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The views expressed on Biotechnology by A. S. Rao (*Curr. Sci.*, 1996, 70, 955–956), P. Tauro and M. V. Nayudu (*Curr. Sci.*, 1996, 71, 169–170) are timely, thought provoking and highly relevant to the progress of Biotechnology in our country in future years.

Biotechnology being a multidisciplinary subject, requires coordinated efforts and expertise of scientists with different backgrounds to be put together in order to achieve success. I had stated in my earlier article (*Curr. Sci.*, 1994, 66, 137–140) that Biotechnology is an 'Olympics' involving the interplay of Biology, Chemistry, Physics, Mathematics and Engineering – particularly in developing technology out of microbial fermentations and manufacturing products on commercial scale. As such no one can be a complete 'Biotechnologist' with absolute mastery in all the disciplines, but one can form a part of the networking that is essential for achieving realistic goals in commercializing Biotechnology.

Biology is essentially the basic science on which biotechnology progress depends and in the case of Microbial Technology, Microbiology is the bedrock from which newer developments in Biotechnology would emerge. I believe and I have emphasized on several occasions that natural microbial biodiversity is the resource pool for discovering novel bioactive metabolites and there is an urgent need for exploring natural resources for novel microorganisms by innovative techniques and conserving them in well-organized germplasm banks. In combination with application of modern techniques of genetic engi-

neering and recombinant DNA technology including PCR, gene amplification, etc., unlimited potential for developing new technologies based on indigenous discoveries would emerge and make our research and technology competent and globally competitive.

The question to analyse and answer is how far are we presently prepared to accept this challenge in our country and are we doing the right things to meet the challenges in the 21st century – with the GATT, WTO and IPR coming into full swing when we have to play our role and achieve international competitiveness in Biotechnology.

In my opinion, the following are the most essential points on which focussed decisions need to be taken and implemented fast to achieve this competence and competitiveness.

We need to establish active schools of research at Universities and national institutes to explore, identify and conserve in pure culture germplasm banks of indigenous microbial strains which must represent biodiversity of the native microflora from the diverse ecosystems which our country is abundantly endowed with. Among microbes, expertise in the taxonomy, physiology and biochemistry of fungi and actinomycetes is either non-existent or will be vanishing as the older generation of microbiologists fade off and these areas need the proverbial 'shot in the arm' urgently. Research work and capability build up in the modern aspects of genetic engineering must keep pace with the positive developments in the developed world – for example the present use of filamentous fungal systems with their

capacity for protein hypersecretion as the preferred hosts for heterologous expression of genes (the 'Cassette Expression System') which we need to develop expertise in and apply to our future technologies in bioproduct manufacture.

We need to establish the infrastructure as well as the technical competence of germplasm banks conforming to international standards on a priority basis. Culture collection(s) so established must get recognition under the Budapest treaty to enable our biotechnologists in future years apply for international patents without the necessity of having to deposit our patent strains in other recognized culture collections abroad. National patent laws including the patentability of both naturally occurring and recombinant strains must be debated in depth and policy decisions quickly taken and speedily implemented.

In the light of some of the points discussed, human resource development for biotechnology becomes most vital for future progress. The culture of working in teams respecting one another's competence and expertise and putting the heads together to work out new problems and find innovative solutions through individual and collective creativity is most essential for Biotechnology as a science to blossom into world class technology in our country.

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