

earlier. The language of the text was however, not uniform. I discovered that the author (not Indian) had copied verbatim paragraph after paragraph from my book on water hyacinth (Elsevier, 1987) and done a very bad 'cut and paste' job with few of his own sentences thrown in between. My book was not referred to at all. I am sure the editors could have never discovered a case of blatant plagiarism.

Second, the Himachal Pradesh State Council of Science and Technology (HPSCST) asked me to prepare a report on the water resources of the state. I declined to do so because of my lack of experience in the state, but to my surprise, after a year or so, I received a small report giving a very sketchy account of the lakes, rivers and wetlands in the state. A far better report could have been prepared by a research scholar on

the basis of published papers alone. I conveyed my great disappointment over the report. After some time I received a letter from one of my friends (unfortunately he is no more) who took offence at my report and abused me directly. I was shocked. I wrote to the HPSCST about revealing my name to the author of the report. I was told that this was inevitable because the author was a member of the Council, he had himself suggested my name for review of the report, and then my report had been placed at the Council's meeting.

I give a third example, in light of your comment 'peers are out in the open'. Once, while commenting on the suitability of a research project for funding, I went on to the extreme of extremes, and wrote that the PIs (two senior scientists) were not competent enough to handle the project which was very badly formulated.

To my surprise, the project was not only sanctioned but the concerned Department asked me to comment on the Final Technical Report after three years. What is the need of these anonymous comments if these are not to be taken into account? If the reviewer is unreasonable, harsh, arrogant, why should the same person be troubled again and again for this thankless, non-remunerative job!! Ethics demands that the final decision of the editors and grant committees be conveyed to the reviewers. This, however, is done, only rarely, even outside India.

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## Biotechnology: Human resource development

After reading the observations made by P. Balaram on 'Biotechnology courses' (*Curr. Sci.*, 1999, 76, 859-860) I wish to submit the following thoughts on the same subject, essentially from the viewpoint of a 'classical' biologist.

Biotechnology courses are presently oriented towards educating the younger generation of students in the advances made in the field of genetic engineering and recombinant DNA technology and the emphasis is largely on the details of the techniques applied in these studies. It is no doubt very important to get familiar with these advances to understand and utilize them in our future projects. But sadly, students are not given even an elementary exposure to several important aspects of basic biology in these courses. For instance, taking microbial biotechnology, while DNA isolation, cloning and the type of vectors used are taught in detail, the aspects related to natural biodiversity of microbes, their ecology and distribution, how they are classified and above all how they are isolated, cultured and conserved in germplasm banks ensuring viability and genetic

stability on long-term basis are totally ignored in biotechnology courses. Particularly, mycology as well as the biology of actinomycetes are taught very little. Presently, fungal systems are becoming more important for heterologous gene expression and actinomycetes are the most important sources for a variety of high value secondary metabolites and industrially useful enzymes. I wish to reiterate what I had stated earlier (*Curr. Sci.*, 1996, 71, 597) that biology is essentially the basic science on which the progress of biotechnology depends and in the case of microbial technology, microbiology is the bedrock from which newer developments in biotechnology would emerge.

Biotechnology in its simplest sense would mean using the biological systems to develop technologies useful to man which in turn means process development and manufacture of valuable products employing biological systems. If our future generations of bright biotechnology students do not have any exposure to important aspects of basic

biology, how could they be expected to be competent and internationally competitive in the new millennium for developing viable technologies for novel bio-based metabolites? If biotechnology courses are indiscriminately started in locations lacking adequate infrastructure or trained staff to impart the right blend of knowledge, the day will not be far when we will no doubt have a large population of biotechnologists with paper qualification, but with little knowledge or wisdom to deliver the goods expected of them through applying biotechnology for generating national wealth.

An urgent need has arisen to carefully look into the present situation as far as biotechnology education is concerned and corrective measures should be implemented at the earliest to make the courses more meaningful, practical and targeted to achieve specific objectives.

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