

## On the threshold of 1996 – Molecular biology comes of age in India, will Biotechnology follow?

V. Ramalingaswami

When India became independent in 1947, the Research Councils – Medical (ICMR), Agricultural (ICAR), and Science and Industry (CSIR) were already there. So were the Tata Institute of Fundamental Research (TIFR) and the Indian Institute of Science (IISc). Active research was going on in the relatively small number of Universities. There was one Nobel Laureate in Physics and a few Fellows of the Royal Society. India thus had a base in Science on which independent India began to build the large edifice of the Science we see today. Jawaharlal Nehru was the guiding spirit under whose benign umbrella scientific activities widened and deepened. That Science is a pathway of development and that it also exerts a humanizing influence on society was the Nehruvian ethic. The Science Policy Resolution passed by India's Parliament in 1956 set the seal and committed India irrevocably on the path of Science. Special mission-oriented agencies such as the Atomic Energy Commission and Space among others were created. The Prime Minister was in direct contact with the scientific infrastructure and its activities through a Committee that would report directly to the Prime Minister. India was respected as a leader of Developing Country Science. There have been many societal dividends out of the scientific progress made in India over the years. And yet there is a feeling that the dividend was not commensurate with the investment and expectations in the field of Medicine and Public Health, the investments themselves being relatively small, not that there were no successes in these fields as well. While the country is second to none in the skilful use of techniques for patient care (witness the fine tertiary health care palaces coming up in the country), it had not been in the forefront in basic research leading to new and innovative health care technologies. The economic liberalization of India and the Intellectual Property Rights, GATT and WTO globally have now put India's Science to test, especially in the biomedical sciences and public health.

Advances in molecular biology and its offshoot biotechnology is one of the

areas of scientific research filled with great expectations at this moment in history. It is poised today around the world for industrial application with resultant wealth creation and rising standards of living. The purpose of this communication is to indicate that it is in this sphere that Indian Science has been making steady progress over the last few years. Government support to this field increased substantially through the newly established Department of Biotechnology (DBT) in the Ministry of Science and Technology. New strategies have been adopted. A competitive spirit and good quality of projects are much in evidence. Limited funds are concentrated on the best researchers, not the old *laissez-faire* policy of distributing grants too widely and too thinly. Research grants are being made on a substantial basis, not too tiny to yield successful results. There is more openness and willingness for dialogue amongst scientists within the country and between them and leading scientists abroad. The new policies enable income from profitable products to be ploughed back into institutional strengthening. Brain drain continues but need no longer be a worry in view of the ease and speed of travel and communication across national borders. India continues to produce some high quality scientists despite the general decline in University Research from its pristine position of the old days. Indian scientists working in Indian Laboratories are producing world-class research in a few selected fields.

I happened to inaugurate a two-day workshop on 'Infectious Diseases: Diagnostics, Prophylactics and Therapeutics', at the National Institute of Immunology, held on the 21st and 22nd December, 1995 under the auspices of the DBT. I also had the privilege of being associated with a number of scientific meetings on infectious diseases organized in the country as fitting tributes to Louis Pasteur towards the latter part of last year. It was obvious that scientists working in different laboratories and in different disciplines are talking to each other and in some cases even working together on a common project. Substantial advances with po-

tential for industrial exploitation, low in cost, high in quality, and relevant to India's needs, are being made. These include diagnostic kits for the detection of AIDS and tuberculosis at a much earlier stage than is possible today, new vaccines and drugs against malaria and kala-azar, innovative vaccines against cholera, which can be administered conveniently by mouth and new drug delivery systems. On the hepatitis front, India's contributions have been substantial, ranging all the way from hepatitis-causing virus A to hepatitis virus F. In the field of hepatitis E, India is a world leader, a saga that begins in the contaminated waters of Delhi and Kashmir. Synthetic peptides as immunizing agents for protection and as diagnostic agents in the Eliza system are once again gaining respectability as a result of Indian scientists' work carried out in India. India is one step short of linking with industry to produce and test some biotechnology products on a scale that will bring economic and health benefits to the country. The time has come to take steps for a home-grown biotechnology industry to take over. The biotechnological advances are non-polluting and gentle on the environment.

I know there are developments in other areas of Science and Technology in India of equal significance, but this is the area I know best. Is this all a belated flowering of Science and Technology, only to fade away in time? Or will we take this opportunity of nurturing and sustaining this effort and not let this momentum pass by? It is particularly important at this stage to open the doors and enhance interaction: (a) between laboratory scientists and clinical scientists caring for patients; and (b) between laboratory scientists and pharmaceutical industry if the nation is to move forward on this front. The New Year and the remaining few years of this century are crucial for rejuvenating Indian Science and Education to enable them to reach cruising altitudes and cruising speed.

V. Ramalingaswami is in the All India Institute of Medical Sciences, New Delhi 110 029, India