Sir Shanti Swaroop Bhatnagar (1894-1955)

- Accomplished chemist
- A poet at heart
- An institution builder
- Foremost builder of science & technology in India

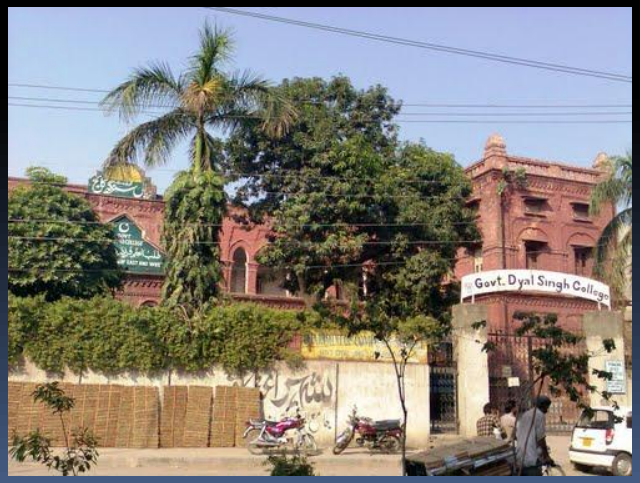
Bhatnagar was born in 1894 in undivided Punjab

He was exposed to Hindi and Urdu literature as a young child

In school, he showed deep interest in science subjects and was a favourite student of his teachers

Bhatnagar Joined Dyal Singh High School and then moved to Dyal Singh College in Lahore

Did extremely well in school and college, winning many prizes and a college scholarship



Dyal Singh College, Lahore

Prophecy of Mr. Welinker, Principal of Dyal Singh College in January 1915:

"Mr. Shanti Swaroop 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 – literature, science, dramatics 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 opportunity to develop his talents in some European or American centre of scientific research, he will do remarkable work in science and will be in a position to render high service to his country"

Bhatnagar did his M.Sc in Physical chemistry from Forman Christian College, Lahore

FORMAN CHRISTIAN COLLEGE
(A CHATERED UNIVERSITY)

Went to London to do DSc from Ramsay Laboratories of University College under the guidance of Prof. Frederick Donnan

Prof. Frederick Donnan

- **Bhatnagar also worked with Prof. Fritz Haber at the Kaiser Wilhelm Institute in Berlin and later, with Prof. Freundlich, an expert on colloids**

Fritz Haber

- While 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 soon established an active school of research in the areas of colloids, magneto-chemistry and photochemistry

Department of Chemistry
BHU

- Bhatnagar moved to Punjab University, Lahore as Professor of Physical Chemistry and Director of University Chemical Laboratories at the age of 30
- He spent 16 years in Lahore, and this period was the most active period of his life for original scientific work
- Besides colloidal chemistry and magneto-chemistry, he did considerable work in applied and industrial chemistry
- In 1928 Bhatnagar, jointly with K.N. Mathur, invented an instrument called the Bhatnagar-Mathur Magnetic Interference Balance
- The balance was one of the most sensitive instruments for measuring magnetic properties

- The Bhatnagar laboratory soon became a leading center of chemistry specializing in solving problems of the nascent Indian chemical industry
- The first industrial problem undertaken by Bhatnagar was the development of a process to convert bagasse (peelings of sugarcane) into food cake for cattle
- He tackled industrial problems for Delhi Cloth Mills; J.K. Mills Ltd., Kanpur; Ganesh Flour Mills Ltd., Layallapur; Tata Oil Mills Ltd., Bombay; Steel Brothers & Co. Ltd., London and so on..

- One of the important achievements was the work for Attock Oil Company at Rawalpindi (representative of M/s Steel Brothers & Co London). In their drilling operations, they confronted a peculiar problem - the mud in contact with saline water got converted into a solid mass which hardened further. This solidification of the mud rendered all drilling operations impossible

- Bhatnagar realized that this was a problem in colloidal chemistry. The problem was elegantly solved by the addition of an Indian gum which had the remarkable property of lowering the viscosity of the mud suspension and of increasing its stability against the flocculating action of electrolytes

- M/s Steel Brothers were so pleased with the result that they offered a sum of Rs. 1,50,000/- to Bhatnagar for research work on any subject related to petroleum
- At the instance of Bhatnagar the company placed the amount at the disposal of the University
- The grant helped to establish the University Department of Petroleum Research
- Investigations carried out under this collaborative scheme included deodorization of waxes, increasing flame height of kerosene and utilization of waste products in vegetable oil and mineral oil industries
- Realising the commercial importance of the collaborative scheme, the Company increased the amount and extended the period from 5 to 10 years

- ***Bhatnagar persistently refused to receive any monetary benefit arising out of his applied/industrial chemical research for his personal ends on the ground that it may be utilised for strengthening research facilities at the University***

- In 1930s, there were no research organisations for the development of natural resources and new industries. Sir Richard Gregory, then editor of *Nature*, after visiting scientific departments and universities in India in 1933, drew the attention of Sir Samuel Hoare, Secretary of State for India, to the lack of research organizations equivalent to those in Britain for the development of natural research and new industries

- Sir Ramaswamy Mudaliar's (Commerce Member in Viceroy's Council) efforts led to the creation of the Board of Scientific and Industrial Research (BSIR) on 1 April 1940 for a period of two years

Sir Ramaswamy Mudaliar

- Bhatnagar was the natural choice to head it
- He was designated as Director, Scientific and Industrial Research
- The BSIR was allocated an annual budget of Rs. 5,00,000 and placed under the Department of Commerce

- By the end of 1940, about eighty researchers were engaged under BSIR
- Within 2 years, the BSIR had worked out a number of processes for industrial utilization
- Those included techniques for the purification of Baluchistan sulphur, anti-gas cloth manufacture, development of vegetable oil blends as fuel and lubricants, the invention of a pyrethrum emulsifier and cream, the development of plastic packing cases for army boots and ammunition, dyes for uniforms and the preparation of vitamins

- Bhatnagar persuaded the Government to set up an Industrial Research Utilization Committee (IRUC) in early 1941, for translating laboratory results into application
- Sir Mudaliar pushed for an Industrial Research Fund for fostering industrial development in the country, and for an annual grant of rupees 1 million for a period of 5 years. It was accepted by the Govt. in November 1941
- The efforts of Mudaliar and Bhatnagar led to the constitution of the Council of Scientific and Industrial Research (CSIR) as an autonomous body, to administer the Research Fund created by the government
- The CSIR came into operation on 28 September 1942

- The BSIR and IRUC were designated as advisory bodies to the Governing body of the CSIR
- In 1943 the Governing Body of the CSIR approved the proposal mooted by Bhatnagar to establish five national laboratories:

Central Glass and Ceramics Research Institute. Kolkata, 1945

National Metallurgical Laboratory , Jamshedpur, 1946

Central Fuel Research Institute, Dhanbad, 1946

National Chemical Laboratory, Pune, 1947

National Physical Laboratory , New Delhi, 1947

In 1944, in addition to its annual budget of Rs. 1 million, the CSIR received a grant of Rs.10 million for the establishment of these laboratories

- The Tata Industrial House donated Rs. 2 million for the Chemical, Metallurgical and Fuel Research laboratories

- On 1 January 1955, at the age of 61, the Father and the Heart and soul of Council for Scientific and Industrial Research, Shanti Swaroop Bhatnagar who in a short span of five years had established twelve world class laboratories suffered heart attack and prematurely passed away.

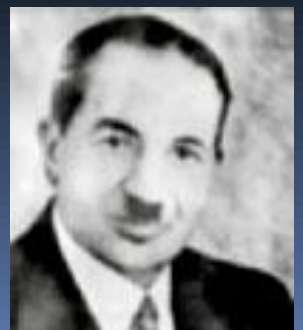
- CSIR now has 39 laboratories, manned by more than 5000 scientific and more than 10000 S &T staff

Shanti Swaroop Bhatnagar Awards

- After his death in 1955, CSIR established the Shanti Swaroop Bhatnagar Award for eminent scientists
- The Shanti Swarup Bhatnagar Prize for Science and Technology is awarded annually by the Council of Scientific and Industrial Research (CSIR) for notable and outstanding research, applied or fundamental, in biology, chemistry, environmental science engineering, mathematics, medicine and physics.
- The purpose of the prize is to recognize outstanding Indian work in science and technology
- It is the highest award for science in India

Bhatnagar at NCL Pune in January 1950

“ In that hour when I decided to take up office, I dreamt of a chain of National Laboratories, of large teams of scientists working for the development of India and for the creation of scientific outlook on life among India’s masses. Those who feel that India’s ills can be cured by increasing productivity must realise that this can be achieved only by the application of science to its agriculture. I have struggled through the years to fulfill that dream and it seems that it may now come true”



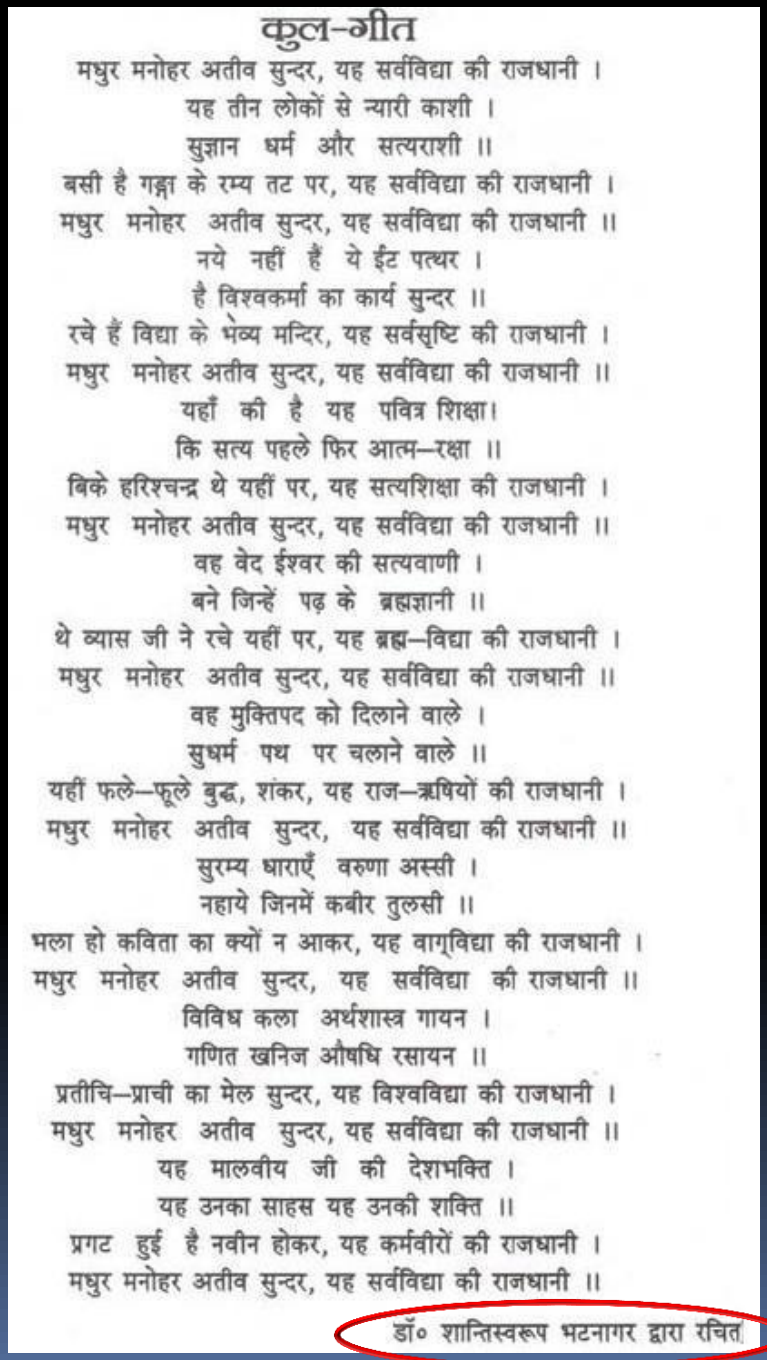
A few accolades & positions

- Order of British Empire in 1936
- Knighthood in 1941
- First Director General of CSIR in 1942
- In 1943 he was elected Fellow of Royal Society
- Secretary to the ministry of education 1948
- Secretary of Atomic Energy Commission
- First secretary to the ministry of natural resources and scientific research 1951
- Chairman, University Grants Commission 1953
- Padma Vibhushan in 1954

About Bhatnagar…

"We consider that at no time in the history of the scientific evolution of any country, one single person has done such an enormous service to science and has achieved such a great success in such a short period as Sir Shanti Bhatnagar. He is full of fruitful ideas and is bestowed with vigor and energy to execute them"

Dr. Irene Joliot Curie, Director Curie Laboratories, Paris



कुल-गीत

मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ।
यह तीन लोकों से न्यारी काशी ।
सुज्ञान धर्म और सत्यराशी ॥
बसी है गङ्गा के रम्य तट पर, यह सर्वविद्या की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ॥
नये नहीं हैं ये ईंट पत्थर ।
है विश्वकर्मा का कार्य सुन्दर ॥
रचे हैं विद्या के भव्य मन्दिर, यह सर्वसृष्टि की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ॥
यहाँ की है यह पवित्र शिक्षा।
कि सत्य पहले फिर आत्म–रक्षा ॥
बिके हरिश्चन्द्र थे यहीं पर, यह सत्यशिक्षा की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ॥
वह वेद ईश्वर की सत्यवाणी ।
बने जिन्हें पढ़ के ब्रह्मज्ञानी ॥
थे व्यास जी ने रचे यहीं पर, यह ब्रह्म–विद्या की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ॥
वह मुक्तिपद को दिलाने वाले ।
सुधर्म पथ पर चलाने वाले ॥
यहीं फले–फूले बुद्ध, शंकर, यह राज–ऋषियों की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ॥
सुरम्य धाराएँ वरुणा अस्सी ।
नहाये जिनमें कबीर तुलसी ॥
भला हो कविता का क्यों न आकर, यह वाग्विद्या की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ॥
विविध कला अर्थशास्त्र गायन ।
गणित खनिज औषधि रसायन ॥
प्रतीचि–प्राची का मेल सुन्दर, यह विश्वविद्या की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ॥
यह मालवीय जी की देशभक्ति ।
यह उनका साहस यह उनकी शक्ति ॥
प्रगट हुई है नवीन होकर, यह कर्मवीरों की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ॥

डॉ० शान्तिस्वरूप भटनागर द्वारा रचित

"Many of you perhaps do not know that besides being an eminent scientist, Professor Bhatnagar was a Hindi poet of repute and that during his stay in Banaras, he composed the 'Kulgeet' of the University... Prof. Bhatnagar is remembered with reverence in this University and will continue to be so remembered till this University exist"

Justice N.H. Bhagwati, Vice-Chancellor of BHU

About Bhatnagar…

"I have always been associated with many prominent figures eminent in other ways, but Dr. Bhatnagar was a special combination of many things, added to which was a tremendous energy with an enthusiasm to achieve things. The result was he left a record of achievement which was truly remarkable. I can truly say that but for Dr. Bhatnagar you could not have seen today the chain of national laboratories"

- **Pandit Jawaharlal Nehru**

About Bhatnagar…

"The vision of harnessing our scientific and research talents to the solution of our problems that spurred Shri Jawaharlal Nehru to establish within a few years of our becoming free, a network of scientific and research institutes throughout the country. Nehru conceived of it and Bhatnagar as his ally, he could achieve it in surprisingly short period. **Sir C.V. Raman once applauded this as the "Nehru-Bhatnagar effect"**

Shri Chandrajit Yadav, Union minister for steel and mines on silver jubilee of NML (1975)