

Indian science needs young blood

Much before India wrested its freedom, C. V. Raman observed: 'Most of the great discoveries in science have been made by young people. It is not the experience or wisdom that old age brings but the freshness of outlook, the indomitable desire to achieve, which is the natural characteristic of youth that makes discoveries possible.' Decades have passed ever since he made this observation but neither have we had a Nobel Laureate in sciences after him nor have we made an honest effort to at least read into the essence of his observation. With the scientists in the country at an average age of 45 plus, as of today, can we hope of pathbreaking research in our laboratories? With senior scientists outnumbering the young, has not the scientists' hierarchy gone topsy-turvy? With no young scientists in the mainstream now, will not Indian science find the going to be tough for want of creativity and freshness?

As of today, when the system largely seems to be guided by economic expediency rather than scientific spirit, the excitement of doing science is erod-

ing fast. Under such circumstances, increasing disenchantment among the younger generation towards a career in scientific research, also redolent from now a hugely popular and oft-quoted study by Sushil Kumar *et al.* (*Curr. Sci.*, 1998, 74, 20–24), hardly merits explanation. Among others, J. V. Narlikar has notably scripted his concern over the lingering velleity and apathy of young blood opting for a career in science.

Towards this cause, the scheme to 'catch-them-young' mooted by the Government with CSIR as the nodal agency for dispensing scholarships to young science graduates, is highly commendable. But will these meritorious youth prefer to pursue scientific research at a time when economic fundamentalism is ruling the world with dictatorial arrogance? Further, in the absence of career security and commensurate remuneration in this profession, the youth may find other professions more lucrative and nothing can contain their cross-over.

Towards the advent of the next millennium, time is ripe to realize that

curiosity-driven research cannot be slighted in favour of demand-driven research as it is the former which fuels the latter though in a slightly long run. The present situation warrants nothing short of a concrete action plan to rope in young people bubbling with creative thoughts and fresh ideas. They ought to be considered for suitable packages and incentives which can promote amongst them the tendency to remain dedicated to their discipline and excel further therein. But for such a policy crystallizing at the earliest, it is really doubtful that ongoing research in our greying laboratories will bear fruits proportionate to the requirements of the society in the days to come. Indian science is actually thirsting for young blood and divorcing ourselves from this reality will only blur our 'Vision 2001' or 'Vision India 2020'.

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Phase transition in a scientist's life

The editorial in the July issue of *Current Science* (1999, 77, 205–206) addresses the question of supporting retired scientists. One cannot help feeling that the usually forthright editor has shied away from some vital issues. Each one of us has his/her own experience with retired scientists, and this letter conveys the conclusions I have drawn from mine.

The editorial starts with very special cases where a person is really doing outstanding work and some special arrangement is needed to ensure that superannuation does not come in the way. Such cases when the quality of the person and the work are beyond doubt should be easy to deal with since they are rare and the signal is much larger than the noise. The definition of special is like that of above average – everyone cannot be above average. One could peg 'special' at the top few per cent for example. But the reality is that we are concerned with a

much larger fraction of people and how they could best be utilized in our system.

Looking at the wider scenario, the experiment of a scientist continuing to work after retirement has been successful when: (i) The host institution is not one where he ('or she' is omitted from now on) recently held a high post, and better still is one he had little connection with earlier. (ii) The assignment is purely academic/scientific and does not involve any form of decision making or authority. (iii) The scientist is the kind who could do things for himself and hence is not totally dependent on younger people for knowing about the literature, calculations, or experiments. (iv) The kind of work and the spirit in which it is carried out ensure that there is no conflict of interest with the younger people in the institution.

Under these conditions, one has seen people immersed in their work, respected

and consulted by their colleagues, giving expertise, enthusiasm and a good example to the younger generation, and genuinely happy. The relationship has its parallels with grandparents in some families who actually have more time for important things than the busy, hassled parents.

These conditions are not fulfilled in many of the cases one is familiar with. More often than not, a person 'continues' in the same place. There is then a genuine risk of interference in the affairs of the host institution, of joining or even creating a clique within it. There can be diversion of precious resources such as office and lab space and even manpower and funds. There is certainly an element of tragedy in seeing someone who once had a prominent role struggling to continue in it. But as the legend of Yayati (and even more its reworking into modern drama by Karnad) reminds

us, the tragedy can recoil on others as well.

We are talking of different phases of one's scientific life and there has to be at least a loosely defined phase transition. This may be placed somewhere between the ages of 60 and 65 for administrative and economic purposes. But the real transition is when one is struggling to keep pace with younger colleagues and with

the development of the subject. It comes at different times to different people and can be postponed by energy, experience, enthusiasm, and sheer ability. Its external manifestation can also be delayed by a few years after its internal onset.

One can worry, as Balaram's editorial does, about those cases when it comes after the administrative deadline. But let us not forget that in most cases the

transition comes far earlier, and we should all think about how to handle that, in others and in ourselves.

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A few words of appreciation for editorials

At the outset, I must put in these small words of appreciation before they get 'dissipated' again. I have been wanting to write this letter of appreciation for over a year now, but it always gets drowned in the innumerable mundane things one does (including writing research papers). These words (which come straight from the heart and are not meant to flatter) are for the editorial column in *Current Science*. Its amazing consistency (there has not been a single issue without the column) has made me pick up *Current Science* the moment it lands on my table. I can make one honest confession here. I invariably read the 'Editorial' first, the letters next and then the research papers. Over the years the quality of papers has become 'run of the mill', with the

emphasis so much on methodology, and procedures. So, my preference has not changed. The credit for that goes to the Editor. I was particularly fired at last to, put down these words of appreciation, after I read the latest one 'A profusion of academies' (*Curr. Sci.*, 1999, 77, 5-6). I remember mentioning this to several colleagues in many academic meetings and seminars. A colleague of mine who is a fellow of the Indian Academy of Sciences (IAS), once patiently explained to me how the IAS (Bangalore) was 'different' from the National Academy of Sciences (Allahabad). I asked him how it was different and he said, it was 'different' because it was 'accepted' that the IAS (Bangalore) was higher up in the 'hierarchy of professional membership'

than NAS (Allahabad), which in turn was probably 'on par', with INSA, Delhi. The personal egos of two 'larger than life' personalities (as the editor subtly put it), dictated that two separate entities be born in the mid-30s. But, C.V. Raman and Meghnad Saha are no more. Does anybody now have the audacity to suggest in the annual meeting of the academies (before or after the sumptuous lunch and the evening 'Nastha') that a merger of the two is still possible? He will probably have to insure himself first.

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Why should the pollinators be conserved?

Flowers are the most precious and beautiful gift of nature. When they bloom in different colours, they provide a picturesque landscape to the earth's ecosystem. Can anyone imagine the earth without vividly coloured flowers? Yes, this could happen if the devastation being caused by human-engineered activities continues to eliminate the pollinators. The latter have played a great role in the evolution of different morphs and colours of the flowers¹⁻³. The conservation of this great biodiversity, therefore, depends upon the conservation of pollinators.

During the course of evolution of angiosperms (the flowering plants), they developed a genetically strong breeding

barrier – the self-incompatibility². Due to this barrier, a flower cannot utilize its own pollen or pollen from the same clone/ramet/genet for the fertilization of its ovules (i.e. selfing is not possible). Therefore, the conspecific pollen has to be brought from the other flower(s) or flowers of a different clone/ramet/genet. This is called cross-pollination. Entomophily (i.e. pollination by insects) was the first to evolve. It started with unspecialized pollinators like beetles (cantharophily) to end with very highly specialized pollinators like bees (melittophily). Present day self-pollination and other kinds of biotic and abiotic pollination are all manifestations of sec-

ondary derivatives of entomophily, albeit subsequently specializations did evolve in other kinds of zoophily (pollination by animals) too, for example, ornithophily (bird pollination), chiropterophily (bat pollination), psychophily (butterfly pollination), sphingophily (moth pollination), etc. Due to these specializations, strong mutualistic relations exist between the pollinators and the plants. The elimination of one class of pollinators would, therefore, curtail the reproduction of different kinds of plants and thus open a path to their extinction. Erosion of habitat of the pollinators, use of several poisonous chemicals and addition of pollutants in the environment of the