Legacy of Dr. Shanti Swarup Bhatnagar and the research in Universities and the National Laboratories: A perspective

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University of Jammu, Jammu, J & K
A STORY

# Recap. on “Regulation of Education in India”
~ 1850

# Initiation of Research in Universities
~ 1904

# S S Bhatnagar at University of Punjab at Lahore
~ 1925 - 39

# Initiation of CSIR and National Laboratories
~ 1940 - 47

# S S Bhatnagar and Homi J Bhabha

# Bhatnagar’s contribution to TIFR and Atomic energy
~ 1943 - 55
Regulation of Education in Colonial India

- **1849**: British annex Punjab & establish control over entire Indian Continent
- **1854**: Enunciation of Education Policy, education in Schools to be regulated
- **1857**: Commencement of Universities at Calcutta, Bombay and Madras as Affiliating and Examination bodies

Univ. Entrance Examinations initiated, which emerged as School Board Exams.
1861: Only 4 students from Punjab qualify Entrance Exam of Calcutta University, there was no College in Punjab (from Delhi to Peshawar) till 1864.
College Education in Punjab: 1864-1902

- Jan., 1864: Govt. Colleges at Lahore (GCL) and Delhi, the latter fold up in 1877 merged with GCL
- Oct 14, 1882: University of Punjab at Lahore, centered around GCL, and affiliating other colleges, like, Oriental College, Law School, St. Stephen’s College (Delhi), etc.
- 1886: DAV College, Lahore, Forman Christian (FC) College, Lahore
- 1887: Mahindra College, Patiala
- 1901-02: 15 Colleges affiliated to P.U. at Lahore
Higher Education: 1904 onwards

- **1904: Indian Universities Act:** Universities empowered to appoint Professors who would undertake Research.

- **1904 onwards:** College Teachers allowed to proceed abroad on sabbatical /study leave.

- Eminent teachers invited from Britain for extended stays at Indian Universities.
Scene at University of Punjab at Lahore

- **1912**: Astronomical Observatory set up at Lahore
- **1919 onwards**: Honours Schools (Integrated BSc./B.A. & MSc./MA) started in Oriental Languages, History, Mathematics, Chemistry, Botany & Zoology

- **1920s**: Dr. Birbal Sahni & Dr. Kartar Singh Bawa join as faculty in Botany and Chemistry

- **1924**: Dr. S S Bhatnagar arrives from BHU to take charge as First Director of University Chemical Laboratories & Professor of Physical Chemistry
Dr. S S Bhatnagar made pioneering contributions in fundamental research, applications to industry & consultancy.

Contemporaries of Dr. S S Bhatnagar in Science Depts at Lahore:

**Botany**: Prof S R Kashyap

( Dr Birbal Sahni, Dr A C Joshi, Dr P N Mehra, Dr M S Randhawa)

**Zoology**: Prof. Vishwanath, Dewan Anand Kumar

**Chemistry**: Dr. Sri Krishna, Dr. Mata Prasad

**Physics**: Dr. Nazir Ahmed, Dr. P K Kitchlew

Nobel Laureate A H Compton had visited Lahore on invitation from PU and conducted Cosmic Ray Explorations at Gulmarg along with Dr. S. S. Bhatnagar and Dr. Nazir Ahmed (did Ph.D under Lord Rutherford).
Contemporaries of Dr. S S Bhatnagar at Lahore

Mathematics: Prof Sarvadaman Singh Chowla
(students of Chowla: R P Bambah, F C Kohli, Abdus Salam)

Agriculture: Khan Bahadur Mian Mohammad Afzal Hussain,
First full time Vice Chancellor of University of Punjab at Lahore (1938-44) & Foundation Fellow of National Institute of Sciences (INSA) in 1934, along with Dr. S S Bhatnagar

Dr. S S Bhatnagar and 12 other teachers and alumni of PU, Lahore invited to Foundation Fellows of IASc, Bangalore by Prof. C V Raman in 1934-35.
Professor Ruchi Ram Sahni (April 5, 1863 – June 3, 1948)

Mentor of Shanti Swarup Bhatnagar

Stamp released to honour on RRS on October 24, 2013
Prof. Ruchi Ram Sahni graduated (1984) and served (1887-1918) at Govt. College, Lahore
Dr. Birbal Sahni, FRS & Dr. SS Bhatnagar, FRS
Two Doyens

Sir Shanti Swarup Bhatnagar

- 21 February, 1894, Bhera, Shahpur in Distt. (Pakistan) - Jan 1 1955, Baroda
- Parents: Smt. Parbati and Shri Parmeshwari Sahai
- Childhood at Sikandarabad, Distt. Bulandshahar, UP, after losing his father when he was just 8 months old
- 1908: Moves to Lahore, under the care of Shri Raghunath Sahai, the famous headmaster of the Dyal Singh High School at Lahore, and a close friend of his father

Dr Homi J. Bhabha

(October 30, 1909, Mumbai - January 24, 1966, Mount Alps
* Parents: Smt. Meharbai and Mr J. H. Bhabha, Barrister, Legal Advisor to Tatas,
Grandson of Dr Col. Hormusji J. Bhabha, M.A., D.Litt., Inspector General of Education at Mysore

Childhood and Early Education: Mumbai.
Dr. Shanti Swarup Bhatnagar

- 1911 Matriculation, Dyal Singh High School at Lahore
- 1913 Intermediate, Dyal Singh Intermediate College
- May, 1915: Married to Lajwanti, daughter of Shri Raghunath Sahai, his father’s childhood friend.
- 1916: Completes B.Sc. with Honours in Physics from Forman Christian College
- Was **failed in Chemistry** due to an up-to-date answer on wave attributes of X-rays, not available in then text books of Physics and Chemistry
- Provides import substitution for German Gelatin duplicating pads used for printing. **Rewarded Rs.150 for this innovation**
- Writes a research paper as BSc student

Dr Homi J. Bhabha

Schooling: Cathedral School and Royal Institute of Science, Mumbai
- 1927-1939: Cambridge University, UK
  - First –Degree in **Mechanical Engineering**, followed by that in Mathematics and Physics.
  - Ph.D. in Theoretical Physics.
- Travelled to Europe on a Fellowship like SSB, met W. Pauli at Switzerland and Neils Bohr in Copenhagen.
<table>
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<tr>
<th>Sir Shanti Swarup Bhatnagar</th>
<th>Dr Homi J. Bhabha</th>
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<tr>
<td>▪ 1919 : Completes M.Sc., takes three years as he has to earn while learning. Works for FC College, while studying at Government College, Lahore.</td>
<td>1939-1945: Stay at Dept. of Physics, Indian Institute of Science, Bangalore</td>
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<tr>
<td>▪ 1919-1921 : D.Sc. Degree at University of London. Fellowship arranged by Prof. Ruchi Ram Sahni from Dayal Singh Trust.</td>
<td>19 August 1943 : Proposes the initiation of Tata Institute of Fundamental Research</td>
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<td>▪ Meets Prof. Walther Hermann Nernst, Nobel Prize Chemistry (1920)</td>
<td>1 June 1945 : TIFR Starts at IISc., Bangalore</td>
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<td>▪ 1921-1924 : Research Professor at Banaras Hindu University, on invitation from Pt. M M Malviya - Establishes Chemistry Laboratory</td>
<td>19 December 1945 : TIFR inaugurated at Mumbai</td>
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Dr. Shanti Swarup Bhatnagar

- 1924-1939: Professor of Physical Chemistry and Founder Director of University Chemical Laboratory, Lahore. **Initiator of Chemistry Honours School** at P.U. Lahore.

- December 1939: Sir Ramaswami Mudaliar, Commerce Member in Viceroy’s Committee identifies him to conceive plans for Scientific and Industrial Research (SIR) to aid war effort of British in Europe.

- **1940: Director, Scientific and Industrial Research, Calcutta.**
  
  Sets up Research Laboratory at Alipore in Calcutta

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Dr Homi J. Bhabha

April, 1946: First meeting of CSIR Committee for Atomic Research conducted at TIFR, Mumbai in which Shanti Swarup Bhatnagar participated.

26 August, 1947: **Board for Atomic Research created in CSIR**

April 1948: **Atomic Energy Commission** created with Dr Homi Bhabha, Dr Shanti Swarup Bhatnagar and Dr K.S. Krishnan as members.
Sir Shanti Swarup Bhatnagar

- Nov. 14, 1941: Industrial Research Fund Created with an annual grant of Rs.10 lakhs
- 12 March 1942: CSIR registered as a Society
- September 26, 1942: Research Fund transferred to CSIR, Hence the Foundation Day of CSIR.
  (SS Bhatnagar Prizes announced every year on this day)
- After August 1945: Creates Committee for Atomic Research
- Starts setting up chain of CSIR Laboratories
- CGCRI, Calcutta, 24 Dec. 1945
  - CFRI, Dhanbad, 17 Nov., 1946
  - NML, Jamshedpur, 21, Nov., 1946
  - NPL, New Delhi, 4 January, 1947
  - NCL, Pune, April 6, 1947


A very small weight of the substance, of the order 0.01 gm., a change in diamagnetic susceptibility of the order of 0.2 per cent or even less can, therefore, be easily detected.
“On turning over the pages of Nature my eyes changed across an advertisement of Macmillan’s in which I find your book* at last advertised. That the book is of a high standard is indicated by the most excellent review in *Current Science* by Professor Stoner, who is competent to judge.

I very much specially admire your energy and perseverance in having produced such a book in spite of your other important scientific activities. Your name now stands as one of the very few Indians who have written scientific books claiming the respect and attention of senior workers in every country.”
Prof. C V Raman & Dr. S S Bhatnagar
“…..first class work being done by that very distinguished scientist Dr. Bhatnagar in the University Laboratories on the technology of oils. In am told by men who know the practical side of the industry that the results already attained promise to be of very great commercial value. While the possibilities are immense, we know that a well-known firm has shown its faith in Dr. Bhatnagar and his assistants by a handsome financial contribution…..
“It is gratifying that the Chemistry laboratory under the able and enthusiastic guidance of Dr. Bhatnagar continues to do valuable research work, which apart from its educational value is proving of great benefit to the industrial concerns in Punjab and elsewhere. Some of the results of Dr. Bhatnagar’s researches have deservedly earned for him and his associates an international place in the field of Applied Chemistry.
“Congratulations on your noble gift to the Punjab University, you have hereby raised the status of the University teachers in the estimation of the public, not to speak of the benefit conferred on your Alma Mater.

India does not lack in men earning millions but if a few of these millionaires were guided by the fine examples set up by a comparatively poor teacher like yourself, …
His Excellency Sir Henry Craik, Governor of the Punjab while inaugurating 26th session of the All Indian Science Congress, Lahore (2nd January, 1939)

- “There has been also been much of greater output of written work notably in Chemistry Department under the distinguished direction of Professor Bhatnagar which had attracted students from all parts of India, and its achievements have won recognition in Europe also.”
His Excellency Sir Henry Craik, Governor of the Punjab at the Annual Lunch of the Northern India Chamber of Commerce, Lahore, 13th April, 1940

“\There is every reason to suppose that the war will give an immense filip to Indian industry. There will be double stimulus. The great demand for industrial products created by the War will be the direct incentive to the existing industries while the difficulty of obtaining many of the articles, we are importing before will stimulate, the search for substitutes or ways and means of producing them here.\
Sir Henry Craik ....contd.

.. and in order to promote and coordinate and to facilitate the exploration of more fields of development the Central Government has just set up a Board of Scientific and Industrial Research on which a number of Scientists and Industrialists of this country have agreed to serve. I believe that the establishment of this new organization will prove to be an important landmark in the history of India’s industrial development.
And I am sure everybody here, would agree with me in congratulating the Central Government on having secured the services of Dr. Bhatnagar as member of the Board and as Director of Scientific and Industrial Research. As Chancellor of our provincial University of which he is so distinguished an ornament, I deeply regret his transfer to another sphere.
Dr. Bhabha’s letter to Sir Sorab Saklatvala, Chairperson, Tata Sons Ltd., (1944)

I also hope that in time we shall receive liberal support from the Board of Scientific and Industrial Research whose avowed policy includes support of pure research.

It would be in the interest of efficiency if the Board of Scientific and Industrial Research decided to subsidize us to carry on pure research which is its intention to foster by paying us, say, ten percent of the annual expenditure it contemplates on the projected National Physical Laboratory.
Early days of TIFR
1945-1950
In May 1945, the Trustees of the Sir Dorabji Tata Trust decided to sponsor an Institute for Fundamental Research, in co-operation with the Government of Bombay. It was decided to incorporate the Cosmic Ray Unit of the Indian Institute of Science, Bangalore in this Institute. It was also decided to name the new Institute

“The Tata Institute of Fundamental Research”

The Provisional Council consisting of
Sir S.D. Saklatvala (Chairman) Representative of Sir Dorab Tata Trust
Mr S.N. Moos Representative of Government of Bombay
Dr John Mathai Representative of Sir Dorab Tata Trust
Dr H.J. Bhabha Director of the Institute

held its first meeting on May 18, 1945.
First Meeting of TIFR Council (May 1945)

In this meeting, a tentative proposal for the budget of Rs 80,000 was passed for the year 1945-46. The income available was:

- Rs 45,000 from the Sir Dorab Tata Trust
- Rs 25,000 from the Government of Bombay
- Rs 10,000 from the Council of Scientific and Industrial Research
The CSIR sanctioned an annual block grant of Rs 75,000 to the Institute during the year 1946-47. This grant was to enable the Institute to create a Chair of Astrophysics.

Sir S.S. Bhatnagar, Director CSIR, was appointed as a representative of the Central Government on the Council of the Institute.
Atomic Research Committee, appointed by the CSIR recommended in 1948 that TIFR should be the centre of all large-scale research in nuclear physics in India.

The Committee recommended that a high energy accelerator capable of producing particles of energy above 200 MeV and sufficient to create mesons should be set up in TIFR.

A committee was set up to appoint a team of ten scientists and train them in techniques of Nuclear Physics. CSIR also sanctioned a sum of Rs. 32,400 for the training of this team of scientists.

Dr Bhabha personally was in charge of the team.
In September 1949, the Institute moved from its old premises of Kenilworth Bungalow at Pedder Road to the converted Old Yacht Club (OYC) buildings near Gateway of India.

CSIR sanctioned an additional grant of Rs 30,000 for the purpose of constructing suitable accommodation in the new premises.
Dr Bhabha’s communication to Pandit Nehru (1953)

The **Atomic Energy Commission**, on the initiative of **Dr. S. S. Bhatnagar**, at its 27th meeting on the 22nd and 23rd **April 1953** recorded the following:

“The Commission noted that it had recognized the **Tata Institute of Fundamental Research** as the only laboratory of the Commission for Fundamental Research in Atomic Science. **In view of this decision the Commission would not set up another laboratory of its own for fundamental research in atomic physics.”
Dr Bhabha’s address on foundation stone laying ceremony at TIFR

(January 1, 1954)

I would also like to record here my appreciation of the tireless efforts made by my colleague, Dr Bhatnagar, in securing this site and it is, thanks to this, and all the help he has given, that we are today in a position to lay the foundation stone.

We have associated with them as executing architects, the well-known firm of Master, Sathe & Bhuta who built the National Chemical and the National Physical Laboratories and with them we have also associated Mr. Kanvinde of the Council of Scientific and Industrial Research for working out the details.
The lack of sufficient funds made me propose that the Tata Fundamental Research Institute should be expanded to include all scientific research of a fundamental character in these fields and that it should be ranked and perhaps named as a national institute.
Dr. S.S. Bhatnagar contd…

..... I told my friend that he did not know Dr. Bhabha intimately enough and that although his fame in mathematical physics brought a great deal of credit to India, his talents in other fields such as arts and paintings were no less creditable and that above all he had had his basic training in engineering subjects ...

...nobody in India was in my opinion better fitted to take up this task which was assuming world importance and could not be neglected by us.
Dr. S S Bhatnagar at laying of Foundation Stone of TIFR, Jan. 1, 1954
Architectural Model of TIFR
“I have always associated with many prominent figures closely connected with the Science Congress and among them the chief was Dr. S.S. Bhatnagar. We have eminent scientists in this country and people eminent in other ways. Dr. Bhatnagar was a special combination of many things added to which was a tremendous energy, with an enthusiasm to achieve things.”

“Bhatnagar-Nehru Effect” (C V RAMAN)
Pandit Jawahar Lal Nehru  *contd.* ... 

“There are many things which he discussed with me and which he hoped to put through soon. **We want many more scientists like him if we are to go ahead and solve our problems**.”

**“Bhabha-Nehru Effect”**
I met Dr. Bhatnagar for the first time in 1942. I was returning to Calcutta after release from the central jail at Naini.

...as I came out of the crowd and got into the car, one man detached himself from the crowd and came up to me. He touched my feet and said, “I am Shanti Swarup Bhatnagar”.
Shri Maulana Abul Kalam Azad

contd...

..... I can say, without reservations, I have not met a man who was more active and energetic.

- After independence in 1947, he was also first Indian Secretary in the Ministry of Education.

- In 1953, he was asked to Chair, UGC
Dr. Bhatnagar was carrying the burden of four men.

He was secretary to two ministries, Director of the Council of Scientific and Industrial Research and also Secretary of the Atomic Energy Commission.

He however carried out single handed, the duties of four officers with great devotion and ease.
I had worked with him as a colleague for nearly 10 years and I can, therefore, say personally, his premature death was due to overwork. Science is today an integral part of the modern civilization and it is Dr. Bhatnagar’s outstanding achievement that in the short period of a few years he conceived and built in India a chain of magnificent National Laboratories.
I would like at this point to pay a tribute to the memory of my friend and colleague, the late Dr S.S. Bhatnagar, thanks to whose enthusiasm, energy and dynamic personality a large number of national laboratories were established within a period of some seven years.
Remembering the Legends
at PU Campus

- S R Kashyap Hall
- S S Bhatnagar Hall
- Mehr Chand Mahajan Hall
- G C Chatterji Hall
- P N Mehra Botanical Garden
- Dewan Anand Kumar Admin. Block
- G P Sharma Herbal Park
- R C Paul Rose Garden
- M R Sahni Geology Block
- H R Gupta Mathematics Block
- Balwant Gargi Theatre
- SS Bhatnagar Univ. Inst. of Chemical Engg & Technology

Feb. 21, 2013

Apr. 5, 2013

150th Birthday of R R Sahni (1863-1948)
Thank You
for your patience