

# CURRENT SCIENCE

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## EDITORIAL

### Starting out in research

The practice of science is a highly professional activity today. New entrants to research can be confronted with bewildering choices at the beginning of their careers; difficult decisions need to be made about the fields of activity they wish to pursue. Most often, a choice casually made at the entry to a PhD program remains the dominant steering force during a research scientist's lifetime. At this time of the year most of our research departments and institutions are in the process of admitting fresh students to PhD programs; the choices to be made by successful entrants are determined by a multitude of factors, many of which lie outside the students control. While opportunities do exist for changing fields and techniques, these are not always easy to come by. The course of a PhD program merges almost continuously with postdoctoral research; for students from many institutions in India this is almost inevitably a stint of several years in a Western laboratory. On an average, most aspiring scientists spend almost a decade acquiring PhD degrees and gaining appropriate postdoctoral experience, before they are in a position to look for permanent placement and embark on an independent scientific career. Since the median age of entry to our PhD programs lies in the early twenties, most of our potential scientists are in their early thirties before they are in a position to chart their own course. It is at this point that the real trouble begins. The window of opportunity to obtain a position on the faculty of our institutions is narrow; too little postdoctoral experience can be a disadvantage, while too much can also be a disqualification, since applicants on the wrong side of 35 are not enthusiastically considered by selection committees. Many applicants who are overseas find it almost impossible to squeeze through this slit of opportunity. The fortunate few, who manage to manoeuvre themselves into permanent positions, are now ready to embark on their own careers; independence is a prized attribute in the profession of science. For the first time these new recruits are in a position to follow their own instincts in research; there is no mentor (or 'guide') breathing down their necks, clearly marking out the paths to be taken. I am talking here primarily about academic science as practised in many universities and

central institutions, including several of our national laboratories. A somewhat different situation obtains in industry and the strategic laboratories, where areas of research and project goals are more clearly defined and a chain of command and responsibility is well laid out.

Scientific independence can be, and often is, a wonderful blessing. But at the start of a career many new entrants may feel as though they are traveling in a boat on a treacherous sea, without a guiding hand on the rudder. The problems of 'getting started' in India can be compounded by the absence of adequate 'start up' support, physical difficulties in creating functional laboratories and a generally unsupportive and disconcertingly, disinterested environment. But beyond the problems of limited resources and minimal infrastructure looms an even more difficult issue: what problems should an independent researcher tackle at the start of a career? The most famous, recent attempt to give 'Advice to a Young Scientist' was, of course, Peter Medawar's extended essay (Harper and Row, 1979). Medawar in his preface says that he was trying to write a book that 'I myself should have liked to read when I began research, before most of my readers were born – that is not a patronizing comment but a straightforward recognition of the fact that most scientists are young in years and that no one actively engaged in research thinks of himself as old'. Medawar's book, written inevitably for a scientist starting out in the West, contains many nuggets, but I particularly liked his description of the 'art of research as the art of the soluble'; an adaptation of Bismarck's dictum that 'politics is the art of the possible'. Medawar is firm with his prescription for those at the starting line of an independent career: 'After graduate students have taken their PhDs, they must on *no account* continue with their PhD work for the remainder of their lives, easy and tempting though it is to tie up loose ends and wander down attractive byways. Many successful scientists try their hands at a great many things before they settle down upon a main line of investigation...'. Medawar's caution might well be extended to beginning faculty at our institutions, who return after years of postdoctoral toil, often from the West, carrying with them an intellectual baggage which is not easy to jetti-

son. Many scientists also become prisoners of techniques they have specialized in; the scientific problem frequently takes a backseat, while specialized (and expensive) methodologies chase questions that need answers. Theoreticians, of all hues, are more fortunate than their experimentalist counterparts; the travails of organizing a laboratory, finding financial support and acquiring a group of coworkers are either unnecessary or on a scale that is substantially smaller. Not infrequently, many new recruits in India continue to work on 'imported' research problems, sometimes with the tacit support of foreign mentors. The entry of international agencies (and national ones, too) for funding overseas collaborations acts as an incentive for continuing to work on problems, which can be appendages to a major project in well-known laboratories. Occasionally, a starting researcher misjudges his or her own contribution to an important and successful project in a mentor's laboratory and begins a competitive line of investigation. This is an approach that almost guarantees failure. It is normally foolhardy and mildly improper to enter into such direct conflict with mentors.

For beginning researchers in India, the choice of problems and areas of research are critically important. The temptation to continue postdoctoral problems is overwhelming. Frequent trips to old haunts in the West, maintain an umbilical cord that is not easily cut. Well meaning international agencies underwrite the costs of these expeditions and perpetuate projects in which Indian laboratories play a minor, supportive role. When a Western connection is absent there can be a strong internal factor which is again detrimental to independent development of young scientists. In many Universities and research institutions new recruits to the faculty are old students, who have sometimes developed no independent research interests of their own. This kind of inbreeding, a compelling demonstration of the power and short-sightedness of senior faculty, has had a debilitating effect on major science departments across India.

But, for starting scientists, while fertile research problems are important, money to run laboratories is also crucial. Funding for research comes slowly; all our major funding agencies have succumbed to a bureaucratic stranglehold, from which they seem unlikely to recover. The individual investigator-driven basic research project is accorded the lowest priority for processing, leaving scientists running from pillar to post to get sanctioned funds released. It is, therefore, easy to be seduced by the promise of funds for research in areas that government committees have decreed as potentially 'applicable'. Once the bait is taken, many new entrants embark on a ride to nowhere – many 'young' biologists, for example, chase mythical vaccines, therapies and

diagnostics, within the precincts of institutions, hardly designed for such 'focussed' activities. There is an unfortunate tendency in India to underestimate the complexity of many scientific problems; an alarming technical innocence has begun to spread contagiously. To paraphrase Medawar, self-deception is the first step in deceiving others. There are few takers for quiet and scholarly work in areas far removed from the limelight; indeed, fishing in the backwaters is an unfashionable activity. But, new entrants to research might in fact, be well advised to consider carving out a niche area, even if this involves swimming against a local tide. Fashions are notoriously fickle and patient plodders do sometimes find that they have created a pleasant, research garden of their own. Diversions from research, and our institutions provide many, can sometimes tempt a beginning researcher from the chosen path. There is however, one activity that complements and enhances research, and that is, teaching. Unfortunately, teaching even at the pre-Ph D level is an activity scorned in our research institutions. In places where teaching is essential, the conduct of classes becomes a convenient excuse for diminished research performance. To many of the new members of our institutions, teaching appears an impediment, detracting from their research functions. Here they forget that for the newly independent researcher, teaching becomes a vital process of learning; enlarging the base of facts so essential for everyday science, sometimes clarifying concepts and methods that have been clouded by misunderstanding and confusion over the long years of studentship.

But, eventually the ship does set sail and most new researchers are off on their own. Sometimes, they chase with quixotic relentlessness their pet hypotheses. Here, Medawar has a stern admonition – 'I cannot give any scientist of any age better advice than this: the intensity of the conviction that a hypothesis is true has no bearing on whether it is true or not'. Others, worry their favourite problems with a ferocious intensity. Still others, a pragmatic majority, view science as a sedate profession, behaving much as wage earners do in any area of activity. A very small minority become the torchbearers of a new generation. What are the factors that make for success in science? No easy answers are forthcoming. But, two ordinary qualities are useful – persistence and common sense. Medawar believed that there are no 'important national differences in the ability to "do" science', presumably upholding 'Descartes contention that common sense is the most equitably distributed of all human gifts'.

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