LETTERS

edited by Etta Kavanagh

Difficulties for Foreign Scientists in Coming to the United States

THE RECENT EDITORIAL "THE HIGH COST OF COMING TO AMERICA" BY A. TEICH and W. D. White (5 May, p. 657) calls attention to the humiliating and unjustifiable treatment of distinguished scientists such as Goverdhan Mehta in the Visas Mantis program.

"It is in the [U.S.] national interest **to find a more favorable balance between regulations** that aim to exclude terrorists and the need to rally the best of the international scientific community to meet pressing challenges."

—D'Elia ***et al.***

The Visas Mantis program is just the tip of a larger iceberg involving not only the U.S. Department of State, but also the U.S. Citizenship and Immigration Services (USCIS) of the Department of Homeland Security. In January 2006, Secretaries Rice (State) and Chertoff (Homeland Security) announced an initiative ("Secure Borders and Open Doors in the Information Age") to correct and improve U.S. performance in balancing security and openness. But hearings before the House Committee on Government Reform in April 2006 showed how bad this balance is, largely because of cumbersome administrative processes in the hands of too few, inadequately trained consular staff (*1*). High-profile incidents such as that suffered by Mehta are too often repeated with less distinguished but vitally needed foreign scientists and technologists. The reforms proposed by Rice and Chertoff need to be put in place with a greater sense of urgency than is apparent.

The collateral costs of these failing visa and immigration policies are substantive. Universities have had to increase the resources allocated for international student services and are now burdened with extensive, unfunded reporting requirements such as the Student and Exchange Visitor Information System (SEVIS). The United States risks losing its market share in an "industry" (higher education) in which it has been a world leader and accrues substantial opportunity costs as it fails to attract and retain the needed international scientific talent that it used to take for granted.

It is in the national interest to find a more favorable balance between regulations that aim to exclude terrorists and the need to rally the best of the international scientific community to meet pressing challenges.

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Reference

1. Testimony of Jess T. Ford of the U.S. General Accouting Office before the House Committee on Government Reform, 4 April 2006 (available at http://reform.house.gov/UploadedFiles/GAO%20-%20Ford%20Visa%20Testimony.pdf).

Bridging the Divide or Deepening It?

IN "BRIDGING THE DIVIDE IN THE HOLY LAND" (News Focus, 21 Apr., p. 352), J. Bohannon discusses his view of how Israeli and Palestinian scientists are working together within the frame of the Israeli-Palestinian Scientific Organization (IPSO). The article ends on an optimistic note, with the Palestinian scientist Mukhles Sowwan stating that "science is a universal language, like music. It can make people understand each other."

In a section of the article subtitled "Where collaboration is a dirty word," mention is made of "one Israeli professor," who "railed" against the IPSO program. The unnamed professor is the signatory of this letter. I am also cited as stating that the program is "dangerous" and "playing into the hands of terrorists." This information has no factual basis. It is correct that I expressed my opposition to the launching of IPSO under the present circumstances in a letter to Menahem Yaari, Deputy Chairperson of the Executive Council of IPSO and one of the founders of the organization. The reason for my opposition was the partisan character of the organization, which drew support, on the Israeli side, exclusively from persons of a political orientation unabashedly critical of the policies of recent Israeli governments toward the Palestinians. At the very least, I would have expected Yaari to encourage Bohannon to read my letter and Bohannon to contact me in person and enable me to present my arguments directly to him and not by proxy.

As for the text, cited statements, and pictorial material figuring in the article, many of these are not "facts" but markedly biased political declarations, representing exclusively the Palestinian view and, again, that of one extreme pole of political opinion in Israel, referred to above.

The aerial picture of the "security barrier" and the associated text (box on p. 354) do not explain that the barrier was an option forced on Israel by the grim reality of the killing and maiming of innocents by Palestinian terrorists. A juxtaposed picture of the horror on the streets of Tel Aviv or Jerusalem after one of the bomb attacks (not "bomb plots") would, perhaps, have been appropriate. The building of the barrier has the support of the overwhelming majority of the Israeli electorate, and the highly respected Israeli Supreme Court of Justice is dealing with every complaint concerning the barrier, whether submitted by Palestinians or Israelis. The claims (unproven) that the barrier is depriving Palestinians of water and blocking animal migration

must be weighed against its (proven) life-saving effects.

On page 356, readers are shown Viveca Hazboun in front of her clinic, which is said to have been destroyed by Israeli artillery fire. Assuming that the facts are correct, don't the readers of *Science* deserve to be fairly informed about the background to the shelling? There is a war in the Holy Land and civilians, as innocent as Hazboun, were victims of Palestinian sniper fire. Thus, any description of the unfortunate results of warfare should be presented in the context of the events having led to these results.

I think that Sowwan got cause and effect in the wrong order: "People must understand each other first; then they can do science and play music together."

EDGAR PICK

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Scientific Activity Should Have No Borders

BOHANNON'S WELL-RESEARCHED AND BALanced article "Bridging the divide in the Holy Land" (News Focus, 21 Apr., p. 352) might be criticized by some as "political activism," but it is an excellent example of scientific activism. He takes on a host of controversial issues: terrorism, the human right to move freely, environmental degradation, and barriers to scientific collaboration. In these days of debates on borders that impede the free movement of people—the U.S.-Mexican border, the European Union–African maritime borders, and the Israeli-Palestinian separation wall—Bohannon reminds us that science is an international activity that knows and should know no border.

Scientists understand the importance of the free flow of ideas, knowledge, and professionals. When scientific collaboration is seen as enemy collaborationism, science is losing against confrontational politics. While the battle against terrorism is of great importance, walls and barriers are against the essence of science.

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Reexamining Fusion Power

FOR THE REASONS GIVEN IN W. E. PARKINS'S Policy Forum "Fusion power: will it ever come?" (10 Mar., p. 1380), interest from the utility companies in hot fusion is nonexistent and will probably remain so for the foreseeable future. No utility company would even consider either of the two hot fusion concepts—the tokamak or inertial. The reasons are fundamental and cannot be remedied by any known materials or design.

We have reviewed the National Research Council Burning Plasma Science Assessment Committee papers of 2002 and 2003 (*1*) to see whether the rough plant design estimates presented by Parkins remain valid. In recent years, the fusion community has been very innovative in condensing the proposed burning plasma experiment, but seems to have given little consideration to the practical engineering and economics of the unique heat conversion and maintenance systems of a full-scale demonstration plant, which are the core of Parkins's criticisms. The size caused by the unique heat transfer limitations of the concepts calls for a huge lump capital investment beyond the risk level of any utility system. Most of the output energy is in the form of 14-Mev neutrons, which means that the bulk of available energy is in the blanket material and structure. Such bombardment will eventually cause intolerable neutron damage in any blanket and structural material, and induce radioactivity in almost every part of the internal structure. Thus, long-life maintenance becomes essential but impractical, especially with the huge blanket required. Even in the present commercial fission plants, "hot" maintenance creates a heavy manpower burden with the limited exposure personnel are permitted. The concepts require vacuum-tight containment, but vacuum maintenance in large structures requires constant pumping and leak repair.

The electric utilities' first priorities are the economic and operating problems they must solve in commercial fission plants. Any concept that multiplies these difficulties gets a cold reception. The lack of operating utility interest in today's hot fusion concepts is a reality that is not likely to change in the foreseeable future.

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Reference

1. Included in the Department of Energy Budget Requests for Fusion Energy Sciences, 2003 and 2004 (www.ofes.fusion.doe.gov/FusionDocs.html).

ALTHOUGH ONE MAY CRITICIZE THE LATE W. E. Parkins for using dated information in his Policy Forum "Fusion power: will it ever come?" (10 Mar., p. 1380), the general spirit of his comments still rings true. The tokamak confinement concept became the front-runner in 1968 after the Soviets found high electron temperatures in one of their experiments. The result was that all of the fusion eggs were thrown into the tokamak basket and the search for more attractive concepts declined worldwide. U.S. fusion funding levels, now about 1.5 IWDs ["Iraq War Days," a unit of currency equal to the amount the United States spends in Iraq in one day (about $190 million)], does not permit exploration of innovations at the level required. If this were increased to, say, 4 to 5 IWDs, then I believe we would be able to find fusion concepts that are tolerably compact and have attractive (e.g., axisymmetric) geometry, acceptable recirculating power, decently high fusion power density, magnetic fields that are realizable at large scale, and a cost-effective means for blanket change-out and refurbishing. Perhaps if we could get the military-industrial complex and their lobbyist colleagues behind us, such funding would be forthcoming.

ROBERT BOURQUE

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IT IS NOT CLEAR WHY *SCIENCE* HAS CHOSEN TO publish a reiteration of arguments against the development of fusion power ("Fusion power: will it ever come?", W. E. Parkins, Policy Forum, 10 Mar., p. 1380) that were already shown to be wrong when the author first published them in 1997 (*1*). There have been no new developments since then that have made the arguments that were wrong then valid now or that have removed the need for a sustainable energy option. What is new since 1997 is a thorough European study of the prospective fusion power plants, addressing safety and environmental impact, economics, and development needs (*2*). The points raised by Parkins are fully answered in this study.

Internal components of the fusion reactor will indeed have to be periodically replaced by remote maintenance, while the vacuum vessel and the magnets are designed for the lifetime of the reactor. Maintaining vacuum integrity in a large toroidal system—flagged as an insurmountable problem by Parkins—is in fact already demonstrated in many large fusion devices. The projected cost of fusion electricity is comparable to other sustainable energy technologies.

On 24 May, China, India, South Korea, Japan, the Russian Federation, the United

Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 6 months or issues of general interest. They can be submitted through the Web (www.submit2science.org) or by regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

States, and the EU signed the agreement to build the international fusion experiment ITER, which will demonstrate 10-fold power multiplication in a fusion reactor, at the 500-MW power level. Parallel to ITER, a technology and materials program is being mounted, so that soon after ITER is built, physics and technology can be combined into a demonstration reactor. As European and U.S. studies have shown, fusion could deliver electricity to the grid in 30 to 35 years.

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Auxin Signaling in Plant Defense

IN THEIR REPORT "A PLANT MIRNA CONTRIBUTES to antibacterial resistance by repressing auxin signaling" (21 Apr., p. 436), L. Navarro *et al*. demonstrate a link between auxin signaling in plants and resistance to bacterial pathogens. As part of a plant-induced immune response, bacterial pathogen-associated molecular pattern (PAMP) recognition down-regulates auxin signaling in *Arabidopsis* by targeting auxin receptor transcripts. These results indicate that decreasing plant auxin signaling can increase resistance to bacterial pathogens; Navarro *et al*. also showed that exogenous application of auxin enhances susceptibility to the bacterial pathogen.

We note that auxins, as exemplified by indole-3-acetic acid (IAA), can also have a direct effect on pathogen survival and its resistance to plant defense. Some microorganisms, independent of their ability to produce IAA, use auxin as a signaling molecule. For example, IAA can act as a signaling molecule in microorganisms such as *Azospirillum brasilense* (*1*, *2*), *Escherichia coli* (*3*), *Agrobacterium* (*4*), and even yeast (*5*). It can induce the expression of genes related to survival under stress conditions in *E. coli* (*3*). Furthermore, a knockout *A. brasilense* mutant with decreased IAA production is strongly impaired in stationary phase survival (*6*). Consistently, *E. coli* cells treated with IAA survive substantially longer than untreated cells (*3*).

These findings shed new light on IAA and its role as a signaling molecule.

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Women Science Faculty at MIT

A QUOTE FROM ME IN AN ARTICLE BY A. LAWLER ("Progress on hiring women science faculty members stalls at MIT," News of the Week, 21 Apr., p. 347) may have left an incorrect impression about tenure rates for female versus male faculty in the School of Science at the Massachusetts Institute of Technology (MIT). Over many years, women faculty in the school have received tenure at the same rate as men. The reason that the number of women faculty in science at MIT did not increase from 2001 to 2005, following a rapid increase from 1997 to 2000, was due to normal attrition rates combined with a difference in the rate of hiring. In the 3-year period between 1997 and 2000, women were hired at a rate of nearly four per year among the six departments in the School of Science; in contrast, in the 5 years from 2001 to 2005, women were hired at a rate of about two per year.

A further correction to the article is in the number of women joining the MIT faculty in the two 5-year periods before and after 2000: 15 joined between 1996 and 2000, and 11 joined between 2001 and 2005, not 13 and 12, as stated in the article.

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Clarifying Cancer Mortality Rates

YOUR ISSUE ON THE STATE OF CANCER RESEARCH (Special Section: Cancer treatment gets personal, 26 May) uses an incomplete reading of cancer trend statistics to support a misleading conclusion on the progress made in cancer mortality. In H. Varmus's Perspective "The new era in cancer research" (p. 1162) and in the Introduction (p. 1157), it is noted that cancer mortality rates today are very close to where

they were 50 years ago.

In fact, death rates from cancer have changed dramatically over the past 50 years. Age-standardized death rates (deaths per 100,000 population) from cancer increased from 195.4 in 1950 to 215.1 in 1991, primarily because of increases in smoking-related cancers, particularly lung cancer. In the early 1990s, reductions in smoking as well as advances in treatment and early detection led to a drop of about 1% per year in the overall mortality rate, which brought the rate back to 190.1 by 2003. That same year, the number of actual cancer deaths dropped for the first time since mortality record-keeping was instituted in 1930, as the decreasing mortality rate overtook population factors that have obscured the progress made.

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TECHNICAL COMMENT ABSTRACTS

COMMENT ON "Ongoing Adaptive Evolution of *ASPM*, a Brain Size Determinant in *Homo sapiens*" and "*Microcephalin*, a Gene Regulating Brain Size, Continues to Evolve Adaptively in Humans"

Mathias Currat, Laurent Excoffier, Wayne Maddison, Sarah P. Otto, Nicolas Ray, Michael C. Whitlock, Sam Yeaman

Mekel-Bobrov *et al*. and Evans *et al*. (Reports, 9 Sept. 2005, p. 1720 and p. 1717, respectively) examined sequence data from modern humans within two gene regions associated with brain development, *ASPM* and *microcephalin*, and concluded that selection of these genes must be ongoing. We show that models of human history that include both population growth and spatial structure can generate the observed patterns without selection.

Full text at www.sciencemag.org/cgi/content/full/313/5784/172a

RESPONSE TO COMMENT ON "Ongoing Adaptive Evolution of *ASPM*, a Brain Size Determinant in *Homo sapiens*" and "*Microcephalin*, a Gene Regulating Brain Size, Continues to Evolve Adaptively in Humans"

Nitzan Mekel-Bobrov, Patrick D. Evans, Sandra L. Gilbert, Eric J. Vallender, Richard R. Hudson, Bruce T. Lahn

Currat *et al.* present computer simulations to argue that the haplotype structure found at the *microcephalin* and *ASPM* genes can be better explained by demographic history rather than by selection. The demographic models they adopt, however, strongly contradict a decade of empirical research on human demographic history and do not account for the critical features of the data on which our argument for selection was based.

Full text at www.sciencemag.org/cgi/content/full/313/5784/172b