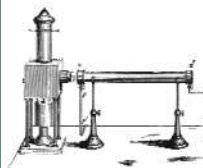


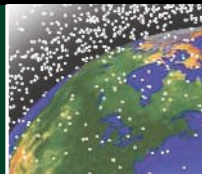
Helical spin order

338



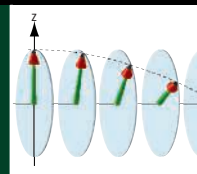
Space junk

340



Bottling blue sky

344



LETTERS | POLICY FORUM | ESSAYS | BOOKS | PERSPECTIVES

LETTERS

edited by Etta Kavanagh

Editorial Retraction

THE FINAL REPORT FROM THE INVESTIGATION COMMITTEE of Seoul National University (SNU) (1) has concluded that the authors of two papers published in *Science* (2, 3) have engaged in research misconduct and that the papers contain fabricated data. With regard to Hwang *et al.*, 2004 (2), the Investigation Committee reported that the data showing that DNA from human embryonic stem cell line NT-1 is identical to that of the donor are invalid because they are the result of fabrication, as is the evidence that NT-1 is a bona fide stem cell line. Further, the committee found that the claim in Hwang *et al.*, 2005 (3) that 11 patient-specific embryonic stem cells line were derived from cloned blastocysts is based on fabricated data. According to the report of the Investigation Committee, the laboratory “does not possess patient-specific stem cell lines or any scientific basis for claiming to have created one.” Because the final report of the SNU investigation indicated that a significant amount of the data presented in both papers is fabricated, the editors of *Science* feel that an immediate and unconditional retraction of both papers is needed. We therefore retract these two papers and advise the scientific community that the results reported in them are deemed to be invalid.

As we post this retraction, seven of the 15 authors of Hwang *et al.*, 2004 (2) have agreed to retract their paper. All of the authors of Hwang *et al.*, 2005 (3) have agreed to retract their paper.

*Science* regrets the time that the peer reviewers and others spent evaluating these papers as well as the time and resources that the scientific community may have spent trying to replicate these results.

DONALD KENNEDY  
Editor-in-Chief

References

1. Investigation Committee Report, Seoul National University, 10 Jan. 2006. (Members: Chairman Myung-Hee Chung, SNU, Uhtaek Oh, SNU, Hong-Hee Kim, SNU, Un Jong Pak, SNU, Yong Sung Lee, Hanyang University, In Won Lee, SNU, In Kwon Chung, Yonsei University, Jin Ho Chung, SNU)
2. W. S. Hwang *et al.*, Evidence of a Pluripotent Human Embryonic Stem Cell Line Derived from a Cloned Blastocyst, *Science* **303**, 1669 (2004).
3. W. S. Hwang *et al.*, Patient-Specific Embryonic Stem Cells Derived from Human SCNT Blastocysts, *Science* **308**, 1777 (2005).

Madison and Climate Change Policy

IN THEIR POLICY FORUM “A MADISONIAN APPROACH to climate policy” (16 Sept. 2005, p. 1820), D. G. Victor *et al.* oppose international cap and trade agreements with binding greenhouse gas emissions limitations. They argue for bottom-up local policy experiments as the best way to promote action and eventually lead to wider

cooperation to address climate change. They claim that this approach (as contrasted with top-down rules) is what Madison envisioned in *The Federalist Papers*—the laboratory of multiple states in federalism. Yet Victor *et al.* have mistaken and misappropriated Madison and advocated a policy that will not solve the global tragedy of the climate commons.

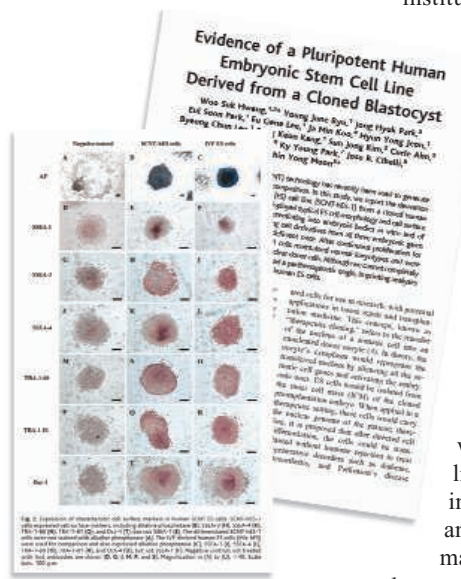
Victor *et al.* neglect that Madisonian federalism involved a strong central government with significant coercive power. Madison was

advocating not pure bottom-up diversity, but a new Constitution replacing the Articles of Confederation with an overarching legal and institutional framework to govern and mobilize both the states and the private sector in the common interest.

Victor *et al.* also mischaracterize the plurilateral treaty approach advocated by Stewart and Wiener (1). This approach involves building agreements among plural coalitions of willing nations to create parallel systems of international emissions trading. It would not be a “top-down” system, nor would it approach the degree of centralization involved in Madison’s version of federalism. It would avoid the difficulties of establishing a single universal cap and trading system under the Kyoto Protocol and focus on cooperation among the major emitting countries, as Victor *et al.* urge. The plurilateral cap and trade approach would foster a variety of trading systems to encourage precisely the diversity and experimentation in policy and practice that Victor *et al.* favor. But it would also involve binding mutual commitments by participants.

In contrast to both Madisonian federalism and plurilateral trading, Victor *et al.* argue for bottom-up local policies that they hope will somehow help move states from uncoordinated autarchy to the accretion of shared norms and informal cooperation. In certain situations under favorable conditions—generally involving small, close-knit groups—some tragedies of the commons can be successfully addressed through such informal development of shared norms (2). But often, especially at larger scales where reciprocity and monitoring are more elusive, the tragedies persist unless stronger institutions provide incentives for action in the common good [e.g., (3–5)]. Between bottom-up diversity and top-down rule, plurilateral cap and trade systems would provide these incentives while avoiding excessive centralization.

Effective climate policy will require emissions abatement by China, India, and other major developing countries, as well as by the United States and Europe, but purely bottom-up experiments have little chance of engaging all of these countries anytime soon. Some



Downloaded from www.sciencemag.org on November 25, 2009

kind of international transfers must occur to engage China and India. Victor *et al.* offer no way to structure that deal. International cap and trade systems do. Victor *et al.* assert that trading approaches are “doomed” because “governments that have imposed strict caps and strong institutions for trading will object to the printing of extra credits that will cause capital and effort flow into the developing countries.” Yet Victor *et al.* propose just such capital and effort flows, via government aid programs, to promote natural gas technologies in China and India. Trade is better: Government aid risks political distortions, bureaucratic selection of technologies, higher costs, and a subsidy for uncapped emissions abatement that yields a potentially perverse impact on aggregate emissions. Cap and trade would avoid these problems and mobilize private-market actors via competition to deliver the “capital and effort flows” most cost-effectively and innovatively.

JONATHAN B. WIENER,<sup>1</sup> RICHARD B. STEWART,<sup>2</sup>  
JAMES K. HAMMITT,<sup>3</sup> JEAN-CHARLES HOURCADE<sup>4</sup>

<sup>1</sup>Law School and Nicholas School, Duke University, Box 90360, Durham, NC 27708, USA. <sup>2</sup>School of Law, New York University, 40 Washington Square South, New York, NY 10012, USA. <sup>3</sup>Center for Risk Analysis, Harvard University, 718 Huntington Avenue, Boston, MA 02115, USA. <sup>4</sup>Centre International de Recherche sur l'Environnement et le Développement, 45 bis, avenue de la Belle Gabrielle, 94736 Nogent sur Marne, France.

#### References

1. R. B. Stewart, J. B. Wiener, *Reconstructing Climate Policy: Beyond Kyoto* (AEI Press, Washington, DC, 2003).
2. E.g., R. Ellickson, *Order Without Law* (Harvard Univ. Press, Cambridge, MA, 1991).
3. G. Hardin, *Science* **162**, 1243 (1968).
4. E. Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge Univ. Press, Cambridge, 1990).
5. T. Dietz, E. Ostrom, P. C. Stern, *Science* **302**, 1907 (2003).

#### Response

THERE ARE MANY OBVIOUS DIFFERENCES between the U.S. federal government and an international world of autarchic states. Nonetheless, we label our approach “Madisonian” to underscore the similarities in mechanisms for governance from the “bottom up.” These mechanisms inform more effective strategies for providing global public goods and also more sober expectations about when such efforts will bear fruit.

We agree with Wiener *et al.* that effective international coordination can't rely on powerful central government. That's why international measures, much more so than national policies, must be tailored carefully to the underlying interests of constituents. For countries that are willing to spend resources to control emissions—notably the European Union (EU) and Japan, but also Canada and parts of the United States—international emission caps can work. What matters, however, is not the “international” aspect of the cap but rather

the intranational (or intraregional in the case of the EU) institutions that enforce the cap and provide integrity to the system. Once those institutions are functional, there will be strong pressures to interconnect the systems for reasons that would be quite familiar to Madison—namely, the gains that arise from coordinated trading at larger scale. For



Madison, coordination through a relatively weak center was a matter of constitutional design; for the international system, it is a necessity. Stewart and Wiener have made a similar point elsewhere [(1), p. 132].

Where we disagree is on the best strategy for engaging developing countries. We criticized Stewart and Wiener's plurilateral approach as “top down” because it requires a heroic, central first step of allocating valuable “headroom” emission credits to countries that have no interest in limiting their emissions or creating the law-based institutions that are necessary to enforce an emission cap. Stewart and Wiener themselves indicate [(1), p. 72] exactly why this approach won't work—these countries will cash in the credits and then exit, which will undermine the integrity of emission caps in every trading country (2, 3). Wiener and Stewart point to reputation as a reason why that won't happen [(1), pp. 72–74], but reputation is a very poor deterrent in the international system when governments and their policies are transient but commitments, as in the Kyoto Protocol, extend over long time periods. Only in special cases is reputation an effective glue for collective action (4).

We also disagree with their claim that our alternative approach to engaging developing countries requires a politically impossible transfer of resources. In fact, the resources transferred in our approach are connected to large, irreversible changes in energy infrastructures, providing assurances that make them politically more palatable to donors. Moreover, our scheme is remarkably cheap and may introduce commercial and security bene-

fits attractive to the industrialized world.

We don't claim that the Madisonian approach is the best of all imaginable solutions to collective action (5). Our argument, rather, is that it offers a realistic vision for how systems where formal government is weak are, nonetheless, able to provide public goods that are the essence of governance.

DAVID G. VICTOR,\*†  
JOSHUA C. HOUSE, SARAH JOY

Program on Energy and Sustainable Development,  
Stanford, CA 94305–6055, USA.

\*D.G.V. is adjunct senior fellow at the Council on Foreign Relations.

†Author for correspondence. E-mail: david.victor@stanford.edu

#### References

1. R. B. Stewart, J. B. Wiener, *Reconstructing Climate Policy: Beyond Kyoto* (AEI Press, Washington, DC, 2003).
2. D. G. Victor, *Collapse of the Kyoto Protocol and the Struggle to Slow Global Warming* (Princeton Univ. Press, Princeton, NJ, 2001).
3. D. G. Victor, J. C. House, *Harvard Int. Rev.* **26** (no. 2), 56 (summer 2004).
4. E. Ostrom *et al.*, *Governing the Commons* (Cambridge Univ. Press, Cambridge, 1990).
5. R. G. Lipsey, K. Lancaster, *Rev. Econ. Stud.* **24**, 11 (1956–57).

## Advising on Publication

DONALD KENNEDY'S EDITORIAL “BETTER NEVER than late” (14 Oct. 2005, p. 195) appears to misunderstand the role of the National Science Advisory Board on Biosecurity (NSABB), as well as Secretary Leavitt's decision to ask the NSABB to review the Tumpey manuscript (“Characterization of the reconstructed 1918 Spanish influenza pandemic virus,” T. M. Tumpey *et al.*, *Research Articles*, 7 Oct. 2005, p. 77).

When briefed on this manuscript authored by CDC staff and others, the Secretary noted the dual-use nature of the work and wanted additional expert advice on the position the Department should take concerning publication. The NSABB was specifically created to provide advice on dual-use research and its communication. The charter states that the NSABB is to “advise on national policies governing publication, public communication, and dissemination of dual-use research methodologies and results.” The Editorial asserts that the NSABB's “charter makes clear that it does not screen individual papers.” As one of the drafters of that charter, I take issue with this statement. While it was never the Department's intention to screen all dual-use papers, it was understood that special cases would occur from time to time and that the Secretary would need to seek advice on individual papers. Indeed, the charter provides that the NSABB shall “address any other issues as directed by the Secretary.”

Out of an abundance of caution, Secretary

Leavitt sought the NSABB's advice on publication of this manuscript and a companion manuscript planned for publication in *Nature*. The Department expedited the NSABB review process. NSABB members and staff worked long hours to ensure that any disruptions caused by this additional layer of review were minimized. In the end, the NSABB recommended that the Department support publication. Given the significance of the 1918 virus, it was both reasonable and appropriate for the Secretary to seek the advice of the NSABB. It might have caused some concern among the Editorial staffs at the two publications, but under the circumstances I say, "Better safe than sorry."

STEWART SIMONSON

Assistant Secretary for Public Health, Emergency Preparedness, U.S. Department of Health and Human Services, 200 Independence Avenue, SW, Washington, DC 20201, USA.

## HIV Prevention in Adolescents

MOST HIV PREVENTION PROGRAMS AT PRESENT (for example, the World Health Organization) are aimed at 15- to 24-year-olds (1). This age range unfortunately disregards the well-established fact that girls mature sexually two

to three years earlier than boys (2, 3): Girls attain menarche (the first period) in well-nourished populations on average at 12.5 years, whereas boys reach sexual maturity on average at 14.5 years. In developing countries, with poorer nutrition levels or female physical work, girls' menarche can be 13 to 15 years, and boys' sexual maturity can be later by three years, at 16 to 18 years (2, 3). Completion of growth for girls is therefore also earlier than for boys in both well-nourished and poorly nourished populations (4, 5).

Because an important aim of HIV/AIDS prevention programs is to inform girls of the dangers to their health of early, unprotected sexual intercourse, education programs should start at ages 11 to 12 years, and the realistic standard for both sexes should be ages 12 to 24 years.

ROSE E. FRISCH

Associate Professor of Population Studies Emerita, Harvard School of Public Health, Harvard Center for Population and Development Studies, 9 Bow Street, Cambridge, MA 02138, USA.

### References

1. World Health Organization, [www.who.int/child-adolescent-health/HIV/HIV\\_adolescents.htm](http://www.who.int/child-adolescent-health/HIV/HIV_adolescents.htm), 5/24/2005.
2. R. E. Frisch, R. Revelle, *Science* **169**, 397 (1970).
3. R. E. Frisch, R. Revelle, *Hum. Biol.* **41**, 536 (1969).
4. R. E. Frisch, R. Revelle, *Hum. Biol.* **41**, 185 (1969).
5. R. E. Frisch, *Science* **199**, 22 (1978).

## Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 6 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.

### CORRECTIONS AND CLARIFICATIONS

**News of the Week:** "Scientific drill ship to be reborn" by R. A. Kerr (23 Dec. 2005, p. 1890). The correct name of the cited program is the Integrated Ocean Drilling Program.

**News of the Week:** "How fast does your dinosaur grow?" (16 Dec. 2005, p. 1751). The article incorrectly stated that dinosaurs are not reptiles. Dinosaurs, along with birds, are members of the clade Reptilia. The article also incorrectly stated that "dinosaur" means "thunder lizard" rather than the correct "terrible lizard."

**Perspectives:** "The changing picture of volatiles and climate on Mars" by B. M. Jakosky *et al.* (2 Dec. 2005, p. 1439). In reference 6, the third author's name was incorrect. It should be M. K. Rifkin.

Need help  
taking your next  
career step?

### ScienceCareers.org Workshops

Join ScienceCareers.org and local Boston scientists as they discuss –

**Interviewing Skills for Scientists  
and Technical Professionals  
Entering Industry Science**

January 30, 2006  
MIT Campus, Building 10-230  
Cambridge, MA  
2:30 p.m. check-in  
3:00 p.m. seminar

For information and to register, search for MIT at:  
<http://sciencecareers.sciencemag.org/meetings>

Sponsored by MIT Careers Office, MIT Postdoctoral Advisory Council, MIT Graduate Student Council and brought to you by ScienceCareers.org

nextwave now part of:  
**ScienceCareers.org**  
We know science AAAS

