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**Rajinder Singh**

**Bidhu Bhushan Ray - A Pioneer  
of X-Ray Spectroscopy**

Foreword by Suprakash Chandra Roy

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## Preface

Before my visit to the Niels Bohr Archive in Copenhagen about twenty years ago, the name Bidhu Bhushan Ray was unknown to me. From the records of the archive, I found out that B.B. Ray was the first Indian to work under the Dane, Niels Bohr. Ray's correspondence with physicists like N. Bohr, Samuel Goudsmit and Y. Nishina is not only about the exchange of scientific ideas, but also about their private and political situations. This aroused my interest and I searched for his biography but without success.

We (R. Singh and Dr. Falk Riess) published a short article entitled "Bidhu Bhushan Ray and his Western connections" in "Science and Culture" 66, 177-181 in 2000. Shortly after that, I received an invitation from the Indian Association for the Cultivation of Science, Kolkata, the oldest research institute of India. The director of the Association – Prof. D. Chakravorty, who had read the article, introduced me to B.B. Ray's nephew, who was working as a professor. We made appointment for further discussion. In the evening, his second nephew also joined us. During the discussion, I realized that before Raman got the Nobel Prize, B.B. Ray received a letter from Manne Siegbahn, (with whom he had worked in 1924-1925), telling him that soon Raman would be with us. Ray showed the letter to his teacher, Raman, who took it and never returned.

Before proceeding any further, I would like to point out that for western readers and non-Bengalis, a Bengali name sometimes posed a problem. For instance, Bidhubushan Ray, Bidhubhusan

Ray, Bidhu Bhushan Roy, B.B. Roy or B.B. Ray as appeared in different places is the same person. Throughout the text, I have abbreviated the name to BBR or B.B. Ray.

Remaining objective becomes problematic for a historian if he or she gets documents from the family members of the person whose biography is to be written. In general, the objectivity of the research work suffers if a writer gets paid to write a particular biography. In my own case, none of the Indian institutions, in particular in Bengal, have financed this work. Neither did any of Ray's family members impose any conditions before sending the documents to which reference is made in this work, so I was free to write as I chose.

I must confess that I am not quite satisfied with the present work. The reasons are fourfold: 1. Original and written documents are missing to explore B.B. Ray's contact with W. Heisenberg as is the role played by Heisenberg in introducing Netaji Subhash Chandra Bose to Adolf Hitler. 2. I contacted the University of Uppsala and Royal Swedish Academy of Sciences, Stockholm, regarding the Manne Siegbahn – B.B. Ray correspondence. I was told that they do not possess it. 3. A general reader without a fundamental knowledge of physics might not be able to understand some parts of the book containing his physics research. 4. A “hard-core” physicist will miss the details of B.B. Ray's scientific work.

The justification from my side for the above-mentioned drawbacks is:

- My aim was to write “a biography” of a man, whom the scientific community hardly knows, though he belongs to the generation that influenced the development of physics in India. My hope is

that the present work will motivate other authors to write more. This book may be seen as a starting point for further research.

- B.B. Ray's scientific work, which belongs to his D.Sc. thesis, has been extensively discussed on the understanding that majority of the people hardly knows about this work.
- In 1930, BBR observed the "Raman effect in X-rays." European and American scientists were unable to confirm Ray's results. This led to controversy. In order to resolve the issue, Ray's scientific work has been discussed in detail.
- Ray's work undertaken in Copenhagen and Uppsala is reproduced in detail because (1) It shows the importance of his work in the development of atomic physics and (2) the exchange of ideas between Bohr and Ray.

At the end, I would like to say that my aim is to write about B.B. Ray, one of the unsung heroes of Indian science, like S.K. Mitra, D.M. Bose and U. Brahmachari. I hope that some of the Bengali people will appreciate my efforts and perhaps translate this book.

## **Acknowledgements**

To start with, I would like to thank Mr. Subrata Roy, retired Director-in-Charge of Central Silk Technological Research Institute, Bangalore, for sending me (1) the article written by S.N. Sen on his teacher, B.B. Ray's life; (2) B.B Ray's lecture delivered at the Indian Science Congress Association, 1942; (3) Family photographs. With pleasure, I acknowledge that Prof. Debabrata Ray, Secretary,

National Education Commission Bengal, sent me information about the family background as well as photographs.

Thanks are due to Professor Suprakash Chandra Roy, Editor-in-Chief of “Science and Culture”, Member of the National Commission of History of Science, Indian National Science Academy, for sending B.B. Ray’s “Obituary”; and correcting my English to make the text readable. Without his help this book would have not been complete. I am grateful to Prof. Arnab Rai Chaudhuri, Fellow of the World Academy of Sciences (TWAS), Indian National Science Academy and Indian Academy of Science, for sending me the link to the documents in the Archive of the University of Calcutta; and the correspondence between M.N. Saha and P.C. Ray.

Thanks are due to the Philosophical Archive, University of Konstanz, Germany, for sending the correspondence of N. Bohr, Samuel Goudsmit, Ivar Waller and B.B. Ray. During my visit to Niels Bohr Archive Copenhagen, Dr. Finn Aaserud and Mrs. Felicity Pors helped me, and it is with pleasure that I acknowledge their kind assistance.

I am grateful to Prof. Dr. Michael Komorek, Head of the Research Group - Physics Didactics and History of Science, for supporting my research work by providing appropriate facilities. Last, but not least, thanks are due to Mrs. Leany Maaßen (Shaker ‘Verlag’) and the Shaker ‘Verlag’ Aachen, for printing this work.



## Foreword

When I was a student of M.Sc. Physics class at Calcutta University, there were photographs of a few physicists hanging on the wall of the Lecture Theatre located in the first floor of the Physics Department. We were familiar with all the faces like C.V. Raman, M.N. Saha etc., except one with an unassuming personality and in a casual attire (the same picture as presented in this book - page 21). On enquiry, we came to know that he was Bidhubhusan Ray and was a professor in the department of Physics. As it appeared, no one knew much more about this man. My second encounter with this name happened when I became associated with the editorial board of the journal Science and Culture in the eighties only to discover that B.B. Ray was the first editor of the journal, jointly with Meghnad Saha and J.C. Ghosh. I was excited when Rajinder proposed to write a biography of B.B. Ray. Frankly speaking it gave me immense pleasure to read this book and to know more about a man, albeit late, whose name I had become familiar with about fifty years ago.

Rajinder has the capability of digging up water out of a hard rock. India has never been good at keeping documents and maintaining diaries etc. including that of persons of importance and therefore procuring documents on Indian scientists is as difficult as getting water out of a hard rock. And Rajinder has done exactly that with his own acumen. In my opinion, Rajinder is an investigative historian who is always on the run to discover new things, new materials etc. In the process he has written biographies of some Indian scientists

like S.K. Mitra, D.M. Bose and U.N. Brahmachari who were eminent in their own fields of research but no biographies on them were available. A biography of B.B. Ray was long overdue. Our kudos to Rajinder for filling this void.

This book is a complete biography of B.B. Ray in a sense that it talks about his life, his philosophy of life, his courage to accept challenges, his relationship with important political personalities like Netaji Subhash Chandra Bose, Rabindranath Tagore etc. and on the other hand, he had a friendly relationship with eminent scientists of his time like Samuel Goudsmit, discoverer of electron spin; Niels Bohr, founder of quantum atomic theory; Werner Heisenberg, initiator of quantum mechanics and others.

The book talks about the unbelievable struggle of a person towards fulfillment of the dream of his life: science and scientific research. The book will act as a source of inspiration to young aspiring scientists. B.B. Ray is known to be one of the founders of X-ray spectroscopy in India. But I doubt how many physicists are aware of the fact and that of his research work on X-ray spectroscopy. Rajinder has tried his best to explain B.B. Ray's scientific work in this book.

The book will be an enjoyable reading for general readers as well as physicists.

S.C. Roy

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**Dedicated to Professor Dr. Suprakash Chandra Roy**



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