



## LETTERS

edited by Jennifer Sills

### Retraction

THE RESEARCH ARTICLE “REACTOME ARRAY: FORGING A LINK BETWEEN METABOLOME AND genome” (1) described the synthesis of some 2000 quenched fluorescent dye-metabolite compounds, and their use to create an array to obtain a global overview of the metabolic network operating in a population of cells at the time of sampling. Upon productive interaction with an enzyme in a sample, an array compound releases the dye, which fluoresces and its signal is captured. To our profound regret, peer inspection of the paper after publication revealed errors and omissions in the information provided on the chemistry underlying array compound synthesis, and the processing of array data obtained. After an investigation, the Ethics Committee of the CSIC in Madrid has recommended the withdrawal of the paper. Given the errors in the paper, and the skepticism about the array that they have generated, we retract the paper. We apologize to *Science*, our institutions, and the scientific community for any inconvenience caused by our paper and its retraction.

ANA BELOQUI,<sup>1</sup> MARÍA EUGENIA GUZZARONI,<sup>1</sup> FLORENCIO PAZOS,<sup>2</sup> JOSÉ M. VEITES,<sup>1</sup> MARTA GODOY,<sup>2</sup> OLGA V. GOLYSHINA,<sup>3</sup> TATYANA N. CHERNIKOVA,<sup>3</sup> AGNES WALICZEK,<sup>3</sup> RAFAEL SILVA-ROCHA,<sup>2</sup> YAMAL AL-RAMAHI,<sup>1</sup> VIOLETTA LA CONO,<sup>4</sup> CARMEN MENDEZ,<sup>5</sup> JOSÉ A. SALAS,<sup>5</sup> ROBERTO SOLANO,<sup>2</sup> MICHAEL M. YAKIMOV,<sup>4</sup> KENNETH N. TIMMIS,<sup>3,6</sup> PETER N. GOLYSHIN,<sup>3,7,8</sup> MANUEL FERRER<sup>1\*</sup>

<sup>1</sup>CSIC, Institute of Catalysis, 28049 Madrid, Spain. <sup>2</sup>CSIC, Centro Nacional de Biotecnología, 28049 Madrid, Spain. <sup>3</sup>HZI/Helmholtz Centre for Infection Research, 38124 Braunschweig, Germany. <sup>4</sup>Institute for Coastal Marine Environment, CNR, Messina 98122, Italy. <sup>5</sup>Universidad de Oviedo, 33006 Oviedo, Spain. <sup>6</sup>Institute of Microbiology, Carolo-Wilhelmina Technical University of Braunschweig, 38106 Braunschweig, Germany. <sup>7</sup>School of Biological Sciences, Bangor University, Gwynedd LL572 UW, UK. <sup>8</sup>Centre for Integrated Research in the Rural Environment, Aberystwyth University–Bangor University Partnership (CIRRE).

\*To whom correspondence should be addressed. E-mail: mferrer@icp.csic.es

#### Reference

1. A. Beloqui *et al.*, *Science* **326**, 252 (2009).

### Editorial Expression of Concern

RESEARCHERS INVOLVED IN GENOME-WIDE association studies have expressed technical concerns about a Report by P. Sebastiani *et al.*, “Genetic signatures of exceptional longevity in humans,” published in *Science Express* on 1 July 2010. In their study (1), Sebastiani *et al.* used a number of different genotyping platforms and neglected to perform data quality-control steps, which resulted in their reporting several false-positive single-nucleotide polymorphism (SNP) associations. In particular, one of the platforms used in their work, the Illumina 610-Quad array, has been shown in unpublished studies by

other investigators to produce artifactual genotype data at a subset of SNPs.

*Science* and the authors are taking these concerns seriously. Since learning of these potential problems, Sebastiani *et al.* have been performing a thorough quality-control analysis on the original raw data, as well as generating new data to compare the genotype calls from the 610-Quad array and the other platforms within the same individuals. These steps aim to eliminate biases between platforms. Furthermore, they are undertaking an additional validation measure on several SNPs via the TaqMan<sup>®</sup> assay, a non-microarray-based genotyping method. After ensuring that all data are clean, they will redo the statistical and modeling analyses, which they expect

to be completed in December. At that point, *Science* will reevaluate the paper, determine the extent to which the strength of its original conclusions has been altered by the revised data, and take the appropriate action.

**BRUCE ALBERTS**

Editor-in-Chief

#### Reference

1. P. Sebastiani *et al.*, *Science* **10.1126/science.1190532** (2010).

### Training Physicians to Communicate

BASIC SCIENCE TRAINING IS CERTAINLY CRUCIAL for future physicians (“Science for physicians,” M. Cooke, Editorial, 24 September, p. 1573). Effective patient care requires physicians to keep pace with change in the natural sciences. However, clinical practice also requires the recognition that social sciences are equally important. Incorporating good social science involves more than establishing health values (1) and economics, and acknowledging diversity. Rather, physicians must understand patient autonomy and be sensitive to each patient’s unique preferences and experience (2, 3). Excessive focus on natural science education, including the technologies underlying “personalized” genetic medicine, could further dehumanize care. In the past decade, treatments have improved spectacularly in all oncology subdisciplines, yet patient concerns, distress, and satisfaction ratings have remained unchanged (4). Understanding the relevant natural science does not necessarily translate into a physician’s ability to communicate with patients, nor does it guarantee informed consent. The most basic education for a physician is learning to develop a helpful and caring relationship with every patient.

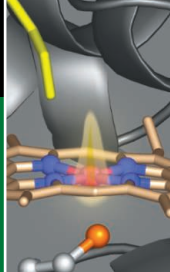
**GLENN W. JONES**

Department of Radiation Oncology, Credit Valley Hospital, McMaster University, Mississauga, ON L5M 2N1, Canada. E-mail: gjones@cvh.on.ca



Trojan horse or fertility goddess?

922



Examining enzymatic oxidations

924

#### References

1. M. G. M. Hunink *et al.*, *Decision-Making in Health and Medicine—Integrating Evidence and Values* (Cambridge Univ. Press, Cambridge, 2001).
2. G. W. Jones, in *Questions of Right and Wrong*, E. C. Hui, Ed. (Regent College, Vancouver, 1994), pp. 140–155.
3. D. L. Sackett, W. M. C. Rosenberg, J. A. M. Gray, R. B. Haynes, W. S. Richardson, *Br. Med. J.* **312**, 71 (1996).
4. Cancer Quality Council of Ontario, Patient Experience ([http://csqi.cancercare.on.ca/dimensions/responsive/pat\\_exp/](http://csqi.cancercare.on.ca/dimensions/responsive/pat_exp/)).

## Birds of Prey Remain at Risk

E. KINTISCH'S NEWS STORY "OUT OF SITE" (special section on Scaling Up Alternative Energy, 13 August, p. 788) discusses the bird-of-prey deaths (including golden eagles) caused by wind turbines. The story implies that the problem at the Altamont Pass Wind Resource Area (APWRA) in California has been reduced by spacing turbines farther apart and removing turbines from problematic sites. These statements are misleading.

In fact, numerous mitigation measures recommended by the Scientific Review Committee as part of the Alameda County Avian Wildlife Protection Program were either never implemented or implemented in a piecemeal manner (1). Neither total avian fatality rates nor fatality rates of focal raptors (golden eagle, red-tailed hawk, American kestrel, and burrowing owl) at the APWRA have decreased when compared with the periods 1998 to 2002 and 2005 to 2009. Some fatality rates may have actually increased between the comparison periods (2). For the period from 2005 to 2007, an estimated 65 golden

eagles were killed annually at the APWRA (3). Given that little has been done to implement substantial mitigation measures, such high fatality rates for golden eagles, as for other species, will likely continue.

To reduce bird deaths in the APWRA, we must either (i) abandon the site altogether for wind energy production or (ii) replace existing infrastructure with fewer, larger wind turbines, and choose their locations by using map-based technologies that incorporate mortality studies and species-specific avian flight behavior (4) or avian land-use patterns (5). Even then, no single siting plan can take into account the patterns of all avian species. What works for birds might not work for bats.

DOUGLAS A. BELL<sup>1\*</sup> AND K. SHAWN SMALLWOOD<sup>2</sup>

<sup>1</sup>Wildlife Department, East Bay Regional Park District, Oakland, CA 94605, USA. <sup>2</sup>Davis, CA 95616, USA.

\*To whom correspondence should be addressed. E-mail: dbell@ebparks.org

#### References

1. K. S. Smallwood, *Environ. Energy Law Pol. J.* **2**, 229 (2008).
2. K. S. Smallwood, "Fatality rates in the Altamont Pass Wind Resource Area 1998-2009" (Altamont Scientific Review Committee Report P145, 2010); [www.altamontsrc.org/alt\\_doc/p145\\_smallwood\\_fatality\\_monitoring\\_results\\_12\\_31\\_09.pdf](http://www.altamontsrc.org/alt_doc/p145_smallwood_fatality_monitoring_results_12_31_09.pdf).
3. K. S. Smallwood, B. Karas, *J. Wildlife Manage.* **73**, 1062 (2009).
4. K. S. Smallwood, L. Neher, "Siting repowered wind turbines to minimize raptor collisions at the Tres Vaqueros Wind Project, Contra Costa County, California" (Altamont Scientific Review Committee Report P162, 2010); [www.altamontsrc.org/alt\\_doc/p162\\_smallwood\\_and\\_neher\\_tres\\_vaqueros\\_repowering\\_siting.pdf](http://www.altamontsrc.org/alt_doc/p162_smallwood_and_neher_tres_vaqueros_repowering_siting.pdf).
5. K. S. Smallwood, L. Neher, D. A. Bell, *Energies* **2**, 915 (2009).

## Mentors for Elementary School Teachers

IN HIS NEWS OF THE WEEK STORY "A WAY to heal science education, but is there the political will?" (24 September, p. 1582), J. Mervis quotes from the President's Council of Advisors on Science and Technology (PCAST) report, stating that "too many American students conclude early in their education that STEM [science, technology, engineering, and math] subjects are boring, too difficult, or unwelcoming, leaving them ill-prepared to meet the challenges that will face their generation, their country, and

the world" (1). The PCAST report proposes some solutions but overlooks one possibility.

The answer lies in elementary school, where children form their first opinions about STEM. How can they develop a passion for STEM when many elementary school teachers themselves hate or fear these subjects?

I propose that all elementary school teachers be provided with real-world STEM research experiences from scientist mentors. One case study showed that after a 6-week research experience, elementary school teacher attitudes changed from "my students will not become scientists" to "my students are scientists" (2). Quality research experiences for elementary school teachers will help solve the national crisis cited in the PCAST report (1).

STEVEN B. OPPENHEIMER

Center for Cancer and Developmental Biology, California State University Northridge, Northridge, CA 91330-8303, USA. E-mail: steven.oppenheimer@csun.edu

#### References

1. President's Council of Advisors on Science and Technology, "Prepare and inspire: K-12 education in science, technology, engineering, and math (STEM) for America's future" (PCAST, 2010); [www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-stemed-report.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-stemed-report.pdf).
2. P. Dixon, R. A. Wilke, *J. Elem. Sci. Educ.* **19**, 25 (2007).

## CORRECTIONS AND CLARIFICATIONS

**Policy Forum:** "Remeasuring aging" by W. C. Sanderson and S. Scherbov (10 September, p. 1287). At the start of the second paragraph on the second page, the year was incorrect. The text should read as follows: "In our forecasts for the United States, in 2023, the number of expected years of disability above age 65 is 4.1."

**Reports:** "Females use multiple mating and genetically loaded sperm competition to target compatible genes" by S. R. Pryke *et al.* (20 August, p. 964). The legend for Fig. 1C was incorrect. It should read "eight of nine broods contained extra-pair offspring when the social male was incompatible and the extra-pair male was compatible."

**Perspectives:** "An outlook on microalgal biofuels" by R. H. Wijffels and M. J. Barbosa (13 August, p. 796). The text attributed the following parameter to C. de Fraiture, M. Giordano, Y. Liao, *Water Pol.* **10** (suppl. 1), 67 (2008): "For the production of 1 liter of biofuel from fuel crops, approximately 10,000 liters of water are needed." In fact, the de Fraiture paper states: "It takes on average roughly 2,500 [liters] of crop evapotranspiration and 820 [liters] of irrigation water withdrawn to produce one liter of biofuel. But regional variation is large."

## 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](http://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.

