

## Biotechnology Education

### Commentary: Is There a Science Lesson in the Headlines?

SCIENTIFIC FRAUD AND FRAUDULENT SCIENCE

Received for publication, January 3, 2006

**Sheldon M. Schuster‡**

*From the Keck Graduate Institute for Applied Life Sciences, Claremont, California 91711*

Last year two events occurring within a few days of each other put science, and in particular the scientific method, on the front page of newspapers nationwide. On December 20, 2005, Federal Judge John E. Jones III issued an order barring the teaching of intelligent design (ID)<sup>1</sup> as science in public classrooms. Three days later, an investigative panel from Seoul National University issued a report charging “intentional fabrication” in the published and highly visible work on the cloning of human embryos by Dr. Hwang Woo Suk. These juxtaposed examples of fraudulent science and scientific fraud, respectively, provide a rare opportunity for the nonscientific public to understand what scientists do and why the scientific method is essential for assuring technological progress. As educators, we must utilize these events to teach a basic lesson that science requires both a testable hypothetical framework as well as an uncompromising respect for the truth.

The federal court decision regarding ID confirmed what all credible scientists know: reputable science is both testable and repeatable. Judge Jones declared that ID is a cover for religious doctrine and cannot be tested. Therefore, it does not belong in the science classroom. In an unfortunate example of how the scientific method functions, the work presented by Dr. Hwang was testable but will likely not stand up to the mandatory requirement for repeatability. Therefore it will not be accepted by the scientific community. This too demonstrated what all credible scientists know: scientific progress depends to a great extent on the honesty and integrity of each member of the community.

There is no doubt that the public trust enjoyed by the scientific community will be damaged by the grossly unethical behavior alleged in the Hwang affair. In contrast, many in the scientific community were encouraged by the judicial decision that the religious beliefs underpinning ID are not part of science. Nonetheless, these two events are linked not only temporally but also in what they tell us about the lack of appreciation for both the methods and ethics of science. It is ironic that many of the public argue that the ethical values at the core of religion might be exactly what were needed to avoid the scientific

misconduct of Dr. Hwang. But the real convergence of these two events is that neither the public nor some practitioners of science appreciate the basic philosophy of science.

As life science educators who must teach the philosophy and ethics of science, we have a daunting task. In the wake of the misconduct allegations, there was a spate of articles exploring the issue of scientific misconduct. The *New York Times* article “Global Trend: More Science, More Fraud” [1] is typical of the following message: as science grows around the world, the methods that could guard against fraud and error are being overwhelmed. The authors cited Ulrich’s Periodical Directory in stating that there are now over 54,000 scientific journals published around the world, and more than 29,000 are foreign (not U. S.-based). While they quoted experts noting the difficulty in enforcing scientific standards in other countries, the problem is not one peculiar to researchers outside the U. S. To illustrate, the authors make reference to a study conducted last June by scientists at the University of Minnesota and HealthPartners Research which found “. . . up to a third of the respondents had engaged in ethically questionable practices, from ignoring contradictory facts, to falsifying data.” Although other news articles explored possible mechanisms for detecting either misconduct or error such as an Internet data base for submitting DNA fingerprinting data or even establishing independent laboratories that would verify results [2] many of these solutions suffer from being impractical, costly, and in the end dependent on the honesty of those participating.

It is naive to believe that teaching the ethics of science will change someone who is dishonest. Equally, it is impractical to propose educating a scientifically illiterate public about the scientific method. The educational message from these events, however, is that the future of science is in the hands of those who do in fact appreciate the philosophy of science. It was those who realized the necessity for the honesty of science who ultimately pointed out the fraud of Dr. Hwang. It was South Korean scientists who kept up the pressure on Dr. Hwang through web sites and blogs and who showed that there are scientists who would appreciate the lessons about the philosophy of science. The educational challenge is to empower those who care about the future of science with the philosophical background and moral courage to do what they know to be ethical.

‡ To whom correspondence should be addressed: Keck Graduate Institute for Applied Life Sciences, 535 Watson Dr., Claremont, CA 91711. Tel.: 909-607-0108; Fax: 909-607-8598; E-mail: Schuster@kgi.edu.

<sup>1</sup> The abbreviation used is: ID, intelligent design.

If there are more effective and current educational materials that can be used to teach the philosophy or what Judge Jones calls “the centuries-old ground rules of science,” then *BAMBED* should be the place where they can be made available. I look forward to your comments and contributions.

## REFERENCES

- [1] L. K. Altman and W. J. Broad, Global Trend: More Science, More Fraud, December 20, 2005, *New York Times*.
- [2] A. Srikameswaran, and B. Spice, Stem Cell Work Faked, Korean Scientist Claims, December 16, 2005, *Pittsburgh Post-Gazette* ([www.post-gazette.com/pg/05350/623383.stm](http://www.post-gazette.com/pg/05350/623383.stm)).