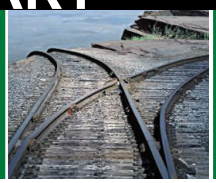
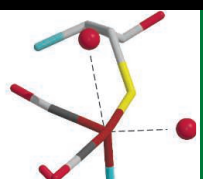
Generative or sterile? 491



Hydrogen activation 498



Bulk metallic glass 502

LETTERS | BOOKS | POLICY FORUM | EDUCATION FORUM | PERSPECTIVES

LETTERS

edited by Jennifer Sills

Retraction

EXTENSIVE EFFORTS WITH REVAMPED APPARATUS TO REPRODUCE THE RESULTS PUBLISHED IN OUR 2004 *Science* Report, "Real-time quantum feedback control of atomic spin-squeezing" (*1*), have failed, as have attempts to develop a quantitative understanding of how those results could have arisen spuriously. We must therefore retract the Report.

J. M. Geremia accepts primary responsibility for his large role in acquiring and analyzing the data upon which this paper was based. J. K. Stockton and H. Mabuchi also accept responsibility for failing initially to probe these results with sufficient skepticism. In the course of our efforts to understand the results subsequent to their publication, we have come to appreciate that analyzing Faraday spectroscopy of alkali clouds at high optical depth in precise quantitative detail is surprisingly challenging. Our understanding of this system as of 2006 is described in J. K. Stockton's thesis (*2*), together with a preliminary reassessment of published results; continuing research in the group of H. Mabuchi has improved upon the thesis results. We now have a technical understanding sufficient to rule out any possibility of spin-squeezing under the conditions of our 2004 experiment.

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1. J. M. Geremia, J. K. Stockton, H. Mabuchi, *Science* **304**, 270 (2004).
2. J. K. Stockton, thesis, California Institute of Technology, Pasadena, CA (2006); http://resolver.caltech.edu/CaltechETD:etd-02172007-172548.

Doubts About GM Crops

N. FEDOROFF'S EDITORIAL ("SEEDS OF A PERfect storm," 25 April, p. 425) calls on the scientific community to rally around genetically modified (GM) crops as the basis for "a second Green Revolution." She asks whether we have "the will and the wisdom" to lower regulatory barriers and integrate these crops fully into world agriculture. However, her framing of the issue is dangerously narrow.

First, the decision about whether and how to deploy GM crops is not just about safety. There are two imperatives for 21st-century agriculture: to increase yields and to fully integrate agriculture with biodiversity conservation and the provisioning of ecosystem services. Fortunately, it appears possible to do both (*1*), but it is not clear what role GM crops can or should play in an agriculture designed for systemic benefits and not just for maximizing the yield of monocrops.

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Second, consumers are correct to be skeptical about a regulatory process in which the corporations being regulated have extraordinary influence. In this context, to simply appeal to the fait accompli of a quarter-century's experience and a billion acres on the ground is naïve. As Marvier *et al*. point out in the same issue (*2*), despite more than a billion acres, we still don't have a full accounting of the ecological costs (or benefits) of these crops.

Finally, Fedoroff presents no evidence that GM crops are the key to solving our looming global food supply issues. A recent international assessment (IAASTD) concluded that they are "appropriate in some contexts, unpromising in others, and unproven in many more" (*3*). Although the IAASTD has its critics, it appears to be the best starting point we have for getting past the narrow self-interest of agribusiness corporations. Molecular biologists who sincerely wish to see their efforts serve humanity would be wise to treat the public as a full and respected partner in this debate.

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1. S. Scherr, J. McNeely, Eds., *Farming with Nature* (Island Press, Washington, DC, 2007).
2. M. Marvier *et al*., *Science* **320**, 452 (2008).
3. E. T. Kiers *et al*., *Science* **320**, 320 (2008).

Italy Not Alone in Science System Woes

IN THE LETTER "OPEN LETTER TO SENATOR Rita Levi-Montalcini" (21 March, p. 1615), R. Clementi *et al*. raise concerns regarding the paucity of long-term contracts among medical scientists in Italy.

It is true that the nonmeritocratic system causes many young researchers to fail. The system is further jeopardized by the fact that those who do achieve a "professor" position can hold the position (with its financial guarantee) for years regardless of productivity. Professors can become "empty names"—they are hardly reachable and sometimes they are not even there. Even worse, there are no formal procedures to handle misconduct allegations in Italian universities.

However, these challenges are not unique to the Italian research community. In the United States, graduates also hold temporary

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positions for many years before the possibility of attaining even the nontenured rank of assistant professorship. At this phase, renewal of contract depends mostly on their productivity (i.e., the number of publications). In most institutions, investigators are required to obtain funding to support their salaries, and this has become more challenging, given the recent drop in success rates for NIH-funded grant applications (*1*). The candidate is eligible for tenure only after a long probationary period of at least 7 years and, according to one study (*2*), only 50% of the candidates will obtain tenure, at which point their average age is 43 to 44 (*3*).

Although presenting some disturbing characteristics, in comparison to the United States, Italy does not seem to represent such a dramatic case.

MARTINA VENDRAME

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1. Office of Extramural Research (http://grants.nih.gov/grants/award/success.htm).
2. M. J. Dooris, M. Guidos, paper presented at the *Annual Forum of the Association for Institutional Research*, Chicago, IL, 14 to 18 May 2006 (www.psu.edu/president/pia/planning_research/reports/AIR_Tenure_Flow_Paper_06.pdf).
3. National Study of Postsecondary Faculty (http://nces.ed.gov/dasolv2/tables).

Leave Regulation to the FDA

FORMER FDA COMMISSIONER DONALD KENNEDY recently opined ("Misbegotten preemptions," Editorial, 2 May, p. 585) that makers of FDA-regulated products should be subject to lawsuits in state courts when things go wrong, even if they have followed FDA's rules to the letter. I disagree. The regulatory process set up by Congress for the testing and approval of these products is, although imperfect, still the gold standard. It is clearly superior to regulation through ad hoc litigation. Lawsuits to penalize companies when an unknown risk results in harm to a patient do so only by undermining FDA's authority to decide which risks are significant and which are not.

What would Kennedy's new regulatory regime look like? We can make an educated guess from the experience that every one of us has faced in applying for a loan. Those pages of disclosure, opaque and endless, are the lenders' rational response to the possibility of litigation.

Kennedy argues that regulation by jury is needed to supplement the FDA's imperfect ability to detect and manage risks in medical products. He seems to ignore the continuing growth of FDA's considerable capabilities. Every drug candidate today has to survive regulatory scrutiny on dimensions of safety that even 10 years ago could not have been identified. We know more about the safety profiles of our medicines than ever before. This is the result of deeper biological understanding, improved methods of gathering and interpreting information about patient experiences (including large observational and epidemiological studies), and strengthened regulatory requirements for monitoring and reporting safety data after a product is approved. Risk-management plans for the entire product life cycle are rapidly becoming the norm.

Few older drugs, even aspirin, would make it through this gauntlet today. Evidence of the benefits of modern safety testing can be found in recent work by Frank Lichtenberg, National Bureau of Economic Research (*1*), which studied over half a million patients and the impact of the vintage (original FDA approval date) of the drugs they took on their 3-year probability of survival. It found that patients on the oldest drugs (pre-1970 approval) did the worst, with 4.4% actual mortality compared to 3.7% actual mortality for patients on drugs with approval after that date. That is a 16% decrease in actual mortality. The trend was sustained by a decade of approval, with the newest vintage drugs (approval after 1990) doing the best. These statistics suggest that newer is better, that pharmaceutical and medical standards are improving, and that the FDA is raising its game.

The FDA's regulatory system will never be perfect, but the greater danger to public health is that we deter innovation by trying to regulate drug development through litigation. If the FDA is to be the authority on what the label says, juries and judges cannot be given license to rewrite the label and thereby regulate the FDA. Any honest trial lawyer will tell you that litigation is fueled by emotion, theatrics, and opportunism. It does not produce predictable or systematic results. It certainly does not produce science, and it should not be allowed to replace scientific judgment. **OWEN C. B. HUGHES**

Legal Division, Pfizer, New London, CT 06320, USA.

Letters to the Editor

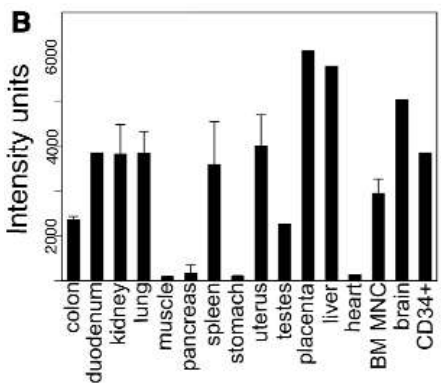
Letters (~300 words) discuss material published in *Science* in the previous 3 months or issues of general interest. They can be submitted through the Web (www.submit2science.org) or by regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

Reference

1. Frank R. Lichtenberg, "The effect of drug vintage on survival: Micro evidence from Puerto Rico's Medicaid Program" (National Bureau of Economic Research, NBER Working Paper No. 10884, Cambridge, MA, 2004); www.nber.org/papers/w10884.

CORRECTIONS AND CLARIFICATIONS

Reports: "A heme export protein is required for red blood cell differentiation and iron homeostasis" by S. B. Keel *et al.* (8 February, p. 825). Three editorial errors were made. The *y*-axis label for Fig. 2B should read CD71 (not CD17). The corrected Fig. 3B is shown here; stomach, the label for the eighth bar, has been restored. In the legend to Fig. 4, the concentration of hepcidin should read 1 μg/ml.



TECHNICAL COMMENT ABSTRACTS

COMMENT ON "Major Australian-Antarctic Plate Reorganization at Hawaiian-Emperor Bend Time"

Anahita A. Tikku and Nicholas G. Direen

Whittaker *et al.* (Reports, 5 October 2007, p. 83) presented reconstructions for Australia and Antarctica showing a change in relative plate motion ~53 million years ago, coincident with an inferred major global plate reorganization. This comment addresses problematic areas in their assumptions and the geological consequences of their reconstructions.

Full text at www.sciencemag.org/cgi/content/full/321/5888/490c

RESPONSE TO COMMENT ON "Major Australian-Antarctic Plate Reorganization at Hawaiian-Emperor Bend Time"

J. M. Whittaker, R. D. Müller, G. Leitchenkov, H. Stagg, M. Sdrolias, C. Gaina, A. Goncharov

Accurately locating boundaries between continental and oceanic crust is topical in view of locating offshore boundaries relevant to margin formation models, plate kinematics, and frontier resource exploration. Although we disagree with Tikku and Direen's interpretations, the associated controversies reflect an absence of agreed-upon geophysical criteria for distinguishing stretched continental from oceanic crust, and lack of samples from nonvolcanic margins.

Full text at www.sciencemag.org/cgi/content/full/321/5888/490d