

ATMA RAM

(1908–1983)

Elected F.N.I. 1953

TOWARDS the end of 1942 when Dr Shanti Swarup Bhatnagar, the then Director, Scientific & Industrial Research moved his laboratories from the Government Test House, Alipore, Calcutta, into the newly built premises of Physics and Chemistry Departments of the Delhi University, which were lying vacant at that time, a young scientist aged 34 working in the laboratories of the Director, Scientific & Industrial Research (D. S. I. R.), attracted considerable attention of his colleagues and also visitors, who were at that time plentiful, from various government departments and the defence services. This was Dr Atma Ram who was then a Research Officer with Sir Shanti Swarup Bhatnagar, F. R. S. working on some problems of immediate importance to the defence efforts of the then government. Most of the activities of the laboratories of the D. S. I. R. were to assist the war against the Japanese on the Burma front and South-East Asia, under Lord Mountbatten's overall command. At a period when scientific research was identified with elegant glass apparatus, test tubes and beakers, Dr Atma Ram was handling gallons of some dirty solutions in large drums and buckets in the open courtyard. Not only were the solutions dirty but also smelly. Dr Atma Ram used to be dressed like any technician in 'khaki' half-pants and an ordinary shirt without the usual tie, creaseless shirt and pants. It was but natural that he attracted attention. The problem he was dealing with was the production of air-foam solutions from waste horns and hoofs from animals by degradation and digestion which would form stable foam on aeration. He used to create artificial fires and with a stir-up pump, spray the air foam solutions on the fires to extinguish. To the scientific community then this appeared rather crude compared to elegant scientific experiments on laboratory tables they were used to. But this was a piece of work which was immediately accepted by the Defence services. Similar were his work on moisture detecting compositions, tank seals and the like. These specific problem solving activities which were strictly of immediate relevance to the then needs gave a considerable turn to Dr Atma Ram's thinking and influenced his work in later life. Although he had a D. Sc. degree of Allahabad University in physical chemistry, he became greatly devoted to the application of science to technological problems of industrial and current national relevance.

The manner in which Dr Atma Ram would roll up his sleeves and did not find any work dirty or demeaning so long it was of scientific value and could lead to application, he would not hesitate to do it. In a way it gives an insight into his





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life, both his early academic career as well as his later rise in the scientific hierarchy of the country.

EARLY LIFE AND EDUCATIONAL CAREER

Born on October 12, 1908 in the tiny village of Pilana in Bijnor district in Western U.P., in a lower middle class family consisting of mostly traders and munshis, Atma Ram had his early education in the village under a village school teacher; he studied Persian, Arabic and Urdu. Coming up to the higher classes he had to walk several miles everyday to a school in another village.

His precocious advancement in the school prompted the family to send young Atma Ram for higher studies to the Banaras Hindu University, where he did his intermediate. He then joined the D. A. V. College in Kanpur wherefrom he passed the B.Sc. degree examination standing first in the college and with merit of the Agra University in 1929. Although the family desired that he should start earning, his teachers at Kanpur and Banaras encouraged him to join the M.Sc. course in Allahabad. He took the M.Sc. degree of Allahabad University in chemistry with first division and stood first in order of merit. It was with great difficulty that the family could find the necessary finances for his higher education. At one stage, he received a scholarship of Rs. 6/- p.m.!

Based on his performance at his M.Sc. he was taken as a research student by Professor N. R. Dhar, who was then Professor of Chemistry at the University of Allahabad.

Atma Ram worked in the areas of photochemical reaction, photooxidation, presence of formaldehyde and the mechanism of its formation in the upper atmosphere. All these were essentially in pure chemistry and formed the subject matter of his doctorate thesis.

An interesting episode which Dr Atma Ram used to recount often during his later days relates to his visit to a sugar factory during a vacation. One of the technicians incharge of the crystallisation pans had asked him whether he could tell him at what stage the syrup would form crystals. While he was left guessing, the technician demonstrated how by feeling the consistency of the syrup between two fingers, he could exactly say the point at which formation of crystals would set in. This had made a lasting impression on his mind. Throughout his entire career, both as a working scientist and later, as scientist-administrator in the higher echelons of the scientific establishment, he would repeatedly emphasize the importance of technicians in the field of science, technology and industry and the need to recognise their value.

One of the major influences in Atma Ram's life while he was in Allahabad working for his doctorate, was his association with Professor Meghnad Saha who had distinguished himself by his fundamental contributions to astrophysics, and who was then Professor of Physics in Allahabad University. Among the many intellectual friends of Pt. Jawaharlal Nehru, Professor Saha was at that time held in great esteem by Nehru. Saha had developed a particular liking for Atma Ram for his



devotion to scientific work and his basic thought processes. At the instance of Professor Saha, Atma Ram did certain amount of background work for the National Planning Committee under Nehru's Chairmanship and thus came into contact with Nehru who also considerably influenced him.

ENTRY INTO INDUSTRIAL RESEARCH

This event could also be considered as one which prompted Dr Atma Ram to seek a position in the Industrial Research Bureau then functioning in the Government Test House in Alipore, Calcutta. The Bureau was a small set-up and at that time the available openings for young men with science qualifications were also very few, and therefore, there was stiff competition even for a very junior position. He was interviewed by a high-power Board. He got selected to the post. Later, when the Industrial Research Bureau was taken over by the newly appointed Director of Scientific and industrial Research, Dr Sir Shanti Swarup Bhatnagar, F. R. S., Dr Atma Ram became one of the nucleus staff of the organisation which blossomed forth as the present Council of Scientific and Industrial Research and its chain of National Laboratories.

Since the total number of scientists working in the laboratories of the D. S. I. R. was small, Dr Bhatnagar kept in close touch with each individual by assigning projects and watching and monitoring their progress day-to-day. He would personally go round and discuss with each scientist. Dr Atma Ram impressed him a great deal. The entire programme of D. S. I. R. was organised on the basis of projects only and almost all of them related to the immediate needs of the then situation. In the early period, relevance was considered in terms of the war effort. But as the war was coming to a close Dr Bhatnagar nurtured other ideas, more long-term in nature in the national perspective. Projects were taken up and financed by individual departments of the then government. Dr Bhatnagar would canvass for such projects from the departments. He prepared the basic concept and outlines for setting up a chain of national laboratories for which he did not hesitate to bring influence and pressure, if one may say so, through his scientist friends and colleagues in the U.K., as for instance Professor A. V. Hill, F. R. S., who visited India and submitted a report to Government.

Dr Bhatnagar also got appointed a Committee under the chairmanship of Sir R. K. Shanmugam Chetty (who later became the first Finance Minister of free India) to examine the necessity, the directions and details of future industrial research in India. This Committee recommended the setting up of a number of industrial research laboratories, some discipline-wise and some industry-wise. Most part of subsequent activity of Dr Bhatnagar was devoted to the planning and establishment of a chain of national laboratories amongst which was the Central Glass & Ceramic Research Institute.

One of the methods adopted by Dr Bhatnagar was the constitution of a number of Research Committees for specialized areas of science and entrusting them with the functions of promoting, sponsoring and funding of research schemes and also preparing futuristic plans for specialised areas. By this means he was able to bring



within the domain of governmental funding of research a large number of professors and experts in universities and other academic institutions. Similarly, Dr Bhatnagar constituted Committees on which he drafted top experts in the academic institutions, government departments and industry to prepare the basic plan, structure and functions of each one of the national laboratories and central research institutes. While the membership of such committees was honorary, there was a Secretary either on full-time basis or one of his research officers was assigned on part-time basis to do the secretarial and detailed work for the committees. Dr Atma Ram was associated with such a committee in the field of glass and ceramic technology. It was obvious that Dr Bhatnagar felt that with Dr Atma Ram's academic background as a physical chemist and his subsequent interest and success in technological research relating to industrial problems he would be the most appropriate person.

GLASS AND CERAMICS RESEARCH

When the Government of India took the decision to set up the Central Glass and Ceramic Research Institute, the obvious choice for Dr Bhatnagar was to request Dr Atma Ram to do its planning and take charge of the establishment of this Institute in Calcutta from the scratch. From 1945 to 1949, Dr Atma Ram's efforts were entirely devoted to the detailed planning, construction, equipping and manning of the Institute right from acquisition of a piece of land at Calcutta. The tremendous boost that science and technology got in the hands of Nehru from 15th August 1947 onwards is well known. He took over the Presidentship of C. S. I. R. and the establishment of the laboratories was done with great expedition. Dr Atma Ram was asked to take over as Joint Director of the Institute between May 1949 to January 1952 and Director from January 1952 onwards. In this capacity he was instrumental to formulating research programmes and progressing them. The manner in which he did this earned him encomiums of both the academic community and industry.

Another important event in Dr Atma Ram's life which may be mentioned as of some significance was his inclusion as a member of one of the investigating teams to visit Germany at the conclusion of the War. As Germany was under military occupation Dr Atma Ram was given the honorary rank of Colonel and put on uniform. The visit was organised by the Allied Control Commission to laboratories and factories in the field of glass and ceramics and related areas. During this visit a sharpnel struck one of his eyes and he had to be hospitalized both in Europe and in England for a number of months at the end of which he lost one of his eyes and for the rest of his life he worked with only one eye. Medical treatment at that time was still not as advanced as at present with the result he developed allergy to most chemotherapeutic drugs as well as antibiotics. He contracted a bronchial problem, asthma and urticaria from which he frequently suffered afterwards. Ultimately, he succumbed to bronchial infection. Because of this allergy, he had to avoid antibiotics and other modern remedies and substitute them with homeopathic treatment whenever he fell ill. His long stay in Calcutta helped him to acquire a certain amount of mastery in homeopathic medicine and practice. He became extra



conscious about his food and living habits; he was a strict vegetarian, nonsmoker and teetotaler. Because of this regimen he was somewhat withdrawn in his social habits.

As Director of the Central Glass and Ceramic Research Institute (C. G. & C. R. I.) by the manner in which he went about organising its activities, he was able to bring in industry's cooperation and involvement right from the beginning. At the early stages when the Indian glass and ceramic industry was still at a rudimentary level, the two major projects which secured for the Institute the confidence of the industry were the comprehensive all-India survey of glass and ceramic raw materials, their availability both quantitatively and qualitatively, their beneficiation and treatment for use in industry. This survey established hitherto unknown sources of high grade raw materials within the country which could be used in place of imported ones. The second project was detailed testing of the products manufactured and marketed by the industry. During the testing of samples procured from the market he invited representatives of manufacturing companies to witness it and offer suggestions. With the aid of such tests he was able to deduce the basic defects in the manufacture of these products and show the industry how these could be rectified. Having once established a rapport with industry he could take further steps to develop new products out of waste, improvements in existing production techniques and substitution of imported raw materials. One of the important ones that could be mentioned is the substitution of imported selenium with copper to produce the ruby red glass which was one of the most popular items of bangle making industry of Ferozabad. This investigation he carried out not only in the laboratories but also right in the factories of Ferozabad. From waste mica, a byproduct of the Bihar mica industry, he developed new products such as mica-based paints, reconstituted mica, mica insulating bricks and the like. From glass waste, he developed a new product foam glass, which was very light in weight and heat insulating. Quite a number of these developments were put into commercial use. Among other products could be mentioned chemical procelain, railway signal glasses, special refractories, glass electrodes for *pH* meters and spark plugs. He had taken about 23 patents relating to all this work and many scientific papers and technological reports and communications.

OPTICAL GLASS

However, the most outstanding work by Dr Atma Ram at the CG&CRI which attracted attention, both within the country and outside, was the establishment of the technology and production of optical glass in the country. He had occasion to visit the National Bureau of Standards, U. S. A. where some work on optical glass was going on. Although he was denied access to the crucial operations in the making of optical glass, he made full use of his stay to absorb mentally as much information as possible. He had also visited many European countries, visiting glass factories and ceramic factories, and he could absorb and develop many new ideas. The Government of India was keen in establishing an optical glass plant and all the negotiations to obtain the knowhow did not fructify. Ultimately, the Government



of USSR agreed to set up an optical glass unit as part of their Ophthalmic Glass Project at Durgapur. During this period, Dr Atma Ram was quietly working on his project, created the infrastructure necessary including the equipment and instrumentation needed for production of optical glass and announced proudly that requirements of the country's optical glass could be fully met by his small unit at CGCRI. He had a most receptive Prime Minister at that time in Jawaharlal Nehru whom he met and showed some of the samples and convinced him that there was no necessity for any foreign technology. The matter was taken up at the highest level between the Government of India and the Government of USSR and the optical glass part of the Project in Durgapur was deleted. Since then most part of India's requirements of optical glass of international standards is made at the CG & CRI, Calcutta.

While the above project could be cited as an example of Dr Atma Ram's technological triumph, on the pure scientific side his research and publications in regard to the role of cuprous ion in providing the ruby red colour in glass altered the then prevailing concept. His another important contribution is the production of highly homogeneous, optically clear and corrosion resistant lead glass sheets, blocks and slabs, for nuclear reactors. His work at CG & CRI earned for him the reputation of being a capable organiser of industrial research and one who introduced into industry a certain amount of scientific consciousness and, vice versa, among the scientific community the essential element of commercial sense without which industrial research could not succeed.

A perusal of the list of patents and research papers, both scientific and technological, given at the end of this Memoir, will show the wide canvas of Dr Atma Ram's interests and work in the field of glass, ceramics and mica industries. His record at Calcutta drew high appreciation from the Reviewing Committee Consisting of Sir Alfred Egerton, F.R.S., and later Sir Ramaswami Mudaliar, Professor W. E. S. Turner, F.R.S., of Sheffield, a doyen in the field of glass and ceramics technology who went to the extent of publishing a note of appreciation in the British Journal of Glass and Technology in the following words :

All glass technologists can feel a glow of pleasure at the prominent place their subject has attained in India and will join in their appreciation of Dr Atma Ram's work.

HONOURS

Directly flowing from his performance in Calcutta, he was the recipient of some high honours. He was awarded the *Shanti Swarup Bhatnagar Medal* of the Indian National Science Academy in 1959 for outstanding contribution in physical and technological sciences. In 1964, the All-India Glass Manufacturers Federation honoured him with a plaque of honour for bringing science consciousness in the glass industry. The International Commission on Glass made him special Member under the special category of outstanding merit. In 1966, he was made an Honorary Fellow of the world famous Society of Glass Technology, Sheffield. In 1967, the Indian Ceramic Society honoured him for his outstanding contributions for science



and technology. In the same year, the degree of Doctor of Technology, *honoris causa*, of the Lenin Soviet Technological Institute of Leningrad was bestowed upon him.

He was elected to two of the high offices in the community of scientists, namely, Presidentship of the Indian Science Congress (1968) and that of the Indian National Science Academy (1969–70). These two positions gave him the platforms and bestowed upon him a certain amount of scientific independence to express his views as he felt. He was also President of the Institution of Chemists and the Indian Ceramic Society which were more professional in character.

Dr Atma Ram was also invited by a number of universities to deliver their convocation addresses and scientific institutions to preside over or inaugurate functions. The Universities of Banaras, Saugar and Andhra honoured him with honorary doctorate degrees. These occasions also gave him opportunities to speak out his mind on many current issues.

One of the honours which Dr Atma Ram valued a great deal was the recognition by the "Anuvrat Movement" of the Jaya Tulsi Foundation. His distinguished and long service to the cause of ethical principles and moral and human values and character building were recognised in a function of the above foundation in October 1981 and he was given a cash award of rupees one lakh. Dr Atma Ram's steadfastness to principles is amply borne out by the fact that he at once contributed the award back to the Anuvrat Movement to be used for the good cause they were working for.

AS DIRECTOR-GENERAL, CSIR

The Government of India invited him to fill in the vacancy of Director-General of Scientific and Industrial Research in August 1966. His period as Director-General of Council of Scientific and Industrial Research could be considered in many ways 'tumultous'. He was not afraid of giving certain new orientations in the functioning of the organisation which he felt were necessary. In the process, he set in motion a certain amount of contentions and reactions for and against, in the scientific community, in the press, parliament and even at the political level. It should be said to his credit he could face the resultant problems courageously and with determination. Although he could be considered as a member of the establishment, he did not hesitate to express independent views sometimes to the discomfiture of the establishment. He considered it as a basic privilege of a scientist to express objectively his views without the constraints of office.

He had the courage of his convictions to discuss frankly, freely and fearlessly although some people felt he was creating controversies. His view was that leaders of science and technology in the country should discuss and debate, provoke and initiate such debates on major policy questions in the field of organisation and management of science and technology, the role of scientists in society in India, content and policies of education, science and technology in the development process of the country, the rights and responsibilities of scientists, the need for a separate Technology Policy Statement, policies governing technology trade with other countries



etc. Many of his utterances were provocative leading to widespread debates, discussions and sometimes adverse reactions and even personal accusations of Dr Atma Ram by a few. But till the last days nothing deterred him from straightforward and forthright expression of his views. His personality and statements attracted not only the scientific community at large but also the media, particularly the newspapers, parliament and the political leaders. He had his supporters, both inside and outside the country, as well as those who questioned his views. He welcomed such discussions and debates so long as they were healthy. He continued to be ebullient.

SOME IMPORTANT VIEW POINTS

Restriction of space does not permit detailed analysis of this particular aspect of Dr Atma Ram's career. Nevertheless, some of the more important utterances and views of Dr Atma Ram may be listed briefly without discussing the merits and demerits of any of them. It is, however, important to note that he did not exercise any dichotomy in his precepts and practice. He tried his best to put into function many of his ideas although he did not always succeed:

1. A society which continued to be largely illiterate, would find progress, economically, socially and culturally at a fast rate difficult. Therefore, first priority must be given to education not only for imparting knowledge but also skills.
2. The superstructure of Indian science and technology to be strong, healthy and progressive, must be built on the strong foundations of university research. This was not given enough attention.
3. The academic community, particularly scientists and technologists, have a tremendous social responsibility in India. This means their activities should be related to needs of the society which supports them.
4. Freedom and accountability must go hand in hand in the work of scientists. Freedom cannot be interpreted to mean that one can do whatever one wishes to, but one should have the fullest intellectual freedom to carry out one's tasks, in the choice of which national requirements should dictate; the methodology of dealing with a project should be entirely that of the scientist.
5. In a poor country like India scientists must be extra careful in spending public funds.
6. Scientists who continued to work at the bench were far more important than those who had gone into offices to deal with paper work, administration or similar responsibilities. While the role of a technician should be appreciated and he should be given the best possible terms of emoluments and recognised in society, the relative roles and functions of a scientist and a technician should be understood. It may not be good to call a technician, a scientist.
7. There had been increasing governmentalisation of Indian Science with the result there was no independent scientific public opinion in the country which could critically examine, comment and even question government policies and functioning in the field of science and technology.



8. Scientific academies and learned societies have a special responsibility for generating independent scientific public opinion. He felt that this had not happened to the extent necessary.
9. While science and technology interact synergistically they had their own separate identity, roles and importance, As India had one of the best statements on Science Policy, there ought to be a Technology Policy Statement as well. After a number of years of campaigning by him, the government did make a Statement on Technology Policy.
10. For several reasons he wanted a more liberal policy of import of technologies from the advanced countries subject to certain basic conditions such as adaptation and further improvements within the country, selectivity with a view to encouraging indigenous efforts (without providing protection to mediocre efforts). He felt that although people felt rather strongly against imports of technology, the fact was that more than 90% of technological knowhow and industrial development in India had been based on such imports, although often times, indiscriminate. Even the public sector had been built more or less completely with imported technology. Whatever indigenous efforts had been made in the private sector had been built upon the efforts of scientists, engineers and technicians throughout the country, on the basis of adaptation and improvements of imported plant and machinery and equipment and technology. He, therefore, felt his views were completely justified. He even felt inspite of all that was being said, it was likely our dependence could continue for quite sometime because of the inadequacy of our efforts within the country.

Dr Atma Ram was appointed Chairman of the National Committee on Science and Technology (N.C.S.T.) in June 1977. In this position, he had the national responsibility of overseeing the total science and technology effort in the country. As Chairman of N. C. S. T., he was Principal Advisor to the Prime Minister and the Union Cabinet on Science and Technology and, therefore, as soon as the Government at the Centre fell, he submitted his resignation without any loss of time in order that the new Prime Minister may have the opportunity to review such appointments. He considered that this was a matter of principle and he should set up a healthy precedence.

The three most important questions dealt with by the N.C.S.T. under his guidance were :—

- (a) Science and technology education must get a fair share of the brightest young.
- (b) The need to substantially augment the resources of the universities for research and development.
- (c) Preparation of the draft of the Technology Policy Statement for Government's consideration.

Dr Atma Ram, even after ceasing his connection with the government continued to take active interest in the field of science and technology as an adviser to scientific foundations and industrial groups for the establishment of their corporate R & D



and also in matters of science policies. Till the day of his demise his interest in science and technology was spirited and lively.

It may not be known to many that an event occurred in his official career to show what a man of principle he was. When he was appointed in August 1968 as Director-General of Scientific and Industrial Research with the position of Secretary to the Government of India, for a period of about 10 months he declined to draw the salary as the appropriate orders regarding his Secretaryship and the terms going with it were not issued because of some behind the scene happenings. Dr Atma Ram felt that if he compromised in any manner in regard to the D.G.'s position, it may be harmful not only to his functioning but to the status of the post itself in future and this would do damage to the cause of science and technology in India. Ultimately, he had his way and in the process he vindicated again a principle. These and other episodes mentioned in this memoir and many not mentioned here go to establish his unswerving devotion to principles, values and causes he held dear and he felt convinced to be correct.

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