ammonia and glutamine/glutamate ratio are also considered significant to regulate NUE[4,5]. Further, in nitrogen fixing legumes and in plants growing under anaerobic conditions, ammonia and not nitrate is the major nitrogen source. Under certain conditions, significantly high amounts of ammonia are regenerated inside the plants by photorespiration and catabolic activities. In such cases, manipulation of NUE has also not been dealt in the article.

Transgenic *Nicotiana plumbiginifolia* plants constitutively over-expressing NR activity resulted in lower nitrate content compared to the wild ones. In this case, however, total N and biomass production have not been increased[6]. Contrary to this, in transgenic *Arabidopsis thaliana*, over-expression of NR activity yields an increase in protein content by 200% than the wild-type[7]. This indicates that a functional role of NR over-expression is species-specific and requires more studies to determine its importance in NUE by the crop plants. Transgenic plants modifying the expression of glutamine synthetase (GS) and glutamate synthase (GOGAT), the key enzymes for ammonia assimilation have been produced recently[8–10]. The expression of cytosolic GS of soybean origin in shoots of transgenic *Lotus corniculatus* plants triggers changes in ammonia assimilation and plant development, leading to early senescence and premature flowering[8]. Similarly, genetic engineering techniques have recently been employed to produce transgenic tobacco plants expressing a Fd-GOGAT cDNA fragment in the antisense orientation under the control of CaMV 35S promoter[10]. Further, due to the importance of internal gln/glu and other amino acids in regulating NUE by the feedback catabolite repression effect, the transport and translocation of amino acids to different parts of the plant and their redistribution are also very significant[1,4,5]. Tissue/substrate-specific amino acid transporters have recently been characterized in the plants which show an analogy to yeast amino acid transporters[11]. Genes which encode these transporters and plant mutants for such transporters are now being used to regulate the NUE.

Thus, it appears that cloning, transfer and regulation of expression of GS and GOGAT in the transformed plants are possibly more effective strategies to modulate NUE as they catalyse a key central process of NUE in all plants irrespective of the source of inorganic nitrogen input. Efforts are being made to produce transgenics with modified expression of various isoforms of ammonia assimilating enzymes, e.g. GS, NADH and Fd-GOGAT and NADH/$NAD^+$–GDH to regulate NUE in a desired manner. Such studies not only improve the yield and productivity of the plants but also manipulate the nutritional qualities and the physiological responses.

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RANA P. SINGH
PAWAN K. JAIWAL

*Department of Biosciences,*
*M.D. University,*
*Rohtak 124 001, India*

# Reviewing: A disliked necessity

This is a response to the editorial 'Peer review' by P. Balaram (*Curr. Sci.*, 1999, **76**, 1288.). The 'obvious imperfections' of peer evaluations are not so much due to the imperfection of the process as due to the imperfection of our 'peers' and much more due to the imperfections and intolerance of the authors. I must add that quite often the behaviour changes quickly with the role as an author or a reviewer. This stems from the attitude that I know more than anyone else. This is more common with senior persons who start relying on their students and still expect that whatever and wherever they submit should get accepted and be published. A common problem with the vast majority of Indian authors is that they rarely care for or devote time to search the published literature. The common refrain is that it is not accessible. It is quite simple to state that there has been no study of the kind being reported by the author. Whether the reviewer points out the shortcomings in detail or rejects the paper without meaningful comments, the authors blame the reviewer.

Majority of the Indian reviewers (peers) of course, do not go through the manuscripts critically, and rarely devote time to offer suggestions for improvement. However, the reviewers should also be not expected to rewrite the paper, supply references or analyse and interpret the data.

With regard to the importance of a peer evaluation and its anonymity, I wish to give two examples from my personal experience. First, the editor of the *Journal of Aquatic Ecosystem Health and Management* (then published by Kluwer) sent to me a long manuscript on the problems, control and utilization of water hyacinth. Going through the manuscript, I developed a feeling that I had read it

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.

BRIJ GOPAL

*School of Environmental Sciences,*
*Jawaharlal Nehru University,*
*New Delhi 110 067, India*

# 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.

M. C. SRINIVASAN

*Biochemical Sciences Division,*
*National Chemical Laboratory,*
*Pune 411 008, India*