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EDITORIAL

## Plagiarism: A Spreading Infection

*'Critics of science make a lot of mileage out of the manifest discrepancies between the private and public actions of scientists. They also fasten on examples of scientific behaviour that obviously deviate from the norms – fraud, plagiarism, partisan disputes over priority, and so on. These are serious matters of concern, but they are not so widespread and prevalent that they completely corrupt the whole enterprise. Indeed, the fact that such episodes are regarded as both deviant and scandalous is a tribute to the continuing moral authority of the ethos that they flout.'*

–John Ziman

*Real Science. What it is and what it means*  
Cambridge University Press, 2000, p. 32

In his sympathetic treatment of the philosophy and ethos of science John Ziman notes that 'plagiarism is as infamous as fabrication in a scientific paper' (p. 40). Plagiarism appears to be on the increase. Several manuscripts submitted to this journal have substantial portions of text which are taken verbatim from published sources, with no attribution or credit assigned to the original authors. Detection of plagiarism is difficult. Hard pressed editors and referees can hardly be expected to act as policemen, preventing violations of commonly accepted ethical practice. Even as I wrestled with a couple of manuscripts that appeared to transgress all acceptable limits, I was pleased to receive a copy of an editorial entitled 'Plagiarism in the age of electronic publishing' (Sota, T., *Population Ecology*, 2004, 46, 219). Clearly, I was not alone, sinking in editorial distress. The case discussed, involved a review article published in an 'online journal', which appeared to have expropriated large tracts of a paper previously published in *Population Ecology*. The editorial analysis provided interesting statistics; the plagiarized paper used 29% of the original text without modification, while '93% (in terms of words)' were common between the two papers. The editorial noted that 'the prevalence of plagiarism in scientific papers is an acute problem, but tackling it is not easy when considering the rapid expansion of scientific journals supported by the worldwide propagation of the Internet'.

Has the Internet contributed to the rising incidence of plagiarism? Coincidentally, while I was thinking about

deviant behaviour in science, *The Hindu* (27 April 2005) reproduced (of course, with permission) an article from *The Guardian* entitled 'Ethics and plagiarism'. The report by John Crace describes the rise of Jude Carroll, who is dubbed as a 'leading authority on plagiarism'. Carroll's research has focussed on plagiarism practised by students who turn in essays and reviews of literature as part of their coursework at high school or university. Copying has become easier, given the power of modern search engines and the volume of digital information readily available on the Internet. *Google* and the download can permit assignments to be completed in record time; a new generation of students is quickly seduced by the ease of electronic plagiarism. Ironically, the search engines have also made the detection of plagiarism a lot easier. However, constant suspicion hardly facilitates any scholarly activity. Journal editors (and those at this journal are no exception) rarely attempt to establish plagiarism before a manuscript is reviewed. Authors are trusted implicitly. Cases of plagiarism are uncovered, usually by accident, long after publication, often leading to prolonged correspondence between the editors and the offending authors. Demands for redressal from the victims of plagiarism must also be addressed. These episodes are unpleasant and consume a great deal of time. In the end, there are no winners. After a couple of difficult experiences, most editors (and I must count myself amongst them) begin to view some submissions with suspicion. My colleagues and I worry about manuscripts in which the linguistic style is uneven; grammatically perfect in part and replete with errors, elsewhere. An odd figure that appears to have a distinctly higher quality than others is another tell tale sign.

Plagiarism is like an infectious disease and can spread rapidly amongst students, if the environment is conducive. The first signs of infection are evident in seminars, where wonderfully prepared slides are displayed (*PowerPoint* is another great facilitator), without any citation of the source. A little investigation usually reveals that most illustrations have been simply downloaded from readily accessible websites. Non-citation of the source is usually an oversight; unfortunately this quickly becomes a habit and eventually intellectual theft becomes a routine practice. Plagiarism

of term papers and assignments has long been rampant in American universities, leading most institutions to circulate detailed definitions of plagiarism to students. A cursory search of the Internet revealed that plagiarism is an issue that has been seriously addressed in the West, with considerable effort expended on educating new students in colleges and universities. So far there appears to have been little effort in India to consciously educate students on ethical issues involved in the practice of science. An exercise to instruct students (and indeed more senior practitioners) of science, on proper citation practices and a clear definition of what constitutes plagiarism, may be worthwhile. Such instructions must form part of pre-Ph D training programs. Sadly, in most of our institutions, the Ph D program appears to be private contract between students and research supervisors; academic administrators usually favour a course of 'benign neglect'. Indeed, educating the new generation may be the only vaccine available to stem the spread of the virus of plagiarism.

Plagiarism in India was dramatically highlighted by the Kumaun University affair a couple of years ago (*The physics of plagiarism*, Ramachandran, R., *Frontline*, 26 October–8 November 2002). Deviant behaviour is, of course, a worldwide problem. Some years ago, several plagiarism cases rocked the Chinese scientific establishment (*Science*, 1996, 274, 337). The issue was alive several years later when plagiarism and unethical practices were discussed at the 2003 meeting of the Chinese Association of Science and Technology. More recently, plagiarism has been established in several papers in the area of materials science, published from Cambridge University (Giles, J., *Nature*, 2004, 427, 3). Plagiarism appears to be a quick route to scientific success; fabrication of data is another deplorable practice adopted by unscrupulous climbers in science. In his perceptive and scholarly analysis of science John Ziman notes: *'The scientific culture depends fundamentally on personal honesty and mutual trust. For this reason, deliberate plagiarism – the expropriation of genuine research results – is almost as reprehensible as their fabrication. And yet, in spite of peer review and other safeguards, it is relatively easy to get fraudulent research claims into the literature, and to profit from them careerwise for a while. Such cases, when found out, stimulate much institutional turmoil and public comment. The contrast between their condemnation*

*as instances of grave social deviance and the relatively lenient sanctions applied to those who perpetrate them tells us a lot about the internal sociology of research communities.'* (p. 267). As the scientific community has grown worldwide and competitive pressures have increased, the incidence of unethical practices in science has become more common. Today, even students in India who wish to enter Western universities for Ph D degrees attempt to spend summers in research laboratories as apprentices in science. Some years ago, this short stint was viewed as 'research experience' that could be flaunted on an application form. Now, there is pressure to obtain publishable results in a very short period, inexperience notwithstanding. A research publication can quickly smoothen an admission process. The pressure to publish increases as one moves up the academic ladder, presumably easing only at the top. Tenure, promotions, awards, grants, recognition and even self-esteem seem to depend critically on publications. It is this unremitting pressure, coupled with the absence of deterrent punishment for offenders, that has led to the increasing corruption of the scientific enterprise.

Plagiarism and fabrication of results are among the most common and clearly recognized forms of deviant behaviour in science. There is, however, on the horizon a new issue which muddies the distinction between acceptable and unacceptable practice. Many areas of science require the presentation of images. For example, microscope images and gel photographs are staple features of papers in molecular and cell biology. 'Digital photography and image manipulation software allow biologists to tweak their data as never before' proclaims a news feature in *Nature* (2005, 434, 952). *Photoshop* and competing programs now permit researchers to 'massage their data', blurring the line between 'acceptable enhancements and scientific misconduct'. As the *Nature* report highlights, 'many scientists are oblivious to the consequences of such actions, because they have only a rudimentary knowledge of the sophisticated equipment involved'. Since presentations of data are invariably prepared by students and postdoctoral fellows, who are usually more familiar with the latest software for image manipulation than senior professors, it will become essential to clearly define the limits of acceptable practice.

P. Balaram