LETTERS

edited by Etta Kavanagh

Balancing Communication and Safety

DEMOCRATIC SOCIETIES ARE NOW ENGAGED AGAINST TERRORIST ACTIVITIES. In such an environment, there is tension between the desire to withhold scientific information from those who would use it for ill and the need to not stifle fundamental research in the life sciences or the open communication of results. To inhibit the pursuit of science may suggest safety from those prepared to use science for harmful purposes, but any sense of security is false. Freedom for research and communication is more necessary than ever, and the best defense against those who would employ science as a weapon is scientific excellence. There will inevitably be worldwide communication of the results of scientific studies, but open communication is vital to peer review and an independent evaluation of research, including oversight by the executive and legislative branches of government as well as the public. Open communication is also essential for public-health and public-safety planning, for the robust growth of business and technology, and for research that will be beneficial for society. Such openness is additionally necessary for the development of countermeasures against sinister applications of science. Preventing publication, even if that could be accomplished, will not prevent the misuse of science because sanctions will not deter those who have a malevolent intent. Secrecy instead poses the danger of enforced ignorance.

"Freedom for research and communication is more necessary than ever…"
—Ehrlich

The life-sciences community has generally garnered public trust. To ensure the continued success of the scientific enterprise, it is critical to maintain and further that trust against the possibility of public misunderstanding, particularly in an ever-changing scientific and political environment. To preserve their credibility, members of the scientific community must remain sensitive to the potential that information could be misused by individuals and communities to endanger public safety and health or otherwise jeopardize national security; continuing education and responsible engagement in the wider body politic are required.

Life scientists enjoy a virtually unrestricted exchange of information; shared information has been a safeguard and a cornerstone. But legitimate threats to our national security necessitate that there be appropriate oversight of scientific research and publication. Restraints of the kind set forth by President Reagan in National Security Decision Directive (NSDD) 189 (*1*) are fit. However, perfect regulation is impossible because it assumes perfect compliance. While the scientific community continues to accept responsibility for principled research and communication, and regulation as a management tool, the public and the government must recognize that true national security requires scientific accomplishment and that scientific excellence requires the open communication of research and results. **SUSAN A. EHRLICH***

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*The views expressed are the author's alone.

Reference

1. Available at www.fas.org/irp/offdocs/nsdd/nsdd-189.htm.

Glossing Over the Complexity of Water

ALTHOUGH WE APPLAUD THE RECOGNITION GIVEN BY *Science* to Freshwater Resources, the recent Special Section (25 Aug., pp. 1067–1090) missed an opportunity to highlight the multifaceted nature of water resources research. Framing "the" water problem as a search to quench a universal thirst ("A thirsty world") glosses over critical differences in the causes of, and thus the solutions to, water problems across regions. It forces the discussion into the domains of supply augmentation and engineering and marginalizes underlying drivers of "thirst" such as rapid urbanization, economic transitions, geopolitical factors, or poverty.

Lack of access to water in many African countries, for example, is less the outcome of a first-order water scarcity than of a second-order scarcity of social resources (*1*). As the News story "Running out of water—and time" (J. Bohannon, p. 1085) suggests, Gaza suffers at least as much from geopolitical factors that inhibit access to money and nearby water as from the "environmental problem" of "running out of water." Water transfers or desalination help overcome local/regional scarcity, but with important environmental, social, and economic costs ("Going against the flow," R. Stone, H. Jia, News Focus, p. 1034; "Desalination freshens up," R. F. Service, News, p. 1088). For example, Israel's water management is becoming "sustainable" ("Seeking sustainability: Israel's evolving water management strategy," A. Tal, Perspective, p. 1081) only from a narrow technical perspective that treats as exogenous the growth in its arid south and neglects the environmental and third-party impacts of overexploiting the Jordan River. First-order scarcity metrics ("Global hydrological cycles and world water resources," T. Oki, S. Kanae, Review, p. 1068), especially global ones, overlook such specificities and are of limited policy use.

The interdisciplinary water research community has shifted its attention to context-specific and proactive approaches such as watershed management, ecological engineering, demand management, reallocation, and collaborative/adaptive planning (*2*). We understand that the Special Section was not meant to be an exhaustive review of freshwater issues. But institutional, political, and economic options deserve more than cursory mention in *Science*, since it is primarily these, rather than technical fixes alone, that "offer a measure of hope for the future" ("A thirsty world," J. Yeston *et al.*, p. 1067).

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2. P. H. Gleick, *Water Int.* **25**, 127 (2000).
3. The Letter was written with input from the ERG Water Group.

Mitochondrial DNA and Population Size

IN THEIR REPORT "POPULATION SIZE DOES NOT influence mitochondrial genetic diversity in animals" (28 Apr., p. 570), E. Bazin *et al.* present compelling evidence that selective sweeps occur in animal mitochondrial DNA (mtDNA) and reduce genetic diversity below the level expected at mutation-drift equilibrium in some taxa. They also assert that this evidence implies that mtDNA has limited relevance to biodiversity and conservation studies. I contest this claim on two fronts.

First, the selective sweeps that they detect occur at very deep phylogenetic levels (phyla to class), which translate into deep evolutionary time (hundreds of millions of years). It is rare that conservation biologists are interested in how mtDNA diversity is distributed at such a level. Rather, it is standard practice that genetic diversity is interpreted in the context of a relevant, almost always closely related, control group (*1*). This practice is designed to account as best as possible for the potentially confounding historical, demographic, mutational, and selective variables that influence genetic diversity.

Second, it is well established that the geographical distribution of mtDNA diversity as determined by lineage-sorting, and not just diversity per se, is informative with respect to biodiversity conservation (*2*–*4*). Use of this criterion is recognized to address the very differences in accumulation or maintenance of genetic diversity within different taxa described by Bazin *et al.*—otherwise known as the "how much divergence is enough" question (*3*).

Clearly, conservation biologists should not ignore selective sweeps; they do occur, and sometimes rapidly (*5*). However, mtDNA diversity is abundant at the population, species, and genus level of animals (*2*), and it is here that it can be, and is, most relevant and routinely exploited for conservation purposes. This would not be the case if selective sweeps were as dominant a force as implied by Bazin *et al.* Despite their claims, Bazin *et al.*'s results have limited relevance to most standard applications of mtDNA in conservation.

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IN A META-ANALYSIS OF GENETIC POLYmorphism, E. Bazin *et al.* suggest that mitochondrial DNA (mtDNA) is more profoundly affected by nonneutral evolution than nuclear loci ("Population size does not influence mitochondrial genetic diversity in animals," Reports, 28 Apr., p. 570). This interpretation has already led some to conclude that mtDNA is of little utility in studies of evolution and conservation. It is well known

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