

Wissenschaftsgeschichte/
History of Science

Rajinder Singh

**Chemistry and Physics Nobel Prizes
- India's Contribution**

Shaker Verlag
Aachen 2016

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <http://dnb.d-nb.de>.

Copyright Shaker Verlag 2016

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the publishers.

Printed in Germany.

ISBN 978-3-8440-4669-4

ISSN 2198-8552

Shaker Verlag GmbH • P.O. BOX 101818 • D-52018 Aachen

Phone: 0049/2407/9596-0 • Telefax: 0049/2407/9596-9

Internet: www.shaker.de • e-mail: info@shaker.de

Content

PREFACE	V
FOREWORD.....	IX
INTRODUCTION	1
Selection Process of a Nobel Laureate	2
HOMI J. BHABHA AND THE COSMIC RAYS	9
Cosmic Rays – The Background	10
Cosmic Rays Research in India	11
Bhabha's Theoretical Work on Cosmic Rays.....	12
H.J. Bhabha, C.V. Raman and the Fellowship of the Royal Society	14
Bhabha's Nomination for the Nobel Prize by Jacques Hadamard	15
Opinion of the Nobel Committee on H.J. Bhabha's Work.....	16
Homi J. Bhabha as a Nominator	17
M.N. SAHA – THE SCIENCE OF STARS.....	27
<i>Saha's Important Scientific Researches before 1930</i>	<i>28</i>
Selective Radiation Pressure and Elements in the Sun	29
Saha- or Saha-Eggert Ionization Equation.....	29
<i>M.N. Saha a Controversial Candidate for the Fellowship of the Royal Society</i>	<i>30</i>
<i>M.N. Saha and Some of his Nominators for the Fellowship</i>	<i>30</i>
Seeking Support for a Candidate	33
Dispute over Saha's Nomination	34
<i>M.N. Saha's Nomination for the Nobel Prize.....</i>	<i>38</i>
Nomination by Debendra Mohan Bose and Sisir Kumar Mitra	38
M.N. Saha - Seeking Support for the Nobel Prize Nomination	41
Nomination by A.H. Compton	42
Sisir Kumar Mitra – A Persistent Nominator.....	43
<i>Expert and the Nobel Committee – Saha's Work is Hardly a New Discovery.....</i>	<i>48</i>
<i>Saha as Nominator</i>	<i>51</i>
Appendix - M.N. Saha in Sweden.....	52

C.V. RAMAN – FROM THE BLUE COLOUR OF THE SEA TO THE MOLECULAR SCATTERING	61
<i>C.V. Raman's Researches and the Fellowship of the Royal Society</i>	<i>63</i>
<i>Raman's Work on Light Scattering</i>	<i>64</i>
Coining the Term "The Raman Effect"	67
<i>The Nobel Prize Controversy.....</i>	<i>67</i>
<i>Opinion of the Nominators.....</i>	<i>70</i>
<i>Opinion of the Nobel Committee's Expert's</i>	<i>72</i>
<i>Russian Physicists, Priority over the Discovery and the Physics Nobel Committee</i>	<i>73</i>
Creating a Myth	74
<i>C.V. Raman as Nominator</i>	<i>75</i>
Appendix - C.V. Raman and Swedish Community	80
S.N. BOSE – BOSE-EINSTEIN STATISTICS	89
<i>S.N. Bose's Contribution and Albert Einstein's Role.....</i>	<i>90</i>
<i>S.N. Bose - Belated Nomination for the Physics Nobel Prize</i>	<i>91</i>
The First Nomination by K. Banerjee.....	91
Nomination by D.S. Kothari.....	93
S.N. Bose's Nomination from the University of Calcutta	95
<i>S.N. Bose's Achievements and the Opinions of the Nobel Committee and it's Expert</i>	<i>97</i>
<i>S.N. Bose and the Belated Fellowship of the Royal Society</i>	<i>98</i>
S.N. Bose – "... none of them Knew what he had done ..."	99
G.N. RAMACHANDRAN – STRUCTURE OF COLLAGEN AND NOMINATION FOR THE CHEMISTRY NOBEL PRIZE.....	105
X-Rays and Determination of Structure of Substances	105
G.N. Ramachandran – Structure of Collagen	108
C.V. Raman Nominates G.N. Ramachandran for the Chemistry Nobel Prize.....	114
Expert's Opinion on G.N. Ramachandran's Contribution	116
G.N. Ramachandran – Nobel Committee's Report for the Year 1964	119
G.N. Ramachandran as a Nominator.....	120
Ramachandran's Plot, other Scientific Contributions and Fellowship of the Royal Society of London	121
INDIAN CHEMISTRY NOBEL PRIZE NOMINATORS AND THEIR NOMINEES...	129

Prafulla Chandra Ray and Prafulla Chandra Mitter – The first Nominators for the Chemistry Nobel Prize	129
Nil Ratan Dhar’s Nominations.....	131
Bawa Kartar Singh and Nomination for the D.D.T.	134
Bhupendra Nath Ghosh’s Two Nominations	137
Dilip Kumar Banerjee and his American Connections.....	139
Ram Prasad Mitra and his Candidates.....	141
Tiruvankata Rajendra Seshadri F.R.S. and his Candidates for the Chemistry Nobel Prize	143
Padubidri Subbaraya Sarma Nominated American and British Chemists	145
P.B. Janardhan – A Very Special Case	147
Appendix - P.C. Ray and Arrhenius	148
INDIA IN INTERNATIONAL CONTEXT	155
Physics Nobel Prize and Nominees.....	155
Chemistry Nobel Prize and Nominees	160
Chemistry Nobel Prize and Nominators	162
Fellowship of the Royal Society of London – India’s Chemists vs. Physicists	164
CONCLUDING REMARKS	169
BIBLIOGRAPHY	175
INDEX	193

Preface

The following two books on the Nobel Peace Prize were written by the present author: "Mahatma Gandhi – Sex scandals and the missed Nobel Peace Prize" and "Inside story of the Nobel Peace Prize award – Indian contestants." In "India's Nobel Prize nominators and nominees – ..." (Its German version: "Die Nobelpreise und die indische Elite"), the geographical distribution of India's nominators and nominees in the fields of Chemistry, Physics, Physiology and Medicine, Literature and Peace Nobel Prizes was discussed. According to the best of my knowledge, there is not a single book, which extensively deals with Indian Nobel Prize nominators and nominees in Chemistry and Physics. The present book intends to fulfill this gap.

In the 1990s a number of short articles were written by R. Singh and F. Riess, on M.N. Saha's and C.V. Raman's nomination for the Physics Nobel Prize. The reports of the Nobel Committees as well as that of the experts are in Swedish. These documents and the nomination letters (some of them in French, Danish and German) were translated by professionals. However, the work was limited from 1900 to 1950. Last year, the documents regarding Indian nominators and nominees in the fields of chemistry and physics were obtained from the Royal Swedish Academy of Sciences, Stockholm. They cover the time period from 1951 to 1964. Based on these documents some short articles were written. They are under consideration in different journals. In the present book attempts to compile the results of my research on the Chemistry and Physics Nobel Prize during the last 17 years have been made. However, this

work does not include articles written on the American physicist Robert A. Millikan and the German Max Born.

In the cases of H.J. Bhabha, S.N. Bose and G.N. Ramachandran the reports of the Nobel Committees and its experts are translated by online translators. This is a weak point in the present work. I hope that my education as a physicist as well as knowledge of Indian scientists and their work compensate this drawback up to some extent.

I decided to include short biographies of the nominators as most of them are not well-known to the general public.

Only the scientific work on the nominees is given for which he was nominated for the Nobel Prize. The other achievements can be found in “Scientific Papers” or similar documents referred to in this book.

The information regarding the award for a particular person, year and work is taken from the official webpage of the Nobel Foundation. For example, C.V. Raman was awarded the Nobel Prize in Physics “for his work on the scattering of light and for the discovery of the effect named after him.”

Acknowledgements

The nomination letters, experts’ reports as well as the reports of the Nobel Committee regarding the Chemistry and Physics Nobel Prizes were sent to me by Mrs. Maria Asp Dahlbäck - Archivist, the Royal Swedish Academy of Sciences, Stockholm. I am grateful to her for helping me during the last 15 years. Thanks are due to the workers

of following archives and libraries, for providing me historical material such as correspondence: Archive Churchill College Cambridge; “Philosophische Archiv, Universität Konstanz”; Archive Royal Society of London; Bodleian Library, Archive of the University of Oxford; Harvard University Archive; Niels Bohr Archive, Copenhagen; Nehru Memorial Museum and Library, New Delhi; “Staatbibliothek zu Berlin, Preussischer Kulturbesetz”; Raman Research Institute Archive; Indian Association for the Cultivation of Sciences; S.N. Bose National Center for Basic Sciences, Calcutta.

I am indebted to Mrs. Adelheid Wegner Demmer, I.C.B.M., University of Oldenburg and Dr. Jan Tapdrup, University of Aarhus, Denmark; who provided me with English translation of Swedish and Danish manuscripts respectively.

I am thankful to Prof. Dr. Michael Komorek, Head of the Research Group - Physics Didactics and History of Science, for supporting my research work by providing research facilities. Furthermore, I thank Mr. Gunnar Shaffer, University of Oldenburg, Germany, for the correction of this manuscript. Last but not least, thanks are due to Mrs. Leany Maaßen (Shaker ‘Verlag’) and the Shaker ‘Verlag’ Aachen, for printing this work.



Dr. Rajinder Singh, Research Group – Physics Education, History and Philosophy of Science,
University of Oldenburg, Germany. E-Mail: rajinder.singh@uni-oldenburg.de
<http://www.rajindersinghdr.npage.de>

Dr. Rajinder Singh has published more than 90 articles in national and international journals. He is editor of:

1. "Jugend forscht – Schüler experimentieren" – nicht nur für Hochbegabte und Überflieger, Shaker 'Verlag' Aachen 2012.

Dr. R. Singh has written the following books:

2. Nobel Laureate C.V. Raman's work on light scattering, Logos Publisher Berlin 2004.
3. Nobel Laureate C.V. Raman's science, philosophy and religion, Dharmaram Publications Bangalore 2005.
4. Characteristics of solar radiation photovoltaic pyranometers Licor 200SZ and Martix 1G, Shaker 'Verlag' Aachen 2012.
5. Upendranath Brahmachari – A pioneer of tropical diseases – A summary of his discoveries and scientific work, Shaker 'Verlag' Aachen 2013.
6. Nobel Prize Nominator Sisir Kumar Mitra F.R.S. - His scientific work in international context, Shaker 'Verlag' Aachen 2014.
7. Mahatma Gandhi – Sex scandals and the missed Nobel Peace Prize, Shaker 'Verlag' Aachen 2015.
8. The making of the politician M. Gandhi by Muslims, Jews and Christians – Gandhi's methods to solve immigration problems, Shaker 'Verlag' Aachen 2015.
9. Inside story of Nobel Peace Prize award – Indian contestants, Shaker 'Verlag' Aachen 2016.
10. India's Nobel Prize nominators and nominees – The praxis of nomination and geographical distribution, Shaker 'Verlag' Aachen 2016.
11. Die Nobelpreise und die indische Elite, Shaker Verlag Aachen 2016.
12. D.M. Bose – His scientific work in international context, Shaker Verlag Aachen 2016.

Foreword

Rajinder Singh started his journey as Historian of Science by working on his Ph.D. thesis: "Nobel Laureate CV Raman's work on Light Scattering". Presently, he is working as a Post-doctoral Fellow in Physics Education, History and Philosophy of Science Research Group of University of Oldenburg, Germany. According to author: "There is not a single book which exclusively deals with Indian nominators and nominees in Nobel Prizes in Chemistry and Physics.". This book intends to fill the gap as it has been compiled in an attempt to find out in International context: Who nominated Indians; and who was nominated by the Indians for Nobel Prize (N.P.) in Physics and Chemistry?

The author has made a tremendous effort to collect and collate information extracted from archives of Royal Swedish Academy of Sciences, Stockholm. The procedure around the selection of the winners of Nobel Prizes was strictly confidential but in 1974, Nobel Foundation decided to grant access to all archival material relating to Prizes more than 50 years old. As a consequence, Rajinder has discovered that until 1964, only five Indians were nominated for Nobel Prizes in Physics/Chemistry and twenty Indians were asked by Nobel committee (N.C.) to send their nominee proposals.

Rajinder Singh has started his write up with nomination of Homi J. Bhabha, the father of Department of Atomic Energy (D.A.E.) of India, who was a pioneer Cosmic Ray physicist. Bhabha published 15 Papers in Europe from 1933 to 1938 and his joint paper with W. Heitler on Theory of Cosmic Ray Showers is rated as of highest quality till date. He returned to India in 1939 to join C.V. Raman in Indian Institute of Sciences Bangalore in 1940 to head the Cosmic Ray group. Bhabha failed to win Nobel Prize and Rajinder has evaluated the reports of N.C. to come to the conclusion

that Bhabha's research got derailed in India as he shifted to experimental area and became fully involved in administrative work, first at Tata Institute of Fundamental Research and then in D.A.E. However, Bhabha was a successful nominator; he nominated 3 Scientists for Nobel Prize and all got it. Cosmic ray was my favourite subject in Aligarh Muslim University, India where the famous Cosmic Ray physicist, Piara Singh Gill, was Chairman of Physics Department. I find useful information provided by Rajinder about two young ladies, Marietta Blau from Austria (nominated for N.P.) and Bewa Chaudhary from Kolkata (D.M. Bose group), who did excellent experimental work on Cosmic Rays to qualify to be a nominator. I invited Bewa Chaudhary to Guru Nanak Dev University, Amritsar in 1983 to deliver a talk.

M.N. Saha was a brilliant scientist who was nominated by D.M. Bose and S.K. Mitra in 1930 but he failed to make the grade in face of nomination of C.V. Raman by 10 topmost scientists from outside India. Raman won the prize despite tough competition provided by the Russians. The reason for Saha's failure in later attempts was his research being classified under Astronomy/Astrophysics, and not in Physics. He was elected Fellow of Royal Society (F.R.S.) in 1925 despite opposition from British Indian Govt., because he had leanings towards communist ideology. It proves that for election as F.R.S., the political views of a nominee do matter. Rajinder has revealed that Saha suffered as a student because he belonged to poor and low caste family, which is a bane of Indian society till today. As a member of Parliament (1951-56), Saha was an opponent of Pundit J.L. Nehru, the Indian Prime Minister, but he was a successful Parliamentarian.

Rajinder Singh has delved deep into archival material available in India and Sweden to prepare his write up on C.V. Raman, who eminently deserved the N.P. Raman has made some original contributions in the

fields of Scattering of Light; Acoustics; Optics; Optics of Minerals and Diamond; Physics of crystals; and Colours and Visual Perception. Raman was nominated by ten topmost foreign Scientists but when the turn of two Indian scientists came, they preferred to nominate M.N. Saha, not C.V. Raman, which shows their Bengali affinity. The author has revealed that Raman was most deserving of all nominated candidates in the opinion of N.C. but still he was kept on tenterhooks because of the claim of Russians to N.P. for the same discovery as reported by Raman. Rajinder has done justice to resolve this controversy on the basis of N.C. reports and using his own logic. According to author, Raman's original thinking, financial support, a team of dedicated researchers, and international contacts were the main causes of his success to win N.P.

S.N. Bose story is most fascinating as he derived Planck's law of radiation by using Einstein's concept of light quanta, wrote a paper in English and sent it to Einstein for German translation. It is assumed wrongly by many in India that Einstein added his name in the paper as co-author. However, Rajinder has cleared the mist that Einstein extended Bose's idea for the monoatomic gases and called it Bose-Einstein Statistics. It is unfortunate that Einstein never nominated Bose; he was nominated by lesser beings from India, and was ignored by N.C. This also indicates that the status of nominators from international scientific community plays an important role.

The history of Chemistry Nobel Prizes in India is almost discouraging. C.V. Raman nominated G.N. Ramachandran for Chemistry Nobel in 1963 for his work on discovery of Collagen structure and elucidation of its properties, but it was ignored by N.C. Rajinder has given a list of Indian Chemists including P.C. Ray, P.C. Mitter, N.R. Dhar, Bawa Kartar Singh, B.N. Ghosh, D.K. Banerjee, R.P. Mitra, T.R. Seshadri, P.S. Sarma and P.B. Janardan, who were nominators from India but hardly any of their

nominees got the N.P. It looks strange that Indian Chemists did not find any nominee from India worth their recommendation. The author has added some appendices towards the end; in the first, P.C. Ray sending his publications to S. Arrhenius to show him the work of Indian School of Chemistry. A number of data Tables have been added by the author to show the number of nominators and nominees from various countries. Only India and Japan have been shown to be active in this domain from Asia.

I appreciate the efforts of Rajinder Singh as informative, interesting and challenging for the young historians of science from India and other developing countries. In my view, Indian policy makers in the field of Education will take note of Rajinder's contributions and introduce History of Science in School/College/University curriculum to inspire and motivate young Indians for the study of Science.

I was given the privilege to write the reviews of his Books: "Inside Story of Nobel Peace Prize Awards - Indian Contestants" and "India's Nobel Prize Nominators and Nominees." I am thankful to the author for inviting me to write the "Foreword" for this volume. I am sure the author is going to pen his findings in more new volumes on History of Science for the general reader.

Prof. Dr. Hardev Singh Virk
Visiting Professor at SGGGS World University,
Fatehgrah Sahib (Punjab), India.