

# CURRENT SCIENCE

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EDITORIAL

## Books, Bronowski and the Ethics of Science

Book lovers can often be easily seduced by the appearance and feel of a new book. Today's bookshops have well stocked shelves of both new titles and old classics, reprinted in a most attractive manner. A recent discussion on TV focussed, somewhat surprisingly, in this age of scams and controversies, on the topic of e-books and electronic 'readers'. The discussion raised an interesting question: Would the digital revolution eventually consume the printed volume? Would books, as we know them now, cease to exist? In the field of scientific publishing scholarly journals are increasingly being accessed only on computers. The traditional journal may be close to extinction, as even conservative scientific societies begin to turn towards a business model that would eventually phase out the conventional printed journal. Science textbooks seem to be less endangered, although a new generation of students may hasten the end, when reading on computer (and tablet) screens becomes a way of life. The situation for books in general seems quite different, as bookshops overflow with new arrivals. As a compulsive book buyer, my thoughts turned to the future of books, as I tried to dust and rearrange my untidily stacked collection. Books unread, half read and read and long forgotten surfaced, as I struggled through the piles. In such tidying operations the best of intentions can be derailed by the sighting of an old favourite. My moment of distraction from the task at hand, came when I discovered an old, fraying and bedraggled copy of Jacob Bronowski's, *The Ascent of Man* (British Broadcasting Corporation, 1973). This is a book that I have mentioned in these columns in the years gone by (Science and the ascent of man, *Curr. Sci.*, 2001, **81**, 1273; Science, technology and war, *Curr. Sci.*, 2003, **84**, 859). I have used material from this book in lectures. Coincidentally I rediscovered old slides with quotations from Bronowski's book, even as I struggled to prepare a presentation to the Indian Women Scientists' Association, which met a few days ago in Mumbai, to address the complex issue of Science and Ethics. This is an area that Bronowski addresses, especially poignantly in the aftermath of the Second World War, illustrating the many moral dilemmas that confront the best of scientists in difficult times.

Invitations to lecture are often hard to turn down, especially when the request arrives many months in advance.

Having accepted an invitation from the Women Scientists' Association, I made the cardinal error of not reading a long letter, which outlined the theme of the conference. To my vast discomfiture, I realized a day before the conference that the meeting was intended to address 'Science and Technology: Ethical Issues'. Reading and rereading the draft program, it became apparent that the conference would discuss both the 'ethics of science' and also 'ethics in science', which may be more appropriately cast as 'ethics of scientists'. Even as I contemplated these closely related, but undoubtedly distinct phrases, the power of the preposition in the English language became apparent. A consideration of the 'ethics of science' must presumably address the broad questions of the use of scientific advances in human affairs, most dramatically illustrated by the moral dilemmas faced in the late 1940s by the best of scientists, in the Manhattan project. There are the well known stories of Fritz Haber and Werner Heisenberg, remarkable scientists caught in the tangled web of historical circumstances. In more recent times, ethical questions have been debated not when science is involved in destruction, but ironically when the march of science has facilitated creation. In the years immediately preceding the successful creation of the world's first test tube baby, R. G. Edwards the recipient of last year's Nobel Prize in medicine or physiology had initiated a public discourse involving both clinicians and clergymen on the ethical issues that surround the entire area of assisted human reproduction.

As the time for delivering the lecture drew perilously close, the temptation to consider the alternative topic of 'ethics in science' seemed irresistible. This is indeed a simpler topic, easily understood, and of considerable recent interest. The current literature of science is replete with instances of misconduct, sometimes outrageous, at other times mildly transgressing well established requirements for reporting scientific data. Fabrication of data and plagiarism are eventually detected and the papers and authors discredited by their peers. The current debates on misconduct appear to centre more on institutional responses and punishment of offenders, both of which are difficult and uncomfortable issues for the scientific community. There are many other issues of ethics in science. These include 'honorary authorships', violation

of conflict of interest norms, especially in clinical research involving corporate pharmaceutical interests and misappropriation of intellectual contributions. Ethical issues also involve referees, editors and publishers. The process of 'anonymous peer review' is the foundation on which scholarly journals in science have been raised. Reviewers can sometimes be competitors, with the result that detachment is often a virtue in short supply. Editors are under constant pressure to raise impact factors of journals; a relatively new phenomenon in recent times, which has led to interesting examples of directed citations. Science publishing is a robust commercial enterprise, with monopoly publishers having a clear financial interest in the proliferation and aggregation of scientific journals. Recent cases of journals, notably in the area of biomedical research, have provided evidence for a new phenomenon which can only be labelled as 'publisher misconduct'.

A quick survey of the program for the symposium on 'Science and Technology: Ethical Issues' reassured me that the questions of ethics *in* science were well addressed. A day long session on 'Ethics *in* Medical Sciences' seemed to confront more complex issues. The topics suggested that no resolution would be possible, without an understanding of the more general issues of the ethics *of* science. Biomedical advance has raised ethical questions which are difficult to confront, in areas like surrogacy in assisted reproduction, prenatal diagnostic tests, genetic analysis which may provide foreknowledge of disease without a cure and the oft discussed right to 'die with dignity', in an age where medical technology can often prolong life under the most distressing circumstances. The contentious debate on the use of embryonic stem cells in research in the United States has really hinged on perceptions of when life begins.

In preparing for my lecture, I realized that any discussion of ethics in science must necessarily begin with a consideration of the meaning of 'ethics'. The dictionary provides a largely unhelpful interpretation, terming ethics as 'a system of moral principles'. In addressing abstraction, I turned to Einstein: 'Ethical axioms are found and tested not very differently from the axioms of science. Truth is what stands the test of experience'. These reflections seemed closer to the realm of philosophy, a subject far from my sphere of understanding. To return to firmer ground, I turned to a quote attributed, at times, to Richard Feynman: 'Philosophers of science are about as helpful to scientists as ornithologists are to birds'. Unable to proceed further to discuss the issues that formed the theme of the seminar, I was drawn to a famous statement made by J. Robert Oppenheimer in 1956: 'We have done the devil's work. Now we have come back to our real job, which is to devote ourselves exclusively to research.' There is a chilling quality to this view; an assessment of science and research that is unlikely to be shared by most scientists, over half a century later. Even as I struggled to

put together a presentation it dawned slowly on me that I must turn to Bronowski. As one tempered in the cauldron of the run up to the Second World War, the war itself and its immediate aftermath, Bronowski is often sadly reflective. He quotes Leo Szilard after Hiroshima: 'It is not the tragedy of scientists. It is the tragedy of mankind.' There is something haunting when he describes Auschwitz: 'This is where people were turned into numbers. Into this pond were flushed the ashes of four million people. And that was not done by gas. It was done by arrogance. It was done by dogma. It was done by ignorance.' In writing this column, I searched the internet and quickly found a short clipping, where Bronowski stands in a slushy pond in the stark desolation of the long abandoned concentration camp, tracing what can only be termed the 'descent of man'. But there is one word that Bronowski uses which must strike a chord; that is the word 'arrogance'. In his compelling narrative Bronowski returns to this theme at the very end, in his assessment of John von Neumann. In Bronowski's words, Neumann believed in the 'aristocracy of the intellect'; 'a belief which can only destroy the civilization that we know. If we are anything, we must be a democracy of the intellect. We must not perish by the distance between people and government, between people and power. . . . And that distance can only be conflated, can only be closed, if knowledge sits in the homes and heads of people with no ambition to control others, and not up in the isolated seats of power'. Bronowski's views on science evoke images that can only be uplifting: 'Science is a very human form of knowledge. We are always at the brink of what is known, we always feel forward for what is to be hoped. Every judgement in science stands on the edge of error, and is personal. Science is a tribute to what we can know although we are fallible.' At the very end he returns to ethics. 'We devise ethical strategies or systems of values to ensure that what is attractive in the short term is weighed in the balance of the ultimate long term satisfactions.'

Many public debates, some already underway, on science and society loom ahead in India. The use of genetically modified crops as the driver of food security, nuclear power as a key component to satisfy energy needs and climate change and conservation issues versus development strategies are already widely discussed. Protagonists on all sides of these debates may find echoes of their positions in Bronowski's reflective comments on science and ethics. Even as I left the podium after the lecture, a young lady walked up and took issue with my choice of Bronowski: 'He ignores India and her contributions'. This is indeed true, in his Eurocentric view of human progress with science as the catalyst of change at every turning point. But, we must remember that discussions of ethics and science arise largely in the context of the breathtaking advances of science over the past century.

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