

was for crop-specific journals, both Indian and foreign. The trend of scientists to prefer journals which will be read by those working on the same crops, is justifiable. Balaram³ also opined that papers should be published where they are noticed by others in the field. Scientists published 450 papers in two Indian journals of rating 1.5 and 83 papers in three foreign journals of rating 1.5, 2.5 and 1.5 respectively. It should be admitted that neither the institute nor the scientist has ever given importance to the IF of journals which published research papers. The fact remains that some of the papers published in high IF journals may not be cited, while those in low-impact publications get cited³.

The comparative scenario between FAJ and IAJ (Table 1) calls for a total reform by the Indian scientific societies concerned with publication, to publish only peer-reviewed research papers. This perhaps may involve a thorough streamlining of the process of refereeing of journals, with guidelines on high rating of research papers.

To conclude, the Indian scientific journals fall much short of the ratings of international standards. There are many Indian journals which have the lowest rating. The rating of papers published in the journals at the organizational, divisional, personal (individual) levels indicates the level of research output, although done only for agricultural sciences as a case study for

an institute. Scientific academies/councils/societies have a role to upgrade the standard of scientific publication in the country.

1. King, D. A., *Nature*, 2004, **430**, 311–318.
2. Arunachalam, S., Srinivasan, R. and Raman, V., *Curr. Sci.*, 1998, **74**, 433–441.
3. Balaram, P., *Curr. Sci.*, 1999, **76**, 1519.

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The stages of scientists

I read with interest the editorial on the above subject¹. Relevant to this subject, I wish to share with the readers a quotation from Carl Jung and a conversation I had with the late S. Chandrasekhar, Nobel Prize winner in Astrophysics.

Jung wrote: 'A human being would certainly not grow to be seventy or eighty years old if this longevity had no meaning for the species to which he belongs. The afternoon of human life must have a significance of its own and cannot be merely a pitiful appendage to life's morning. The significance of this morning undoubtedly lies in the development of the individual, our entrenchment in the outer world, the propagation of our kind and the care of our children. But when this purpose has been attained – and even more than attained – shall the earning of money, the extension of conquests, and the expansion

of life go steadily on beyond the bounds of all reason and sense? Whosoever carries over into the afternoon the law of the morning – that is, the aims of nature – must pay for so doing with damage to his soul just as surely as a growing youth who tries to salvage his childish egoism must pay for his mistake with social failure. Moneymaking, social existence, family and posterity are nothing but plain nature – not culture. Culture lies beyond nature. Could by any chance culture be the meaning and purpose of the second half of life?'

I met Chandrasekhar sometime in 1990 when he was 80 years old and still continuing his work at the University of Chicago. While my wife and I were walking on the lawns of the Chicago University with him, he said that he received an invitation from the Dean of a reputed University in USA requesting him to come and stay at their

University for a few years, and that they would provide all facilities for his work. Professor said that he replied stating that in the Hindu religion it is said that after a certain age one should give up everything and go into 'vanaprasthashram' – withdrawing into the forest. The Dean's reply he said was interesting – it said that it would be possible to provide him with all facilities but providing a forest might be a bit difficult!!

1. Balaram, P., *Curr. Sci.*, 2004, **87**, 1319–1320.

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Lack of team spirit among scientists

There is an underlying implicit assumption in the lament 'The country produced Bose, Raman, Ramanujan and Saha, to name a few'¹ in the pre-independence era. My contention is the absence of potentially high quality students that is implicit in the above lament is erroneous and sets unre-

alistic reference levels to judge the decline in the quality of scientists produced in the country. The question to be asked is why did these stalwarts not succeed in raising a larger number of equally fine scientists for the leadership of the next generation, though they remain Indian icons even to-

day. It is unlikely that we are not producing many students who are equally bright or better, considering the large number of science graduates passing out of nearly 250 universities every year. In my opinion, such minds are not visible because they must now perform as members of a team

howsoever amorphous, and some among them genuinely accepted as natural intellectual leaders, not just as individual scientists working with a laboratory assistant or a few students. The more significant scientific pursuits had already begun demanding group activity then. The apparent decline, therefore, is the inability of the likes of Boses and Ramans of today to lead teams to contribute first-rate work in joint ventures before others do it. We can do it all, though perhaps inefficiently, but only after others have shown us how to work together, that too only in technology, but not in pure sciences. So in spite of successes we lag behind, be it in nuclear, and space science, biotechnology, etc. And in basic sciences excellence is judged purely through global competition, unlike in technology. The point to be realized is that team spirit, that entails genuine appreciation of each other's skills, is not our cup of tea. I strongly feel that the root of the problem is in our basic philosophy that majority live by. It is 'Moksha' (personal emancipation) that we adore and glorify, unwittingly sanctifying selfishness in general, as a great virtue. Tagore had made this point way back in 1934 in a slightly different context and tone, with clarity characteristic of him. I give below a free translation (mine) from the text of the address² that Tagore delivered to a literary gathering outside Bengal, commenting on the reason for excellence in Bengali literature, transformed by the likes of Raja Ram Mohan Roy, Madhusudan Dutta and Bankim Chandra Chatterjee: '...Even today, also in modern literary activity, Bengalis' degenerate mind, eloquent in

slanders, is ever alert to mercilessly inflict painful insults at which they are extremely skillful.... This strange self-degrading zeal of Bengalis would have torn to pieces their own literature, carry her to the great funeral pyre in the cremation ground of dead literature, shrieking abuses to each other on their gleeful march singing the last rites – but *since literature is not a cooperative business venture, nor a joint stock company or a municipal corporation, and since she inspires solitary single travellers, managed to escape all kinds of assaults hurled at her.* The jealousy-prone Bengalis rejoice today because they are witnessing their *only successful adventure*, that is, in literary creativity...'.

The emphasis is mine to draw attention to the fact that Tagore was in regular correspondence with J. C. Bose, and knew the scientific contributions of other Indian stalwarts of his times as well. But he knew what was happening in science in the rest of the world too. That may be the reason why he singled out literary activity explaining the reasons for its success, for Tagore must have been aware of how group-fights were leading to the decline in scientific activities in the country.

Our dominant cultural traits thus continue to limit achievements in all spheres of our activities, not necessarily in identifiable sets of individuals as in sports teams or political groups, but also in amorphous groups of researchers in any discipline. In institutions of the West, one can find a number of great minds moving under the same roof for years, but it would be a miracle if it were to happen in India. Raman's style of science management in

India was a deterrent to Chandrasekhar Subramaniam's return. One must read his biography by Kameshwar Wali³ for more details. Our group activities do not match those of others because of mutual suspicion, rampant sycophancy, meanness, and above all a deep-rooted belief that the means of acquiring personal fame or position does not matter, even if it degrades joint ventures. That has naturally compelled arbitration by outsiders such as politicians and bureaucrats to streamline functioning of institutions of higher learning. Academics should have known better how to manage such institutions, for they, and not politicians and bureaucrats, teach management to young minds. Obvious damage is the lack of respect for academicians amongst students – the first step towards decline! Students do not witness any team spirit worth emulating and rarely, if at all, find a role model while acquiring their degrees.

1. Kothari, L. S., *Curr. Sci.*, 2004, **87**, 1029.
2. Reproduced in *DESH*, Ananda Bazaar Patrika, Kolkata, 2 November 2004, pp. 41–43.
3. Wali, Kameshwar, C., *CHANDRA: A Biography of S. Chandrasekhar*, Penguin, 1987, pp. 247–307.

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Water resource planning and management

This refers to the article on water scarcity in India¹. The water scenario is going to be the most serious problem that the country will be facing in the 21st century. The total demand for water has been projected as 400 km³. Total annual precipitation in India is about 4000 km³. Groundwater contributes 70–80% of agricultural produce in India, about four-fifths of the domestic water supply in rural areas and about 50% of urban and industrial uses. From the estimated utilizable freshwater

resources of about 1130 km³, only less than 600 km³ has been put to use at present. Climatic changes account for 20% increase in water scarcity and balance 80% is due to population increase and economic developments resulting in water pollution. Demand for freshwater by the industrial sector rose from 3% in 1990 to 4% in 2000 and will be up to 11.5% in 2025. The share of irrigation demand is projected to decline from 84% in 2000 to 73% in 2025. According to the latest census, India's

population is about 1020 million, which is projected to go up to 1333 million by AD 2025 and further to 1640 million by AD 2050. It is projected that the per capita water availability in India may reduce to about 1200 m³/year by 2047. For feeding a population of 1.64 billion, nearly 450 million tonnes of food grains would be required by the year 2050, production of which would be a gigantic task considering the constraints being faced in the irrigation sector, including irrigation water resour-