

## Administrative wrangles as an impediment to research progress in India

There have been a number of articles providing reasons for lack of proper research output in India. While a few have highlighted the failure of the system and policies<sup>1,2</sup> as one of the reasons, others blame that mediocrity breeds mediocrity, and hence talented researchers should be selected for research and teaching<sup>3</sup>. A few others have claimed the administrative wrangles and the associated bureaucracy as one of the reasons that is curtailing Indian research<sup>2</sup>. The administrative staff mainly provide a supporting role. However, most of the time they fail to understand this and put all sorts of hurdles and impediments to scientific pursuits. Instead they should extend full cooperation and be an asset to any institution. Scientists can do the routine clerical and other secretarial work such as typing reports and publications, purchasing a few items themselves anticipating delays from ad-

ministrative departments. Several articles have raised this issue<sup>2</sup>. A chemical or any other item which could be purchased in a few days normally take 3 to 4 months. The administrative staff quite often blame the various procedures and norms of the organizations for such delays. Basically it seems that the administrative staff have a different mindset. The delays in purchase of important chemicals, instruments, etc. would irritate the research staff and make them demoralized. Few can overcome this irritation and still work patiently and carry on with their research pursuits. In addition, quite often the JRFs, SRFs and other temporary staff do not get their salaries on time, etc. In my opinion we should undertake a survey and gather opinions from researchers in India, and see to what extent the administrative wrangles are a factor derailing the progress of research output in the

country. And at the end of such a survey, if it is found that they are indeed a liability for research institutions, we need a redressal for the benefit of the country, society and researchers. Alternatively, if it is the 'system' that is an impediment then it has to be overhauled as suggested by Lakhotia<sup>2</sup>.

1. Ramanamurthy, M. V., *Curr. Sci.*, 2008, **95**, 830–831.
2. Lakhotia, S. C., *Curr. Sci.*, 2005, **88**, 1731–1732.
3. Sharma, O. P., *Curr. Sci.*, 2008, **95**, 448–449.

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## Who coined the terms 'biotechnology' and 'genetic engineering', and when?

History of science is an important part of education to provide an insight into the complexities of logical development of thought, concepts and experimental protocols, which often inspire young minds. Information about scientists and dates of coining of conceptual terms, an important component of history of science, signifies crystallization of ideas and the development of protocols needed to translate ideas into applications.

Biotechnology and genetic engineering were conceptualized long before the elucidation of the structure of the DNA by Watson and Crick in 1953, which is so essential to take the two concepts into the realm of practice. I have noticed that the issue of coining the two terms, 'biotechnology' and 'genetic engineering', which are widely used and misused in a variety of contexts, is affected by ambiguities, inaccuracies and at least one extravagant and spurious claim from India perpetuated in the Indian media<sup>1</sup>. This situation needs to be set right in the interest of science.

Karl Erkey is widely credited<sup>2</sup> to have coined the term 'biotechnology' in 1919. While there is no disagreement that Erkey coined the term, the year appears to be incorrect.

Philippe Goujon, a science historian, comments that by the year 1917, Erkey was convinced of the urgent need to replace in Europe the 'archaic peasant economy' with a 'capitalist agricultural industry based on science'<sup>3</sup>. In two publications in 1917, one on 'Food production and agriculture'<sup>4</sup>, and another on the 'Large scale development of pig fattening under normal conditions in Hungary'<sup>5</sup>, Erkey had elaborated 'biotechnologie' and visualized pigs as processing machines ('Biotechnologische Arbeitsmaschine'), that could convert a calculated amount of input (food) to a certain quantity of output (meat)<sup>4,5</sup>. In the book *Biotechnology of Flesh, Fat and Milk Production in a Large-scale Agricultural Farm*, published in 1919, Erkey<sup>6</sup> proposed 'biotechnologie' as a process by which 'new materials are biologically validated'. The term

'biotechnologie' in the title of this book, and Berlin which was the academic epicentre of the time being the place of publication, have together contributed to the popular belief that Erkey coined the term 'biotechnologie' in 1919, and the two rather obscure earlier publications<sup>4,5</sup> of 1917 were largely missed.

It was believed for some time that the term 'genetic engineering' was 'probably first coined by Edward L. Tatum during his 1963 Nobel Lecture'<sup>7</sup>. In another speech in 1965, Tatum went beyond his previous call for 'biological engineering' by suggesting the advent of 'genetic engineering'<sup>7</sup>. He conceptualized biological engineering as composed of three natural primary categories of means to modify organisms, one of which is genetic engineering 'producing new genes by a process of directed mutation', and the other two being eugenics and control of gene expression<sup>7</sup>. In the same year Hotchkiss, cautioned not to move too quickly and to prevent the uncontrolled growth of genetic engineering<sup>8</sup>, a sensible advice we