

not remedied immediately, the unemployment of Ph Ds is going to have a drastic negative impact on Indian science in the near future.

I would like to suggest two remedies. Firstly, Research Associateship should not be restricted to one term. There should be three or more grades in Research Associateship (say A, B, C, etc.). Those performing very well in the first grade (or the first term of 5 years) should get a second term (of 5 years more) in the next grade; and those performing exceptionally well in the second term should get a third term (of another 5 years) in the next grade. As compared to the number of years spent in education and training, the stipend paid to Research Associates at present is very meagre. There is an urgent need for revising the pay for Research Associates. It should be somewhere near to the salary paid to regular employees having the same qualification and experience.

Research Associates constitute a young, enthusiastic and energetic lot, and contribute much to the scientific output of the institutions in which they work. Still when they complete tenures and go out, they do not get any monetary assistance, whereas even the most unproductive regular employee is entitled for many benefits including pension for self and family. If possible, a contributory provident fund should be introduced for the Research Associates.

This would increase the involvement of Research Associates in their work as well as their interest in the growth of the institution in which they work. It would also help them to pull on for sometime before they get a suitable job elsewhere.

Secondly, funding agencies should make available a few Post-Doctoral Fellowships (PDFs) tenable with professors and senior scientists who are working on projects of national importance and have already made some remarkable contributions (as scientists, not as administrative heads). This way it would be possible to (i) create more job-opportunities for fresh Ph Ds in the country, (ii) establish some strong research teams working on nationally important projects, and (iii) check brain-drain.

It is alleged that research institutions in India hire assistants in place of qualified and competent persons, to work on important projects. How far is this true? Absence of regular recruitments has resulted in a 2-tier system in many of the research institutions. There are permanent employees and temporary employees. When employees involved in the same job are governed by two sets of service conditions, is it not possible that the temporary employees are exploited by the permanent employees? How does this 2-tier system affect the progress of the projects? More impor-

tantly, how does this 2-tier system affect credit-sharing? Does it pave the way for unethical misappropriation of credit? Most of the temporary employees tend to take their job as a stop-gap arrangement, and their involvement in the job becomes very less. To understand all these it is essential to analyse the turnover of assistants in important projects/schemes. Frequent swapping of jobs by assistants affects the progress of long-term projects. Funding agencies should make it compulsory that only Junior Research Fellows, Senior Research Fellows and Research Associates are appointed in projects and schemes which are for a period of three years or more. This would make sure that temporary employees on projects and schemes get a higher pay, and a higher qualification/experience; and they have more involvement in their jobs. It may also prevent possible exploitation of temporary employees by permanent employees.

To succeed in science it is very, very essential that we modify the system according to the changing times. We owe it to the future generations.

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## An alternative view to global vision of Indian R&D

Mashelkar's main thrust is on global R&D, and strong IPR system<sup>1</sup>. His spirited advocacy of the interests of multinational corporations (MNCs) is, however, one-sided. He fails to trace the origin of the big boost corporation-controlled S&T has acquired during the past decade or so, and ignores the fact that the nations professing globalism are engaged in bitter trade wars for supremacy in technology.

Extensive study of literature on S&T policy published in the late 1970s and the early 1980s in US and UK throws light on the genesis of R&D globalism. Declining American leadership in high technology and perceived threat from Japan on US economy and defence capability were the key issues. Political leadership and policy makers in US devised a long-term strategy to face this

challenge. In the year 1980, at least three landmark decisions were made: (1) the US Supreme Court allowed patenting of a genetically engineered bacterium; (2) the US Patent and Trademark Act was amended allowing the universities to apply for patents for federally funded research; and (3) the US Plant Variety Protection Act (1970) was amended. Big companies played a major role in this, while the academic community resented commercialization of research talent and technical skill, pointing out that corporation funding was not for altruistic purposes<sup>2</sup>.

Mashelkar suggests intellectual capital as equity of the Indian R&D partner; a practice in vogue in American universities for more than a decade. The entry of MNCs has pushed the cost of patenting to as high as Rs. 9 lac for a

single patent, and small- and medium-sized-European firms are finding it difficult to file patents<sup>3</sup>. This, coupled with the lack of competent patent professionals in India, would make Indians as cheap intellectual slaves, not equal partners. Whereas IPR systems in other countries have evolved gradually according to their needs, in India the changes are demanded to satisfy the MNCs. How can enforcing new patent laws make Indian R&D innovative? Recalling that the Indian Patent Act (1970) was hailed internationally as the most progressive system, why do our R&D labs not own world-class patents? Why our science leadership failed to update the IPA, and to create world-class patent attorneys in past more than two decades? Now Mashelkar recommends Patent Promotion Fund and spe-



cial fiscal favours to firms dealing with IPR. Is it not akin to the much-decried privileges enjoyed by PSUs till recently? Further, UNCTAD reports and analyses of experts show that joining the Paris convention will be detrimental to India.

Mashelkar's argument that 'firms in the developed world still view cultural barriers as one of the major bottlenecks' is simply outrageous. In view of the social and environmental hazards involved and the vulnerability of India to the manipulations of the MNCs, specially in the sector of pharmacy and biotechnology, one expects extra vigilance and transparency while dealing with foreign firms. To plead for confidentiality and do away with already lax public accountability is *certainly*

*against national interest*. Instead of learning lessons from our failures, the policy makers are treading on a path which is sure to lead to technological and economic subjugation. Since the information related to the politics of S&T and trade is accessible and comprehensible to the generation born after independence, the inability to safeguard national interest will not be a mistake – it will be a betrayal.

To conclude I suggest an alternative strategy: (1) reaffirm commitment to the national goal of self-reliance in technology, and R&D for public good; (2) refer a comprehensive review of the IPA (1970) and the needed changes to a judicial commission; (3) strengthen the PSUs<sup>4</sup> and establish university ↔ CSIR Labs ↔ PSU links; marketism, legal

aspects of patenting, and interaction with private firms being mainly the responsibilities of PSUs; and (4) form a non-governmental working group of experts for in-depth study of the present challenges, and offer directions for the best possible approach for Indian R&D.

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## RESEARCH NEWS

# Evidence for Avian mafia!

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An unwritten rule in evolutionary biology is that anything that *can evolve will evolve*. Birds are remarkable for their extraordinary effort at nest building and brood care. Given that so many species of birds spend so much time and effort at these activities, there is plenty of room for some species to take it easy, lay their eggs in the nests of other species and hitch-hike on their hosts. The cuckoo that lays its eggs in the nests of a variety of host species is well known. Indeed, over 80 species, i.e. over 1% of bird species are known to be such obligate inter-specific *brood parasites*. These include two-sub-families of cuckoos, two types of finches, the honeyguides, the cowbirds and the black-headed duck<sup>1</sup>. Because parasite species often use more than one host species, many more than 1% of bird species act as hosts to brood parasites. Interspecific brood parasitism has evolved independently at least seven times in birds and can have a significant effect on the populations of the host species and even lead to their extinction. Although hosts sometimes detect and eject alien eggs, their success in ridding their nests of parasite eggs is often very limited and that is why brood parasitism has sur-

vived as a way of life. One reason for such limited success of the hosts is the often exquisite mimicry on the part of the parasites whose eggs are virtually indistinguishable from those of the host<sup>1</sup>. What is perplexing, however, is that many parasite species lay eggs that look nothing like their host's eggs and yet get away with it. Obviously hosts have not perfected the art of removing all or most of the alien eggs. But why should this be so?

There are two philosophically different approaches to this question. One is that the process of adaptation of the hosts to the onslaught of the parasites is ongoing and there has not been enough time for it to be perfected. A standard way of expressing this is to say that we are in the middle of an evolutionary arms race and what we are seeing today is no more than an evolutionary snapshot; given enough time, host species will perfect the art of removing all parasite eggs. This may well be the truth but unfortunately we have no way of telling. It is a hypothesis that can neither be proved nor disproved. The other, rather different approach is to assume that this is the best that hosts can do and we are already in an evolutionary equi-

librium. In other words it does not pay the hosts to get better and remove all the parasite eggs. This equilibrium hypothesis may be as wrong or as right as the evolutionary snap-shot hypothesis but it has one major advantage over the former. It compels us to try and discover what the reasons might be for the equilibrium level of perfection on the part of the hosts; why is it that hosts cannot get any better than they already are? This is a more satisfying situation because it gives you something to do. If you find the nature and magnitude of the costs and benefits of alien egg removal to be such that they correctly predict the observed equilibrium level of egg removal then we have much more confidence in our hypothesis. Not that we are anywhere close to achieving this goal, but some exciting leads have been found.

One obvious cost of assiduously removing parasite eggs is the danger of mistakenly discarding one's own eggs. Even when the host and parasite eggs look rather different from each other to our eyes, it is not obvious that they do so to the birds. It is not even obvious that a naive bird knows which is its own egg and which is the parasite's. One way to solve this problem is to be rather