Research spending in science and technology: Radical reform measures needed in the review process

India's spending in science and technology (S&T) research has burgeoned in the last decade. However, translating this generous Government funding to productive research and development (R&D) outcomes, rests crucially on the peer-review system that is fair, balanced and competent.

A peer reviewer in science is someone who is into active research in a given research field. The problem in our system is that the Task Force has a tendency to become rehabilitation centres for retired scientists, who by definition are not peer reviewers as they are currently not running their own research programmes. As a result, the scientific peer review system in India has lost its credibility.

Reviewers must keep in mind that the grant-in-aid is not a Government expenditure, but investment. Hence, reviewers must assess measurable outcomes of a grant by answering the following questions: (a) Once the grant is over, what exactly will be produced, how will it be disseminated and how many people will be benefited? (b) What would be the tangible outcomes to prove that the projected benefit has actually occurred?

Selected reviewers should be (a) recognized authorities in their fields assessed by their record of current (and not past) research accomplishments, (b) investigators on a research project comparable to those being reviewed, and (c) dedicated to high quality, fair reviews judged from their experience as editorial board members of reputed journals and having reviewed projects from international grant agencies. Finally, the Task Force must decide a specific cut-off score for funding based on the allocated budget and the score must be made available to the applicant along with the comments of the reviewers.

In addition, the Task Force conveners of various Government agencies must ensure that it does not become static. Care must be taken to ensure that the Task Force remains aware of the emerging areas of S&T and ever-changing scientific borders. Consequently, it is imperative that at least one-fourth of the Task Force members get rotated each year, as it dramatically influences the breadth of the Task Force in terms of its expertise despite lacking in long-term planning. This will also ensure that over-representation of a given subset of scientists within a given scientific area does not occur.

Given the increasing involvement of researchers with industry and private entrepreneurial ventures, the potential for conflict of interest, which the grant agencies so frequently ignore, should be taken with utmost seriousness while constituting a Task Force. Conflicts of interest may occur when a reviewer's professional activities compete with his/her private interests, such as financial interests, thus raising questions of objectivity.

Currently, submitted proposals are sent to Directors of national institutes, who then become arbiters of having them reviewed. There is no guarantee that the proposals will be reviewed by peers. A reviewer not in the field of the proposal will fail to judge the importance and impact or lack of these attributes. To solve this problem, the grant agencies at first must prepare a database of reviewers by matching keywords assigned to any given scientific field. Identified reviewers should be contacted directly by the agencies for reviewing the grants. Where there is lack of reviewers in our country, proposals should be sent out for e-review. In taking this step, we must ignore the notion that foreign reviewers would steal our ideas. Renowned grant agencies such as NIH, Medical Research Council (UK), Welcome Trust, etc. do send proposals to foreign experts.

Improvements in the peer-review system on these lines can easily be done if there is a will.

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The call for an Elephant Reserve in Andhra Pradesh

The elephant occupied a crucial place in ancient Indian art and culture. Many Indian kings adopted the word 'Gaja' (meaning elephant in Sanskrit) for their dynasties, like the 'Gajapathi' dynasty in Orissa. Many of the kings maintained elephant battalions in their army. The fate of the Asian elephant is in peril today. Its plight is not as well appreciated as that of its African cousin. Unlike the African elephant, the decline in the case of the Asian elephant has been a gradual process historically, virtually unnoticed by the international community of conservationists. The spread of agriculture, logging and poaching has reduced the Asian elephant populations to a meagre forty to fifty thousand individuals in small, scattered conditions extending from India to Thailand[1]. It is only a tenth of its African relative. This calls for an urgent need to think about the conservation of the giant animal. The coming years would decide the ultimate fate of the pachyderm, whose relationship with the natural world and the human spirit has remained unrivalled[2]. According to the Ministry of Environment and Forests (MoEF), Govt of India, elephant census report, only 21,300 elephants are now present in India, with just 12 in Andhra Pradesh[3]. The Rayala Elephant Reserve is the only habitat of elephants found in Andhra Pradesh, bordering the forests of Tamil Nadu. In the recent past, elephants from the Lakhari Valley Wildlife Sanctuary, Orissa entered the forests of Srikakulam and Vizianagaram districts in Andhra Pradesh and killed ten persons besides destroying

crops[4]. The area adopted by elephants has rich vegetation, including bamboo shoots, which are their favourite food. Failing to understand the root of the problem, the Government of Andhra Pradesh launched 'Operation Gajendra' to return the elephants to their original habitat, with the help of trained experts. In this operation, three out of 11 elephants died during their forcible return to the Lakhari Valley Wildlife Sanctuary.

At present, six elephants are found settling down near Veeraghattam forests, which has rich vegetation, including bamboo. This area extends over 15 km^2, with open mixed deciduous forest. Sal (*Shorea robusta*) is the main component of the forest with some rare flora like *Cycas* and ferns, besides wild animals like panther, sloth bear, sambar, cheetal and pal civet. The Orissa–Andhra Pradesh border should be recognized as an elephant corridor and the area must be declared as an elephant habitat zone. The recent incident might have occurred due to various kinds of man-made disturbances to the elephant habitat in Orissa.

The Orissa State Energy Department is considering a proposal to erect transmission towers and laying power lines inside the sanctuary, which would not only result in deforestation of the area but also pose serious threat to the wildlife habitat[5]. The main causes of migration of pachyderms from Orissa to Andhra may be loss of their habitat, conversion of forests to other uses, increasing anthropogenic pressure on habitat, increasing elephant population and their search for food. Mining, followed by deforestation and poaching, have emerged as important factors for rapid loss of their habitat and corridor path. Efforts to save the Asian elephant now need a massive thrust. There is need to develop scientific and planned management for conservation of elephant habitats and their viable populations in India. Therefore, the present habitat of elephants spanning Veeraghattam and Seethampet mandals of Srikakulam District and Jiyyamma Valasa mandal of Vizianagaram District, should be declared as a Wildlife Sanctuary or an Elephant Reserve to provide them better protection.

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3. Anon., Census in elephant reserves in India, MoEF, Govt of India, 2005.
4. *The Hindu*, 21 January 2008.
5. *Protected Area Update*, 2007, vol. 13, p. 11.

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Personalized genome game – A new social discrimination in the offing

The genomic race has been eulogized as the new saviour of human kind. Personalized genome sequencing is going to be a routine procedure. Like today's clinical laboratories, sequencing laboratories will be prominent throughout the world in the near future. Human beings have the basic instinct to know how their future will be. The genomic race paves the way to a new genetic horoscope that can predict the diseases a person would get in his/her lifetime, how one will look like phenotypically or how intelligent one's children would be. New genetic tests will soon be available to offer people answers to these questions and more, assessing their risk for a range of conditions based on a sample of saliva or blood. A physician can prescribe medicines based on the genetic make-up of individuals. The future physician may not use a stethoscope or sphighnomanometer, leave alone recording the pulse rate manually. Is it a reality or an utopian idea?

According to the current trend, personalized genomic sequencing is going to

be a reality. Many companies like de-CODE Genetics, Navigenics, 23andMe, Myriad Genetics Inc., Knome, etc. are already in the race. Many of these companies offer personalized genome services. 23andMe claims that it can even find out one's ancestor. Celebrities like James Watson and Craig Venter have already sequenced their genomes, sponsored by the companies. Recently, Dan Stoicescu of Switzerland had sequenced his genome from Knome paying US $35,000. So the list is growing day by day. The day is not far in the future when we can get the same service in major cities of India. We have to be cautious before accepting this technological fancy.

It is true that genomic data can indicate predisposition to certain diseases, but it does not mean that the person will surely be inflicted with the disease. The mental trauma one has to carry with the feeling that at about the age of 50, he/she will get cancer or Alzheimer's disease is immense. More than the promises it puts forth, the personalized genome pro-

gramme will create chaos in the society. One of the major concerns is that results might encourage people to seek unnecessary and expensive follow-up tests to look for problems that are not there, or there may be a feeling of despair that one cannot do anything about his/her genetic fate.

Confidentiality of the data is also a major problem. Today our insurance companies do not confirm persons having certain diseases in the preview of health insurance. Soon, insurance companies may make it mandatory for all clients to submit their genomic data. Again the day is not far when our brides and grooms will reject proposals solely based on genomic data. What will be the social implication of such a problem? In India, generally people note the family history of the bride and groom. The other parameters include education, health status, economic background and social status. On close scrutiny, one can see that we are re-creating a eugenic culture knowingly or unknowingly. This is the reason