

## BOOK REVIEWS

**Life and Work of Sir S. S. Bhatnagar.** 2004. Norah Richards. New edition. NISTADS, Pusa Gate, K. S. Krishnan Marg. New Delhi 110 012. 270 pp. Price: Rs 425.

This book, though avowedly a biography of Sir Shanti Swarup Bhatnagar, the architect of the Council of Scientific and Industrial Research (CSIR), and one of the builders of the scientific and industrial edifice of modern India, is much more than just that. It presents a large panorama of the great national upsurge reminiscent of that time. In the first half of the last century, the national movement for independence and reformist movements like the Brahmo Samaj in North India, greatly influenced practically every aspect of life, the major impact being on the educational and scientific infrastructure of the country. Bhatnagar was a product of this social environment and this is very vividly brought out by Norah Richards. It has been said that 'a good biography should tell you enough of the person, set him or her in the context of the time, and should be readable'. This biography satisfies all three criteria. It depicts Bhatnagar against the backdrop of an India on the move and the people and the forces behind this movement. The description of the scientific career of Bhatnagar and of his contributions by a theatre artist, without any background of science, is indeed remarkable. It is like a series of snapshots by an artist, with much left to the imagination of the reader. Bhatnagar's life is shown as one of a smooth transition from one stage to another, the accomplishments at each stage making the movement to the next both natural and effortless.

Shanti Swarup was born in 1894 in a Kayastha family of undivided Punjab. His father had become a member of the Brahmo Samaj, a movement which stood against Hindu orthodoxy and the caste system, and was committed to social equity. He had chosen the profession of a schoolteacher as his mission in life. Bhatnagar was less than a year old when his father died and so was brought up by his maternal grandfather whose ancestral house had a big library of Hindi, Urdu and some rare Persian books. Such libraries were then a common feature in the houses of most educated families in North India. Shanti Swarup was thus exposed to both Hindi and Urdu literature as a child. In fact, he started writing and reciting Urdu poetry right from his schooldays, and

continued to do so throughout life. Such was the rich, multicultural environment in which he was brought up for the first 14 years of his life. As a child he showed deep interest in his studies, particularly in science subjects, and was a favourite student of his teachers. Opportunities sometimes come one's way, but only the prepared benefit from these, as Shanti Swarup did, when this happened with him. He was introduced at a social function to Lala Raghunath Sahai, Headmaster of Dyal Singh High School, Lahore, a very highly reputed school run by the Brahmo Samaj. The Headmaster greatly impressed by the educational and cultural background of the young boy, decided to take him under his tutelage. This proved to be the turning point in Shanti Swarup's life.

Senior teachers picking up talented young students and nurturing them was quite common in those days. Teaching was then considered to be not only a profession or career, one among many, but a mission. I recall the house of Bakhshi Ramratan, Headmaster of DAV High School in Lahore, in the 1930s was a veritable home for bright students who could not afford their school expenses, and the headmaster would himself meet their expenses till they were settled in life. What a contrast with present-day teachers! One ponders will this missionary spirit ever come back?

The adolescent Shanti Swarup was the product of such an environment, which left a very deep impression on him and manifested itself in different ways at various stages in his life. This has been described with much feeling by Norah Richards.

Raghunath Sahai took Shanti Swarup with him to Lahore. The young boy joined Dyal Singh High School and then moved on to Dyal Singh College. He did extremely well both in school and in college, winning many prizes and a college scholarship. Mr. Welinker, the then Principal of Dyal Singh College, had this to say about him in January, 1915: 'Mr Shanti Swarup was one of the ablest students in that class of about 100 students.... He distinguished himself in every branch of the work of his classes – literary, scientific, dramatic, social and he gave the most complete satisfaction to the teachers by the excellence of his behaviour. He is a young man of more than usual ability, and I feel sure that if he is given opportunities to develop his talents in some great European or American Centre of sci-

entific research, he will do remarkable work in science and will be in a position to render high service to his country'. So Headmaster Raghunath Sahai's judgement of Shanti Swarup's potential was not wrong, and Welinker's prediction also proved true.

After passing the Intermediate (Science) examination, Shanti Swarup did his M Sc in Physical Chemistry for Forman Christian College, Lahore, then went to England on a Dyal Singh Scholarship and did his D Sc from Ramsay Laboratories of University College, London, under the guidance of Prof. Donnan. While still in London Bhatnagar was selected, in absentia, as Prof. and Head, Department of Chemistry of Banaras Hindu University (BHU) by a selection committee consisting of Sir C. V. Raman, Sir J. C. Bose and Dr P. C. Ray. He joined BHU in 1921, and very soon established an active school of research in the areas of colloids, magnetochemistry and photochemistry. As his reputation spread research students were attracted from all over India. He enjoyed the respect and goodwill, of every one because of his dedication to his work and generous and compassionate nature. He started his innings at BHU with a magnanimous gesture which had no precedent. When the former Head of the Department of Chemistry from whom he was to take charge expressed his distress at handing over the keys which he had held for fifteen years, Bhatnagar's spontaneous response was: 'Then hold them still'. And he really meant it. He persuaded the Executive Council of the University to allow the former head to retain the keys and also to continue as Head of the Department. This unique gesture was greatly appreciated by his new colleagues and by Pt. M. M. Malaviya, the Vice-Chancellor. Bhatnagar's generosity and large heartedness extended to students, especially to science students who could not afford to pay their fees and he paid stipends out of his own pocket to students showing promise.

In 1924, after a brief stay of four years at BHU, Bhatnagar joined the University Chemical Laboratories, Lahore, as Director, at the age of 30. He had been selected in preference to his former teacher, a European, because of his reputation as a scientist. In the role of Director he showed his abilities as an outstanding administrator also. The laboratories soon became a leading centre of chemistry in the country, specializing in solving problems of the nascent chemical industry. This was a new area of research in India. Bhatnagar was

of the view that there is no sharp dividing line between basic and applied research and that a thorough knowledge of theoretical chemistry is a prerequisite for solving industrial problems. An excellent example of this was Bhatnagar's solution of a difficult problem faced by Steel Brothers in oil drilling, that of coagulation of mud during drilling operations. Various elaborate chemical and mechanical methods suggested failed to prevent coagulation. Bhatnagar, with his knowledge of colloid chemistry, suggested using certain Indian plant gums to keep the mud in a colloidal condition. This simple method was highly successful. This may be regarded as the beginning of the industry-academia partnership in India. Synergy with research has been the strength of Indian industry ever since. The growth of the Indian pharma industry to its present status as a global player for supply of generic drugs is a striking example of the result of such synergy.

Steel Brothers were so pleased with the solution of their problem that it offered Bhatnagar monetary rewards. Consistent with his idealism he got this offer converted into a grant to his laboratory and scholarships for research students. This again earned him much accolade and consequently University Chemical Laboratories, began to attract the attention of industry more and more.

The fascinating story of the setting up of the Board of Scientific and Industrial Research (BSIR) and of CSIR, and the subsequent setting up of the National Laboratories is described in some length in the book. It is not generally known that the rapid development of the Science and Technology (S&T) structure in independent India was the result of the convergence of two science and technology streams, the national movement stream and the colonial government stream. The initiative for the former was taken as early as 1934 by a few scientists in Calcutta, which included J. C. Ghosh and M. N. Saha, who started drawing up a National S&T Plan, and in 1938 advised Subhash Chandra Bose, then President of the Indian National Congress, to constitute a National Planning Committee with Pandit Jawaharlal Nehru as the Chairman. This committee set up 29 sub-committees concerned with different areas of industrial development, which submitted their reports by 1939. These sub-committees were also instrumental in bringing together, for the first time, political leaders, scientists, industrialists and economists on one platform, so that

an independent India could, without waste of time, start implementing the plans for scientific, technological and industrial development.

After the start of the Second World War, the Government of India, as a measure of economy, decided to reduce governmental expenditure on S&T development. However, Sir A. Ramaswami Mudaliar, Commerce Member in the Viceroy's Executive Council, was a patriot with a vision of the country's long-term development. While approving that the Bureau of Industrial Intelligence and Research be shut down, he recommended the establishment of a Board of Scientific and Industrial Research to coordinate and direct the work in all scientific institutions towards helping in the war effort.

Bhatnagar was the obvious choice to head the Board because of his demonstrated experience of industrial research and leadership qualities. In 1940 he joined the BSIR as its first Director. The next development was the formation of CSIR in 1942, as an autonomous body to control and administer all S&T developments, including funding of projects in universities. Plans for setting up of 11 specialized National Laboratories were drawn up between 1942 and 1947, and the foundation stones of four were laid even before independence. After independence Pandit Jawaharlal Nehru became Chairman of the Governing Body of CSIR/BSIR. In the very first Governing Body Meeting held on 25 August 1947, immediate decisions on S&T and industrial development could be taken because the necessary groundwork had already been done. And the developments since then are quite well known. If India is shining today, it is because of its S&T strength, the foundations for which were laid by bureaucrats like Ramaswami Mudaliar, scientists like Bhatnagar and political leaders like Pt. Nehru, who were committed to protecting national interest in their own spheres of activity, and saw in science and technology the instrument needed for social transformation.

This biography makes fascinating reading for those interested in the history of S&T development in modern India and of the persons behind it. It should be included in the science teaching curriculum of schools and colleges.

This biography was first published in 1948 by New Book Society of India, New Delhi, and has been long out of print. The book has been recast by NISTADS, an index appended, original photographs

digitally retouched, new ones added and a brief glimpse of Bhatnagar by the Director, NISTADS included, all of which adds to its value. NISTADS has indeed rendered a great service by publishing this edition of the biography of Shanti Swarup Bhatnagar, one of those visionaries who played a vital role in building the edifice of scientific and industrial research in modern India.

I have not been able to understand the purpose of reproducing in this new edition a note from the publisher on p. 240 (titled reprinted from the blurb) containing disparaging remarks about Bhatnagar, both as a scientist and as a person, which, to say the least, is in extremely poor taste. Let the reader judge the scientific, technical and managerial contributions of Bhatnagar from the biography. I hope the publisher will remove this meaningless note from future reprints.

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**Annual Review of Phytopathology 2004.** Neal Van Alfen *et al.* (eds) Annual Reviews Inc, Palo Alto, CA 94303-0139, USA. Vol. 42. 498 pp. Price: \$74.

*Annual Review of Phytopathology* published since 1963 is a very useful and comprehensive resource for updated research in plant pathology. This is how it was and is now, as it covers the significant developments in the field of phytopathology, including: pioneer leaders, development of concepts, plant disease diagnosis, pathogens, host-pathogen interactions, epidemiology and ecology, breeding for resistance, plant disease management and some special topics. The present volume has contributions on most of these aspects which add immensely to the knowledge of the readers. To signify that this is the genomic era, it also carries two contributions, one on the genome analysis of bacterial wilt pathogen, *Ralstonia solanacearum* and the second, on the comparative genomics of two bacterial pathogens of citrus, *Xanthomonas citri* and *Xylella fastidiosa*.

One might wonder if the Annual Reviews still covers all plant pathogens. The answer is 'yes, it does, even in the present volume