A Unified Definition of Biosecurity

CHRISTOPHER F. CHYBA RIGHTLY CONCLUDES in his Editorial that national security strategies need to incorporate the concept of biological security ("Biological security in a changed world," 28 Sept., p. 2349). However, his focus on the public health impacts of biological weapons and infectious diseases is too narrow. The risks of "biological harm" extend to a wide range of sectors (*1, 2*).

Biological security or "biosecurity" has a long history in U.S. agriculture and in this context refers to those measures designed to decrease the transmission of infectious diseases in agriculture and livestock (*3*). Other countries apply this concept across both the economic and environmental sectors; for example, New Zealand implemented a Biosecurity Act in 1993 and enacted subsequent legislation to manage biological threats to agriculture, horticulture, forestry, and the country's unique biota (*4*). More recently, the international community expanded the definition of biosecurity to address threats posed to the economy, the environment, and human health by introduced organisms (*1*). Thus, "biosecurity" could cover strategies to assess and manage the risks of infectious diseases, quarantined pests, invasive alien species, living modified organisms, and biological weapons.

> "The risks of 'biological harm' extend [beyond public health impacts of biological weapons and infectious diseases] to a wide range of sectors."

Implementing a biosecurity strategy under such a comprehensive umbrella is not untenable technically, financially, or politically. We assert that opportunities exist because many of these problems are subsets of the issue of invasive alien species. Furthermore, minimizing the risk of any foreign biological organism requires the same initial lines of defense (prevention, early detection, and rapid response) and coordination across governments and other institutions at all levels.

In the wake of the events of 11 September 2001, it is likely that substantial financial and technical resources will be applied to combat bioterrorism. Leveraging limited resources and improving coordination under a comprehensive biosecurity system could streamline U.S. programs, reduce redundancy in efforts, and ensure that "homeland security" is without gaps.

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References and Notes
1. J. A. McNeely *et al.*, Eds., *Global Strategy on Invasive Alien Species* (IUCN, Cambridge, UK, in collaboration with the Global Invasive Species Program, 2001).
2. Secretariat of the Convention on Biological Diversity, *Cartagena Protocol on Biosafety to the Convention on Biological Diversity: Text and Annexes* (Secretariat on the Convention on Biological Diversity, Montreal, 2000).
3. F. P. Horn, R. G. Breeze, *Ann. N.Y. Acad. Sci.* **894**, 9 (1999).
4. New Zealand Public Act No. 95, RS Vol. 38, p. 139 (1993).

Response

IN MY EDITORIAL, I ADVOCATED A STRATEGY OF biological security that went beyond analogies to nuclear or chemical weapons of mass destruction. Biological security, I argued, must build on those public health steps that are also needed to meet the challenge of infectious diseases and should include domestic and international components. Although these arguments were made before the anthrax attacks within the United States, those attacks only emphasize the need for a comprehensive strategy to combat bioterrorism.

The comments of Meyerson and Reaser seem consistent with mine. However, the meaning of the "comprehensive biosecurity system" that they advocate should be clarified, and to their list of biological concerns I would add the threat of agricultural terrorism.

Stanford University's Center for International Security and Cooperation hosted a conference, "Global Infectious Disease Surveillance, Biological Terrorism, and International Security," in May 2001 to discuss appropriate responses to a number of these threats, including terrorist threats to crops and livestock (*1*). Readers interested in the ethical issues posed by a number of contemporary biological technologies may find introductions in (*2*).

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References and Notes
1. See http://www.stanford.edu/%7Echyba/bioterrorism_and_disease/
2. R. Chadwick, Ed., *The Concise Encyclopedia of the Ethics of New Technologies* (Academic Press, New York, 2001).

Graduate Student Unions

THE RANDOM SAMPLES ITEM "UNION MOVES shake two campuses" (7 Dec., p. 2087) describes a 2-day strike by graduate students at my university, the University of Illinois, Urbana-Champaign (UIUC). However, use of the word "shake" is rather misleading, given the number of students who participated. Out of my fellow 5000 graduate students, there were no more than 50 people demonstrating at any one time, and many of those were outside community members and national union leaders. UIUC continues to strive to be a world leader in facilities and research, but this will be significantly hindered by the presence of a union that apparently only ~1% of graduate students on campus support. UIUC already has mechanisms in place to work on behalf of graduate students for higher pay, better benefits, and clearer grievance procedures. Our Graduate Employees' Organization will not release their membership numbers on campus nor their funding sources. Until there is full disclosure of members and funding, it is hard to believe that the organization is truly working for graduate students on this campus.

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Successes of Newborn Screening Programs

IN "FAST TECHNOLOGY DRIVES NEW WORLD OF newborn screening" (News Focus, 14 Dec., p. 2272), E. Marshall highlights some recent technical advances in the field and discusses some of the challenges to the implementation of expanded newborn screening for universal population-based programs. However, Marshall focuses on the problems and misses opportunities to highlight the successful implementation of these and other new technologies by state-associated screening programs. Also, Marshall inaccurately describes the novel protocol approved by an Internal Review Board that was adopted in Massachusetts to allow universal population-based "testing and reporting" of two sets of disorders for which the "spectrum of disease" and the "spectrum of post-intervention clinical outcomes" are just beginning to be understood.

It is correct that the pilot protocols make it possible for more than 97% of babies born in Massachusetts since February 1999 to have been screened for an expanded panel of disorders (for 30 conditions, not 11, as suggested by the figure on p. 2274). The purpose of the pilot protocols is twofold: first, to ensure

that every baby born in Massachusetts (not just those born to families who could afford supplemental testing) would have the opportunity to access screening services beyond the 10 disorders for which all babies were already screened on a mandatory basis, and, second, to evaluate the efficacy of newborn screening and early intervention for a particular set of 20 disorders (*1*).

The statement that parents "aren't asked for consent" for entering these pilot studies is not correct. The Human Subjects Committees that reviewed the protocols determined that the pilot screening constituted a "human research study" requiring informed consent. These committees accepted an alternative mechanism (verbal consent) conditional to a protocol in which the nurses ask all parents for their decisions about participation in the pilots after parents have been informed about the pilots through a brochure (see also http://www.umassmed.edu/nbs/).

Marshall also says that Massachusetts "gathers more data than it reports, informing parents only of disorders that are considered treatable," implying that the New England Newborn Screening Program (NENSP) withholds testing results on babies with untreatable disorders. This is not true. In Massachusetts, every out-of-range result is reported to the specific healthcare provider for the baby. This is true for results of both mandated and pilot tests, and indeed, for the pilot tests, this reporting is a requirement of the Human Subjects Committees.

The article focuses on metabolic disorders detectable by tandem mass spectrometry, but Marshall briefly mentions screening for cystic fibrosis [which was first implemented in the United States by Colorado and Wisconsin (*2*)]. Therefore, we also note that the second pilot study in Massachusetts provides for cystic fibrosis screening on the same blood sample. To our knowledge, ours was the first program to include DNA analysis for 27 mutations on all babies with elevated immunoreactive trypsinogen screens. Genetic counseling is incorporated into the protocol.

Finally, as Marshall mentions, the NENSP provides testing services for states other than Massachusetts. Maine now offers the same expanded list of metabolic tests as Massachusetts (bringing their total number to 28 disorders, not 9). Indications are that other New England states will avail themselves of our expanded testing capabilities shortly.

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1. K. Atkinson *et al.*, *Public Health Rep.*, in press.
2. K. B. Hammond, S. H. Abman, R. J. Sokol, F. J. Accurso, *N. Engl. J. Med.* **325**, 769 (1991); P. M. Farrell, R. A. Aronson, G. Hoffman, R. H. Laessig, *Wis. Med. J.* **93**, 415 (1994).

Response

THE FIGURE MENTIONED BY COMEAU AND Eaton on page 2274 of my article is a summary of mandated state programs, not pilot research efforts like those offered in Massachusetts and Maine. Although Massachusetts has an excellent process for informing parents about newborn screening, it does not obtain signed consent as Maryland does. I regret any suggestion that Massachusetts withholds important data from parents.

ELIOT MARSHALL

CORRECTIONS AND CLARIFICATIONS

BREVIA: "Miniature genome in the marine chordate *Oikopleura dioica*" by H.-C. Seo *et al.* (21 Dec., p. 2506). In the affiliations list, the name "Sars" of the Sars Centre for Marine Molecular Biology in Bergen, Norway, was misspelled.