

## Causation, Vioxx, and Legal Issues

dures followed. We welcome Christy and Spencer's efforts to estimate these additional errors and look forward to seeing details published as to how they arrived at the numbers quoted and what they found at other stations.

There is growing evidence, however, that the net result of all adjustments will indeed lead to increased warming, contrary to their assertion. First, all published homogenization efforts have led to increased warming (1–3); although weaker than what we found, this is probably because previous efforts went only after the “biggest fish” and/or suffered from other difficulties. Second, a new and independent study (4) strongly suggests that the spurious cooling trends in the stratosphere extend into the troposphere, in accord with our findings and as suggested previously (1). The implication by Christy and Spencer that spurious warmings (which have been documented in the other studies as well) somehow compensate for daytime heating effects in the troposphere, but not in the stratosphere, will require clear support from the data and careful scrutiny of methods. The agreement noted by Christy and Spencer at U.S. stations is encouraging but does not guarantee agreement in the Tropics [and mustn't this previously reported agreement have been affected by the recent revision to their method (5)?].

The trend noted by Christy and Spencer south of 30°N is a misleading statistic that mixes up two parts of the globe whose situation is very different. In the Tropics, sampling is adequate and we find a large error that brings the data closer to what is expected. South of 30°S, on the other hand, sampling is far from adequate, and radiosonde trends have always been erratic, with or without the relatively modest correction implied by our work.

Quite apart from this, it is hard to believe that Christy and Spencer would argue that a data set showing the “wrong” amount of warming must therefore be flawed. If that were a valid argument, their own satellite analysis would have been discarded years ago.

STEVEN C. SHERWOOD<sup>1</sup> AND JOHN R. LANZANTE<sup>2</sup>

<sup>1</sup>Department of Geology and Geophysics, Yale University, New Haven, CT 06520, USA. <sup>2</sup>National Oceanic and Atmospheric Administration/Geophysical Fluid Dynamics Laboratory, Princeton University, Princeton, NJ 08542, USA.

### References

1. J.R. Lanzante, S.A. Klein, D.J. Seidel, *J. Clim.* **16**, 241 (2003).
2. P. W. Thorne *et al.*, *J. Geophys. Res.* **110**, Art. no. D18105/2005.
3. L. Haimberger, “Homogenization of radiosonde temperature time series using ERA4 analysis feedback information” (ERA40 Project Report Series #23, European Centre for Medium Range Weather Forecasting, Reading, UK, 2005).
4. X. Randel, X. Wu, *J. Clim.*, in press.
5. C.A. Mears, F. J. Wentz, *Science* **309**, 1548 (2005); published online 11 Aug. 2005; 10.1126/science.1114772.

**IN THE ARTICLE ON THE FIRST VIOXX TRIAL,** “Vioxx verdict: too little or too much science?” (News Focus, 2 Sept., p. 1481), A. Lawler writes that one commentator attributed the jury's verdict for the plaintiff to the evidence about Merck covering up the problems with its drug. This occurred in a case that most observers thought was one of the weakest ones on individual causation.

In law (as in science), causation is a matter independent of culpability. A drug may innocently cause harm, and the most heinous corporate actions may, through serendipity, not result in harm. Yet the Vioxx verdict appears to be a reprise of what occurred with the drug Bendectin and silicon gel breast implants, in which juries relied on evidence of corporate wrongdoing to reach verdicts that the evidence of causation would not justify (1, 2).

Remarkably, the success of plaintiffs with juries continued in the Bendectin litigation even after the science tending to exonerate the drug became more robust (3).

For the most part, courts corrected those errors in Bendectin (which spawned the famous *Daubert* decision, requiring federal judges to more aggressively screen expert testimony) and in breast-implant litigation. Merck may not benefit from the same judicial intervention. There is, after all, pretty good evidence that Vioxx has caused a substantial number of heart attacks, and those plaintiffs are queuing up for their turn. The first case appears to have ridden on their anticipated coattails.

MICHAEL D. GREEN

Wake Forest University, Winston-Salem, NC 27106, USA.

### References

1. R. Nagareda, *Mich. Law Rev.* **96**, 1121 (1998).
2. M. D. Green, *Bendectin and Birth Defects* (Univ. of Pennsylvania Press, Philadelphia, PA, 1994).
3. J. Sanders, *Stanford Law Rev.* **46**, 1 (1993).

## Illusory Statistics

**THE REPORT BY S. NEE ET AL. “THE ILLUSION OF invariant quantities in life histories”** (19 Aug., p. 1236) demonstrates that empirical support for the presence of invariant ratios in life-history traits is based on spurious correlations. Unfortunately, their example is just one of many: Spurious correlations have been repeatedly raised as statistical proofs for concepts as varied as the energetic costs of reproduction (1), rates of morphological evolution (2), and estimates of forest biomass (3).

The repeated and blind application of discredited statistics is a stumbling block to



Discovering the biggest secret in Science will soon be much easier



Institutional Site License Available

Q  
What can Science STKE give me?



A  
The definitive resource on cellular regulation

STKE – Signal Transduction Knowledge Environment offers:

- A weekly electronic journal
- Information management tools
- A lab manual to help you organize your research
- An interactive database of signaling pathways

STKE gives you essential tools to power your understanding of cell signaling. It is also a vibrant virtual community, where researchers from around the world come together to exchange information and ideas. For more information go to [www.stke.org](http://www.stke.org)

To sign up today, visit [promo.aaas.org/stkeas](http://promo.aaas.org/stkeas)

Sitewide access is available for institutions. To find out more e-mail [stkelicense@aaas.org](mailto:stkelicense@aaas.org)



## LETTERS

the advancement of science. The mere possibility that a statistical artefact could form the empirical base from which a field of evolutionary biology has grown is a sign that something is wrong. It is symptomatic of a larger issue in the biological sciences: To be a good biologist, you must also be a competent statistician, but many are not. To quote one viewpoint recently expressed, “If you can’t understand enough statistics to interpret the data from your own experiments, then you probably don’t deserve a Ph.D. in ecology” [(4), p. 49].

Spurious correlations in biological data are a commonly described phenomenon—Pearson first proved their existence to evolutionary biologists more than a century ago (5). One hundred and eight years on, Nee *et al.* have shown that this simple statistical message is finally sinking in.

ROBERT M. EWERS

Institute of Zoology, Zoological Society of London, Regents Park, London NW1 4RY, UK, and Department of Zoology, University of Cambridge, Downing Street, Cambridge CB2 3EJ, UK. E-mail: [robert.ewers@ioz.ac.uk](mailto:robert.ewers@ioz.ac.uk)

### References

1. S. G. Gebhardt-Henrich, *J. Avian Biol.* **31**, 245 (2000).
2. P. D. Roopnarine, *Annu. Rev. Evol. Syst.* **34**, 605 (2003).
3. T. J. Dean, Q. V. Cao, *For. Sci.* **49**, 279 (2003).
4. C. K. Geedey, J. L. Dudycha, *Front. Ecol. Environ.* **2**, 49 (2004).
5. K. Pearson, *Proc. R. Soc. London* **60**, 489 (1897).

### CORRECTIONS AND CLARIFICATIONS

**News Focus:** “A glass ceiling for Asian scientists?” by J. Mervis (28 Oct., p. 606). The article incorrectly implied that an invitation to Liquan Luo to join the program committee of the Society for Neuroscience came in response to a letter questioning the society’s commitment to providing opportunities for Asian-American scientists. The appointment occurred before the letter was submitted, as part of the society’s normal process of replacing committee members. In addition, the article misspelled the first name of Irwin Levitan, who chairs the society’s committee on committees.

**AAAS News and Notes:** “2006 Annual Meeting: Grand Challenges, Great Opportunities” (28 Oct., p. 635). Two lines were missing from the the last paragraph in column 1 on page 635. The missing text is “Altogether, there will be more than 200 symposia, lectures, seminars, and other sessions. For more about the program and registration, see [www.aaasmeeting.org](http://www.aaasmeeting.org).” The text is correct in the online version.

**News of the Week:** “Six women among 13 NIH ‘Pioneers’ ” (30 Sept., p. 2149). The first name of Pehr Harbury, chosen for the 2005 Director’s Pioneer Award by the National Institutes of Health, was misspelled in the picture caption that accompanied the story.

**Policy Forum:** “Pathogen surveillance in animals” by T. Kuiken *et al.* (9 Sept., p. 1680). In reference (16), part E of the figure was incorrectly attributed to the Australian Broadcasting Corporation; the photograph is from Reuters.