Rights and Responsibilities of Scientists

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The interplay between science and society

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1. The value and importance of research for the human society is undisputable.
2. The public trust in science and technology is a pillar in society.
3. The strength of this pillar depends critically on transparency and the collective reputation of research and researchers.

Conclusion:

The research community has to act in such a way that is regarded as ethical by a significant majority of people in society.

Science betrayed

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POLICY FORUM

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Scientific Misconduct: Do the Punishments Fit the Crime?

What happens to researchers after a finding of misconduct?

Barbara K. Redman[1,2] and Jon F. Merz[3]*

It is commonly accepted that punishments meted out for scientific misconduct (falsification, fabrication, or plagiarism) (*1*) effectively end one's career, banishing the bad apple for violating the trust that the scientific community confers on its members (*2*, *3*). Yet, little is known about the consequences of being found guilty of misconduct. Are punishments as severe as many suspect?

We identified from public records all investigators holding terminal degrees found guilty of misconduct by the U.S. Office of Research Integrity (ORI) between January 1994 and December 2001, inclusive. In late 2003, we examined their cases, searched for publications before and after the ORI decision, and attempted to locate these people to see if the findings had caused career changes and to interview them (*4*).

In this 8-year period, ORI found that 106 individuals had committed misconduct. Of these, 43 held terminal degrees (31 Ph.D., 8 M.D., 4 M.D./Ph.D.) and were employed in a professional, faculty, or research scientist role; we omitted students and fellows, limiting our study to those who had established research careers. All but one individ-

There were few differences in number or duration of sanctions between those who committed fabrication and/or falsification, plagiarism, or misrepresentation. The only systematic differences observed were (i) retraction was never required after plagiarism and (ii) those who had falsified and/or fabricated data were 8.8 times ($z = 2.34$, $P = 0.019$) more likely than others to receive grant debarments and received on average 0.6 more sanctions.

Searching PubMed, we found publication data for 37 of the 43 individuals. Papers were examined to ensure correct authorship. Mean publication rate per year before the finding of scientific misconduct (dating back to each individual's first publication) was 2.1 (SD = 1.7, range 0.2 to 5.9) and after the finding 1.0 (SD = 1.2, range 0.0 to 5.6) (dating up to late 2003). This decline was significant ($t = 4.66$, $P < 0.0001$). Twelve individuals published nothing after the misconduct finding.

From publications and other public sources, we located 28 of 43 scientists. As anticipated, many had changed jobs. Twenty-three of these 28 traceable scientists worked at universities at the time of their misconduct finding, and 10 of these were still in acade-

Indeed, six of the seven continued to publish in the years after the ORI determination (the exception had moved to industry). Our interviewees were more productive than the other scientists, publishing on average 1.3 more papers per year after their cases were decided ($t = 2.77$, $P = 0.0045$), and they were less likely to have been excluded from federal grants and contracts (Fisher's exact test, $P = 0.019$). Thus, the picture of the consequences painted by our interviews, which shows both the hardship of punishment and the chance for redemption, is perhaps more positive than it should be.

We found that 43% of academic scientists whom we could trace remained employed in academia after being found guilty of misconduct, and overall 19 of 37 scientists (51%) found to have committed misconduct continued to publish at least an average of one paper per year after their cases were decided. Overall, the punishments we observed were related to the crimes: Acts of falsification and fabrication were punished more harshly than were acts of plagiarism.

Of course, we have only studied those found guilty of misconduct by ORI, which is the tip of the iceberg. In the shadow of the

Science 2008, *321*, 755

General norms

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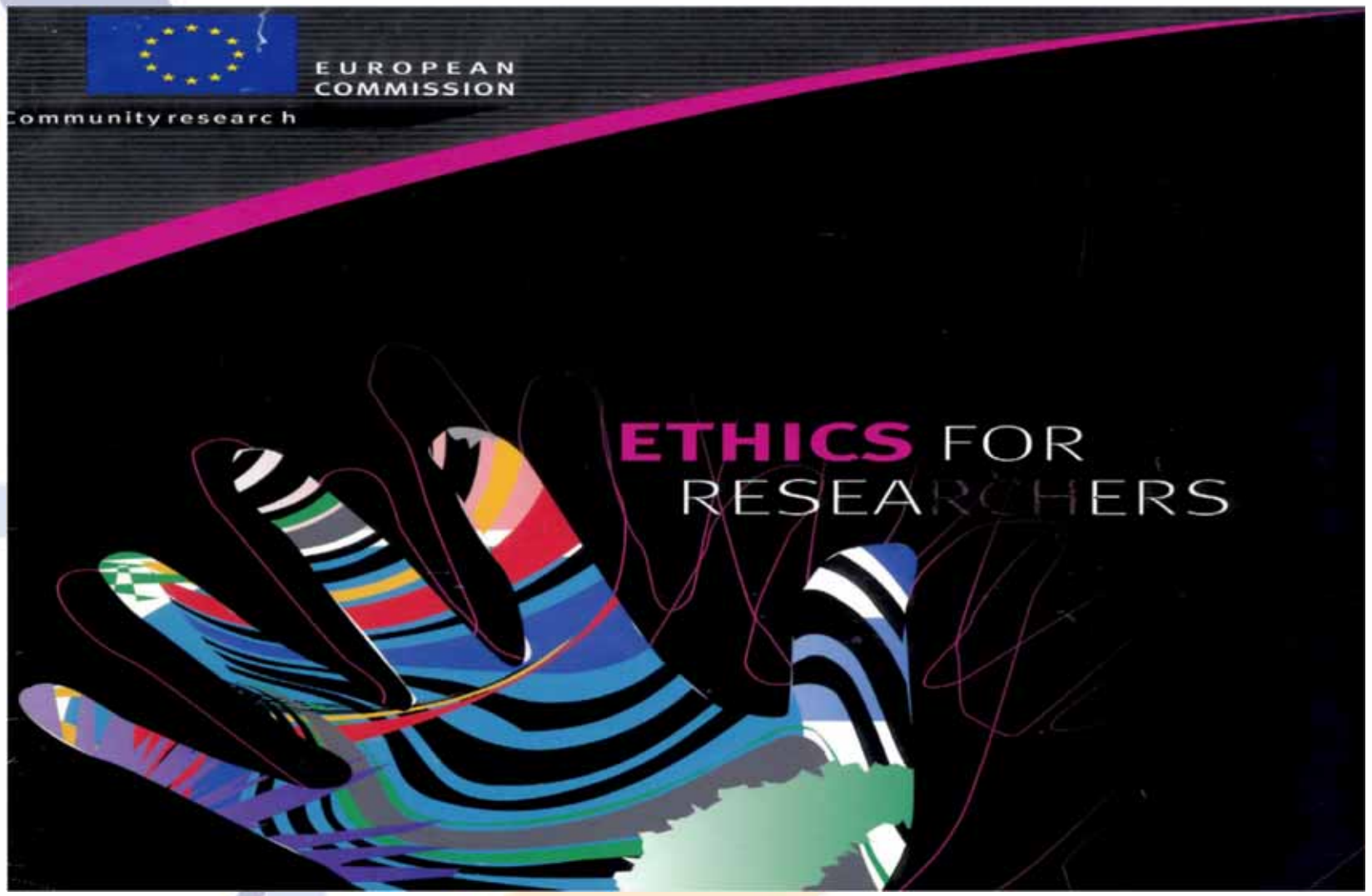

IUPAC's soft approach to a code

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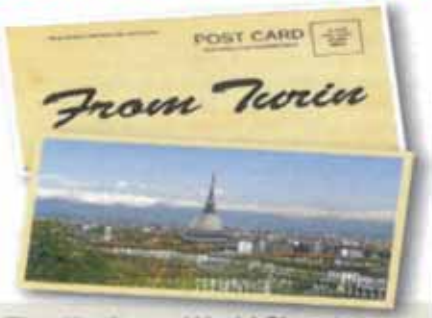
CONFERENCE REPORT Iupac World Chemistry Congress, Turin

Iupac touts chemistry ethics code



The 41st Iupac World Chemistry Congress took place in Turin, Italy, on 5–11 August. Around 1550 delegates attended the meeting, which was divided into eleven parallel sessions on a diverse range of subjects. The idea of the meeting wasn't for chemists to attend as narrow specialists, said Leiv Sydnes, Iupac past-president and co-chair of the International Advisory Board, but to contribute to solving broader practical problems.

As such, Turin was an appropriate venue. Chemistry in Italy is currently going through a period of transition from fundamental to applied research, said Francesco De Angelis, president of the Italian Chemical Society (SCI). This shift has been triggered by a sustained fall in government funding, forcing chemists to look more widely for support. However, the public's perception of chemistry is improving, and

Chemical weapons convention member states (dark and light blue); those with stockpiles (light blue); signatories (grey); non-signatories (red)

Chemists must routinely consider whether their research could be misused, including the possibility of making chemical weapons or dangerous drugs, according to a proposed Iupac code of ethical conduct. The draft code follows collaboration between Iupac and the Organisation for the Prohibition of Chemical Weapons (OPCW), which implements the 1997 Chemical Weapons Convention (CWC). This international treaty covers the misuse of all toxic chemicals, and the OPCW is pushing for chemists to consider it in their everyday work.

The proposal is being led by Graham Pearson, visiting professor of international security at the University of Bradford, UK. Pearson, former director general of the UK's Chemical and Biological Defence Establishment at Porton Down, said that while the idea for the code came out of discussions on chemical weapons, it would cover all aspects of chemistry with the potential for misuse, including syntheses for drug molecules and persistent pollutants. 'Chemistry does a great deal of good, but it does have the potential for causing some harm, and you should at least think about that before you start work,' said Pearson, who suggests that ethical questions could be considered as part of health and safety assessments.

Pearson and colleagues met at the Iupac general assembly in Turin to discuss their project's progress. The code is expected to spend a further three years in development, allowing national chemical societies to contribute to the text. These guiding principles could then be incorporated into national bodies' own codes of conduct. The Italian Chemical Society (SCI) has already drawn up a 'charter of ethical principles', and hopes that young chemists would sign a declaration promising to adhere to the code. But Stuart Parkinson, director of UK-based lobby group Scientists for Global Responsibility, questioned the ultimate value of ethical codes. Many professional bodies already have codes of some form, but these often shy away from including anything overtly political, he said.

It would certainly help if ethics became a part of scientists' lifelong education, agreed Pearson: 'Discussing from a young age how different people react to ethical issues and dilemmas would be much more useful.' *James Mitchell Crow*

***Chemistry World*, September 2007, p. 10**

Global general ethical guidelines

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Ethics guiding scientific experimentation, data collection, and collaborations (Singapore statement; Montreal statement);

Ethics guiding scientific publishing (Vancouver Convention);

Ethics guiding scientific assessment (San Francisco Declaration).

The Principle of Universality of Science

The free and responsible practice of science is fundamental to scientific advancement and human and environmental well-being.

Such practice, in all its aspects, requires freedom of movement, association, expression and communication for scientists, as well as equitable access to data, information, and other resources for research.

It requires responsibility at all levels to carry out and communicate scientific work with integrity, respect, fairness, trustworthiness, and transparency, recognising its benefits and possible harms.

In support of the Principle of Universality

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An important tool is the publication of Advisory Notes:

- *Science communication* (2016);
- *Mobility and Fields Research in the Sciences* (2016);
- *Recommendation on the Status of Scientific Researchers* (through COMEST 2015-2017);
- *Responsibilities for Preventing, Avoiding, and Mitigating Harm to Researchers in Risky Settings* (2017).

ICSU Advice on Science Communication

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It is the responsibility of scientists

1) To communicate research results to society, especially those have an impact on human survival or well being;
2) To reflect the different audiences ability to understand the subject under consideration;
3) To assist the media in correct reporting;
4) To strive for high accuracy and accountability, reflect uncertainty, avoid sensationalism.

Guidelines for science communicators (1)

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- Scientists are individually accountable for their public communications and should be aware of their potential impact on both science and society;
- Regardless of the audience, communications should be accurate and considered, reflecting the status of scientific evidence and uncertainty;
- Estimates of the importance, future implications and impact of scientific results should be realistic;

Guidelines for science communicators (2)

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- Scientists should be transparent in communicating the limits of their expertise and make the distinction between those areas in which they are experts and other areas where they may express views
- Scientists need to understand the different audiences that they communicate with, and what those audiences require in terms of understanding. the subject matter

Actions in support of victims sticking to the Principle

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The committee has taken action in cases related to

- freedom of movement;
- threats to boycott countries for political reasons;
- events in Turkey after the July 2016 coup;
- 18 cases of scientists being persecuted, imprisoned, or detained.

Contact with ICSU members is important for info calibration.

Research integrity under increasing pressure

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- Due to unrealistic political goals;
- Due to a hectic race to improve institutional rankings;
- Caused by decreased focus on teaching and outreach;
- Because scientific reputation is being purchased;
- Because young researcher are taught career planning;
- Because (an increasing amount of) research data are inspected and handled less and less satisfactorily.

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ICSU: www.icsu.org

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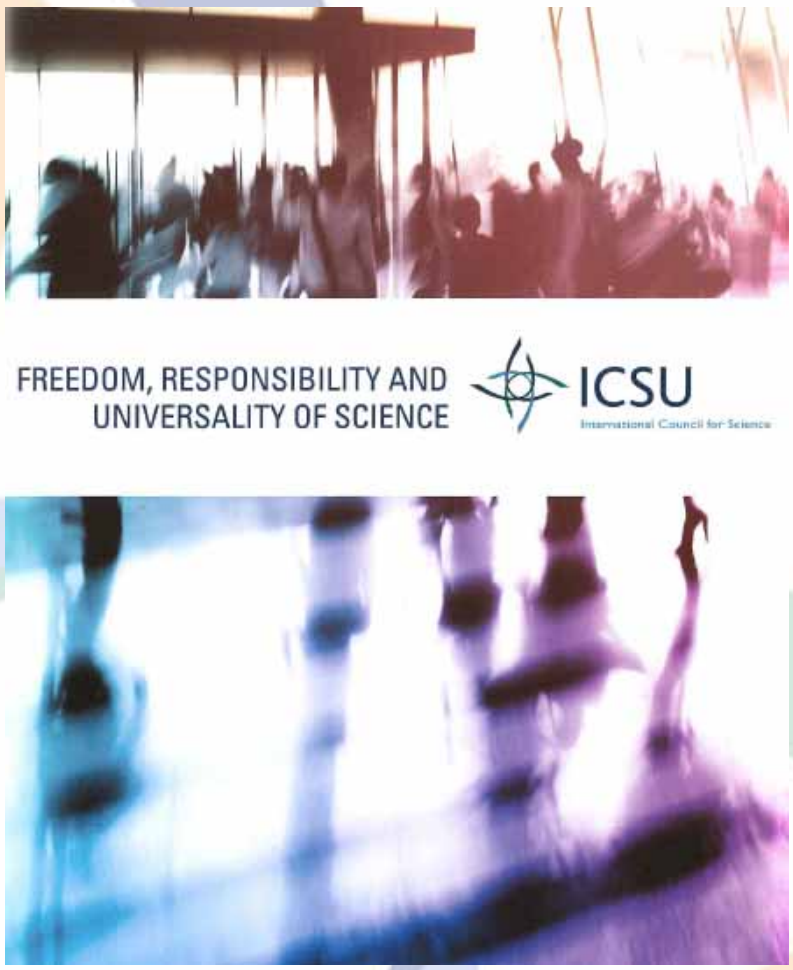

Go to the ICSU website, download the booklet on Principle-of-Universality-of-Science, and read to get inspired to reflect on Research Integrity.

Thank you for your attention!