponsors that reflects or elaborates upon our view on these issues, as well as those that run counter to it. ■

Editorial Sub-Committee

Neuroscience Hiring Controversy at MIT

THE INTERACTIONS BETWEEN Prof. Susumu Tonegawa and Dr. Alla Karpova, at the time a postdoctoral fellow at Cold Spring Harbor Laboratory, have been the subject of scrutiny within MIT, and through the broader scientific community (“Professor Allegedly Bullied MIT Prospect,” *The Boston Globe*, July 28, 2006). Dr. Karpova, recruited as an assistant professor in the Department of Biology, originally planned to come to MIT, but declined the offer after e-mail exchanges with Prof. Tonegawa. The *Faculty Newsletter*, with permission of the authors, is publishing the letter from our colleagues to President Hockfield which initiated expressions of concern, as well as President Hockfield’s reply and the related e-mail sent to the MIT faculty by Provost Reif. An offer was also made to print the letter to President Hockfield from six members of the Picower Institute. Two signers declined that offer, stating: “We feel that enough has been said on this topic and until the report by the special committee is made to the president and provost, it’s not clear what will be gained by reiterating and printing the same three letters that have already been discussed endlessly in the media.” The committee referred to is composed of Dr. Torsten Wiesel and Professors Jacqueline N. Hewitt (chair), Marc A. Kastner, Michael F. Rubner, and Sheila E. Widnall, and is expected to report later in the fall.

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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cambridge, Massachusetts 02139

June 30, 2006

Prof. S. Hockfield, President
M. I. T.
Cambridge, MA 02139

Dear Professor Hockfield,

We write to you to express our deep concern about events surrounding the recruitment of Dr. Alla Karpova, a neurobiologist, as Assistant Professor in the Department of Biology. Several weeks ago MIT made a verbal offer of a faculty position to Dr. Karpova, a brilliant young scientist who already had offers from Max Planck and Cal Tech, among others, but whose top choice was MIT. Subsequently, she had a series of interactions with Prof. Susumu Tonegawa, who strongly opposed her recruitment. He apparently conveyed to her that if she did come to MIT, he would not interact, collaborate or mentor her, and that members of his research group would not collaborate with her. Most disturbing to us is that MIT faculty and administration were not able to assure Dr. Karpova that she was wanted and welcome at MIT. Instead, subsequent discussions with Dr. Karpova left her with the impression that nothing could be done about the behavior of Prof. Tonegawa and that it would be best for her and MIT that she not accept the position. Several senior MIT faculty members in Biology and Brain and Cognitive Sciences explicitly cautioned her not to come to MIT out of concern for her future, given Tonegawa’s opposition to her appointment.

It is our collective and strongly held opinion that MIT has failed in this situation. We have allowed a senior faculty member with great power and financial resources to behave in an uncivil, uncollegial and possibly unethical manner toward a talented young scientist who deserves to be welcomed at MIT. We have acted as if this young woman were the problem, not Professor Tonegawa. We have damaged MIT’s reputation as an institution that supports academic fairness for young faculty and jeopardized our ability to attract the best scientists to MIT. In many respects, we have failed to uphold basic standards of academic integrity.

The damage is great. Professor Tonegawa’s behavior, and MIT’s failure to put a stop to it, has appalled the neuroscience community. This situation is bound to hit the press soon, with further devastating effects for MIT. We urge you to take immediate action.

Most urgently, MIT should do everything in its power to reverse the harm done to Dr. Karpova. In our view, MIT should offer Dr. Karpova a formal apology, and proceed with a sincere, concerted effort, at the level of the President, to understand and rectify the events of the past several weeks. An overture to Dr. Karpova from you, as President of MIT, would be an important part of this process.

On a longer timescale, it is important that we repair the broader structural problems that led to this situation in the first place. The recruitment of Dr. Karpova is not an isolated instance where serious structural issues within the neuroscience community at MIT have interfered with faculty recruitment and provided a less-than-ideal climate for research and academic freedom. We suggest that an *ad hoc* committee, composed in part of members external to MIT, evaluate the administrative and organizational structures that led to this situation, and that such a committee be charged with recommending structural changes to protect MIT and its faculty from similar problems in the future.

In summary, we ask you to take immediate action on these two fronts. At stake are the career of a brilliant young scientist and the reputation of a great institution.

We are available to help in any way we can.

Sincerely,

Prof. Leigh Royden
Chair, Advisory Committee to
Dean Silbey on issues pertaining
to hiring of women faculty

Prof. Paola Rizzoli
Chair, Gender Equity Committee,
School of Science

Prof. Nancy Kanwisher
Advisory Committee to
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to hiring of women faculty

Prof. Barbara Liskov
Chair, Gender Equity Committee,
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Prof. Joanne Stubbe
Advisory Committee to
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Prof. Sally Haslanger
Chair, Gender Equity Committee,
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Prof. Maria Zuber
Head, Department of Earth,
Atmospheric and Planetary Sciences

Prof. Terry Knight
Chair, Gender Equity Committee,
School of Architecture and Urban Planning

Prof. Nancy Hopkins
Co-Chair of the Council
on Faculty Diversity

Prof. JoAnne Yates
Chair, Gender Equity Committee,
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July 17, 2006

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Room 54-1416

Prof. Maria Zuber
Room 54-918

Prof. Nancy Kanwisher
Room 46-4133

Prof. Leigh Royden
Room 54-826

Dear Colleagues:

Thank you for your letter concerning the issues raised by events surrounding the recruitment of Dr. Alla Karpova to the MIT faculty. You wisely point out the importance of protecting MIT's reputation as an institution that upholds the highest standards of academic fairness, and you have recommended correcting a situation within the MIT neuroscience community that threatens ongoing disruption of the collegiality of our academic enterprise.

First, as an institution of higher learning, we are unwaveringly committed to supporting and developing the careers of junior colleagues. We have reached out to Dr. Karpova to emphasize MIT's high standards of collegiality and to apologize for any misunderstanding during the recruitment process that might have made her question MIT's commitment to young faculty and their access to Institute resources.

Second, ongoing tensions among MIT's neuroscience entities have raised the issue of how to encourage productive work among members of our neuroscience and biological science communities, without regard to the specific entity in which an individual holds an appointment. This issue has broad significance because the most important intellectual challenges of our time call for interdisciplinary approaches. The ability to work across center, departmental and school boundaries will increasingly determine MIT's success in its mission of research, teaching and service. While MIT has pioneered cross-disciplinary approaches, we must, as an institution, continually foster structures, policies and practices that will advance work across academic and research units. I have asked the Provost to convene an *ad hoc* committee to look into the current situation, to review the structure of MIT's neuroscience entities, and to make recommendations for how these entities can work together and make faculty appointments more productively.

Finally, while your letter does not explicitly allege that gender played a role in this case, and the issues appear to be driven by the relationships among different research activities at MIT, the question of gender-based discrimination has been raised by some. Whether or not it played a role in this particular case, let me state here that gender-based or other discriminatory behavior conflicts in the deepest way with our commitment to a values-based, meritocratic institution and will not be tolerated.

While I have replied to those who signed your letter to me, this issue has engaged a broad set of our faculty, and so I encourage you to share my response with those who you think might find it helpful.

With my thanks for the positive and productive way that you have brought these issues forward,

Sincerely,

Susan Hockfield

cc: Robert Desimone
Christopher Kaiser
L. Rafael Reif
Robert J. Silbey
Mriganka Sur
Susumu Tonegawa



From: "L. Rafael Reif"
Date: July 20, 2006 5:11:30 PM EDT
To: MIT Faculty
Subject: Ad hoc committee announcement

Dear colleagues,

Over the course of several years, MIT has succeeded in recruiting and developing a remarkable group of neuroscientists, who now work and interact in a magnificent new facility. These successes attest to MIT's commitment to identifying and recruiting outstanding faculty. Nevertheless, the events surrounding a recent recruitment of a junior faculty member in the Biology Department and the McGovern Institute have highlighted tensions among MIT's neuroscience entities. At the President's request, I am convening an *ad hoc* committee to:

1. Review the overall structure of, and interactions among, MIT's neuroscience programs, including the Brain and Cognitive Sciences Department, the McGovern Institute for Brain Research, the Picower Institute for Learning and Memory, and the neuroscience activities within the Biology Department;
2. Look into the recent junior faculty recruitment process, and the faculty recruitment process in general, as a window on the interactions among the neuroscience entities at MIT; and
3. Consider how the climate for neuroscience research and the process of faculty appointments might be improved.

I am grateful to Dr. Torsten Wiesel and to Professors Jacqueline N. Hewitt (chair), Marc A. Kastner, Michael F. Rubner, and Sheila E. Widnall for their willingness to serve on this important committee.

L. Rafael Reif
Provost

From The Faculty Chair Welcome Back

Steven Lerman

IF YOU'VE BEEN AWAY from MIT this summer, you might be wondering why this column is being written by me rather than by Lorna Gibson. I am pleased to be able to tell you that Professor Gibson was offered and accepted the position of Associate Provost, effective immediately. Unfortunately, though, accepting this position left her unable to serve the remaining year of her term as Chair of the MIT Faculty.

According to the *Rules and Regulations of the Faculty*, the Nominations Committee acts with power in appointing a Chair for the remainder of a departing Chair's term. The prior commitments of the other faculty officers made it difficult for them to be able take on the role of the Chair, and the Nominations Committee asked me to do so. Having already served as Chair of the Faculty from 2000-2002, and having enjoyed it enormously, I accepted and, as a consequence, I find myself unexpectedly writing this column.

We will all benefit from having someone with Lorna's energy, talent, and experience in the senior administration, but the truth is that we will also miss her leadership as the Faculty Chair. Lorna brought a combination of wisdom and practicality that served all of us extremely well during the ongoing transition of senior leadership at MIT. She worked to restructure the operations of some of the key committees of the faculty, particularly in the area of graduate student policy and disciplinary reviews. She and President Hockfield also added an open question and answer

session to the faculty meetings, bringing a sense of openness and spontaneity to the meetings that was badly needed. I have no doubt that her breadth of experience as Chair of the Faculty will make her more effective as an Associate Provost, but we will miss her.

Undergraduate Education to consider its recommendations and to make appropriate changes to the *Rules and Regulations of the Faculty* which establish the requirements for MIT degrees.

The governance of the educational commons is one of the central tasks of

I hope we will have a vigorous and constructive debate about what changes in undergraduate education are best for our students. This will require a willingness to question the status quo and a vision that transcends the localized interests of any one department or School.

Task Force on the Undergraduate Educational Commons

Looking forward, I think that some of the most substantive work we will do this year will probably result from the report of the Task Force on the Undergraduate Educational Commons. Under the leadership of Dean Robert Silbey, this committee of faculty, students, and staff has been working for the past two years.

Paraphrasing the Task Force's charter, the members of the Task Force have been working to review MIT's educational mission statement, define goals from that educational mission, develop common curriculum requirements for all undergraduates, and recommend to the faculty the formal structure of the undergraduate curriculum.

Once the work of the Task Force is completed, the faculty will need to work with the Office of the Dean for

those of us who teach at MIT. It is in the *Rules and Regulations of the Faculty* that we set forth the requirements for MIT degrees, including the General Institute Requirements. Ultimately, any changes in these requirements must be voted on and approved by the faculty. In a very real sense, we define our beliefs about what a technological and science centered education means through our degree requirements. Our decisions about the educational commons will influence not only the lives of all our undergraduates, but will also be seen as a model for other universities around the world.

Though we as a faculty must approve any changes in degree requirements, any changes in our undergraduate program forward will involve various groups, including the officers of the faculty, the Committee on the Undergraduate Program, the Office of the Dean for

Undergraduate Education, department heads and deans, the Chair of the Task Force, student representatives, and much of the senior administration. The translation of the difficult and time-consuming work of the Task Force into concrete actions will occupy many of us in the coming year and beyond.

I hope we will have a vigorous and constructive debate about what changes in undergraduate education are best for our students. This will require a willingness to question the status quo and a vision that transcends the localized interests of any one department or School. During this process we should be mindful that the report of the Task Force is the result of extensive research, consultations, and deliberations. While each of us may not agree with every one of the changes proposed by the Task Force, we should view their recommendations as reflecting the best judgment of some of our most deeply committed colleagues.

My goal is to move this process forward in a positive and systematic manner so that any changes may be approved by the faculty during this academic year. The complete implementation of whatever changes we agree upon is likely to require several more years that include development of new courses, new governing structures for the various requirements, and a significant commitment of faculty time and funds to whatever new teaching commitments arise from the new requirements.

Other Topics

Of course, our work on the undergraduate commons is not the only thing on the faculty agenda for the coming year. Some of the other topics we will deliberate on include:

- MIT's continuing efforts to improve the diversity of our faculty and student body, particularly with respect to gender and racial diversity. In a resolution approved in May 2004, we voted "to taking a leadership position among our

peer institutions in the recruiting and success of underrepresented minority faculty and graduate students." This resolution included the goals of doubling the number of underrepresented minority faculty and tripling the number of underrepresented minority graduate students within a decade. We all under-

Given the global nature of research and education, MIT is likely to expand its international partnerships and to create new ones. We need to do this in a way that is aligned with our core mission and opens up new opportunities for the faculty and students.

stood, however, that these goals cannot be met simply by voting. They require ongoing work of the faculty and administration to recruit more effectively and to create an academic environment that is welcoming and supportive of everyone. We will continue to monitor our progress towards our goals and to work with the senior administration to achieve them.

- Given the global nature of research and education, MIT is likely to expand its international partnerships and to create new ones. We need to do this in a way that is aligned with our core mission and opens up new opportunities for the faculty and students. We will discuss some of these new initiatives, including an expansion of our engagement with Singapore, in various faculty committees and at our meetings.
- In May 2006, the Energy Research Council reported on its year-long study of the challenges and opportunities for expanding the Institute's research in the energy field. This report recommended an ambitious initiative that will require new research funding and will involve faculty from all five Schools in basic energy science, technology, economics, and policy. How we organize and gener-

ate funding for this exciting work will be an important topic for discussion between the administration and the faculty.

- MIT has committed to expanding the housing we can make available to our graduate students. Work will start this

fall on a new graduate dormitory at the corner of Albany and Pacific Streets with a space for over 500 students. When this dorm is completed in 2008, the housemasters and students in what is now Ashdown House will move to the new building, and the current building will be converted to an undergraduate dormitory. This will create a more centralized locus of graduate student life in the Northwest area of the campus and will give us an opportunity to expand our undergraduate enrollments.

If history provides any guide, the list of issues we as a faculty need to discuss will likely get longer rather than shorter over the year.

For me, the start of the academic year always has a feeling of renewal and continuity. New students and new faculty arrive, and we move again into the annual cycle of teaching and research. Although certainly unexpected, I find myself looking forward to the coming year as Chair of the Faculty with unabashed enthusiasm. As always, I look forward to working with my faculty colleagues on the many things we all care deeply about. ■

Steven Lerman is Professor of Civil and Environmental Engineering; Faculty Chair (lerman@mit.edu).

Recombinant DNA

Recombinant DNA technology (gene splicing) was a stunning new scientific tool in the 1970s. It enables scientists to transplant genes from one species into cells of a host organism of a different species. The public, and many scientists, worried that splicing together DNA from different species might create new organisms that would pose fundamental risks to life on our planet. Indeed, in 1973 a group of highly respected scientists, including many of the leading researchers in the field, established a voluntary moratorium on classes of experimentation until the risks of gene splicing could be carefully assessed.

Subsequently, Chemistry Nobel Laureate Paul Berg of Stanford chaired a committee that considered the issues and established a meeting at the Asilomar Conference Center in California in February 1975. About 140 scientists from 13 countries, including Phil Sharp and David Baltimore of MIT, as well as attorneys, government officials, and members of the press attended. The purpose of this conference was to decide whether to lift the moratorium, and if so to define experimental conditions and protocols for safely conducting gene-splicing work.

Indeed the conferees decided that the moratorium should be lifted. They also outlined strict biosafety guidelines that were subsequently adopted by the U.S. National Institutes of Health, and ultimately were adopted in many other countries. These remain the basis of guidelines followed today.

Recombinant DNA technology has flourished as a ubiquitous tool in biological research, as the basis of important new drugs, diagnostics, and therapies, and indeed as the basis for the biotechnology industry of which Cambridge and Boston form a major center. In recent years there has been some controversy, especially in Europe, about its application to agriculture and nutrition, but on the whole it is

an accepted basis of important and wide ranging scientific, medical, and agricultural endeavors.

It is noteworthy that:

- The Asilomar meeting and process, in my view, were wise and successful.
- The process was driven by key scientists.
- The moratorium and conference focused on both fundamental and practical risk assessment and safety.
- The conclusions of the Asilomar Conference were reached by consensus, but were not unanimous.
- Some historians and policy experts have criticized the work as having paid insufficient attention to ethical and legal considerations, and to implications for biological warfare.
- National governments adopted regulations based on the Asilomar recommendations.
- The process engendered considerable public trust.

CFCs and the Ozone Layer

Incredibly complex and delicate balances maintain our environment and the life forms that have evolved on earth. In recent history, humans have applied scientific knowledge and engineering principles to develop technologies that extend our capabilities, help us adapt to unwelcoming environments, build our economies, and increase our comfort. Sometimes our technologies upset the delicate balance in unexpected ways. Refrigeration turned out to be an unexpected example of such unintended consequences.

Life on earth depends on the naturally occurring trace gas ozone that resides in our atmosphere and protects us from being exposed to too much ultraviolet radiation. Refrigeration is one of the most important technological developments of the last century. It enables us to ship and store food, improves our comfort and health, and is critical to many industries.

In the 1930s new chlorofluorocarbon refrigerants (CFCs) were developed and heralded as “wonder chemicals” because,

unlike the noxious refrigerants used in earlier refrigeration, they were nontoxic, nonflammable, and very useful. However, in 1973 at the University of California, Irvine, Sherwood Rowland and Mario Molina (who subsequently moved to MIT and became an Institute Professor) hypothesized that by a complex process human-made CFCs were causing a depletion of atmospheric ozone. Molina, Rowland, and Paul Crutzen shared the 1995 Nobel Prize in chemistry for this work.

These scientists engaged the public, industry, and the political process to call attention to the dangers of ozone depletion and to stop it and allow the environment to heal. In 1977 the United Nations, through its environmental program (UNEP) established the Coordinating Committee on the Ozone Layer. In 1978 the U.S., Canada, and several Scandinavian countries banned spray cans with CFC propellants. In 1985, the UNEP Vienna Convention on the Protection of the Ozone Layer was signed to promote cooperative research, development of alternate refrigerants, legal and policy matters, and to facilitate technology transfer.

In 1987, 24 countries signed the Montreal Protocol on Substances that Deplete the Ozone Layer. This protocol froze consumption of key CFCs at 1986 levels, and reduced consumption by 50 percent over 10 years. Less developed nations were given a longer time to stop using CFCs than wealthier nations. Amazingly, the elimination of CFCs accelerated. Europe phased out CFCs by 1995, and the U.S. production was zero by 1996.

Mario Molina has stated “The Protocol demonstrates how the different sectors of society – industrialists, scientists, environmentalists and policy makers – can be productive by working together, rather than functioning in adversary mode.”

It is noteworthy that:

- Science and scientists drove the process.
- The U.N. played a key role.

- The science was still somewhat speculative while the treaty was being negotiated.
- Industry came on board once the science was clear.
- The world moved forward to reduce risk.
- New technologies for replacing and recycling existing CFCs were important to solving the problem.

Deployment of the World Wide Web

Let me end with a very different kind of success story – that of the World Wide Web (WWW). The Web is a world-changing technology that seems to have evolved as a public good through a remarkably successful global collaboration. Its rapid, massive deployment followed an unusually good path in large measure because of the vision and leadership of Tim Berners-Lee, and a somewhat unique culture and worldview that dominated much of the computer science community.

In 1980, Tim Berners-Lee began the work at CERN in Geneva that was to form the basis of the WWW. In 1989 he authored an internal memo, *Information Management: A Proposal*, that noted that “Many of the discussions of the future at CERN and the LHC [Large Hadron Collider] era end with the question ‘Yes, but how will we ever keep track of such a large project?’” He proposed that hypertext would be the key, and that CERN engineers and scientists should involve themselves with hypertext “so that individually and collectively we may understand what we are creating.” In my view, this latter injunction is a critically important one that all too often has not been advanced or heeded in development of other technologies.

In 1993, Berners-Lee and two students began work on the line-mode browser. That same year the first World Wide Web Wizards Workshop was held here in Cambridge, MA. In 1994, Marc Andersen formed Mosaic Communications Corp. that later became Netscape, another international conference “Woodstock of the Web” was held at CERN, and the legislator Martin Bangemann of Germany reported on the European Union’s Information Superhighway plan.

Also in 1994, as a result of leadership from our late colleague Michael Dertouzos, and many others around the world, MIT and CERN announced an agreement to establish the World Wide

The W3C [World Wide Web Consortium] is headquartered in MIT’s Computer Science and Artificial Intelligence Laboratory. . . .

Web Consortium (W3C) to “lead the World Wide Web to its full potential by developing protocols and guidelines that ensure long-term growth for the Web.” The W3C is headquartered in MIT’s Computer Science and Artificial Intelligence Laboratory (CSAIL) and is jointly administered by CSAIL, the European Research Consortium for Informatics and Mathematics (ERCM) in France, and Keio University in Japan.

Few technologies have so rapidly transformed the way we work, live, learn, and play as the WWW.

It is noteworthy that:

- Deployment of the Web was driven by key technical players (in an engineering and computer science culture).
- The vision for the Web was global from the very beginning.
- There were international discussions throughout.
- Informal and formal cooperation among CERN, MIT, the European Commission, DARPA, and others enabled the establishment of the W3C.
- Those who developed the Web were dedicated to open, vendor-neutral standards.
- The consortium is voluntary and global.

Questions, Lessons, and Recommendations

Among the questions raised by these brief case studies are:

- Could the Asilomar process work today when most scientific communities are so large and even more globally dispersed than in the past?

- What is different about today’s global warming challenges and that of CFC phase out? Is it the magnitude of near-term economic consequences? Is it the greater complexity and economics of

mitigating technologies?

- Why did ideology apparently play a less dominant role in the CFC debates than in today’s issues?
- Could the informal, multi-national, multi-sector discussions that led to the World Wide Web Consortium occur today?
- How should we decide when technology deployment should be open, and when it should be market driven?

Despite today’s changing context, these examples suggest some recommendations and remind me of important responsibilities we have as faculty and leaders in science, technology, and policy:

- Above all, maintain the integrity and objectivity of research and scholarship.
- Maintain the openness of our campus, scientific communities, and scholarly communication.
- Promote governmental and industrial investment in the future and create opportunity – globally.
- Help the public to understand risk.
- Maintain continual, respectful dialog with the public and political leaders.
- Fight – without arrogance – the rise of anti-rationality.
- Create cultures of innovation.
- Recognize the increasing role of industry and NGOs in policy matters, innovation, and problem solving.
- Continue to build and sustain good collegiality with rising nations. ■

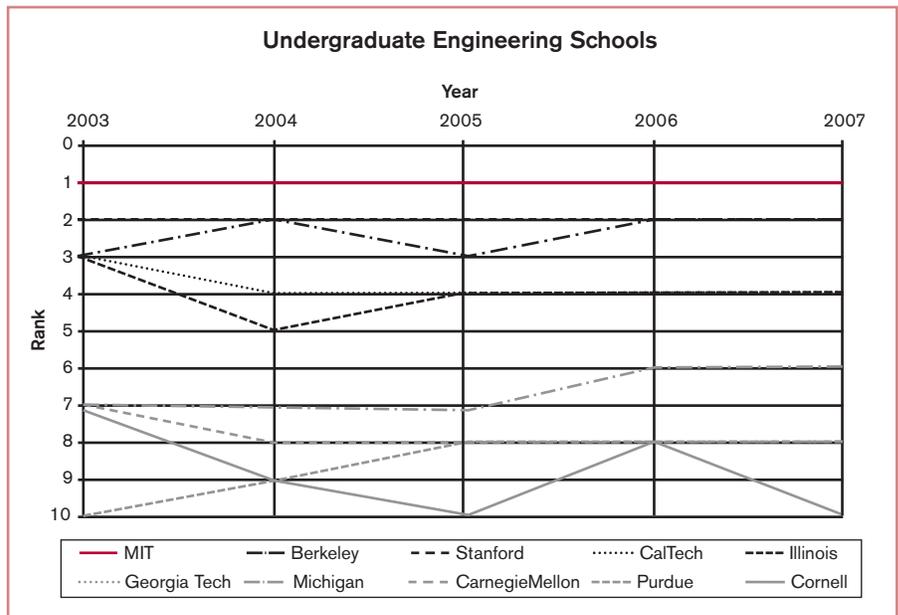
Charles M. Vest is President Emeritus and Professor of Mechanical Engineering (cmvest@mit.edu).

Editor’s Note: This article was based on a talk given by Prof. Vest at a dinner sponsored by the Ethics Lab at MIT held on April 11, 2006.

MIT RANKS 4TH IN the latest *U.S. News & World Report* undergraduate rankings, announced in the magazine's "America's Best Colleges" issue published in late August. Tied with CalTech and Stanford, the Institute ranking is just below traditional leaders Princeton, Harvard, and Yale, and is significantly improved from last year's decade-low ranking of 7th.

MIT is consistently ranked in the top 10 of colleges, with its highest ranking of 3rd occurring in 2000. See "M.I.T. Numbers" (back page) for a chart showing the rankings over the last decade.

MIT ranked even higher when the undergraduate engineering programs and business programs were considered. The Institute ranked 1st in the Best Undergraduate Engineering School category (see chart, next column), and 2nd in the Best Undergraduate Business School category (see chart, next page).



Categories (and weights) used by *U.S. News* to judge colleges include:

- Peer assessment (25%)
- Faculty resources (20%)
- Graduation and retention rate (20%)
- Student Selectivity (15%)
- Financial resources (10%)
- Alumni giving (5%)
- Graduation rate performance (5%)

U.S. News also rated individual engineering and business departments. [Note that not all programs are rated each year.] Several of the Institute's programs in these areas were ranked in the top five. They are:

Engineering

- Aerospace/Aeronautical/Astronomical (1st)
- Biomedical/Biomedical Engineering (4th) [tied with Georgia Tech]
- Chemical Engineering (1st)
- Civil Engineering (4th) [tied with Stanford and U. of Texas, Austin]
- Computer Engineering (1st)
- Electrical/Electronic/Communications (1st)
- Environmental/Environmental Health (2nd)
- Materials (2nd) [tied with Berkeley]
- Mechanical Engineering (1st)

Business

- Entrepreneurship (5th)
- Finance (5th)

- Management Information Systems (1st)
- Productions/Operations Management (1st)
- Quantitative Analysis (1st)
- Supply Chain (2nd)

Graduate Rankings

MIT fared equally well in the *U.S. News* graduate school rankings, announced last April. The Institute ranked first in the Best Graduate Engineering School category (see chart, next page) and has consistently done so over the past decade. The Sloan School at MIT was ranked 4th this year in the Best Graduate Business School category [tied with Northwestern], and has been ranked between 3rd and 5th over the last 10 years.

Individual MIT graduate engineering and business programs that were ranked in the top five, include:

Engineering

- Aeronautics and Astronautics (2nd)
- Chemical Engineering (1st)
- Civil Engineering (4th) [tied with Georgia Tech and U. of Texas, Austin]
- Computer Engineering (1st)
- Electrical Engineering (1st)
- Materials Engineering (1st)
- Mechanical Engineering (1st)
- Nuclear Engineering (1st)

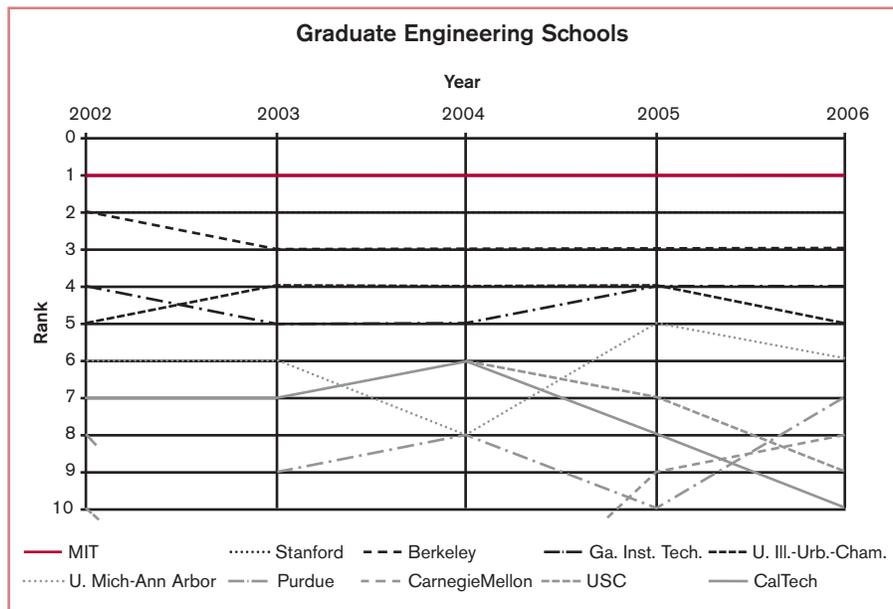
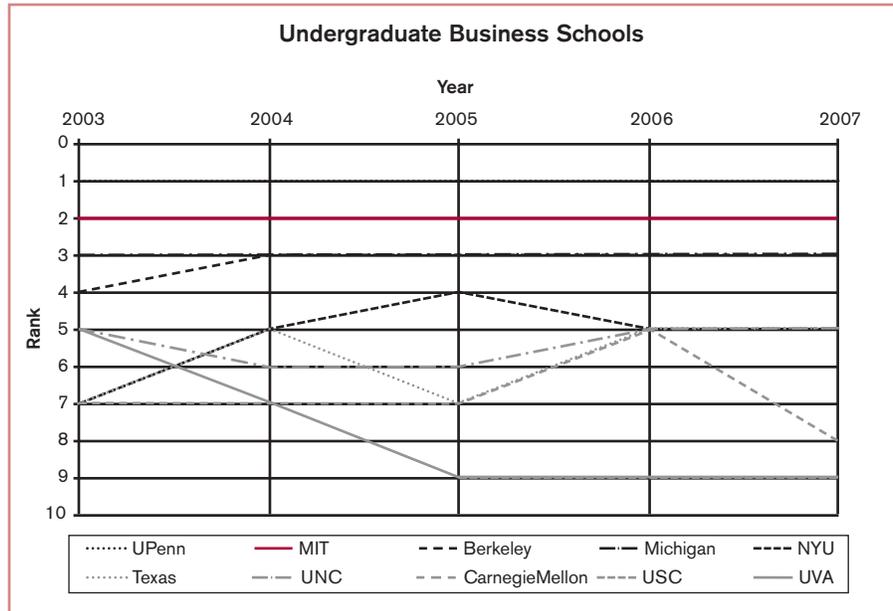
Business

- Information Systems (1st)
- Production/Operations (1st)
- Supply Chain/Logistics (1st)

In addition, non-engineering or business programs were also rated by *U.S. News*. Several MIT departments ranked in the top five in this category as well, including:

- Biology (2nd) [tied with Berkeley and Harvard]
- Chemistry (1st) [tied with the Berkeley]
- Computer Science (1st) [tied with the Berkeley, Carnegie-Mellon, and Stanford]
- Earth Sciences (2nd) [tied with Stanford]
- Math (1st)
- Physics (1st) [tied with Stanford] ■

Preparation of this article included contributions by Greg Harris. Data was taken from the 2007 edition of the *U.S. News & World Report's* "America's Best Colleges." Charts used were prepared by members of the Office of the Provost/Institutional Research.



House Mastering Recollected in Tranquility

Samuel Jay Keyser

“But that was in another country, and beside the mensch is dead.”

IT HAS BEEN A sixth of a century since I was housemaster at Senior House. Times change and so does house mastering. This is a reminiscence of what it was like then.

The day after we moved in I received a visit from the president of the house. I offered him a cup of tea. He declined. He wanted to get straight to business. He told me that my job as housemaster was to stay in the apartment, enjoy its appointments, and whenever the house needed my help in protecting it from the great Satan across the street – that was the Institute – he would let me know. I told him that I would try in every instance to be fair. He looked at me as if I were an exhibit at Madame Tussaud’s Wax Museum.

The second week I gave a picnic for the students, a social at which the students in the house might get to know one another (and me) better. It was held in the courtyard, a friendly, leafy area comfortably enclosed by the house itself and the walls that surround the Gray House garden. At one point two young men came up to me. I asked them about a course I knew they were both taking. The conversation went something like this:

First student: I think it’s a great course, one of the best I’ve had so far.

Second student: I think it’s a lousy course, the worst yet.

First student: Well, you’re an ***hole.

Second student: F*** you.

They stalked off, leaving me with two unclaimed hot dogs.

Life as housemaster often demanded that you make split-second decisions on matters of life, death, or serious injury. In this instance I ate one of the hot dogs and gave the second to a passing student.

There were other occasions that tested my mettle. I recall one evening when I received an urgent summons from a student in Runkle, one of the house’s vertical living divisions. The student said that I had to come over right away, that his girlfriend kept passing out.

When I got to the room, sure enough she was lying unconscious on the floor.

“She was O.K. a minute ago,” he pleaded.

I picked up the telephone and called the emergency number for Medical. I told them the situation and asked them to send an ambulance immediately.

“Is the student conscious now?” the nurse asked.

“Yes,” I said. She had, indeed, opened her eyes.

“In that case we can’t send an ambulance. You’ll have to walk her over.”

“Got it,” I said.

I hung up.

She passed out.

I punched redial.

“She’s unconscious again,” I said. “Can you get an ambulance over here right away?”

Just then she sat up.

“Never mind,” I said.

I remember this event not only because of the oddity of a young woman passing in and out of consciousness (in the end she stayed awake long enough for me to walk her the one block to Medical), but because of her boyfriend. He seemed

conflicted, as if having a girlfriend who exhibited such behavior was both a privilege and a problem.

About a year after this incident a man came to my door, flashed an official looking badge and told me that the boyfriend had applied for a sensitive job and he needed to ask me some questions.

After a few perfunctory ones relating to the student’s study habits and ability to work with others, he asked, “Would you trust him with atomic weapons?”

“Absolutely not,” I blurted out.

The agent’s eyebrows shot up.

“Why not?”

“I wouldn’t trust anyone with atomic weapons.”

Like I said, housemasters have to be fast on their feet.

I was housemaster during the heavy drug use days. There were always people hanging about in the shadows of the trees on Memorial Drive, especially during parties. One could never be sure if they were plainclothesmen or drug dealers. One dealt with it as best one could. I remember one incident, a student disappearance. The grapevine had it that this student was dealing drugs in the house and that he had somehow come into conflict with his supplier. One winter weekend he went north with some friends to Mt. Washington and during a trail hike to the top, peeled off on his own. He was never heard from again. Search parties went looking for him and were subsequently called off. People were sure he had frozen to death. During the winter of his disappearance I received a call from Medical informing me that a frozen corpse had been found up a tree on the

mountain. The authorities said the unfortunate hiker had climbed the tree to get his bearing. He froze to death in the process. I was certain it wasn't our student. I was sure he had staged his own disappearance. His body was never found and to the best of my knowledge that is still true.

The student's disappearance was well within the spirit of the house's motto; namely, "Sport Death." It appears most frequently on a banner at Senior House's annual steer roast. On the banner is a death's head, decorated in the colors of the American flag and with "Sport Death" painted in broad white strokes. I remember asking the students where the motto came from and being told that it was in memory of a Senior House student who had gone skydiving one weekend with several of his fellows. His chute didn't open and he plummeted to his death. The next day his undeterred colleagues were up in the air and skydiving to beat the

band. That was "Sport Death," thumbing one's nose in the face of extremity.

I was suspicious. The story sounded like a tribal myth. I went to the Dean's Office and asked for the names of all students who had been killed in a skydiving incident in the last 50 years. Not surprisingly there was none. Armed with this information I returned to Senior House and, when the time seemed appropriate, I laid it on the table. I might as well have told five year olds there was no Santa Claus. That was when I learned that science's relentless search for the unvarnished truth stopped at our living group door.

Every year the President of MIT – then it was Paul Gray – gave a tea in the president's garden for the parents of incoming freshmen. A high stonewall separated the garden from the dormitory. Only it wasn't high enough. Each year several students dressed up as figures in the Rocky Horror Picture

Show, scaled the wall and mingled with the parents. The idea was to snarf free food, embarrass the President, and epater le bourgeois. A trifecta. Of course, it fell to me to deal with it. I am sorry to say that the best I could do was to mingle with the parents as well and, whenever I saw a particularly uncomfortable parent, I would intervene and explain that the students were rehearsing for a play.

Several of my friends are housemasters. They have sought these positions. They have even asked my advice when it comes to the day-to-day management of things. I often see them in the corridors these days. I notice that there are no dark patches under their eyes, no telltale stoop of the shoulders, no desperate look as if they were being hunted. Something has changed. Maybe it's the times. Maybe it's me. ■

Samuel Jay Keyser is a Professor Emeritus of Linguistics and Philosophy and Special Assistant to the Chancellor (keyser@mit.edu).

Teaching this fall? You should know ...

the faculty regulates examinations and assignments for all subjects.

Check the Web at web.mit.edu/faculty/termregs for the complete regulations.
Questions: Contact Faculty Chair Steve Lerman at x3-4277 or lerman@mit.edu.

First and Third Week of the Term

By the end of the **first week** of classes, you must provide a clear and complete description of:

- required work, including the number and kinds of assignments;
- an approximate schedule of tests and due dates for major projects;
- whether or not there will be a final examination; and
- grading criteria.

By the end of the **third week**, you must provide a precise schedule of tests and major assignments.

For all Undergraduate Subjects, Tests Outside Scheduled Class Times:

- may begin no earlier than 7:30 P.M., when held in the evening;
- may not be held on Monday evenings;
- may not exceed two hours in length; and
- must be scheduled through the Schedules Office.

No Testing During the Last Week of Classes

Tests after Friday, December 8 must be scheduled in the Finals Period.

FOGS Report Highlights Graduate Student Cost Issues

Newsletter Staff

THE COST OF SUPPORTING a Research Assistant (RA) on a grant or contract at MIT is higher than for many of its peer competitors, according to the recently released Committee on the Funding of Graduate Students at MIT (FOGS) report. Another key finding suggests that while MIT is somewhat unique among its peers in lacking some type of reduced tuition policy for advanced graduate students, the establishment of an Institute-wide reduced tuition (“All-But-Dissertation” or ABD) rate is not financially feasible due to the tuition revenue that would be foregone. However, the Committee recommends that MIT explore the possibility of reduced tuition policies for those departments who rely more on internal funds for support. Furthermore, the Committee recommends that MIT consider reducing the non-resident tuition rate, consulting with those Schools or departments most affected by the policy. (The entire final committee report and a list of committee members can be found at: web.mit.edu/provost/reports/FOGS.pdf.)

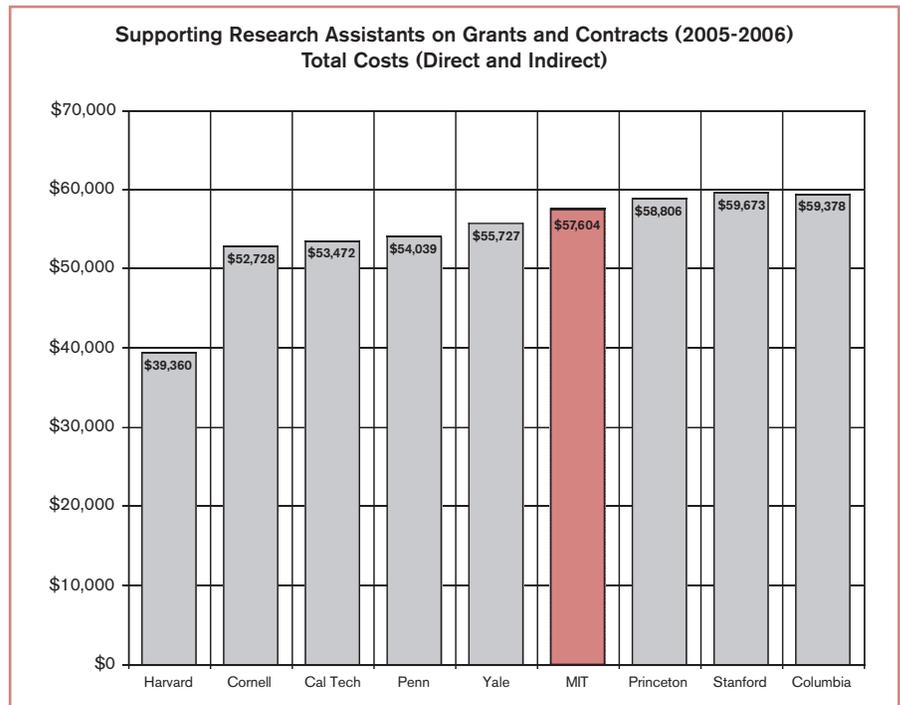
The Increasing Cost of an RA to Research Grants

It is important to continually compare the cost of supporting a Research Assistant (RA) on a research grant at MIT with the cost at our peer universities, because this is a key factor in calibrating the Institute’s ability to compete for research funds. (Part of the reason MIT stands out from its peers is that MIT has a larger number of Research Assistants [see figure, next page].)

A recent history of the cost of an RA charged to a research grant at MIT indi-

cates that this cost has increased by 45% from FY00 to FY06, an increase that is

among top research universities (see figure, below), and therefore any further



likely much greater than the increase of the average grant.

The tuition paid by research grants, currently at the rate of 55%, is a major source of income to MIT. At current levels of RA appointments, every 5% change in the academic year tuition subsidy causes a \$4M variance in the tuition revenue that MIT receives from grants. It is clear that varying the tuition subsidy is one way for MIT to directly influence the number of RAs our grants can afford to support and therefore influence the size of the graduate population. However, as the comparative RA costs indicate, MIT’s cost is currently close to the most expensive

reduction in the subsidy would threaten to price MIT out of the market.

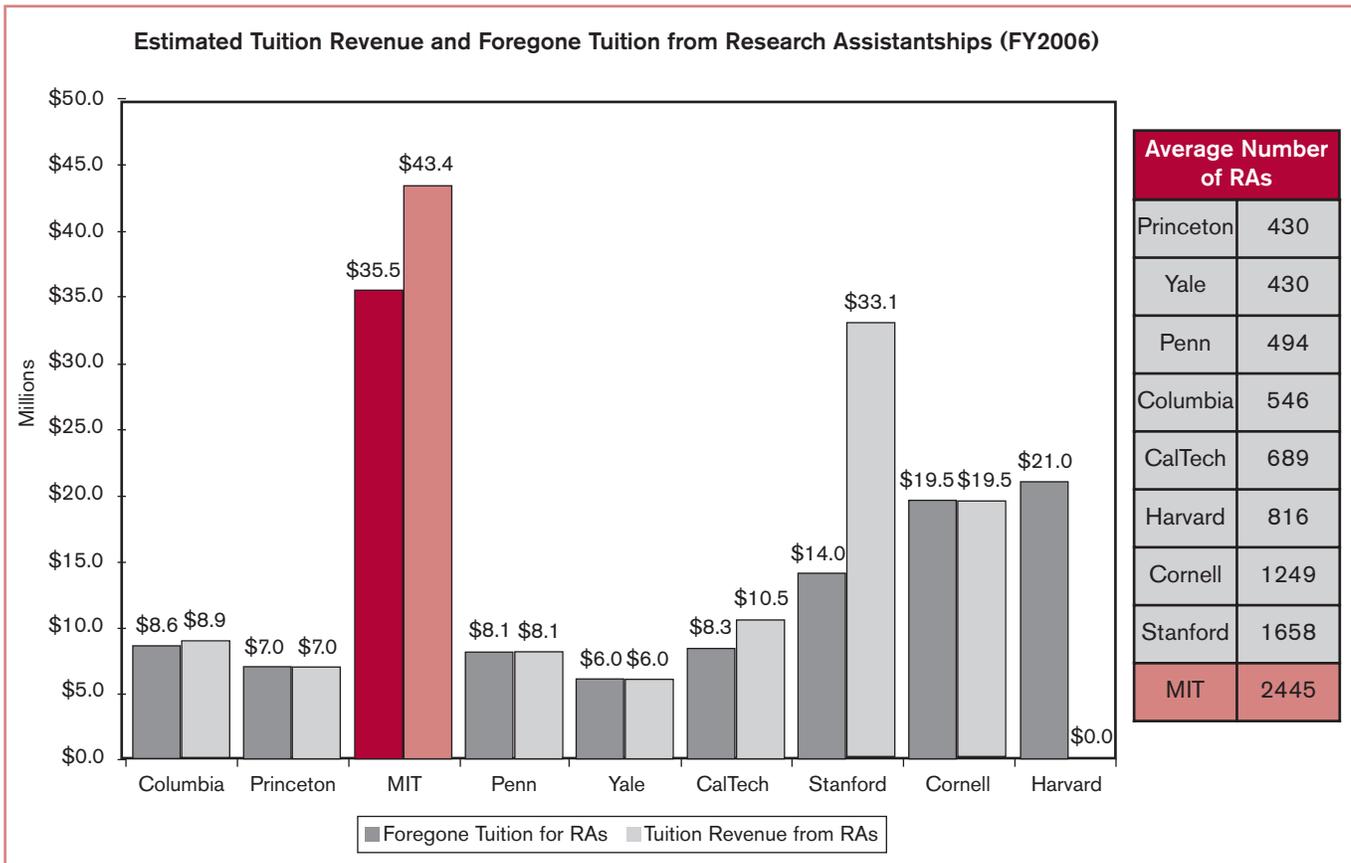
Regulating the Size of the Graduate Population

While variation in departmental support profiles certainly exists within Schools themselves, it is clear that there is a continuum of support profiles across MIT that ranges from support structures based heavily on external funding of RAs to those which are much more dependent on internal MIT funds for graduate support (see “M.I.T. Numbers,” *MIT Faculty Newsletter*, Vol. XVIII, No. 5). In the School of Engineering and the School of

Science, in which the greatest number of graduate students reside, the majority of graduate support is provided in the form of RAs supported by sponsored grants

research volume at MIT, yet the number of faculty have remained level. The committee believes that the number of RAs should generally be allowed to increase (or

mended stipend rates accordingly. While we need to support our graduate students with levels of income that are competitive with our peer institutions (see figure, next



and contracts. By contrast, in the School of Humanities, Arts, and Social Sciences (SHASS), Architecture and Planning (with the exception of the Media Lab), and the Sloan School of Management, the majority of graduate support is provided by internal MIT funds in the form of fellowships and Teaching Assistantships (TAs). Furthermore, the data show that the School of Architecture and Planning and SHASS have considerably higher proportions of students receiving no support from MIT than the other Schools. (A third distinct culture involves Master’s degree programs, addressed briefly in the report.)

The number of graduate students has risen in recent years, with the clearest growth in Engineering. Increases in the graduate (and postdoctoral) population correlate highly with increases in overall

decrease) with the availability of research funds, in order to let “market forces” decide which areas of research ought to be supporting more (or fewer) students. Areas of MIT that depend most heavily on internal support for graduate students (primarily within Architecture & Planning, SHASS, and Sloan) are willing to limit enrollments over time (and have essentially been doing so) in order to be able to secure a predictable graduate funding base and enroll a critical mass of PhD students.

Providing a Reasonable Standard of Living for our Graduate Students

Because the cost of living in the Boston area is one of the highest in the nation, it is critical for MIT to monitor these costs on a regular basis and adjust its recom-

page, for comparative stipend rates), we need to be acutely aware of the particular financial challenges faced by students living in the Boston area and make sure that our stipend rates provide our students with the ability to meet reasonable living standards.

Reduced Tuition Rates and Non-resident Status

With the exception of Cornell and Princeton, MIT is apparently unique among its peer competitors in lacking a reduced tuition policy (commonly known as “All-But-Dissertation” or ABD status), once students reach a certain stage of progress or time in the program. One of the barriers to having such a policy at MIT has been its potential to erode the income

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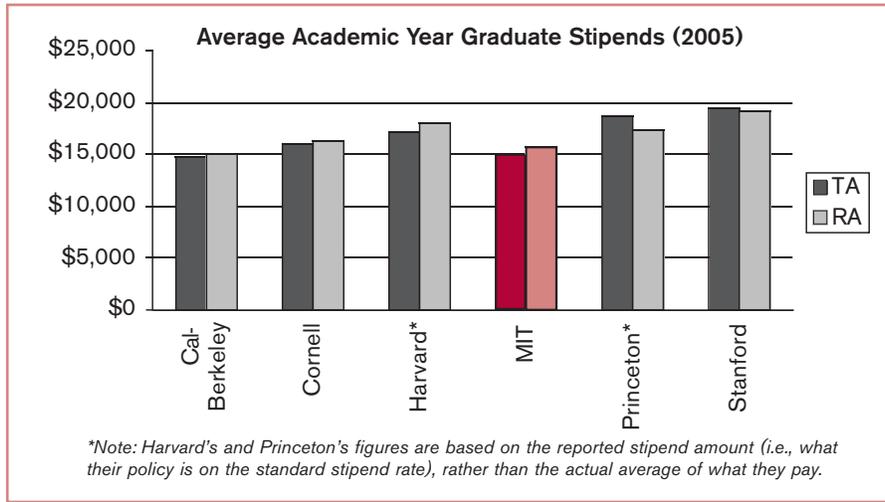
FOGS Report

continued from preceding page

stream that the Institute realizes from RA tuition charged to grants. In addition, some believe that an ABD policy may have a counterproductive impact for some students on the time taken to complete a

incentive for receiving the reduced tuition rate. Alternatively, a special dissertation year fellowship could be established for qualified candidates who have reached the dissertation writing stage who would like to devote full-time to writing. A dissertation fellowship for a limited amount of time might ameliorate the issue of

revenue realized by MIT from all non-resident students averaging about \$500,000 per year. It seems to the Committee that this income is small relative to the financial hardship it seems to impose on these students. The Committee recommends that MIT consider reducing the non-resident tuition rate. For example, if the non-resident tuition rate were reduced from the current 15% of the normal tuition rate to 5%, this would result in a loss in annual income to MIT of about \$310,000 per year. Furthermore, any possible policy changes, both with a reduced tuition rate or non-resident status, should be negotiated with the individual Schools or departments affected by the change.



degree, if it were to become financially easier to remain enrolled in the latter stages of the dissertation. The Committee evaluated the fiscal impact of an ABD policy and results indicate that an across-the-board tuition reduction for advanced graduate students would not be financially realistic. Therefore, the Committee recommends that MIT explore the possibility of negotiating reduced tuition policies that are tailored to the areas of the Institute that have limited sources of graduate support (especially for later-year students) and could benefit the most from an ABD tuition strategy, but would have limited impact on the overall MIT budget.

For example, the committee recommends exploring the possibility of dissertation writers in selected areas of MIT registering for a minimum number of credit units, targeted at a reduced tuition rate. If such options are adopted, MIT should consider limiting them to a specific number of terms per student, and design policies that do not act as disincentives for students to complete their degrees. Thesis proposal acceptance is a possible requirement that could be an

increased time to degree due to teaching responsibilities that can impede progress in the humanities and social science fields. The School of Architecture & Planning and SHASS have larger proportions of students who take eight or more years to complete their degrees.

Closely related to the ABD question is the Non-Resident tuition policy. A significant number of students choose non-resident status because their departments can no longer afford to support them. But these students must remain registered at MIT to maintain student status, but may not receive other financial support through MIT, including loans and teaching assistantships. Thus the non-resident status sometimes serves as a surrogate ABD status. In addition, if a student receives an outside fellowship for dissertation support, they must pay the non-resident tuition and are left with very limited income.

The number of students claiming non-resident status has not significantly increased in recent years (see the report for detailed data). The average number of times students' claimed non-resident status over the last three years is about 200, with

Maintaining MIT's Status as a Premier Research Institution

While MIT-based fellowship support for first-year PhD students has been the normal mode of support for several years in the Schools of Management, Architecture & Planning, and SHASS, there is an expressed, increasing need in Science and Engineering to make fellowship support available to their doctoral graduate students – for the first year in particular. Within its fundraising efforts, MIT should assert the importance of graduate student support, especially fellowships, and explore possible incentives to departments designed to enhance these efforts. This message should emphasize the importance of our graduate students to the core educational and research missions of MIT, and the critical need to continue to attract the very best graduate students to MIT, regardless of field. MIT's strength as an educational institution derives in large part from the great diversity of its academic and research programs, and this diversity is reflected in the different financial needs of our graduate programs. A strong fundraising effort focused on graduate support will be vital to MIT's continued strength. ■

Preparation of this article included contributions by Doug Pfeiffer and Mandy Smith. Charts used were prepared by members of the Office of the Provost/Institutional Research.

National Research Council to Assess U.S. Research Doctorate Programs

Lydia Snover

THE NATIONAL RESEARCH COUNCIL, which is part of the National Academies, has begun a project to assess U.S. research doctorate programs. A similar assessment was conducted in 1983 and 1995. In 1983 MIT had 13 doctoral programs ranked. Four of the programs were ranked 1st, and no programs were ranked less than 10th. In 1995, MIT had 22 programs ranked with six ranked 1st and eight ranked 2nd. No program was ranked lower than 14th. MIT will submit data for 32 programs for the current study.

Unlike the previous efforts in 1983 and 1995, which were based primarily on reputation surveys, the new study will

have no reputation component and instead use data collected directly from institutions, programs and faculty. MIT's participation in this project is being overseen by Claude Canizares, Associate Provost and Vice President for Research, and the Institutional Research group in the Office of the Provost has been tasked with coordinating MIT's data collection and submissions.

Although the NRC has not determined how they will use the data they collect for this study, the rankings will rely heavily on measures related to faculty productivity (publications, citations, research funding) and quality (honors and awards) as well as

program characteristics, including doctoral student support, time to degree, retention, and placement.

MIT will submit data at the institution and program level and faculty involved in doctoral education will be asked to provide a range of data related to their role in doctoral education. The initial data collection began in the summer of 2006 and is expected to conclude by late winter. Additional information on the study can be found at: www7.nationalacademies.org/resdoc/index.html. ■

Lydia Snover is Director of Institutional Research (lsnover@mit.edu).

Comparison of Selected NRC and U.S. News Rankings

Discipline	1982 NRC RANKINGS		1993 NRC RANKINGS		U.S. NEWS GRADUATE PROGRAMS REPUTATIONAL RANKINGS	
	Faculty Quality	Program Effectiveness	Faculty Quality	Program Effectiveness	1994, 1995, or 1996	2005 or 2006
Engineering						
Biomedical Engineering			1	2	4	8
Chemical Engineering	7	8	2	2.5	1	1
Civil Engineering	2	3	1	1	2	4
Materials Science			1	1	1	1
Aerospace Engineering			2	2	1	2
Electrical Engineering	1	2	2	2	1	1
Mechanical Engineering	1	2	2	3	1	1
Humanities and Social Sciences						
Economics	1	1	3	1	1	1
Political Science	6	6.5	12	11	8	10
Life Sciences						
Neurosciences			14	14		9
Physical Sciences and Math.						
Computer Sciences	2	2	2	1	1	1
Mathematics	3	4	3	4	1	1
Physics	5	5.5	3.5	3	1	1
Chemistry	4	3	5	3	2	1

Teach Talk

Jane Dunphy

Supporting MIT's International Graduate Students: Communicating Within and Across Cultures

IN HER PIECE IN the March/April issue of the *Faculty Newsletter*, Danielle Guichard-Ashbrook provides an overview of the impact of Homeland Security's SEVIS system on international student applications and visas to attend MIT. She touched on two central pillars of our culture. First, international graduate students are valued partners in our mission to work with educators and researchers across national boundaries to address the world's major challenges. Second, MIT is committed to providing an excellent educational and research environment here in Cambridge for all members of its diverse student community.

Another defining feature of MIT's culture is the assumption that all graduate students will contribute to MIT's intellectual and creative environment in a variety of ways, such as challenging the status quo, collaborating in research, publishing, interacting in seminars, and teaching undergraduates. Adequate English communication skills are essential for engaging in these activities at MIT and beyond.

MIT currently has 2212 international students enrolled. Table 1 provides the number of students from the five countries with the largest representation. This information encapsulates the range in English proficiency of our international student population. Many speak English as a second (or additional) language (e.g., Chinese, Korean, and French students); a substantial number are functionally bilingual or native speakers, like those from India and Canada.

Regardless of mother tongue, many international graduate students engage

assertively and successfully in the communication culture here starting in their first semester.

Country	# of International Students	% of Total International Students
China (PRC)	308	14%
Korea	226	10%
India	221	10%
Canada	200	9%
France	106	5%

Table 1. Countries with the largest student representation at MIT (2005-2006)
Source: Office of the Provost/IR (2006)

Others, however, struggle to understand and participate effectively in MIT's intellectual environment. A variety of linguistic and cultural factors can determine whether someone is an effective communicator, in general, and whether students can adjust easily to MIT's communication culture:

- Native language
- Pedagogical and communication cultures of home countries
- Prior exposure to English spoken and written by native English speakers
- Personality and talents
- Motivation and interest
- Communication environment in MIT dorms, lab groups, and departments

How do we help international graduate students participate in the communication culture here?

There's no question that MIT's entering international graduate students are expert

learners who have studied hard to meet the requirements of admission. But they, and their advisors, are frequently unaware that the English test-taking skills that allowed them to succeed in the TOEFL test and the GRE may be inadequate for the flexible, interactive production of English required in this lively educational and research community.

The first step is to ensure, in a timely manner, that students who need help know that they need help. The English Evaluation Test (EET), administered each semester by the English Language Studies (ELS) group in the Foreign Languages & Literatures section of the Humanities Department, provides each student and advisor with an assessment of the student's English skills.

The EET

Since 1984, the Committee on Graduate Student Programs (CGSP) has required all entering international graduate students whose primary language of instruction from the age of six through high school has not been English to take the EET. The EET focuses on academic English and is composed of three parts that measure comprehension and production: a multiple-choice assessment of listening and reading comprehension, as well as accuracy in sentence structure; a writing task; and an interview. The test identifies weaknesses in discrete areas of English that may contribute to problems with some aspects of a student's course work, teaching, or research.

Students do not "pass" or "fail" the EET. Rather, the assessment provides

them and their advisors with predictive information to inform subject choices on Registration Day and decisions about teaching and research assistantships. (See EET FAQs at web.mit.edu/fll/www/languages/EETFAQ.html for more details.)

Course Offerings in the English Language Studies Program (ELS)

Our English language subjects are designed for the intermediate through advanced or functionally bilingual English speakers that form a substantial part of MIT’s multicultural student body. The major goal of the program is to foster accuracy, facility, appropriateness, and confidence in a variety of academic and professional contexts. Any student earning a degree at MIT can register for one of the subjects listed in Figure 1. These are regular grade- and credit-bearing classes that meet according to the MIT academic calendar.

Academic Year	'01-'02	'02-'03	'03-'04	'04-'05	'05-'06
International Students	2244	2283	2242	2178	2212
Students Taking EET	331	307	267	306	312
Recommendations: Intermediate Subjects	143	112	103	155	149
No Recommendations Made	47	81	48	85	93

Table 2. Enrolled International Graduate Students and the EET (2001-2006)

Generally, one course cannot be easily substituted for another. For example, Intermediate Spoken & Written Communication (21F211) is recommended for students whose EET results indicate that their academic English skills are inadequate in all categories. Few entering MIT graduate students fall into this

tively in research groups; delivering oral presentations; and writing memos, research papers, reports and thesis. Therefore no recommendations were made. A performance level of “Adequate” does not imply that these students will be excellent as recitation or lab instructors, presenters of research or writers of grant proposals. Few graduate students from any countries, including the U.S., have studied best practices in pedagogy, academic speaking or writing.

Most recommendations resulting from the EET are made for the three high-intermediate subjects in the middle tier. A student receiving a recommendation for any of these subjects is likely to have enough difficulty understanding or contributing to essential communications that action is required as soon as possible. Students acting on these recommendations often start with High-Intermediate Academic Communication (21F214), which is designed to develop accuracy and flexibility in all English skills. Some students continue with English studies in subsequent semesters, narrowing their focus to either writing or speaking/listening comprehension at the high-intermediate level before moving on to the advanced subjects.

Writing Tasks Important for Graduate Academic Success

The curriculum for writing instruction and practice throughout the three levels in the ELS program is designed to develop

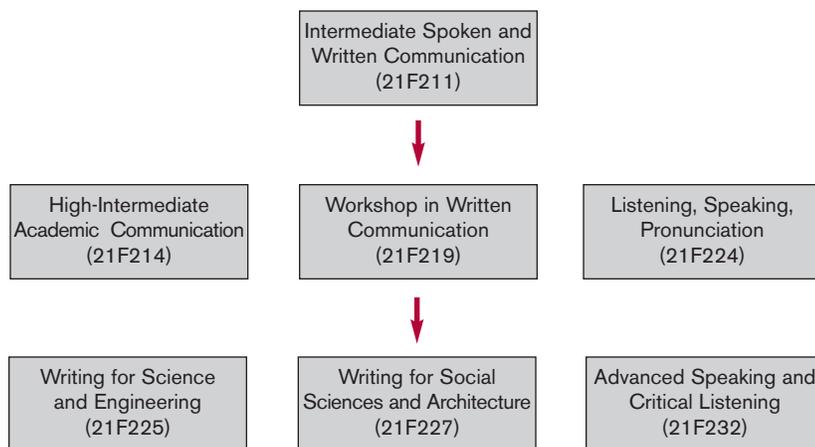


Figure 1. Main ELS subjects, from intermediate (top) to advanced (bottom)

All subjects are designed to provide a great deal of practice and feedback in targeted skill areas. Students are not expected to achieve native accuracy or fluency; nor are they expected to “sound like Americans.” Those goals would be entirely unrealistic. Instead, we focus on strengthening or modifying the aspects of students’ English – for example, listening comprehension or pronunciation – that prevent easy communication. For some students, one ELS course will be insufficient.

category, but those who do truly need to improve all skills as soon as possible! None of the other ELS subjects covers the same intermediate level material.

Table 2 indicates the patterns of eligible international graduate students who have taken the EET over the past five years. Note that, in the last two years, the English skills of almost 1/3 of these students have been assessed as adequate for understanding lectures; teaching recitations or labs; holding office hours, interacting effec-

continued on next page

Supporting International Graduate Students
Dunphy, from preceeding page

and strengthen those skills identified as most important in an extensive survey of American professors. (Source: M. Rosenfeld, R. Courtney & M. Fowles. *Identifying the Writing Tasks Important for Academic Success at the Undergraduate and Graduate Levels*. GRE Board Report No. 00-04R.) Students should be able to :

- Credit sources appropriately
- Analyze and synthesize information from multiple sources
- Organize ideas and information coherently
- Develop a well-focused, well-supported discussion, using relevant reasons and examples
- Use grammar and syntax that follow the rules of standard written English
- Write clearly, with smooth transitions
- Avoid errors in mechanics
- Write precisely and concisely
- Abstract or summarize essential information
- Revise and edit text to improve its clarity, coherence, and correctness

The Advanced ELS Workshops

The advanced ELS workshops (21F225, 21F227, and 21F232) are best suited to students who are managing relatively well in MIT's communication culture, but who wish to fine-tune accuracy in writing or listening and speaking; build more fluency; and develop confidence. These subjects are most helpful to students who are already engaged in research activities at MIT, i.e., students who have been at MIT for at least two semesters and have finished much of their coursework. Interestingly, the advanced subjects regularly attract bilingual students who seek instruction, practice, and feedback in academic speaking and writing, even in the absence of EET recommendations. In fact, the relative scarcity of graduate subjects in academic and professional communication Institute wide has occasionally resulted in American stu-

dents asking permission to register in one of these advanced ELS workshops.

The writing workshops provide motivating contexts in which students learn and practice strategies for audience analysis, document design, and tone. They can

The writing workshops provide motivating contexts in which students learn and practice strategies for audience analysis, document design, and tone. They can write about their own work in various conventional forms such as memos, proposals, journal articles, research reports, and theses.

write about their own work in various conventional forms such as memos, proposals, journal articles, research reports, and theses.

The Advanced Speaking & Critical Listening Skills workshop (21F232) focuses on effective communication in meetings, seminars, classrooms, poster sessions, conferences, and corporate contexts. Many activities in class are recorded onto DVDs, allowing easy, frequent, and timely analysis and feedback. A major component of 21F232 is the study and practice of the interactive teaching and mentoring expected of a recitation TA. As part of the workshop, the course instructor visits the recitations of students in 21F232 who are currently TAs, records their teaching, and meets with them to discuss the recorded session.

Another option for students interested in working on their teaching skills is a three-unit Workshop in Strategies for Effective Teaching (21F230), offered each IAP. It provides most of the instruction, materials, and practice that are covered in the teaching unit of 21F232.

Other possibilities for academic English language study at MIT

Aside from taking formal subjects in the ELS Program, MIT provides two other

ways to study academic English. First, the Language Learning & Resource Center (LLARC) in Building 16-644 offers free access to an excellent collection of materials for self-study, from low-tech options (textbooks, cassettes, and videos) to

interactive DVDs and computer programs. (The Center's catalogue and schedule are available at llarc.mit.edu/home.) In addition, the Writing & Communication Center in Building 32-081 offers free, individual consultations on any kind of speaking or writing task at any stage in its development. Tutors there do not edit students' documents; they work with students to strategize, analyze, and improve them. They are also available to help students plan and deliver presentations. Any member of the community, including family members, may take advantage of the material and expertise available in these two centers.

MIT's goals are ambitious, and the world's challenges are, indeed, great. To succeed, we need to tap the intellectual rigor and creativity of every one of us. Confidence and facility in English, as well as familiarity with academic communication norms, will go a long way toward enabling all of our international graduate students to contribute fully as members of our Cambridge community and as partners in our international mission. ■

Jane Dunphy is Director of English Language Studies (dunphy@mit.edu).

MIT Poetry

by Tunney Lee

Factory Girls

farm
girls
leave home
to escape
arranged marriages
making thirty-five cents an hour
assembling iPods and sewing skimpy bustiers
for without-a-clue teen-agers
ripping off rap songs
smoking pot
picking
at
pimples

they
look
out from
their dorm rooms
at the gibbous moon
and can think only of lyrics
in sad Canto-pop songs longing for romantic love
while their parents left on the farm
gaze at the same moon
and know that
market
day
will
come with
the new dawn

Tunney Lee is a Professor Emeritus
in Urban Studies and Planning.

letters

Accolades for Nancy Hopkins

To The Faculty Newsletter:

THANK YOU SO MUCH for this article ["Diversification of a University Faculty: Observations on Hiring Women Faculty in the Schools of Science and Engineering at MIT," *MIT Faculty Newsletter*, Vol. XVIII, No. 4]! As a recent graduate from MIT (PhD Course 6, 2005) this issue really hits home for me since I constantly evaluate the option of pursuing an aca-

demical career. I really believe that increasing the numbers of female faculty members really lies in creating an environment in which a woman can not only succeed academically, but can also balance a life outside of her career. This is one of the major reasons why I have chosen to pursue industrial research though I have a serious interest in teaching and mentorship of younger students. My advisor in graduate school was female and chose to

wait until she received tenure before having a family. Other women work in industry while they raise their families and then try entering academia at a more senior position once their children are older.

I think a complete study on the leaky pipeline needs also to consider the reasons why women leaked out.

Sheila Tandon

Dental Insurance Plan for Retirees?

Dr. Seldin,

I AGREE WITH YOUR proposal in the May/June *Faculty Newsletter* ["A Modest Proposal: A Dental Insurance Plan for All Students"] that the Institute needs to find some way to provide dental insurance for students. Your arguments are compelling.

However, I would like to call your attention to a minor error in the discussion: in two places you say "...students comprise the only sub-set of our population that goes without the benefit of a dental insurance offering." There is a second important subset of the MIT population that does not have the benefit of a dental insurance offering: retirees. (This is

a subset of the MIT community that you will probably join one day.)

I find this omission similarly puzzling, especially since there appears to be a low-cost way for MIT to provide at least some coverage for retirees: simply make Delta Dental plan coverage available to retirees at cost. Because Delta Dental negotiates favorable prices with many dentists, those favorable prices would significantly lower the overall cost of dental care for retirees without requiring that MIT contribute any funds other than the cost of administration. MIT already provides retirees with up to 18 months of dental coverage at cost under COBRA, and it would seem straightfor-

ward to arrange for that coverage to continue indefinitely.

Jerry Saltzer
Professor Emeritus
Department of Electrical Engineering
and Computer Science

Dr. Seldin Responds:

Thank you so much for pointing out the embarrassing omission of retirees in my campaign of advocacy on behalf of students. Your point is well taken and your proposed solution seems entirely reasonable to me.

Ed Seldin
Chief of Oral Surgery

In Memoriam Vernon Martin Ingram

THE FOLLOWING IS EXCERPTED from a Memorial Resolution for Vernon Martin Ingram presented at the September 20, 2006 meeting of the MIT faculty.

Vernon Martin Ingram, John and Dorothy Wilson Professor of Biochemistry, one of the founding fathers of Molecular Medicine, passed away on August 17, 2006 at the age of 82. Vernon had been a member of the MIT faculty for 48 years.

Vernon was born on May 19, 1924 in Breslau, Germany. When Vernon was 14, he and his family moved to London. Interested in science since an early age, Vernon studied chemistry at Birkbeck College, London University where he received a B.Sc. in 1945 and a Ph.D. in organic chemistry in 1949.

After two years of postdoctoral research in the United States, first at Rockefeller University and then at Yale University, Vernon returned to England in 1952 to work with Max Perutz at the Cavendish Laboratory in Cambridge. It was there, in a bicycle shed converted to a laboratory, that Vernon made the crucial discovery that the blood disease sickle cell anemia was caused by a single amino acid change in hemoglobin. This discovery is heralded to be among the seminal discoveries in molecular biology.

Vernon came to MIT in 1958. He mentions that he came on a one-year sabbatical. It is our good fortune that he ended up staying at MIT for the rest of his life.

Vernon's research efforts were always timely and in important areas. At MIT, Vernon continued his work on hemoglobin and hemoglobin-related diseases, but he was also among the earliest to begin work on transfer RNAs at a time when transfer RNAs were at the center of the newly-developing field of molecular biology. More recently, Vernon switched to neurobiology, focusing on Huntington's disease and Alzheimer's disease. Vernon took great satisfaction in working in the laboratory himself in spite of his advancing age, and was working in the laboratory until the very end.

Vernon's scientific contributions and accomplishments have been widely acknowledged through his election to The American Academy of Arts and Sciences, The Royal Society, London and The National Academy of Sciences, USA.

Vernon was a true scholar and an educator in every sense of the terms. He was totally committed to MIT's educational mission and he cared deeply about the education and well being of the students. In addition to research and participation in the teaching programs of the Biology Department, Vernon served as Director of ESG, the Experimental Study Group, from 1989-1999, as a member of the Committee on Academic Performance from 1996-1999 and 2005 and, along with his wife, Beth, as Housemasters at Ashdown House from 1985-2001. He also taught a Freshman Advising Seminar every year for the past nine years. In all these capacities, Vernon left a lasting impression on whomever he came in contact.

Holly Sweet of ESG says this of Vernon: "During his time as director of ESG, Vernon was active in making ESG a place of educational innovation for students and staff. He developed a biology wet lab, a biology hyper-text book, was one of the first faculty members to conceive of using the internet for teaching, and supported and extended the ESG undergraduate seminar series. He also actively promoted the professional growth of ESG staff members and helped create the ESG teaching seminar, where students and staff trade ideas about education and teaching experiences in an informal and collaborative setting."

As Housemasters at Ashdown House, Vernon and Beth were beloved by generations of graduate students. They advocated tirelessly for Ashdown residents, encouraged and supported students at times of personal and academic difficulties, and celebrated accomplishments with students. In appreciation of Vernon and Beth's long tenure at Ashdown House and their constant considera-

tions of the well being of the students, a former student petitioned successfully to have an asteroid named after them. This asteroid, discovered in 1981, is now officially (6285) Ingram.

Vernon also provided an example of how to live a well-rounded life. He was a gifted pianist, grew orchids at Ashdown, and was a highly talented photographer, who donated several of his works to Ashdown House. He shared his musical gifts with students during Ashdown House concerts. In recognition of their many contributions, a petition has been submitted to the MIT Corporation for the naming of a room in Ashdown House for Beth and Vernon Ingram.

Vernon was a true Renaissance man, a person who could be at home in a laboratory or concert hall. He had the amazing ability to be a well-known scientist, a top notch educator and artist, and a warm and a compassionate person. His get-togethers at Ashdown House were legendary – filled with food, music, and art. He gave a tremendous amount to the various communities with which he was involved, including ESG, Ashdown House, and Rockport, where he spent his summers.

For a scientist who made one of the seminal discoveries at an early age, Vernon was a most humble and modest person. He acknowledged readily the contributions of others in his work and ascribed his most important discovery to serendipity and "dumb" luck. In a Perspective published in 2004, he ended the article as follows: [This writer feels that without a lot of "dumb" luck, the sickle-cell mutation in hemoglobin would not have been pinned down, at least not at that time by us. No doubt it would have been figured out by somebody sometime. The story leaves one with a warm feeling toward "luck"!]

Vernon leaves his wife Beth, his son Peter, daughter Jennifer, their mother Margaret, Vernon's first wife, and four grandchildren. ■

Uttam L. RajBhandary
Gene M. Brown
Chris A. Kaiser

International Development Fair Showcases Students' Global Development Experiences

Amy McCreath
Amy Smith

THINK BACK TO YOUR undergraduate years. Where in the world were you? On campus, mostly? A semester in England or Spain, perhaps? Here's how some of our undergraduates are spending their time:

- building bicycle ambulances in Zambia
- installing early warning systems for floods in Honduras
- establishing income-generating projects with abused teenagers in Sri Lanka.

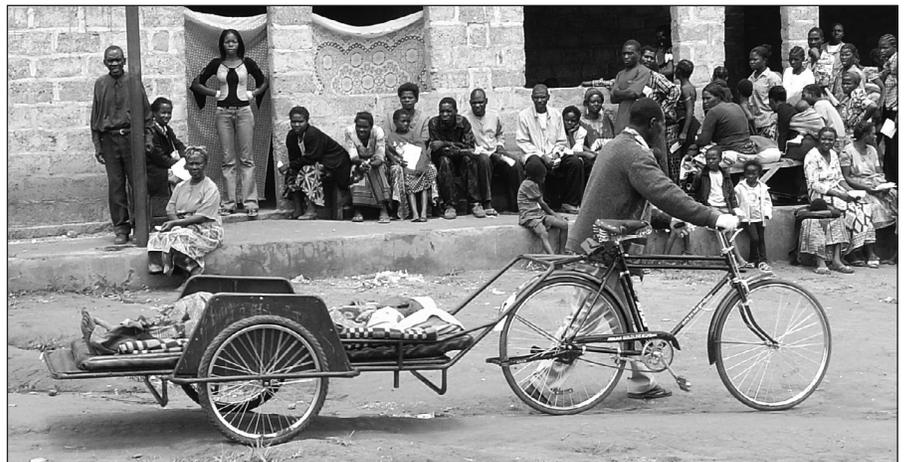
In the last several years, MIT students have become increasingly interested in understanding the developing world and doing work that builds civil society around the globe. In this era of the “flat world,” and at a time when they are living and studying with classmates whose backgrounds and/or connections span the globe, MIT students are seeking out and creating for themselves a fascinating array of ways to use their skills to think and act globally.

For five years now, MIT's International Development Fair (IDF) has been a showcase of the growing student interest in development. Each fall, the IDF fills Lobby 13 with displays and leaders representing all the development-related opportunities available to students at MIT. We seek to showcase and celebrate this work, help incoming students find out about these opportunities early on, and make it possible for students who share a passion for global change to meet and learn from one another.

If you come to this year's IDF on September 29th, you will find passionate

students who believe in their power to make the world a better place, incoming undergraduates starting to wake up to the enormous possibilities open to them, MIT Career Services staff in deep

involved in our city?' They had co-founded a community organization in Montevideo, Uruguay, and thought MIT students would be ideal to help teach technical skills, establish entrepreneurial



The Bicycle Ambulance at work in a village in Zambia

conversation with students who want to “make a difference” but don't know where to start, graduate students halfway through their programs who are contemplating how their work as engineers will connect with larger questions about human community, alumni/ae so moved by the quality and value of the work they see represented that they write a check on the spot to a student group, and faculty demonstrating technologies for improving water quality or rural access to electricity.

You will also see life-changing connections being made. D-lab instructor Stephanie Dalquist reports that last year, a Sloan School alum and his wife “came up and asked, ‘How do we get MIT students

opportunities, and streamline organization processes as the organization grows. For that random connection at IDF, there are now Public Service Center Fellows working in Montevideo over the summer.”

Graduate student Kristen Bethke, a leader of the Floodsafe Honduras project, says she was “uplifted and encouraged by the invitation to display Floodsafe's work, informed about other projects that might be in a similar region or concerned with a similar problem, motivated by the great work others are doing, and comforted by the fact that others face similar challenges in international development work.”



Amos Winter riding his improved hand-cycle in Tanzania

The IDF originated in conversations between leaders at Technology and Culture Forum and the Graduate Student Council. They put together a planning team including leaders from MIT's Public Service Center, the Edgerton Center, and the student group Design that Matters (now Design for Change). Each year, other groups have joined this core to plan the Fair and publish an accompanying "Guide to International Development at MIT." For the last three years, we have also gathered a group of students involved in development-related work on the night before the Fair for a dinner where they can network with one another and meet a few MIT alums who are "in the field." Students who attend the dinner tell us that it is tremendously encouraging to them, because they often feel unsupported by their department or the culture of MIT in general. The dinner creates for them a social and vocational network of like-minded peers. It also leads to collaborations such as \$100K proposals, IDEAS Competition teams, and co-sponsored symposia.



Matt Orosz with his solar generator in Lesotho

As student interest in development-related work continues to grow and student groups in this area seek ways to sustain their communication and mutual support year-round, those of us who have been part of the core team behind IDF for five years are creating an umbrella network. This new International Development Network (IDN) is a collaborative network for sharing and celebrating the rich variety of development-related activities at MIT in which students participate throughout the year. Our goal is not to control or direct the trajectory of MIT's contribution to development; we are not an academic program, nor are we proponents of a specific theory or plan for international development. But we do have a vision: that every MIT student will learn about the wealth of opportunities available when involved with development-related work; that groups and individuals doing such work at MIT will plan collaboratively and build creative partnerships; and that through these efforts, IDN will significantly contribute toward President Hockfield's vision of making MIT the dream of every child who wants to make the world a better place. ■

Amy McCreath is Episcopal Chaplain and Coordinator of the Technology and Culture Forum (mccreath@mit.edu). **Amy Smith** is a Senior Lecturer in the Departments of Mechanical Engineering and Undergraduate Education (abs@mit.edu).

What you can do

- Come to the event (from 1 to 3 pm in Lobby 13 on Friday, September 29th) and send your advisees. It is a wonderful opportunity to support excellent student work and learn what is on the minds of a wide array of students. And, the international food is great!
- Share your ideas and advice. Tell us about projects that are not represented that should be.
- Talk with students about global issues, ask them what their hopes and fears are about the future, help them realize the opportunity to study or work abroad given their research or departmental constraints.
- Think about creating new opportunities to incorporate development-related concerns into your teaching or create new opportunities for students to travel or work on problems for communities abroad. The demand is there! The Service Learning Office can help with ideas for projects.

For more information about the International Development Fair and the International Development Network, please visit our Website web.mit.edu/idf or e-mail us at ids-contact@mit.edu.

M.I.T. Numbers

U. S. News Ranking for National Universities (1998-2007)

