February 20, 2006

Dr. Ralph J. Cicerone, President
National Academy of Sciences
500 Fifth Street, NW
Washington, DC 20001

Dear Dr. Cicerone,

I am writing in my capacity as Editor-in-Chief of The Journal of Cell Biology (JCB), on behalf of my fellow senior academic Editors, to call your attention to a matter that we believe the National Academy of Sciences needs to address. The matter concerns establishing standards for the management of digitally processed data, and for the larger issue of scientific ethics in publication.

For the past four years, the JCB has had a pioneering program to monitor the veracity of digital images provided to us for publication by the authors of accepted manuscripts. Our procedure involves visual inspection of the image files using basic adjustments in Photoshop, and we plan to incorporate the use of detection software being developed by a collaborating mathematician at Dartmouth College.

During the course of this program, overseen by our Executive Editor, Dr. Mike Rossner, we have found that at least 25% of these manuscripts contain one or more figures that must be remade because we detect inappropriate image manipulation, that is, the manipulation violates our guidelines for image presentation, but it does not affect the interpretation of the data. Our standards have been published on our website (www.jcb.org) as well as in a highly distributed article written by Dr. Rossner and my Editorial colleague, Dr. Kenneth Yamada of the National Institutes of Health (Rossner and Yamada, 2004, JCB).

If we suspect fraudulent manipulation that does affect the interpretation of the data, Dr. Rossner contacts the authors requesting original, unmanipulated data. In the large majority of cases, original data were provided and the manipulated images simply needed to be corrected to more accurately reflect those data. In an alarming high number of cases (1% of our accepted manuscripts), however, the authors were unable to provide the original data or provided data that clearly confirmed that fraudulent manipulation had occurred. In such cases, we revoke acceptance of the manuscript and, on occasion, inform the authors' home institution regarding our findings.

The JCB is a high impact, highly selective journal publishing only 15-20% of the papers it receives. Since it is edited by practicing scientists, we have taken the issue of data manipulation very seriously. Our image-screening program helps to ensure the validity of the data we publish (and several other journals, including Science, have taken up this cause), but the prevalence of image manipulation reveals a lapse in the education of young scientists and students on the proper handling of digital image data. The transition of biomedical and biological science to a nearly complete reliance on digital data is relatively recent, but it is already time for the academic
community to establish standards and to educate its trainees on what is or is not appropriate. We have worked, largely without success, to get professional societies to take up this task.

The topic of image manipulation has made news headlines recently amidst the discrediting of the cloning article published in Science by Hwang and colleagues. Since our system would have detected at least one anomaly published by these authors, the popular press reported our efforts extensively, capped off by a front page article written in the New York Times "Science Times" by Nicholas Wade. We have now been inundated with requests for help from virtually all major biomedical science journals from Nature to the New England Journal of Medicine, and we are assisting these other journals to adopt our procedures and standards. Science, ironically, contacted us long before the Hwang case and has implemented our system, but had not done so by the time the Hwang et al. article was published. We have only recently been in contact with George Kendall, the manager of Production, Marketing, and Licensing at the Proceedings, although the Proceedings has yet to adopt any manipulation guidelines.

Even though my senior Editorial group consists of some of the most illustrious and respected cell biologists in the US and Europe, we do not feel that our efforts comprise a community-sanctioned effort to address the issue. Furthermore, there are a number of other critical problems pertaining to the general issue of ethics and publication, such as authorship and the presentation of other types of data besides images, that need to be addressed.

We feel that the goal of establishing clear and logical standards for ethics in scientific publishing is one that is appropriate to be addressed by a high level panel convened by the National Academy of Sciences. The Academy has addressed other issues of community ethics in the past, such as the sharing of published reagents, and with quite some success. We believe that it will not be at all difficult to arrive at a consensus, and doing so will have two very positive effects. First, it will assure the public that the scientific community is acting in an aggressively responsible fashion to ensure the integrity of publicly-funded science. Second, it will provide a clarion pretext to begin educating students, fellows, and even our colleagues on what is acceptable, and not acceptable, in the digital age.

I or any of my fellow JCB editors would be delighted to discuss this issue with you at any time. Thank you for your consideration.

Yours sincerely,

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