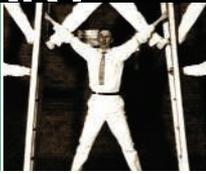


From relationships
to structures

1190



Beauty of
biomineralization

1194



Virtual modeling of
real-world conflicts

1201



LETTERS | BOOKS | POLICY FORUM | EDUCATION FORUM | PERSPECTIVES

LETTERS

edited by Jennifer Sills

Retraction

WE WISH TO RETRACT OUR REPORT (1) IN WHICH we report that β -N-acetylglucosamine-serine can be biosynthetically incorporated at a defined site in myoglobin in *Escherichia coli*. Regrettably, through no fault of the authors, the lab notebooks are no longer available to replicate the original experimental conditions, and we are unable to introduce this amino acid into myoglobin with the information and reagents currently in hand. We note that reagents and conditions for the incorporation of more than 50 amino acids described in other published work from the Schultz lab are available upon request.

ZHIWEN ZHANG,¹ JEFF GILDERSLEEVE,²
YU-YING YANG,³ RAN XU,⁴ JOSEPH A. LOO,⁵
SEAN URYU,⁶ CHI-HUEY WONG,⁷
PETER G. SCHULTZ^{7*}

¹The University of Texas at Austin, Division of Medicinal Chemistry, College of Pharmacy, Austin, TX 78712, USA. ²Chemical Biology Section, National Cancer Institute, Frederick, MD 21702, USA. ³Rockefeller University, New York, NY 10065, USA. ⁴6330 Buffalo Speedway, Houston, TX 77005, USA. ⁵Department of Chemistry and Biochemistry, University of California, Los Angeles, CA 90095-1569, USA. ⁶University of California, San Diego, CA 92121, USA. ⁷The Scripps Research Institute, La Jolla, CA 92037, USA.

*To whom correspondence should be addressed. E-mail: schultz@scripps.edu

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Where Are the Parasites?

THE REVIEW BY E. POST *ET AL.* ("ECOLOGICAL dynamics across the Arctic associated with recent climate change," 11 September, p. 1355) paid little heed to parasites and other pathogens. The rapidly growing literature on parasites in arctic and subarctic ecosystems provides empirical and observational evidence that climate-linked changes have already occurred. The life cycle of the protostrongylid lungworm of muskoxen, *Umingmakstrongylus*



On the decline. Pathogens may play a role in the decline of caribou populations across the North.

pallikuukensis, has changed (1), and the range of that organism and the winter tick, *Dermacentor albipictus*, has expanded (2).

Extremes in temperature and the hydrological cycle, predicted in most climate scenarios, can result in epidemic disease outbreaks in arctic-adapted species such as reindeer and muskoxen, with substantial economic costs for northern aboriginal peoples (3–7). Similarly, increased frequency and magnitude of flooding might enhance transmission of waterborne pathogens such as zoonotic strains of *Giardia*, in and between terrestrial and marine systems (8, 9).

Parasites whose stages in the environment are buffered by gastropod or insect intermediate hosts/vectors have the potential to increase in abundance and distribution, whereas for those with life stages that develop freely in the environment, extreme variability in microhabitat temperatures and

humidity might either increase or reduce their abundance (2, 10).

Given the low species diversity of arctic ecosystems, and the potentially reduced immunocompetence of arctic species (11), these host systems may be particularly sensitive to parasitic invasions (2). Invasions will occur primarily through range expansion of

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.

more southerly host species, through ongoing wildlife translocations, and increasing pressures for domestic animal agriculture. All will radically alter the existing parasite fauna and lead to parasite-mediated competition between current residents and newly arrived host species. This might in turn lead to the loss of parasite diversity as arctic-adapted hosts and their endemic parasite species become increasingly displaced by competitive interactions. Such changes will have profound consequences for ecosystem structure and function and directly impact the health, economy, food safety, food security, and cultural activities of northern peoples.

SUSAN J. KUTZ,^{1*} ANDY P. DOBSON,²
ERIC P. HOBERG³

¹Faculty of Veterinary Medicine, University of Calgary, Calgary, AB T2N 4N1, Canada. ²Department of Ecology and Evolutionary Biology, Princeton University, Princeton, NJ 08544, USA. ³U.S. National Parasite Collection, U.S. Department of Agriculture, Agricultural Research Service, Beltsville, MD 20705, USA.

*To whom correspondence should be addressed. E-mail: skutz@ucalgary.ca

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Still Vulnerable to Killer Tsunamis

AN UNPRECEDENTED RETREAT OF THE SEA on the morning of 26 December was for some witnesses of the 2004 Indian Ocean tsunami the only warning of the series of deadly waves to follow. Homes were crushed, boats swept away, roads destroyed, coastlines obliterated, and more than a quarter of a million lives were lost (1–4). Triggered by an underwater earthquake off the coast of Sumatra (Indonesia), the most devastating tsunami in history produced casualties in at least eleven Asian and African countries. In Banda Aceh, the northernmost province in Sumatra, 170,000 perished.



At risk. Many devastated coastal villages, such as Layeun on the northwest coast of Sumatra, are still vulnerable to future tsunamis.

With the help of the international community, the ability to detect tsunamis and provide timely early warnings in the region has improved since 2004. However, on the fifth anniversary of the 2004 Indian Ocean tsunami, many coastal communities are still vulnerable.

Lingering vulnerability stems partly from economics; some of the funds promised for increasing preparedness following the 2004 event failed to materialize as spending priorities shifted in the wake of other disasters worldwide (5). However, economics is not the only contributing factor.

Disaster preparedness cannot be accomplished in isolation from the vulnerable communities themselves. The planning, implementation, and maintenance of warning systems require decentralized local initiatives to be coordinated at national levels, albeit with full knowledge, participation, and involvement from local networks. Unfortunately, this is often not the case. Ethnic Moken sea gypsies on Lanta Island in southern Thailand, for example, are ambivalent about the two signal towers and evacuation routes that appeared almost overnight. After all, in 2004 many were racing toward the sea to save their boats after being forewarned of the approaching tsunami by cellphone by family members on outer islands. In addition, many believe that another tsunami of this magnitude won't come again in their lifetime. [Science supports this notion (6, 7).]

Some preparedness measures put in place since 2004 may have limited effectiveness. Newly sanctioned escape routes often parallel low-lying coasts for unrealistic stretches, leaving the elderly, sick, and children at risk to storm surges. Poor or no lighting inhibits visibility at night. As time passes, some signs are beginning to deteriorate; others no longer lead to safe havens. During one early test of the warning signals, some Lanta residents mistook the siren's wail for squawking birds.

Local people may also distrust a national system that appears to largely target high-

value tourist coastlines. Throughout the region, many less-developed yet highly populated coasts—Banda Aceh included—are still not protected sufficiently by early warning systems. Several more years will likely lapse before a fully operational system covering the entire Indian Ocean can be established. For some low-lying coasts adjacent to the fault line that triggered the 2004 tsunami, even instantaneous warnings may fail to prevent tragedy.

Socioeconomic conditions and population pressures force many to remain living in harm's way. Communities demolished in 2004 were largely rebuilt in place, where they will always be at risk. Some title-less land holders have been evicted from coastal buffer zones, but in other instances valuable squatter lands have been snatched away by the affluent or entrepreneurs whose actions will likely transfer the risk to richer sectors (8). With nowhere to go, the landless are returning to the coasts—this time in potentially more vulnerable areas.

We need a new paradigm for sustainable coastal zone management that recognizes early warning alone is not sufficient for saving lives. Strengthening the livelihoods of coastal communities, disaster-proofing public spaces, relocating vulnerable populations, and preserving coastal ecosystems will go a long way in reducing vulnerability in developing areas. However, local leadership in conjunction with community-based organizations that bridge gender, ethnic, and religious lines must ultimately embrace cautionary principles that are not reliant on top-down measures requiring substantial external aid. The recent 2009 tsunami in Tonga and the Samoas demonstrate that basic awareness of how to behave during a tsunami can help reduce loss of life.

A. D. ZIEGLER,* P. P. WONG, C. GRUNDY-WARR

Department of Geography, National University of Singapore, 117570, Singapore.

*To whom correspondence should be addressed. E-mail: geoadz@nus.edu.sg

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Teaching Strategies Based on Research

THE LETTER “TEACHING AND LEARNING STRATEGIES THAT WORK” (R. Hoffman and S. Y. McGuire, 4 September, p. 1203) highlights how scientists—or, at least, these chemists—are isolated from “education.” In the Letter, two chemistry professors described educational strategies they have “developed” over the course of their 40 years of combined teaching experience. We were struck by the fact that they made no obvious reference to the discipline of education. In the past 40

years, there have been thousands of research studies documented in the education literature. These research studies detail and inform us of the successes and failures of teaching strategies and their impact on the learner at all stages of development.

Colleges of Education within universities are grounded in research and a body of literature on teaching and learning. All professors wishing to teach should be informed by past research in education, just as we expect chemists to be informed by past research in chemistry. Why is it that professors who earn doctoral degrees in other disciplines automatically presume to be teachers?

Unfortunately, this approach is rampant in academia and even in this journal’s sister publication, *Science Signaling*. Upon review of the 57 abstracts (going back to 2003) that *Science Signaling* lists as “Teaching Resources,” not one was written by an educator. We will see improvements in teaching sooner if we are informed by research on teaching strategies proven to maximize learning across all developmental levels.

P. DEE BOERSMA^{1*} AND LIN ZURFLUH²

¹Department of Biology, University of Washington, Seattle, WA 98195, USA. ²Seattle, WA 98102, USA.

*To whom correspondence should be addressed. E-mail: boersma@u.washington.edu

CORRECTIONS AND CLARIFICATIONS

News of the Week: “When counting jobs isn’t enough” by J. Mervis (6 November, p. 783). Susan Sedwick is associate vice president for research and director of the office of sponsored projects at the University of Texas at Austin.

News of the Week: “Beyond Thailand: Making sense of a qualified AIDS vaccine ‘success’” by J. Cohen (30 October, p. 652). The story overstated IAVI president Seth Berkley’s thoughts about the future of the two vaccines used in the study. Berkley did not dismiss the possibility of other vaccine developers attempting to improve the combination of these two vaccines used in the trial and continuing with their development. In addition, the table on page 653 should have noted that it was “%” Incidence/Yr.

News of the Week: “Research wolves of Yellowstone killed in hunt” by V. Morell (23 October, p. 506). The name of a scientist and his university were spelled incorrectly. The correct spellings are Daniel MacNulty at Michigan Technological University.

News Focus: “Race for the heavens” by Y. Bhattacharjee (23 October, p. 512). The Hale Telescope is located on the Palomar Mountain, not Mount Palomar. Also, Richard Ellis is a professor at the California Institute of Technology, not the University of California, Berkeley.