LETTERS

edited by Jennifer Sills

Turkey Must End Violent Response to Protests

THE TURKISH MEDICAL ASSOCIATION (TTB) REPORTED THAT 8121 PEOPLE WERE OFFICIALLY admitted to hospitals resulting from police violence between 31 May and 26 June (*1*). This number includes 5 deaths, 61 life-threatening injuries, 104 head traumas, and 11 ophthalmic injuries, one of which led to loss of an eye due to shots of tear gas canisters from short range (*1*). Turkish police have used excessive amounts of tear gas (lachrymatory agents) in public (*2*) and confined spaces such as hospitals or infirmaries, according to international media reports and the TTB (*1*–*4*). Such use of asphyxiating gases in confined spaces is not only extremely dangerous for public health (*5*–*8*), but also strictly limited by international agreements, such as the Geneva Protocol (*9*), to which Turkey is a signatory. Security forces have used 130,000 tear-gas cartridges in 20 days, and Turkey is planning to buy 100,000 new cartridges (*10*). Doctors and nurses treating patients affected by tear gas and other police brutality, as well as the Istanbul Medical Chamber General Secretary, have been apprehended by police (*11*, *12*), a clear violation of customary international and human rights law (*13*). More than 4000 academics around the world have already signed a petition to protest the police brutality (*14*). We call upon the Turkish government to obey international law in the treatment of protesters and those providing medical treatment to them, and to start a good-faith dialogue with the protest movement.

Show of force. Turkish riot police fire tear gas at protestors in Istanbul's Taksim Square.

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References

1. TTB Report (www.ttb.org.tr/index.php/Haberler/veriler-3842.html).
2. Gas Burns—Taksim Gezi Parki 12.06.2013 (www.youtube.com/watch?v=66e-jRqMEZg).
3. A. O. Aktan, *Br. Med. J.* **346**, f3801 (2013).
4. Police Throwing Tear Gas into German Hospital İstanbul 16.06.13 2.57am #occupygezi (www.youtube.com/watch?v=AL06wWNqTY4).
5. H. Hu, D. Christiani, *Lancet* **339**, 1535 (1992).
6. B. F. Bessac, S.-E. Jordt, *Proc. Am. Thorac. Soc.* **7**, 269 (2010).
7. B. C. Howard, "The surprising history and science of tear gas," *National Geographic Daily News* (12 June 2013); http://news.nationalgeographic.com/news/2013/06/130612-tear-gas-history-science-turkey-protests/.
8. H. G. Atkinson, "Under the gun: Ongoing assaults on Bahrain's health system," Physicians for Human Rights (May, 2012); http://physiciansforhumanrights.org/library/reports/under-the-gun-ongoing-assaults-on-bahrains-health-system.html.
9. United Nations Geneva Protocol (1925); www.icrc.org/eng/war-and-law/treaties-customary-law/geneva-conventions/index.jsp.
10. "Turkish police to buy 100,000 gas bomb cartridges," *Hurriyet Daily News* (19 June 2013); www.hurriyetdai lynews.com/turkish-police-to-buy-100000-gas-bomb-cartridges-.aspx?PageID=238&NID=49075&NewsCatID=341.
11. *Lancet* **381**, 2067 (2013).
12. E. Güne, "Police search houses of Gezi protests' starter group members," *Hurriyet Daily News* (9 July 2013); www.hurriyetdailynews.com/police-search-houses-of-gezi-protests-starter-group-members.aspx?pageID=238&nID=50349&NewsCatID=339.
13. Convention (IV) Relative to the Protection of Civilian Persons in Time of War (Geneva, 1949); www.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=AE2D398352C5B028C12563CD002D6B5C&action=openDocument.
14. Academics for Gezi: English petition, with more than 2200 signatures at the time of publication (http://academicsforgezi.com/our-call/) and Turkish petition, with more than 1800 signatures at the time of publication (http://academicsforgezi.com/).

Optimizing Peer Review of Software Code

IN THEIR POLICY FORUM "TROUBLING TRENDS in scientific software use" (17 May, p. 814), L. N. Joppa *et al*. make a case for increased education of scientists in computer programming skills and requirements for peer review of scientific software code. We agree in principle but believe that some of the specific recommendations by Joppa *et al*. are unfeasible.

In particular, we believe that requiring prepublication peer review of computer source code by journal reviewers would place impossible strain on an already overburdened system. Many scientific journals currently have great difficulty finding sufficient numbers of qualified reviewers to evaluate submissions in a timely and construc-

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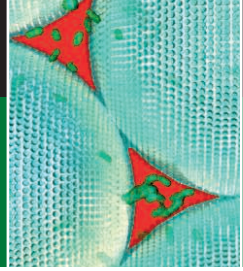

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tive fashion. Requiring that reviewers be able to evaluate not only the scientific merit of a manuscript but also parse, understand, and evaluate what can be thousands or tens of thousands of lines of source code written in one or more of a variety of programming languages is impractical.

A more tenable solution for computer codes is postpublication peer review, where the release of source code is a requirement of publication (*1*) and interested and appropriately skilled members of the broader scientific community may download and evaluate the code at will. This would bring review of computer code in line with existing policies pertaining to data and materials availability already in place at most journals.

Increased dependence on postpublication review will require strengthening procedures and facilities for reporting corrections and retractions of published research articles, a course of action long advocated by those concerned over increasing rates of retraction, especially in the biomedical sciences (*2*).

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References

1. A. Morin *et al*., *Science* **336**, 159 (2012).
2. Retraction Watch (http://retractionwatch.wordpress.com/).

Response

SLIZ AND MORIN QUESTION THE FEASIBILITY of our recommendation to both peer-review computer code and release it, and they proffer an alternative: postpublication community review and stronger procedures and facilities for dealing with corrections and retractions of published results. These are not incompatible. Encouraging the broader scientific community to inspect computer code postpublication would help in identifying scientific errors currently unnoticed in the scientific literature. Improving the process of corrections and retractions would have positive benefits far beyond this issue. However, neither negates the need for prepublication review of code.

The scientific publishing process relies on prepublication peer review as a filter for robust results. This is so because, regardless of the strength of processes for dealing with corrections and retractions, putting "the genie back in the bottle" is always going to be a difficult task after a result has been reported in the literature. At a minimum, code needs to be available to reviewers should they choose to scrutinize it. Moreover, prepublication review of code need not necessarily rely on the current review system. Just as English-language editing services have emerged to ensure a minimum standard of accessibility of articles in many major journals, so might software-reviewing services provide a stamp of approval that code actually implements the algorithm reported in a paper. Indeed, in the commercial sector, software escrow providers routinely provide full verification services to companies purchasing (or investing in) business-critical software [e.g., (*1*)], and the approaches used by such companies might provide pointers for a new model for academic software verification services.

Of course, verification of software is just the first essential step in the process, with by far the more challenging issue being software validation. Addressing this issue, together with the equally pressing issue of uncertainty quantification in complex [computational] models, has been the focus of intensive research efforts in other scientific disciplines (*2*). These efforts might provide a good starting point for equivalent efforts in the life sciences.

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Reference

1. Iron Mountain, "How verification services fortify your software escrow solution" (Iron Mountain, 2011).
2. National Academies Press, *Assessing the Reliability of Complex Models: Mathematical and Statistical Foundations of Verification, Validation, and Uncertainty Quantification* (National Academies Press, Washington, DC, 2012).

Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the past 3 months or matters of general interest. Letters are not acknowledged upon receipt. Whether published in full or in part, Letters are subject to editing for clarity and space. Letters submitted, published, or posted elsewhere, in print or online, will be disqualified. To submit a Letter, go to www.submit2science.org.

CORRECTIONS AND CLARIFICATIONS

News & Analysis: "NIH to phase out most chimp research" by J. Kaiser (5 July, p. 17). The article failed to note that Gabon has not banned biomedical research on chimpanzees. The HTML and PDF versions online have been corrected.

Reports: "A population of fast radio bursts at cosmological distances," by D. Thornton *et al*. (5 July, p. 53). A mistake in the script used to produce Table 1 caused the energy released (E) values in the last row of the table to be off by 10^6. The correct values are ~10^{33}, ~10^{31}, ~10^{32}, and ~10^{31}. The conclusions of the paper are unaffected. The HTML and PDF versions online have been corrected.

TECHNICAL COMMENT ABSTRACTS

Comment on "Can We Name Earth's Species Before They Go Extinct?"

Camilo Mora, Audrey Rollo, Derek P. Tittensor

Costello *et al*. (Review, 25 January 2013, p. 413) challenged the common view that many species are disappearing before being described. We suggest that their conclusion is overly optimistic because of a limited selection and interpretation of available evidence that tends to overestimate rates of species description and underestimate the number of species on Earth and their current extinction rate.

Full text at http://dx.doi.org/10.1126/science.1237254

Response to Comment on "Can We Name Earth's Species Before They Go Extinct?"

Mark J. Costello, Robert M. May, Nigel E. Stork

Mora *et al*. disputed that most species will be discovered before they go extinct, but not our main recommendations to accelerate species' discoveries. We show that our conclusions would be unaltered by discoveries of more microscopic species and reinforce our estimates of species description and extinction rates, that taxonomic effort has never been greater, and that there are 2 million to 8 million species on Earth.

Full text at http://dx.doi.org/10.1126/science.1237381