

Reflections

T R Seshadri was President of Indian Science Congress held at Hyderabad, in 1967. The presidential address he delivered is still largely relevant with respect to scientific activities, science policy, university education, national research institutions, etc. in India. Here are excerpts from that address.

G Nagendrappa

Science and National Welfare

1967, Hyderabad

Prof. T R Seshadri, F.R.S., F.N.I.

Science and Spirituality

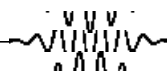
... . Indian thought upholds both religion and Science as valid disciplines in the pursuit of truth. India's thinkers never found any contradiction between the two. The method of investigation in the field of religion is largely the same as in the positive sciences. A thorough scientific study of the facts of the inner life was undertaken by the great thinkers of ancient India; the insights which they gained were re-tested and amplified by a galaxy of subsequent thinkers. It is because of this that Indian spirituality has stood the test of time and is also fully hospitable to modern Science.

... . There is no conflict between Science and religion. Both have the identical aim of helping man to grow in spirituality, and of ushering in a better social order. Each by itself is insufficient and helpless. The combination today of the spiritual energies of these two complementary disciplines in the life of man will produce fully integrated human beings and thus help to evolve a complete human civilization. This synthesis is the most outstanding contribution of Swami Vivekananda to human thought of the present time.

It has been the conclusion of many thinkers that great movements in India have always had a basis in spirituality and her part in the harmony of nations is to play the spiritual note. The recent example of Gandhiji confirms that we have not lost the great tradition. His whole life was a grand effort to spiritualise politics. Will it not be far more easy to bring Science and spirituality together?

Intellectual and Cultural Values of Science

From very ancient days Science has continued to have high intellectual and cultural values. Though culture is popularly associated with certain shows, it is not easy to define, as numerous components are involved, the most important being the scientific and rational attitude of mind. Imagine what would have been the level of our ancient



culture and civilization if the primary attitude of enquiry and critical assessment and search for truth at all levels, physical, mental and spiritual, was not there. In the modern context, this is forgotten and most of the cultural activities have very little of Science component in them. There is another aspect of Science and that is its importance for mental and intellectual health. All of us know how costly cricket is and all other sports including wrestling, boxing, hunting, mountaineering and travel. Sports are generally intended to foster bodily health and fitness though this is frequently forgotten and the business part and other considerations become dominant. Mind is far more important, powerful and valuable and should be kept in proper health and condition. For the purpose nothing can be better than Science, and many great people obviously took to Science for this primary attraction. Very early in the history of civilization Mathematics and Astronomy received attention. They continue to be attractive even now, though many other aspects of Science have developed similar values in recent years, for example, Particle Physics and Structural Chemistry and Molecular Biology.

Science and Society

... . It is with a view to promote the application of science to technology that the large number of National Laboratories and other laboratories have been set up in quick succession in our country during the past 20 years. They have been conceived in a big way, built with great speed and well-provided with staff and equipment. But the fear has been expressed that several of them have not concentrated their capacity on applied scientific research with the result that the resources have not been brought to bear effectively in producing results of economic value. Most of the staff seem to have come with only an academic background with little experience of industry and have not been successfully oriented towards project work of technical importance. Consequently there has been an attempt to make the National Laboratories duplication of universities with the end result that both types of institutions tend to suffer.

Our national need for applied research is so great that in the present context even universities will have to focus their attention on research of this nature. Long ago the main function of a University was teaching. Research was done by enthusiasts, not always in universities but also outside in academies and in many cases by rich people in their own homes. It soon became a normal function of universities. In a democratic and scientific age, a third function is becoming more and more prominent, that is national service. In an ideal university, these functions can be complementary and need not be competitive and each can be done better because of the presence of the others. Normal research programmes are intended primarily for the training of students and for the advancement of Science including techniques and concepts. Other programmes can be



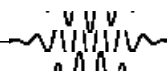
undertaken as service to the State or to industry and should now be considered as a service function of the University. Since this service research in Universities requires considerable finance which no university can afford, adequate financial help from government and Science Research Councils is necessary to enable this function to be effectively performed.

A mistaken impression seems to persist that discoveries in Pure Science are valued more than their application to technology. There is no justification for this. In earlier years, most scientific work was really applied nature and what is called Pure Science is a later development. Achievements in either line have received appreciation; as a matter of fact practical application provides more tangible rewards. However fashions exist as elsewhere in scientific research also. Devotees of Pure Science seem to be more prone to this influence. The more abstract the subjects are the purer they can be; there are surely many interesting intellectual exercises, and there are many others that are mere repetitions and are not so interesting, but in the context of our national needs most of them may merely lead to exertion and not to worthwhile results. They can have validity and fulfillment only when they are capable of application.

Science Policy

... . There is still another point which we should not overlook. Money and materials alone do not secure good research; they are only adjuncts and it is the human element behind them that does. Leadership in this context is of utmost importance. Not only in war, not only in big business and industry, but also in research there is what is known as "strategy". We have all appreciated great generals who with small armies and limited weapons have over-powered larger and better equipped adversaries. Similarly with small resources great men have built up large industries. We can ignore leadership in the field of scientific research only at the cost of the nation's security and prosperity.

In this connection the mental climate of scientific workers becomes a matter of primary importance and we do not seem to have given sufficient attention to it in our educational system. Creative Science has been claimed to be one of the greatest activities of the human mind and spirit. There is great need therefore for adequate preparation of the mind in this supreme effort. The essential steps in the training are described in *Raja Yoga*, the path of Mental Control. According to Patanjaii the first step is *Yama* which includes the practice of non-killing, truthfulness, non-stealing, continence and non-receiving of gifts. Next is *Niyama* which includes cleanliness, contentment, austerity, study and self-surrender to God. These are mental and moral disciplines to be strictly practised; they purify the mind and give it special powers of discrimination and dispassion. There is no doubt that a pure and strong mind sees truth clearly and the practice of



Science then becomes fruitful; not only this, the proper utilisation of Science is also assured. In our traditional thinking without these essential steps further progress is not only unfruitful but dangerous. This is true even today. If there is danger in Science it can arise from the lack of this mental and moral base. Even a little of this good training can yield great results.

In the Organisation of scientific research emphasis has been rightly laid on bringing together groups of scientists having complementary skills and talents and making them work in an atmosphere of mutual understanding and good will. It is however doubtful if due importance is given to the dedicated scientist who has also faith in his work and is capable of leadership. Talents differ widely among scientists. Some are narrow specialists and some others are good in human relations. But at the present time where team work is essential we need a good combination of the two capacities in a leader and it is rare indeed.

Again there is the distinction between devotees of Pure Science and Applied Science subjects. It has been felt that the distinction and delimitation are difficult and many scientists have been good in both. In general however the two aspects seem to depend on different attitudes and capabilities. If one needs men of thought who are contemplative the other needs men of action who are alert and enterprising; both types are necessary because they are complementary to each other. Not long ago the discovery and its utilisation were matters left to individual enterprise and were slow. Now they have become urgent and important because most scientists are maintained by public funds in the expectation of quick and useful results.

In a welfare state we are very much concerned about incentives. Monetary rewards have obvious limits. In the alternative our minds should be hitched to higher ideals which have no such limitations. According to the scriptures the twin ideals of every human being should be (1) liberation or uplift of the Individual and (2) the good of the World. Science is in reality an excellent means for developing the minds and spirit to achieve higher goals. If this faith could grow among scientists, their status will rise remarkably and the ancient vedic prayer which is equally the prayer of modern Science will be fully answered:

*From the unreal lead me to the real
From darkness lead me to light
From death lead me to immortality.*

