



LETTERS

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The More Parasites, the Better?

S. ALTIZER *ET AL.*'S REVIEW "CLIMATE CHANGE AND INFECTIOUS DISEASES: From evidence to a predictive framework" (2 August, p. 514) suggests that increased temperatures will favor several attributes of virulent pathogens that will adversely affect host health. Altizer *et al.* predict a decline in parasite biodiversity but overlook an important problem: This loss could have dire consequences to ecosystems.

Parasite diversity benefits ecosystems by regulating host population dynamics, increasing connectivity and stability in food webs (1) and decreasing community-level disease risk. For example, increased parasite richness reduced transmission of the virulent trematode *Ribeiroia* to amphibian hosts by more than 50% (2). This decrease in disease risk may be due to either increased parasite competition

within intermediate hosts (2) or antiparasite immune responses increasing immune genetic diversity in hosts (3). Pathogens can also have a mediating effect on interspecific competition between shared hosts, as in the case of *Anolis gingivinus* lizards in the Caribbean, which exclude sister species *A. watsi* except when their competitive ability is diminished by the presence of *Plasmodium azurophilum* (4). Parasites likely mediate such interactions largely through immune costs, with hosts trading off resource use between immune responses and reproduction and growth (5). Thus, although some virulent parasite populations may increase with climate change, we anticipate that the loss of parasite biodiversity will result in more widespread and unpredictable threats to ecosystem health. We therefore call for further research into parasite ecology and host-parasite coextinctions as tools for quantifying ecosystem vulnerability to climate change.

COLIN J. CARLSON,¹ CARRIE A. CIZAUSKAS,² KEVIN R. BURGIO,³ CHRISTOPHER F. CLEMENTS,⁴ NYEEMA C. HARRIS^{1*}

¹Environmental Science, Policy and Management, University of California, Berkeley, CA 94704, USA. ²Department of Ecology and Evolutionary Biology, Princeton University, Princeton, NJ 08544, USA. ³Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, CT 06269, USA. ⁴Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK.

*Corresponding author. E-mail: nyeema@berkeley.edu

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Frog with parasite-induced (*Ribeiroia ondatrae*) limb malformation. Increased parasite diversity reduced the transmission of *Ribeiroia* to amphibian hosts.

Open Data: Crediting
a Culture of Cooperation

ALTHOUGH THE QUESTION OF WHO PAYS FOR open data is important ("Who will pay for public access to research data?", F. Berman and V. Cerf, Policy Forum, 9 August, p. 616), a greater challenge lies in implementing the institutional and cultural changes required before data from government-sponsored research can be openly shared.

The Office of Science and Technology Policy (OSTP) has ordered U.S. federal agencies to formulate plans to share federally funded science data (1). This

reflects a fundamental shift in the social contract between scientists and society. While seeking to strengthen science, the order also seeks better use of data to promote economic innovation, improve cross-disciplinary efforts, and address "grand challenge" societal problems such as global climate change and urban violence.

The OSTP memo correctly notes that public availability of atmospheric data enabled commercial weather services and severe weather prediction. Yet many data, tools, and models in the geosciences are held by a mix of individual investigators, national data centers, university-based initiatives,

and commercial labs, embedded in institutional arrangements that actively reward holding onto data and maximizing individual outcomes in a competitive environment. NSF's EarthCube project, a long-term strategic initiative to build the cyber infrastructure for integrating data, tools, and models in the geosciences, illustrates the challenges and benefits of community engagement and institutional alignment (2).

The push for open data goes beyond the question of who pays. It challenges science to create a more cooperative culture that aligns credit and rewards with sharing data, tools, and models.

BURCU BOLUKBASI,^{1*} NICHOLAS BERENTE,^{2*} JOEL CUTCHER-GERSHENFELD,^{1,3*} LESLIE DECHURCH,^{4*} COURTNEY FLINT,^{5*} MICHAEL HABERMAN,^{6*} JOHN LESLIE KING,^{7*} ERIC KNIGHT,^{8*} BARBARA LAWRENCE,^{9*} ETHAN MASELLA,^{10*} CHARLES MCELROY,^{11*} BARBARA MITTLEMAN,^{12*} MARK NOLAN,^{13*} MELANIE RADIK,^{10*} NAMCHUL SHIN,^{14*} CHERYL A. THOMPSON,^{13*} SUSAN WINTER,^{15*} ILYA ZASLAVSKY,^{16*} M. LEE ALLISON,^{17†} DAVID ARCTUR,^{18†} JENNIFER ARRIGO,^{19†} ANTHONY K. AUFDENKAMPE,^{20†} JAY BASS,^{21†} JIM CROWELL,^{22†} MIKE DANIELS,^{23†} STEPHEN DIGGS,^{24†} CHRISTOPHER DUFFY,^{25†} YOLANDA GIL,^{26†} BASIL GOMEZ,^{27†} SARA GRAVES,^{28†} ROBERT HAZEN,^{29†} LESLIE HSU,^{30†} DANIE KINKADE,^{31†} KERSTIN LEHNERT,^{30†} CHRIS MARONE,^{32†} DON MIDDLETON,^{23†} ANDERS NOREN,^{33†} GENEVIEVE PEARTHREE,^{17†} MOHAN RAMAMURTHY,^{34†} ERIN ROBINSON,^{35†} GEORGE PERCIVALL,^{36†} STEPHEN RICHARD,^{17†} CELINA SUAREZ,^{37†} DOUG WALKER^{38†}

¹School of Labor and Employment Relations, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA.

²Terry College of Business, University of Georgia, Athens, GA 30602, USA. ³National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign, Urbana, IL 61801, USA. ⁴Industrial/Organizational Psychology, School of Psychology, Georgia Institute of Technology, Atlanta, GA 30332, USA. ⁵Department of Sociology, Social Work and Anthropology, Utah State University, Logan, UT 84322, USA. ⁶Illinois Informatics Institute, University of Illinois at Urbana-Champaign, IL 61820, USA. ⁷School of Information, University of Michigan, Ann Arbor, MI 48109, USA. ⁸Discipline of Work and Organisational Studies, University of Sydney Business School, 2006, Australia. ⁹Management and Organization, Anderson School of Management, University of California at Los Angeles, Los Angeles, CA 90095, USA. ¹⁰Library and Technology Services, Brandeis University, Waltham, MA 02453, USA. ¹¹Design and Innovation, Weatherhead School of Management, Case Western Reserve University, Cleveland, OH 44103, USA. ¹²Nodality, Inc., South San Francisco, CA 94080, USA. ¹³Graduate School of Library and Information Sciences, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA. ¹⁴Seidenberg School of Computer Science and Information Systems, Pace University, New York, NY 10038, USA. ¹⁵College of Information Studies, University of Maryland, College Park, MD 20742 USA. ¹⁶San Diego Super Computing Center, University of California at San Diego, La Jolla, CA 92093, USA. ¹⁷Arizona Geological Survey, Tucson, AZ 85701, USA. ¹⁸Jackson School of Geosciences, University of Texas at Austin, Austin, TX 78712, USA. ¹⁹Consortium of Universities for the Advancement of Hydrologic Science, Inc., Medford, MA 02155, USA. ²⁰Stroud Water Research Center, Avondale, PA 19311, USA. ²¹COMPRES and University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA. ²²School of Earth and Space Exploration, Arizona State University, Phoenix, AZ 85004, USA. ²³Computing, Data and Software Facility, Earth Observing Laboratory, National Center for Atmospheric Research, Boulder, CO 80301, USA. ²⁴Scripps Institution of Oceanography, La Jolla, CA 92037, USA. ²⁵Department of Civil and Environmental Engineering, Penn State University, University Park, PA 16802, USA. ²⁶Information Sciences Institute, University of Southern California, Marina del Rey, CA 90292, USA. ²⁷Department of Geography, University of Hawaii at Manoa, Honolulu, HI 96822, USA. ²⁸Computer Science Department, The University of Alabama in Huntsville, Huntsville, AL 35899, USA. ²⁹Deep Carbon Observatory, Carnegie Institution for Science, Washington, DC 20015, USA. ³⁰Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY

10964, USA. ³¹Woods Hole Oceanographic Institution, Woods Hole, MA 02543, USA. ³²Department of Geosciences, The Pennsylvania State University, University Park, PA 16802, USA. ³³Department of Earth Sciences, University of Minnesota, Minneapolis, MN 55455, USA. ³⁴Unidata, University Corporation for Atmospheric Research, Boulder, CO 80301, USA. ³⁵Foundation for Earth Science, Raleigh, NC 27612, USA. ³⁶The Open Geospatial Consortium, Wayland, MA 01778, USA. ³⁷Department of Geosciences, University of Arkansas, Fayetteville, AR 72701, USA. ³⁸Department of Geology, University of Kansas, Lawrence, KS 66045, USA.

*Members of Project on Stakeholder Alignment in Complex Systems (NSF SciSPR-ST5-OCI-GEO-INSPIRE 1249607, "Enabling Transformation in the Social Sciences, Geosciences, and Cyberinfrastructure")

†Corresponding author. E-mail: jilking@umich.edu

‡Principal Investigators for NSF EarthCube End-User PI Workshops (NSF EAR-124039).

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Open Data: A Sustainable Model

IN THEIR POLICY FORUM "WHO WILL PAY FOR public access to research data?" (9 August, p. 616), F. Berman and V. Cerf describe some ways to increase public access to research data within the existing budget. Their call for action for joint effort among the private, public, and academic sectors is entirely appropriate and timely. However, thus far, this kind of collaboration remains very limited.

Research data must be hosted somewhere, new biological information must be curated, and services must be managed. All these incur substantial costs. Yet, the research community conventionally expects that access to data should be free. I agree that cultural change is needed. Berman and Cerf, assuming a small data-access fee on par with buying music on the Internet, proposed a broader adoption of the payment model. However, some databases of high community value that have lost their public funding support have had to resort to a subscription model. For example, Human Gene Mutation Database (www.hgmd.cf.ac.uk) and Kyoto Encyclopedia of Genes and Genomes (www.genome.jp/kegg) are now charging about US\$3000 to \$5000 annually for each academic research group. These prices are substantially more than the cost of subscribing to digital versions of a newspaper or paying for music on iTunes. Precedents such as these suggest that the cost would be unaffordable for some research groups.

How can a mature database remain both financially sustainable and accessible to a broad community of users? Every day, scientists use these databases as starting points for in-depth analysis, learning about the data and deriving incremental findings. Perhaps it is time for the subscription-based databases to adopt a curator reward system in which access fees are reduced in exchange for a certain amount of quality curation. If this model were successful, scientists who were unable to pay could help improve the databases in exchange for continuous access. This could be a win-win economic model for both scientists and database managers.

JING-WOEI LI

School of Life Sciences, The Chinese University of Hong Kong, Hong Kong SAR. E-mail: marcoli@cuhk.edu.hk

Ethics Tests for Trials

IN HIS NEWS & ANALYSIS STORY "CLINICAL trials paused as India adopts new rules" (26 July, p. 327), Y. Bhattacharjee discusses the new regulations put in place to protect clinical trial participants. Ethics committees responsible for approving clinical trial protocols play a key role in participant safety. It should be deemed unethical to enroll patients in a clinical trial that has a low probability of generating meaningful information, no matter how promising a new investigational therapy. Thus, the ethics committee should always critically evaluate clinical trial protocols for their probability of success.

To make sure these evaluations occur, ethics committees should include or consult qualified statisticians. Ethics committees should ensure that clinical study protocols are adequately powered to succeed and that the underlying assumptions used in power calculations are reasonable. Only then should clinical trials be allowed to proceed in India, or the rest of the world.

DEEPAK B. KHATRY

Arlington, VA 22205, USA. E-mail: khatryd7@gmail.com

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Colin J. Carlson, Carrie A. Cizauskas, Kevin R. Burgio, Christopher F. Clements and Nyeema C. Harris

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