

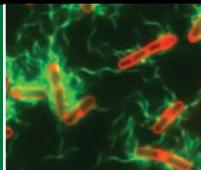
Metaphysics for
creativity

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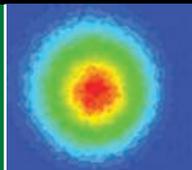
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LETTERS

edited by Jennifer Sills

Environmental Revolution Starts at Home

THE TITLE OF J. LIU AND J. DIAMOND'S POLICY FORUM, "REVOLUTIONIZING CHINA'S ENVIRONMENTAL PROTECTION" (4 January, p. 37), implies a novel solution to China's environmental problems, but suggesting that China must reform its environmental governance is nothing new (1). What's more, criticizing a nation because economic performance is still its main criterion for choosing government leaders hardly seems fair. What criterion guides U.S. national leadership? If the U.S. economy appears greener than China's—and less pollution and greenhouse gases are indeed generated per dollar of U.S. GDP—this is only because the United States has exported the "dirty" industries that produce most of what it consumes to China and other nations that need hard currency from abroad to develop their economies.

China's environmental failings reflect the same basic challenge faced by all governments: how to enforce environmental regulations when these conflict with economic development. Even Liu and Diamond admit that China's government has already attempted to couple environmental performance with governance and has a plethora of environmental regulations on the books. The main problem seems to be an inability to enforce most of these in the face of overwhelming economic pressures.

The reason that China has dramatic environmental problems is not a mystery. China's once small economy is booming, moving large numbers of people into a modern consumer life-style. Given that this development is linked to the expansion of China's industry and energy use, as it has been everywhere else, and that a large share of this is dedicated to manufacturing what the rest of the world consumes, those busy consuming the fruits of all of this industrial production should share some of the responsibility for the environmental results.

This would indeed be a revolution: finding a way to make consumers pay for the environmental costs of their consumption, even when they are incurred on the other side of the world. In a globalized economy, the environmental revolution ought to begin at home.

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Reference

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A Graduate Student Oath

THE HIPPOCRATIC OATH, RECITED BY MEDICAL school graduates worldwide, is arguably the best-known professional honor code. This centuries-old oath instills a commitment to altruism, professionalism, honesty, skill, knowledge, duty, loyalty, and fraternity among medical doctors. The positive impact of the Hippocratic Oath has inspired other professional oaths, notably in schools of pharmacy, dentistry, engineering, physical therapy, veterinary medicine, osteopathy, and law.

The realities of the nuclear age, more frequent acts of bioterrorism, and biotechnological advances such as cloning and stem cells have fueled a call for a similar oath tailored to

biomedical scientists that would encourage awareness and discussion of the social and moral responsibilities of students in the life sciences (1–4). At the Institute of Medical Science (IMS), Faculty of Medicine, University of Toronto, as elsewhere, there is rising recognition of the potential for academic misconduct, in part due to the computer and Internet age, in which there is free access to and exchange of information derived from anonymous sources. Another factor is the increasingly competitive nature and "pressure cooker" milieu of scientific training programs due to the pace of scientific progress. Finally, there is the perception that current students take plagiarism, misrepresentation of facts, and scientific fraud less gravely than did previous generations of

scientists. Clearly, the time is ripe to consider improved strategies for instilling basic values about acceptable and expected behavior (5, 6).

We created an oath to be recited voluntarily at the first meeting of each year's new graduate student body in IMS. We specifically chose to hold the oath ceremony at the entry point to graduate studies rather than at graduation day in order to introduce students to these concepts early. In constructing our oath, we took a simple but holistic approach to emphasize three aspects of scientific training at the graduate level: community, professionalism, and ethical conduct, through declarations of pride, integrity, and pursuit. The text of the Institute of Medical Science Graduate Student Oath follows.

Smog in Shanghai. Pollution in countries such as China is due in part to the outsourcing of "dirty" industries by countries such as the United States.



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CREDIT: KEN SILLS

"I, [NAME], have entered the serious pursuit of new knowledge as a member of the community of graduate students at the University of Toronto.

"I declare the following:

"Pride: I solemnly declare my pride in belonging to the international community of research scholars.

"Integrity: I promise never to allow financial gain, competitiveness, or ambition cloud my judgment in the conduct of ethical research and scholarship.

"Pursuit: I will pursue knowledge and create knowledge for the greater good, but never to the detriment of colleagues, supervisors, research subjects or the international community of scholars of which I am now a member.

"By pronouncing this Graduate Student Oath, I affirm my commitment to professional conduct and to abide by the principles of ethical conduct and research policies as set out by the University of Toronto."

Our inaugural oath ceremony was held in 2007. We felt it was essential to provide each

student with a booklet of information and a personal copy of the oath. The Oath Booklet contained the oath and its purpose; excerpts and Web references to various university codes and policies governing student and ethical conduct; the Canadian Tri-Council policy statement on integrity in research and scholarship; and a reproduction of a speech on science and society by Canadian Nobel Prize recipient John Polanyi (7).

To enhance and solidify the ideals embodied in the initiation oath, we also have infused the IMS graduate training program with additional information provided in a variety of formats. For example, currently, our first-year students attend a mandatory seminar course that includes lecture material on issues of scientific misconduct, including plagiarism. In addition, each new student is required to complete the NIH (8) or Canadian Tri-Council (9) online course on ethics.

We propose that a graduate student oath should constitute a standard requirement of life science graduate programs. This oath

should be the cornerstone of a programmatic series of information modules addressing issues of community, professionalism, and ethical conduct provided by the graduate department and reinforced throughout the student's training by their faculty mentor.

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5. N. H. Steneck, *Sci. Eng. Ethics* **12**, 53 (2006).
6. B. Glass, *Science* **150**, 1254 (1965).
7. J. Polanyi, "Science, ethics, and human destiny," speech given at the 1999 Couchiching Institute on Public Affairs Conference, 6 August 1999; www.utoronto.ca/jpolanyi/public_affairs/.
8. NIH Office of Extramural Research, Protecting Human Research Participants (PHRP) course; <http://phrp.nihtraining.com/users/login.php>.
9. Canadian Institutes of Health Research, the Social Science and Humanities Research Council of Canada, and the Natural Sciences and Engineering Research Council of Canada, Introductory Tutorial for the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS); www.pre.ethics.gc.ca/english/tutorial/welcome.cfm.
10. We thank S. Pfeiffer, Dean of Graduate Studies, for an inspirational address at the oath ceremony and M. Liu for encouragement.

CORRECTIONS AND CLARIFICATIONS

Special Issue on Microbial Ecology: News: "Confusing kinships" by J. Bohannon (23 May, p. 1031). David Ward was incorrectly associated with studies of microbial ecotypes in Israel. He studies ecotypes in Yellowstone National Park. Also, the *Bacillus simplex* ecospecies *Graminifolius* should be *Graminiphilus* in both the caption and text on p. 1033.

Reports: "The antidepressant fluoxetine restores plasticity in the adult visual cortex" by J. F. Maya Vetencourt *et al.* (18 April, p. 385). The list of supporting online material (SOM) was omitted from the end of the paper. The SOM contains Materials and Methods, figs. S1 to S7, and References. It is available at www.sciencemag.org/cgi/content/full/320/5874/385/DC1.

Perspectives: "Zooming into live cells" by F. Pinaud and M. Dahan (11 April, p. 187). In the credit for the image on the bottom of page 188, the name was misspelled. The credit should have been "Adapted from an image by Graham Johnson." The same credit should have accompanied the image on page 147 of the Table of Contents.

Perspectives: "Titan's hidden ocean" by C. Sotin and G. Tobie (21 March, p. 1629). Titan's obliquity is 0.3°, not 3°.

Perspectives: "The new diamond age?" by P. W. May (14 March, p. 1490). The largest single-crystal diamond substrates supplied by Element Six are 5 mm by 5 mm, not 5 μm by 5 μm.

Reports: "Hybrid neurons in a microRNA mutant are putative evolutionary intermediates in insect CO₂ sensory systems" by P. Cayirlioglu *et al.* (29 February, p. 1256). The introductory paragraph incorrectly stated that CO₂ neurons in the tsetse fly are located in the maxillary palps. They are found in the antennae.

TECHNICAL COMMENT ABSTRACTS

COMMENT ON "Athabasca Valles, Mars: A Lava-Draped Channel System"

David P. Page

Jaeger *et al.* (Reports, 21 September 2007, p. 1709) presented images of the Athabasca Valles channel system on Mars and asserted that the observed deposits are composed of thin, fluid lavas. However, all the features they described are secondary and postdate the surface by many millions of years, as documented by structural relationships with small, young impact craters.

Full text at www.sciencemag.org/cgi/content/full/320/5883/1588b

RESPONSE TO COMMENT ON "Athabasca Valles, Mars: A Lava-Draped Channel System"

W. L. Jaeger, L. P. Keszthelyi, A. S. McEwen, T. N. Titus, C. M. Dundas, P. S. Russell

The recent geologic history of Athabasca Valles, Mars, is controversial. Some studies report ice-rich sediment in its channels, whereas others find only lava. Data from the High-Resolution Imaging Science Experiment camera now confirm that, although certain features exhibit a superficial similarity to ice-related landforms, solidified lava coats the entire channel system.

Full text at www.sciencemag.org/cgi/content/full/320/5883/1588c

Prized Programs Need Both Eyes and Ears

IN THE ONLINE NEWS STORY "PLAY IT AGAIN, robot" (21 March, Gonzo Scientist series, www.sciencemag.org/sciext/gonzoscientist/), J. Bohannon imprecisely described the Turing test as a chat-only test. In his seminal article "Computing machinery and intelligence" (1), Turing used the term "imitation game." He then stated, in reference to computer memory requirements, "I should be surprised if more than 10⁹ was required for satisfactory playing of the imitation game, at any rate against a blind man." Presumably, the requirements for playing against a blind man would be different from the requirements for playing against a sighted person in that the game against a sighted person would permit the use of images. At the conclusion of the article, discussing how the computer can be programmed to pass the imitation game, Turing wrote, "It can also be maintained that it is best

to provide the machine with the best sense organs that money can buy, and then teach it to understand and speak English. This process could follow the normal teaching of a child. Things would be pointed out and named, etc.”

In keeping with Turing's broad intention, I have required that in order to win The Loebner Prize Gold Medal and \$100,000, the program must be able to “intelligently” discuss audio and visual input.

HUGH LOEBNER

Sponsor, The Loebner Prize for Artificial Intelligence, New York, NY 10025, USA.

Reference

1. A. M. Turing, *Mind* **59**, 433 (1950).

Giving Samoan Healers Credit for Prostratin

THE UNIQUE ABILITY OF PROSTRATIN TO ACTIVATE latent viral reservoirs while protecting healthy cells from infection makes it of particular interest as a possible adjuvant therapy for HIV/AIDS (1). In an effort to provide a short-term supply of prostratin for future Phase II clinical trials, the Government of Samoa is attempting wide-scale cultivation of *Homalanthus*

nutans. However, the highest-yielding genotype we have found produces a maximum of 52 grams of prostratin per metric ton of wood (2). The partnership between Samoa and University of California, Berkeley, to identify genes responsible for prostratin biosynthesis and to insert them into a prokaryote may eventually provide a low-cost source (3).

The elegant synthesis of prostratin and structural analogs in gram quantities by Wender, Kee, and Warrington (“Practical synthesis of prostratin, DPP, and their analogs, adjuvant leads against latent HIV,” Reports, 2 May, p. 649) is a major step forward. Synthesis of analogs, however, raises interesting issues concerning indigenous intellectual property rights. Because knowledge of prostratin's antiviral activity originated from ethnobotanical studies with Samoan healers, the AIDS Research Alliance (ARA) and the Government of Samoa agreed that 20 percent of ARA's profit from prostratin will be returned to the Samoan people (4). Similarly, Samoa and the University of California, Berkeley, agreed to share equally in commercialization of the prostratin gene sequences (5). In the spirit of these previous agreements, we encourage

future developers of prostratin analogs for antiviral therapy to negotiate fair and equitable benefits with the Samoan people.

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Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 3 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.



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