

Nehru's 'Discovery of India'

The Role of Science in India's Development

Science should unite and not break-up India

'I love India, not because I have had the chance to be born on its soil but because she has saved through limitless ages the living words that have issued from the illuminated consciousness of her great sons'.

So wrote our great poet Rabindranath Tagore several years ago but few among the modern generation of intelligent youth have bothered to get even a glimpse of what that glorious heritage of India was. Valmiki, Vyasa, Kalidasa and Bhavabhuthi are just names. The masses of India, however, are better informed, *Ramāyana* and *Mahābhāratha* have impressed on their mind the oneness of India. Every village, at least till recently, had a *Bhajan Mandal* where the entire village would participate. Pilgrimages were undertaken with great religious fervour to holy places like Varanasi, Gaya, Rameswaram, Dwarka, Puri and Haridwar, Badrinath and Amarnath. These inculcated in the minds of the people the vastness and variety of their homeland and welded them as one human entity. This tradition of unity and integrity of the country is being destroyed by the self-serving politicians jockeying for power and sowing seeds of hatred in an otherwise peaceful population. Science has barely tried to perpetuate this unifying influence.

'The Discovery of India' by Nehru

When my mind was deeply distressed at the present state of the country, I was drawn to a review of the book 'The Discovery of India', a recent edition of which has been brought out by the Penguin publishers. This is an old book which I had read in my young days and re-reading it (written by the person who became the first Prime Minister of India), captivated me and made me realize the intellectual greatness of this illustrious son of India. He was no ordinary politician but represented the best traditions of Indian culture, that it was no wonder that Gandhiji, with his remarkable capacity for recognizing talent, nominated Nehru as his successor.

It was this darling of India that the then British government locked in prison, not for any short period, but for 1041 long days (9 August, 1942 to 15 June 1945), keeping him virtually in solitary confinement in Ahmadnagar Prison. And what was the reason for this inhuman treatment? The love he bore for his country! It is amazing how even this harsh treatment meted out to him failed to tame the spirit of Nehru. He used the time in prison to improve his knowledge of the chequered history of his dear land and the circumstances leading to its enslavement by a foreign power.

Writing followed his thinking process and words flowed from his pen spontaneously and with ease. Being an aristocratic Kashmiri, he traced his genealogy to the venerable sages of old who had inhabited this most beautiful and picturesque part of India and developed a distinct culture of their own. His analysis of the historical development of India makes absorbing reading, with several passages of finest prose.

In order to give his only son a good education, Motilal, his father, sent him to Cambridge and geology was one of the subjects which he chose for study enabling him to survey the march of events beginning with the earth as a planet and the stages through which it had passed. Later, he was to relate this absorbing story in a series of letters addressed to his dearest daughter, Indira Priyadarshini and this was perhaps the earliest and most successful attempt at popularization of science. Modern India would do well to translate it into all the principal languages of the country and make them available to every youth seeking education and enlightenment.

Although his body was confined within the four walls of the prison, Nehru's mind soared beyond time and space, picturing the grand march of Indian civilization.

How amazing is this spirit of man! In spite of innumerable failings, man, throughout the ages, has sacrificed his life and all he held dear for an ideal, for truth, for faith, for country and honour. That ideal may change, but that capacity for self-sacrifice continues, and, because of that, much may be forgiven to man, and it is impossible to lose hope for him. In the midst of disaster, he has not lost his dignity or his faith in the values he cherished. Plaything of nature's mighty forces, less than a speck of dust in this vast universe, he has hurled defiance at the elemental powers, and with his mind, cradle of revolution, sought to master them. Whatever gods there be, there is something godlike in man, as there is also something of the devil in him.

Behind his vision of the panoramic unfolding of history, his mind became oppressed with the humiliating thought of how a great civilization had fallen in such timid submission to an arrogant alien authority and this undercurrent of thought persists throughout the book. The mental poverty of the present-day India, the sterility of its art, and the cessation of original thinking disturbed him. He was also critical of the way India's history was being taught. 'That history was written by Englishmen with panegyrics of British rule, and a barely veiled contemptuous account of what happened here in the millenniums preceding it. Indeed, real history for them began with the advent of the Englishman; all that went before is in some mystic kind of way a preparation for this divine consummation.....' The memory of all that the British had done hurt him; more than everything the fact that we had submitted for a long time to this degradation hurt him the most. He would have preferred any kind of resistance rather than submit to such treatment.

Independence and Dismemberment of India

The inevitableness of the march of events brought independence finally to India, but it dismantled the one homogeneous State into fragments. The physiological unity so characteristic of India was broken and artificial walls erected. This greatly affected the march of science and the progress of the nation as a single unit. Subsequent events have shown how this arbitrary division

created new monsters of terror, destroying peace in both segments of the fragmented India. Seeing this holocaust, poet Tagore, lying in his death bed, cried in agony: 'the demon of barbarity has given up all pretense and has emerged with unconcealed fangs ready to tear up humanity in an orgy of devastation. From one end of the world to the other the poisonous fumes of hatred darken the atmosphere. The spirit of violence which perhaps lay dormant in the psychology of the West has at last roused itself and desecrated the spirit of man.' No creative thinker in this mad world, perhaps, dies with a satisfied mind. He dies with none of his hopes realized, his faith gone and seeing the 'crumbling ruins' of a proud civilization strewn before him like a vast heap of futility. To add to the woes of the country, famine struck as an aftermath of war. The streets of Calcutta were strewn with corpses, but the upper ten thousand of the city underwent no change without any reduction in its gay and pompous exhibition of power and callous indifference to the plight of the poor.

Realisation of the Relevance of Science to India's Progress

Nehru marvels at his country's survival from this disaster and its dynamic capacity for revival. He knew that independence could not be delayed any longer and that he would have to play an important role in building up the new India. He was not impressed with the manifold achievements of the West and sought for something to give India stability, some basic principles to give meaning to life. He also felt the need to absorb the deeper lessons of life which have engaged the minds of thinkers in all ages and climes and had also realized the great importance of Science in the modern world.

'... the applications of science are inevitable and unavoidable for all countries and peoples today. But something more than its application is necessary. It is the scientific approach, the adventurous and yet critical temper of science, the search for truth and new knowledge, the refusal to accept anything without testing and trial, the capacity to change previous conclusions in the face of new evidence, the reliance on observed fact and not on pre-conceived theory, the hard discipline of the mind – all this is necessary, not merely for the applications of science but for life itself and the solution of its many problems. Too many scientists today, who swear by science, forget all about it outside their particular spheres. The scientific approach and temper are, or should be, a way of life, a process of thinking, a method of acting and associating with our fellow men...'

Nehru's Identification of Leaders in Science

Fired with such ideas as these, one of his first acts as Prime Minister of India was to draft a science policy resolution. He had realized that the only way of advancing science was to pick men of genius, back them vigourously and give them a free hand. Early in his career as Prime Minister, he had the good fortune to come across such a brilliant man in Homi Bhabha. Nehru found in him a man who could be fully trusted as he had the rare combination of research, management and an aesthetic sense of building research institutes of great magnificence without causing any damage to the environment. Having found the man, Nehru went out of his way to give him maximum

support, overruling all rules and regulations and the Tata Institute of Fundamental Research (TIFR) came into being. A part of the investment came from the House of Tatas and a high-power body was made directly answerable to the Prime Minister, and bureaucratic control of the science establishment was avoided. The result was an outstanding school of research in Physics and Mathematics where the emphasis was on original scientific research of a basic character rather than on imitative research. This wise step yielded quick results, bringing into being in quick succession great scientific institutes, one after another, namely the Department of Atomic Energy (DAE), the Bhabha Atomic Research Centre (BARC), the Physical Research Laboratory (PRL), and the Indian Space Research Organization (ISRO). Each one of these grew and yielded results far beyond expectations.

Another instance of promoting new science activity was the one provided by K.D. Malaviya. Of all the members of his Cabinet of Ministers, Malaviya alone had realized the importance of developing energy resources, particularly oil. Against all official advice, he fought to establish the organization of the Oil and Natural Gas Commission (ONGC) for exploration of this resource. Nehru admired such bold innovative thinking and lent him full support. Had the same zeal and innovative spirit continued, ONGC would have made greater progress than under the control of the present-day bloated bureaucracy.

Nehru was convinced that it was science that could end the hunger and poverty, insanitation and illiteracy, superstition and deadening, custom and tradition, with vast resources running waste in a sick country inhabited by starving people. But it is surprising that he never gave serious attention to the eradication of these evils which still plague the country. He had the political talent and the ability to galvanize people into action but failed to take steps for the amelioration of the poor.

Nehru was a great dreamer, always thinking of big dams, big hydroelectric projects and big industries. He had been impressed by the progress achieved by Russia and China under their five year plans and could not have been unaware that it could only have been made under the dominant single political parties in those states, where dissent and even constructive criticism resulted in severe consequences. He was interested in the socialistic pattern of development and gave attention to the building of big public sector organizations, and to implement these policies nationalized some of the flourishing industries. These measures did not produce the desired results, while concern for the people and the amelioration of their condition did not receive due consideration. Big dams were a disaster, leading to environmental degradation. Instead a welfare bureaucracy took control cluttering development and ushering in a 'License-Permit Raj' halting the progress of the country.

Nehru, sitting within the four walls of the prison must have thought frequently of the future and the role science should play. He was not enamoured with the old voice of Europe but was impressed with the older world of Asia. It was the voice of an ancient civilization – distinctive and vital, but which, at the same time renewed itself and learned much from other countries of the west. It was therefore, both old and new, with its roots deep in the past but with dynamic urges of

today. When actual power came into his hands, however, he was unable to translate these ideas into action. None of the numerous Research Institutes that came to be established, the IITs, IIMs and Central Universities even remotely tried to understand the past achievements and weld them to the new thinking. Science inevitably came to be Government-controlled, in the hands of a small group of a few educated in the west who lacked the wisdom to understand and try to solve the myriad problems facing the country. To the large majority, science became a means of living with no effort made to improve the soil where real science could grow. The performance of Indian science, with a few honourable exceptions, continues to be poor, with the label 'Mediocrity' written largely on its face. Science is about ideas moving around inside people and borrowed knowledge and pieces of expensive equipment alone will not promote it. Good criticism makes good science, but criticism is resented. There has to be a complete difference between the way a research laboratory functions and that in which the usual bureaucracy works. Accountability and transparency, essential features of scientific field, are difficult to nurture under the dead hand of government control.

Lack of leadership plus increasing bureaucratic control have been responsible for an absence of significant progress except in the few fields already mentioned. In the absence of efforts to identify leadership of high calibre Nehru had to fall back on the bureaucracy for advice. The new-born institutes failed to forge links with industry and in the process the universities were denuded of trained talent.

The IITs no doubt gave good training but of those trained many opted for higher education, left India and rarely returned. It is also not clear why these academic institutes shy away from the essential but distasteful topics of sanitation, waste treatment and recirculation of treated waste water. The country continues to suffer from leadership and dedication to service and the absence of bold thinking has left many of these essential problems facing the country unnoticed and unattended.

'Self-Congratulation A Way of Life'

This cancerous growth has prevailed in all our government-controlled institutes. The opening pages of the annual report of any Institute in the country starts with a list of 'achievements'. The bureaucracy can be excused if it boasts of its achievements in order to further its interests. But should scientific institutes also follow this line? Perpetuation of this attitude has made progress difficult of attainment.

The idea of the superiority of western Christian civilization was 'based on the arrogant ignorance of the rest of the world' (J.D. Bernal). The greatest harm that the British did was to wipe out all vestiges of earlier advances made in science in order to perpetuate the misconceptions of the youth of the country and keep them in ignorance of those advances. The course content in our universities did not place the development of science in the correct perspective and local problems and their solutions were consistently ignored in preference for ready-made western models. The blending of traditional knowledge with ancient wisdom and modern science was never attempted.

Role of Academies and Societies

The formation of Societies and allowing them to function independently of Government is an aspect to which serious thought has not been given. India owed a great deal to Sir William Jones for establishing the Asiatic Society as far back in 1784. The work it did in bringing to light the culture and accomplishments of India are not sufficiently known and appreciated nor is it realized that this mother of all Societies promoted the foundation of such great institutions like 'the Trigonometrical Survey of India (1818)'; 'the Geological Survey of India (1851)' and 'the Meteorological Department (1873)'. The work carried out by these organizations was of outstanding quality so long as they were permitted to grow on their own without any interference by government. The recent bureaucratization of these service organizations has greatly lowered their prestige and importance.

I have a feeling that soon after independence Nehru should have been invited to and taken around the Geological Survey and explained the manifold activities which it has undertaken. Surely he would have been greatly impressed and taken steps to strengthening the organisation, by giving it full independence without any interference by bureaucracy. Unfortunately, this did not happen and a great institute was allowed to degenerate and become an insignificant department of the Government of India.

'Research in any science or technology is based on a spirit of adventure, questioning and especially initiative and unorthodox ideas, whereas the bureaucratic set up is based on stability, rigidity and checks on checks. What is needed now is more vitality and wisdom, more mobility than stability, more right conduct than ritual, so as to restore the institution to its former pre-eminence. Universities which play an important role in nurturing future talent are neglected. Contacts with the world is lost. There is too much inbreeding. Local men are preferred and no attempt made to hunt for talent.

A great deficiency of Indian science is the total lack of opportunity to interact with great minds abroad. There are no liberal grants to travel and develop such contacts, so vital for the advancement of science. Those with modest achievements become conceited with their own importance resulting in the killing of all initiative for growth.

The examples of Homi Bhabha and Keshav Dev Malaviya have already been quoted. As declared by the President of the Harvard University 'there is only one method of assisting the advancement of pure science – that of picking men of genius, backing them heavily and leaving them to direct themselves.' This healthy process needs to be adopted but instead huge National laboratories are created and stacked with instruments.

Bogey of Seniority and Reservation

If any two things have grossly retarded the development of science, preventing new talent from sprouting and developing, it is the misconception that seniority and reservation, made applicable to all departments of government including institutes of higher learning. Seniority in

service is certainly of value but cannot be the sole criterion. The scientific output of the person selected for a higher post should be critically evaluated in making the selection as he has to play an important role in building the unit entrusted to his care. Reservation is a more serious onslaught in greatly reducing the quality of scientific output. Nehru's views on this aspect were very clear:

'If we go in for reservations on communal and caste basis, we swamp the bright and able people and remain second rate and third rate. I am grieved to learn of how far this business of reservation has gone based on communal consideration. It has amazed me to learn that even promotions are based sometimes on communal and caste considerations. This way lies not only folly but disaster. Let us help the backward groups by all means, but never at the cost of efficiency.'

Is India to make a Mark on the Global Stage?

The present status of science, because of too frequent interference by government, will not support anything but mediocrity. We all want that India should grow and make its voice heard on the global stage. But for this to happen there must be a change in the policies of government and remove the adverse factors mentioned earlier. A solemn protest on the part of the scientific community in all fora is long overdue.

If we are to give shape to the India of Nehru's vision and dreams, no time should be lost in initiating steps for re-orientation of policies on higher education. The call given by Wen Jiabao of the Republic of China, our neighbour, (featured in the front page of *Science*, 31 Oct. 2008, p.649) is worth perusing. Although Professors are paid several thousand dollars a year in China, productivity bonus supplements such income by over \$3000. Evaluation of publications is fundamental. Publication of a paper in *Nature* or *Science* fetches a bonus of \$2500 or more. Publication in other standard journals with high citation index bring \$1300. Papers in other journals of lower standard receive not less than \$200. Applying a monetary tag to research may not find favour, but it is a powerful incentive to produce quality papers (*Science*, 31 Oct. 2008, p.666). Is it too much to expect implementation of such policies in our country?

Guaranty of employment of persons who do not engage in research activities is discouraged in China and are 'forced out'. Measures like these are responsible for the remarkable growth of science in recent years in China. These issues are openly discussed in ScienceNet and Websites having thousands of readers per day (*Science*, 31 Oct. 2008, p.666).

China has also supported innovative schemes for research in basic technologies, especially in the fields of energy, water resources and protection of the environment. Our youth are capable of producing good science if they are provided with a level playing field and originality and innovation encouraged.

Nehru gave a big boost to science and technology. The progress achieved in pursuing fundamental research, atomic energy, space research, bio-technology and telecommunications has led the country forward. In many other fields of scientific endeavour, especially on aspects related to the environment, cleanliness, water supply and alleviation of poverty, the country has lost its way, with too much interference from elements least qualified to take major decisions.

The time has come for modernization of science focusing on excellence and attracting the best talent by providing suitable incentive in no way inferior to that being offered by the Information Technology industry. National centres on the pattern of NASA, NHS should be created and liberally funded with full freedom to develop projects aimed at utilization of mineral and energy resources. Our National leadership is presently blind to this basic activity which can make the country rich and prosperous.

A beginning can be made by having 10 of the universities in the forefront for promoting excellence in science. It will not be a bad idea to offer high salaries and attract meritorious scientists from outside. Government should take policy decisions at the highest level not influenced by political and other considerations. Steps have to be initiated to have collaborative relationships with well-known laboratories of the world. Indian science should become truly international.

China and Japan are opening up to the world (*see Physics Today, Dec.2008, p.28*). India with its varied culture and artistic ability, its excellence in dance, music and the fine arts and the knowledge of English of no mean order (what better example than Nehru) should not delay in taking forward steps. Raman made a beginning and almost succeeded in getting scientists like Max Born to the Indian Institute of Science but was thwarted in his attempts by narrow minded individuals erecting hurdles. When a progressive government is capable of taking a decision to send man to the moon, the creation of major facilities to promote science should not be difficult. Where there is a will certainly a way will be opened.

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