

alternative but to develop our own expertise in the field of plant virology. Time is really ripe and what is needed is a strong leadership to provide much needed dynamism *to transform the concern into action*. At present, the major research emphasis in plant virology continues to be on the characterization of genome and proteins mainly because of the widespread usage of techniques that make the handling of these macromolecules far more amenable than the host genes. As the expression of viral infection involves an

interaction between the host and viral genes, it is only in the last few years that with the incorporation of techniques like RFLP and RAPDS in combination with mendelian genetics, that it is becoming possible to isolate a few of the host genes that play a role in viral infection. A study of these genes undoubtedly offers yet another viable strategy to produce virus resistant plants.

Ample opportunities, particularly in terms of adequate funds and rapid communication with international labs,

need to be provided to our scientists in India to take advantage of rapid developments in the field of plant virology. A rapid flow of data and knowledge coupled with a global network are immediately needed and the tempo of decision making and implementation should be speeded up.

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## COMMENTARY

# Central Research University for Science and Technology (CRUST) – A proposal

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Indian Science is today at cross-roads. The scientists have begun to feel that they are not getting enough support, encouragement and recognition from Government and Industry. There is at the same time a growing feeling in some government circles and also industrial organizations that scientists have not been able to deliver the goods despite all possible encouragement and support since India's Independence in 1947, particularly from India's first Prime Minister, Pandit Jawaharlal Nehru, during 1947–1964. According to articles appearing in the media in the recent past, Indian Science has had very little success so far in developing indigenous technology and transferring the same to industry profitably. Further, since Independence, Indian Science has not been able to throw towering personalities like Ramanujan, Raman, Bose, Saha and Sahni as it did during the more difficult and less prosperous preindependence days. Except in a few areas here and there, Indian Science has also not been able to make any significant impact on the global scene. There have been complaints against many senior scientists that they are more inclined to pursue power than to seek Truth with devotion and dedication.

There are obviously many reasons that have gradually led to the dismal

scenario of today as described above. One of them has been the low morale and inadequate motivation among young scientists and technologists entering the fascinating world of scientific research. Their expectations with regard to emoluments, working conditions, library facilities, supervisory guidance, boarding and lodging arrangements etc. are rarely fulfilled and they tend to become disappointed, cynical and frustrated in no time. The pursuit of Excellence in Scientific Research has thereby been adversely affected, causing already incalculable damage to the growth of healthy traditions in our Universities and Research Institutions like those of Council of Scientific and Industrial Research (CSIR), Defence Research and Development Organization (DRDO), Department of Science and Technology (DST), Indian Council of Agricultural Research (ICAR), Indian Council of Medical Research (ICMR) and the Departments of Atomic Energy and Space (DAE and DOS).

The present proposal is concerned with the many, many hundreds of our bright young scientists and technologists who are associated with well over one hundred well-equipped R&D Establishments, have started their research careers and wish to do their Ph D as quickly as possible. Most of them face different types of registration

problems and have often to get affiliated to distant and not so well-known universities with outdated, stringent and meaningless procedures, made even more trying by the callous attitude of bureaucrats and petty officials in their Academic Sections. Registration can be done only *TWICE* in the year, say February and August, in most Universities. External Registration is generally frowned upon and definitely discouraged by difficult and often almost impossible course or residence requirements, apart from the need for the so-called 'local' supervisor. The supervisors in the R&D units, often more qualified and better recognized professionally than the academics in Universities, are made to feel inferior to the local guides since they are not designated as Professors and have to depend heavily on the latter for the smooth progress in research of their wards.

Taking all the above facts into account, it is now proposed that the Union Ministry of Human Resource Development (HRD), in consultation with the University Grants Commission (UGC) and other concerned Departments/Agencies, may establish through an Act of Parliament an Institution of National Importance to be called 'Central Research University for Science and Technology (CRUST)' and



to function as a pace-setting institution for promoting excellence in Scientific and Technological Research. The HRD Ministry will naturally finance the establishment of CRUST, but its running/recurring expenses can easily be raised through registration, course and examination fees.

Located at *New Delhi* and working closely with the *University Grants Commission* and the *Indian National Science Academy*, CRUST may be administered by a Board of Governors with the following illustrative list of members: – Vice Chancellor, CRUST (Chairman); Nominee of President, INSA; Nominee of President, INAE; Nominee of Chairman, UGC; Nominee of Chairman, AICTE; Nominee of Director-General, CSIR; Nominee of Director-General, ICAR; Nominee of Director-General, ICMR; Nominee of Director-General, DRDO; Nominee of Department of Science & Technology (DST); Nominee of Department of Atomic Energy (DAE); Nominee of Department of Space (DOS); Nominee of Finance Ministry; Pro-Vice-Chancellor, CRUST, Registrar, CRUST (Non-Member Secretary).

The Research Council of CRUST will be made up of distinguished scientists and technologists representing different subjects including those nominated by the Board of Governors as Chairmen of the corresponding Subject Committees for three-year periods as in the following illustrative list of members: – (1) Vice-Chancellor, CRUST (Chairman); (2) Pro-Vice-Chancellor, CRUST (Vice-Chairman); (3) Chairman, Committee on Physical Sciences; (4) Chairman, Committee on Chemical Sciences; (5) Chairman, Committee on Mathematical Sciences; (6) Chairman, Committee on Earth Sciences; (7) Chairman, Committee on Plant Sciences; (8) Chairman, Committee on Animal Sciences; (9) Chairman, Committee on Bio-Sciences & Techno-

logy; (10) Chairman, Committee on Agricultural Sciences & Technology; (11) Chairman, Committee on Medical Sciences & Technology; (12) Chairman, Committee on Constructional Engineering & Technology; (13) Chairman, Committee on Mechanical Engineering & Technology; (14) Chairman, Committee on Electrical Engineering & Technology; (15) Chairman, Committee on Chemical Engineering & Technology; (16) Chairman, Committee on Materials Engineering & Technology; (17–20) Four experts nominated by the Board of Governors from among Directors of National Level Laboratories; (21) Registrar, CRUST (Non-Member Secretary).

The Subject Committees may each have not less than five and not more than nine members, including the Chairmen, all to be nominated for three-year periods by a Nominating Committee made up of Vice-Chancellor, CRUST, as Chairman & Convener and with the Pro-Vice-Chancellor, CRUST and Chairman of the concerned Subject Committee as Members.

While framing CRUST's Act/Statutes/Rules/Regulations so as to maintain the highest standards in research, the following points may be kept in view:

1. Registration for Ph D of CRUST should be easy and possible any time of the year on payment of the concerned fees and fulfillment of necessary prerequisites.
2. Any Scientist/Technologist associated with the Board of Governors/Subject Committee of CRUST should hold the Ph D or equivalent degree of a recognised University and also be a Fellow of one of the Indian Science/Engineering/Medical Academies. Such a person may well be a retired Professor or Scientist, eminent in his field and still active in research

3. Only Ph D degree holders with sufficient research experience shall be recognised as Ph D supervisors from R&D Establishments and these may be conferred ADJUNCT FACULTY POSITIONS in CRUST on a contract basis with nominal honorarium, provided he or she has guided at least *one* Research Student/Fellow for the Ph D of CRUST.

4. CRUST shall ensure that certain minimum standards are maintained by concerned R&D Establishments as regards emoluments, living and working conditions, laboratory, library and computer facilities etc. for the Ph D registrants.

5. Quick, efficient and courteous with all concerned in its dealings, CRUST shall ensure monitoring of progress in research and examinations of Ph D theses without undue delay and due understanding of the human angle in the whole process.

6. Based on examiners' reports, Ph D theses of exceptional quality should be rewarded.

In conclusion, it needs to be stressed that this proposal has nothing to do with the numerous existing *degree-conferring* institutions of our country viz., Universities, Deemed Universities and Institutions of National Importance. Its main thrust is towards assistance and guidance to hundreds of young Indian scientists and technologists who are eager to work for their Doctorate degrees, but find many hurdles in their way to the goal because of their association with *non-degree conferring* R&D Institutions, Laboratories or Centres.

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## Science communication – A proposal for action

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Pandit Jawaharlal Nehru had a keen appreciation of science and its role in nation building; amongst those who have led free India he had it in the greatest measure, he upheld it and lived

by it. It is indeed paradoxical that a generation later, when we apply science, technology, agriculture and medicine in Indian life more than ever before, those subjects are treated with benign

(occasionally not so benign) neglect by the media, the legislators and the government. The science magazines *Science Today* and *Vigyan* have folded. No news magazine of repute, be it in