CURRENT SCIENCE

Volume 82 Number 1 10 January 2002

EDITORIAL

Science, technology and public perception

'Pure science requires no justification outside itself, and its usefulness has no bearing on its validation.'

P. B. Medawar

'The effects of science are of various, very different kinds. There are direct intellectual effects, and the adoption of others suggested by the success of the scientific method. Then there are effects on technique in industry and war. Then, chiefly as a consequence of new techniques, there are profound changes in social organization which are gradually bringing about corresponding political changes. Finally, as a result of the new control over the environment which scientific knowledge has conferred, a new philosophy is growing up, involving a changed conception of man's place in the universe.'

Bertrand Russel
(*The Impact of Science on Society*,
Unwin Hyman, 1952, pp. 11–12)

'Technology, unlike science, is a group activity. It is not based on an individual intelligence, but on the interacting intelligence of many.'

A. P. J. Abdul Kalam
(*Wings of Fire*,
Universities Press, 1999, p. 169)

Science and technology are inextricably linked, yet they are divided by a chasm which is sometimes difficult to bridge. Public understanding of science and technology is clouded by many misconceptions, some of which are of little consequence, while others are more 'mischievous'. In Peter Medawar's words, 'all help to estrange the sciences from the humanities and the so called "pure" sciences from the applied' (*Pluto's Republic*, Oxford University Press, 1983, p. 28). Two centuries of extraordinary progress in science and its application have propelled science and technology (S&T, in government parlance), to a position where the public at large and decision makers in particular, can ill afford to be completely ignorant of the complex relationships of scientific research, technology development and its eventual impact on society.

In India, the lines dividing science and technology have, traditionally, been drawn very sharply. Even at the level of governmental policy statements, the divide is emphasized by the existence of two distinct enunciations of national intent – the Science Policy Resolution of 1958 and the Technology Policy Statement of 1983. The former recognized that 'technology can only grow out of the study of science and its applications', while the latter emphasized the need for 'the development of indigenous technology and efficient absorption and adaptation of imported technology appropriate to national priorities and resources'. Science, to most people, seems to embody the 'pure' sciences taught in colleges and universities and researched in quiet and unobtrusive institutions. Very few realize that connections may exist between scientific research and the teaching of science on the one hand and the many practical and seemingly obvious advantages of applicable advances in science, on the other. Technology is more clearly perceived and assessed. Technology, in the public mind, is associated with engineering; broader definitions that encompass areas like agriculture are appreciated only in specialized circles. It is not an accident that the most visible and successful educational institutions in post-Independence India have been the Indian Institutes of Technology (IITs), which have produced generations of outstanding engineers and entrepreneurs, who have distinguished themselves globally. Interestingly, we have only one Indian Institute of Science, whereas the number of IITs is swelling; as many as seven at the last count. Even 'Indian Institutes' in subjects like management and information technology have burgeoned, apparently serving an increasing public demand. Clearly, there is an important difference in the way in which the lay public and even decision makers, politicians, bureaucrats, scientists and technologists amongst them, perceive the importance and needs of the twin arms of science and technology. Sometimes, the operational phrase is 'science *and* technology'; on many occasions, it seems to be 'science *versus* technology'.

There are profound differences in the manner in which basic scientific research is pursued and the pathways by which successful technologies are developed and imple-

mented. Abdul Kalam delineated these differences clearly, painting the view of science as an individual activity, while technology development invariably is a coordinated, group activity. So it has been for much of the period over which modern science has developed. But, in more recent times the distinctions between scientific discovery and technology development have become blurred. Biotechnology is a dramatic example. In this area the borders between 'pure' and 'applicable' science dissolve very quickly. Today's laboratory curiosity can become tomorrow's favourite technology of the market place. Biotechnology is a curious arena, where the transition from science to technology does not always have to be midwifed by engineers. The direct impact of biotechnology on vast areas of medicine and agriculture is transforming the way in which the relationships between science and technology are perceived.

The importance of enhancing the public understanding of science and its potential applications has grown in recent times; the fact that many disciplines of modern science can only be undertaken with a considerable investment of public funds, imposes on its practitioners a major responsibility to communicate in a clearly understandable manner the results of studies that may have a direct societal impact. In a timely 'millennium essay', Nancy Rothwell notes that 'the communication of science to society is not new, nor is it an easy task. It is almost two hundred years since Albemarle Street in London, home of the Royal Institution was designated the first one way throughfare'. The horse-drawn carriages that clogged the street outside the Royal Institution, brought much of the aristocracy of Victorian England to hear Humphry Davy and later, the incomparable, Michael Faraday. In India the public communication of science has been limited and there is little effort to explain the pros and cons of most new technologies in a manner that promotes informed debate. Major issues like the nuclear power scenario, the introduction of genetically modified crops or the mass immunization strategies are rarely discussed or explained until a controversy erupts. Even then, the S&T establishment generally takes the view that the shaping of public opinion is unimportant, tacitly assuming that the comprehension of the niceties of technical issues is generally outside the capabilities of the lay public. Indeed, on most issues of public concern, even scientists and technologists outside a specialized field do not form informed and independent opinions. Scientists also take little time to convey the great sense of excitement and challenge that motivates many researchers, who work at the cutting edge of science, thereby missing an opportunity to recruit public support for scientific endeavour.

But, in considering the public perception of science news from Europe makes interesting reading. A European Commission Survey revealed (*Nature*, 2000, **414**, 680) that 'when the public were asked which professions they held in the highest esteem', doctors, scientists and engineers took the top three spots, edging out sportsmen, lawyers and journalists. True to form, politicians brought up the rear. However, less than half of those polled, described themselves as interested in science. There is a growing need to enhance the public perception of science in India; the onus for any initiatives rests with the scientific community.

P. Balaram