



S.R. Khastgir



SATIS RANJAN KHASTGIR

(1898 — 1973)

Elected Fellow 1944

BIRTH, PARENTAGE AND CHILDHOOD

SATIS RANJAN was born on September 5, 1898 in the well-known Khastgir family of Chittagong, now in Bangladesh. His father, Late Satyaranjan Khastgir was a Civil Engineer in the PWD, Bengal, Bihar, and Orissa circle who also worked as a District Engineer for some years. His mother, late Souranalini was the eldest daughter of late Rajani Kanta Ghosh, a devoted member of the then East Bengal Brahma Samaj at Dacca, and was also the Assistant Headmaster of the Dacca Collegiate School. As his father was in transferable job, Satis Ranjan had his school education at different places - Krishnanath Collegiate School at Berhampore (Murshidabad), Government Schools at Dacca, Faridpur and Chittagong.

FORMATIVE INFLUENCES ON THE YOUNG SCIENTIST

The cultural tradition of the family - 'Khastgirs of Chittagong' - influenced young Satis Ranjan to a great extent during his formative years. He had always been an ardent admirer of his celebrated teachers in schools and colleges. In his later educational career he was deeply influenced by the eminent Professors; CV Raman, DM Bose, PC Mahalanobis, SN Bose, SK Mitra, MN Saha and others. He possessed as a 'treasure' the lecture notes of most of his illustrious teachers, all through his life. (In fact, these were once shown to the present author). No doubt, his mentors left an everlasting impression on his mind, which inspired Satis Ranjan to emerge as a celebrated postgraduate teacher and a reputed scientist in later years.

SCHOOL AND UNIVERSITY EDUCATION

Satis Ranjan passed the Matriculation Examination in 1915 from the Chittagong Collegiate School with a district scholarship and a medal. In 1917 he



stood second in order of merit at the Intermediate Examination in Science from the Chittagong College. In 1919 he obtained First Class Honours in Physics, standing second in order of merit, from the Presidency College, Calcutta. He was the recipient of the Hindu College Foundation Scholarship for proficiency in Honours and the subsidiary subjects. He also obtained the Mohini Mohan Roy Prize for proficiency in Physics. In the MSc Examination in Physics, he stood first in Class and third in the University in 1921, also from the Presidency College, Calcutta. Before proceeding abroad for higher studies and research, he worked under Professor CV Raman, for nearly three months. In 1922 he joined the Edinburgh University as a research student under Professor CG Barkla, Nobel Laureate, and obtained the degrees of PhD and DSc in Physics in 1924 and 1926 respectively from the same University. The subject of his thesis was related to X-ray scattering and absorption.

PROFESSIONAL CAREER

On his return to India, Dr Khastgir worked for a year as an Assistant Professor of Physics in the Presidency College, Calcutta. In 1928, he joined the Colonial Education Service in the University College, Colombo, Ceylon (now Sri Lanka). In 1931 he joined the University of Dacca as a Reader in Physics and was actively engaged in his researches with a band of enthusiastic students. After Professor SN Bose left Dacca, Dr Khastgir became the Head of the Physics Department and later on was elected as the Dean of the Faculty of Science and remained in that capacity till he left Dacca, a year after the partition of India. He then joined the Banaras Hindu University and remained there for about 10 years and built a strong school of research workers. At the BHU, he became a University Professor and Head of the Physics Department. In 1958, he left Banaras to join the University of Calcutta as the Khaira Professor and the Head of the Department of Physics. Subsequently he was elected as the Dean of the Faculty of Science, Calcutta University and worked in that capacity till he retired from the University's Service on October 31, 1963. However, till April 30, 1964 he was attached to the University College of Science, Calcutta, for guiding research students under the UGC Scheme for utilizing services of 'Retired Professors'. Subsequently, he joined the Bose Institute, as Professor and Head of the Department of Physics. After he left Bose Institute in May, 1969, he went to the Visva-Bharati University (Santiniketan) as a CSIR Retired Scientist. He bought a house at Santiniketan (Purba Palli) where he lived, till his death on May 6, 1973 after a brief illness, in Calcutta.



A COMPREHENSIVE COVERAGE OF HIS RESEARCH CONTRIBUTIONS

Throughout his life, Professor Khastgir had been a successful teacher and an ardent researcher. He could inspire students and thus active schools of research grew in the universities and institutes, he served. At the University of Edinburgh, he was closely associated with late Professor CG Barkla, Nobel laureate, where he made important contributions on scattered X-rays and the J-phenomenon. Although he had his basic research training in the studies of X-rays and allied phenomena, he could not maintain that tradition and had to change over to a comparatively new science under queer circumstances as had been disclosed to the present author. In the Physics Department, University of Dacca, he introduced a special paper on 'Wireless' (renamed as Radio Physics and/or Electronics) in the MSc Physics course and subsequently developed research activities in different disciplines.

Professor Khastgir once told the present author the reason which led him to switch over to the then comparatively new science of 'Radio' from 'X-rays' - the subject of his specialisation. When he joined as one of the Readers in the Physics Department of the University of Dacca in 1931, Professor SN Bose was the Head of the Department and Dr KS Krishnan was the other Reader. MSc students enrolled themselves either under Professor Bose or Dr Krishnan, for the specialized courses being offered by them. It was rather difficult for Dr Khastgir to get students for specialization in X-rays. Disappointed as he was, he sought the advice of his former teacher, Professor SK Mitra of the University of Calcutta, who was internationally reputed for his pioneering researches on radio wave propagation and ionospheric investigations. Professor Mitra inspired and helped Dr Khastgir to initiate similar investigations at Dacca. He also advised him to arrange to offer a special paper on 'Wireless' in the MSc (Physics) curriculum at Dacca. The scheme proposed by Dr Khastgir was readily accepted by Professor Bose and the Wireless laboratory started functioning at the University of Dacca from 1932. In subsequent years, Dr Khastgir received advice and also technical help from personalities like Dr H Rakshit (the then Lecturer, Applied Physics Department, Calcutta University and later on Professor & Head, Department of Electronics and Electrical Communication Engineering IIT Kharagpur) and from Dr SK Chatterjee (who, as an Officer in the Indian Meteorological Department, was then posted at Dacca for a few months to set up an atmospheric recorder there. Dr Chatterjee later on joined the Indian Institute of Science, Bangalore as Professor of Electronic Engineering). Students were gradually attracted to this new discipline which gained immense popularity in subsequent years.



Thus, inspired by the late Professor SK Mitra, pioneer in the field of radio research in India, Dr Khastgir introduced and gradually developed the 'Wireless' laboratory in the Physics Department of the University of Dacca with his untiring zeal. Within a few years, promising students opted for this new discipline to take up both the special paper and dissertation in 'Wireless' under the guidance of Dr Khastgir. When he left the University of Dacca after partition, sixty one research papers had been published in different journals, some independently by him and a large number under joint authorship with his students (Refer to Bibliography 1933-50). The major contributions made were in the areas: Crystal rectification, Dielectric constant of ionized gas; Fading of radio signals; Polarization of radio waves; silent AC discharges; studies on atmospherics; nature of lightning discharges and the like. However, he could not build a so called 'research school' at the University of Dacca, as almost all his talented students got immediate employment in organisations like the then All India Radio and the Meteorological department, besides educational and research institutions.

The second and perhaps the most important phase of Dr. Khastgir's activities started at the Physics Department, Banaras Hindu University, where through the kind efforts of his teacher, Professor SN Bose, he could be employed as a lecturer in 1949 when he was compelled to leave Dacca by the then East Pakistan administration consequent to Mrs Anila Khastgir having categorically refused to read the English news bulletins of Radio Pakistan, as these were severely critical of our revered leaders like Jawaharlal Nehru, Sardar Patel and others. However, in recognition of his scholarship and wide experience, he became a Professor at the Banaras Hindu University (BHU) and gradually built an active school of research. One of his students and later a colleague in the same department, Professor RS Singh remarked - "Dr SR Khastgir joined the Physics Department of Banaras Hindu University in 1949, where he became Professor and Head of the Physics Department in 1956. He became the incharge of the Wireless Section, where he was entrusted by the CSIR to look after two research schemes: Polarization of Down Coming Radio Waves' and 'Study of the Nature of Atmospherics'. Thus he was able to develop a group of young research workers in the department and the department became an important centre for doing research work in Atmospherics and Ionospheric Physics. Several persons received their PhD degrees under his guidance, and later held important positions both in the department and elsewhere. His behaviour towards his research students was very affectionate and most of them were like his family friends."

Important contributions were made in different areas like: fading of medium wave radio signals; stepped-leader stroke of a lightning discharge; polarization



of echoes from the sporadic E (Es) and the F-layers of the ionosphere; cloud to cloud lightning discharge; waveform of atmospheric; ionospheric absorption and moving irregularities and energy spectrum of atmospheric. Quite a large number of research papers were published in reputed journals (Refer to Bibliography 1951-61). Professor Khastgir had been highly respected and admired by his students. Professor Sushil Chandra wrote to the present author;—
"I had the privilege of knowing Professor SR Khastgir since 1952, when I joined the Physics department of the Banaras Hindu University as MSc student. I also briefly worked with Professor Khastgir as a PhD student prior to coming to the United States. Professor Khastgir is one of the few men for whom I have the greatest respect and admiration. He was my teacher and Guru in the truest sense. He was a perfect gentleman and human being and had set a very high standard for all of us to follow in his footsteps."

The third phase (1958-63): Professor SR Khastgir joined the Department of Physics, Calcutta University as the prestigious Khaira Professor in 1958 and ultimately became the Head of the department. It may be mentioned here that as early as in 1949, the then Ghosh Professor of Physics, Professor SK Mitra, established a separate department exclusively for higher studies in Radio Physics and Electronics (first of its kind in Asia), pulling all the resources of the then Wireless Laboratory of the Physics Department and also of the Communications Laboratory (then known as the Kanodia Laboratory) of the Applied Physics department. A void was thus created in these departments so far as the higher studies in Wireless was concerned. Immediate steps were taken by Professor Khastgir to revive and reconstruct the same. A special paper in 'Electronics' was introduced in the MSc Physics curriculum and a laboratory was gradually developed. As in the universities of Dacca and Banaras, he also initiated similar types of research in the Physics Department with some of his talented students. As the Investigator-in-charge of several research schemes with grants from PL-480, CSIR and the UGC, the research activities gradually built up and several research papers were published (Refer to Bibliography, 1962-66).

The fourth and the final phase (1967-73) : After his retirement from the University of Calcutta, Professor Khastgir joined the Bose Institute as Professor and Head of the Department of Physics, under the then Director, Dr DM Bose. He soon realized that the Institute, founded by Acharya Jagdish Chandra Bose, the father of 'Microwaves', had failed to initiate researches in Radio Sciences. This prompted him to introduce radio wave propagation and ionospheric researches in the Institute. With the support of Dr DM Bose and the active collaboration of some of his very able research scholars, he constructed an ionospheric recorder which was installed in a fairly quiet locality near Baruipur. One of his coll



rators, Dr Suman Ganguli expressed his views as, - *"As a research Supervisor, he was magnanimous, gentle, broad minded and sincerely cared for the students. He trusted his students and taught us independent thinking. Our achievements in the Physics Department, Calcutta University, and later in the Bose Institute during the sixties (where indigenous equipments such as 80KW transmitter, sophisticated receivers etc. were built from scratch) were possible through his broad vision and his ability to give his students a complete free hand."*

Once the author had a long discussion with a friend, Dr TC Bhadra (since deceased), who was a student of Professor Khastgir at Dacca and much later a colleague at the Bose Institute, about our beloved Professor. He remarked: *"Professor Khastgir was an extremely dedicated person in the field of scientific research. All through his life, he geared his research objectives so firmly that he could steer through successfully, amidst all obstacles, to reach the goal. He had always been loved and admired by his friends, colleagues and generations of students."*

In concluding this section, some salient features of Professor Khastgir's life long research activities have been highlighted. In fact, he could know about the publication of the last two papers at his death bed. As the chief investigator of over twenty research schemes in the areas of his interest, as referred to above, his contributions made significant impact on our existing knowledge. Two such broad areas are as follows. The first one relates to his various studies on the nature of atmospheric and the physics of the atmospheric discharges and the second one relates to his studies on ionospheric radio wave propagation in general and that of polarization studies in particular. In the last phase of his life, while at Santiniketan, he completed the manuscript of a monograph on the "Polarization of Radio Waves Reflected from the Ionosphere", which is soon to be published by the Asiatic Society, Calcutta.

OTHER ACADEMIC ACTIVITIES

Besides his research activities, Professor Khastgir had always taken active interest on the issue of popularization of science through the medium of the mother tongue, Bengali. While at Dacca, he had been particularly inspired by his former teacher and colleague, Professor SN Bose, in this regard. In the preface of his Bengali book entitled, '*Bidyut-pat sambandhey Baijnani Gabeshana*' Professor Bose wrote, *"Dr Khastgir devoted his whole life to studies of the characteristic features of the atmospheric electrical discharge phenomenon and its propagation. While at Dacca, very often he used to discuss about the popularization of science through*



mother-tongue. A popular science magazine in Bengali named 'Bijnan Parichaya' was published accordingly. Besides contributing several articles Dr Khastgir also acted for some time as the Editor of the same magazine. Even today, questions are being asked whether it is at all possible to explain the fundamentals of sciences to the common people. Dr Khastgir has been successful in that endeavour" (translated from Bengali).

It was during the years 1948-49, that Professor SN Bose founded the 'Bangiya Bijnan Parishad' and its monthly magazine 'Jnan-O-Bijnan' with the help of his friends and admirers, besides his students in Calcutta. Professor Khastgir had been a life member of the Parishad and contributed a large number of articles therein. Besides the popular science book referred above, he had to his credit two more books, *Betar and Bijnaner Swarup* (Refer to Bibliography for details).

Professor SR Khastgir had been an extremely well read person in subjects like literature, philosophy and history of science. He was well versed in Tagore literature, particularly in songs and poems, many of which he could recite from memory. He was, in fact, a complete human being.

MEMBERSHIP OF LEARNED SOCIETIES

Professor Khastgir was the President of the Physics section of the Indian Science Congress held at Roorkee in 1961. In recognition of his research contributions, he was elected Fellow of different learned societies like-the Royal Society of Edinburgh (UK), the National Institute of Sciences of India (renamed as the Indian National Science Academy), the Indian Physical Society and the Institution of Radio Engineers (New York). He served as a member of the Radio Research Committee, New Delhi, for six years. In September, 1966 he went to Munich to participate in the XVth General Assembly of the International Union of Radio Science (URSI) as one of the Indian delegates. He delivered an invited talks on " ELF-emission due to corona discharges from the return stroke channel" at the Assembly.

MARRIAGE AND FAMILY

Satis Ranjan was married in 1934 to Srimati Anila (died on February 5, 1990), the youngest daughter of late PK Bose and late Swarnalata Bose, a grand daughter of the renowned philosopher and educationist, late Dr PK Roy of Dacca and late Sarala Roy, the founder of the Gokhale Memorial Girls's High School (now College) in Calcutta. Professor Khastgir had a highly cultured family



background. All his brothers were renowned in their respective fields like art and painting, medicine and engineering. The eldest of his younger brothers, Ashok Ranjan, was a respected doctor, who settled at Manchester, UK; the next one, Debranjana was a reputed engineer and the youngest, Sudhirranjan was a renowned artist who started his career as the Art Master of the Doon School and then became the Principal of the Government Arts College at Lucknow. On retirement, he worked at the Visva Bharati, Santiniketan.

His eldest sister, Miss Asalata Khastgir, was an eminent educationist, who migrated from Sylhet and founded the Satyaranjan Khastgir Sishu-o-Prathamik Vidyalaya, named after their father, at Jadavpur in Calcutta. His next younger sister, Lila, was married to Dr Devaprasad Mitra, an eminent Bacteriologist and a revered Acharya of the Sadharan Brahmo Samaj. His youngest sister, Santi, who was married to a bank manager, was an exponent of Tagore Songs.

His only son, Shivaranjan, a talented Mechanical Engineer, educated at the Indian Institute of Technology, Kharagpur and subsequently at the University of Illinois, USA, served in different reputed organizations in senior executive positions. After retiring as an Executive Director of Hindustan Copper Ltd, he is presently working with Mobar India Ltd, founded by Mr Russi Mody, former Chairman of Tata Steel.

Shivranjan married Sreelata, the youngest daughter of late Mahendra Mohan and Sovarani Ghosh of Jamshedpur, in 1964. Their elder daughter, Rosinka, recently obtained her D Phil degree in English literature from the University of Oxford. She is married to Dr Amit Chaudhuri, D Phil (Oxon) whose novels published by Heinemann of London have been widely acclaimed. Amit won the first prize in the 1991 Betty Trask awards and the Commonwealth Writer's Prize, 1992 for the best first book. Amit is also an accomplished vocalist and his cassettes of Hindustani classical music have already been recorded and released by the HMV in India. Their younger daughter, Priyanka, graduated from the Rani Birla Girls College of Calcutta in 1996 and is presently engaged in computer studies at the NIIT.

REMINISCENCES OF PERSONAL LIFE

Born and brought up in a highly cultured environment, Professor Khastgir maintained that tradition all through his life. A man of charisma, he had always been loved and admired by all. A devout 'Brahmo', but without any dogmatism, he had been a highly respected person in society. He used to participate in



types of social gatherings, well clad in the conventional Bengali dress. Although the author was fortunate in having a life-long association with his esteemed Professor, he did not have the opportunity of precisely knowing about his philosophical outlook. He had discussions with Shivarangan, who was kind enough to express his view, some of which are being quoted hereunder.

"My father was a great believer in God and Nature. Whenever he was not busy with his scientific studies, he used to think and write on the philosophical aspects of life; transcending the boundaries of religion. As a nature lover, he used to take keen interest in flowers, plants and animals... Being a true believer in God despite being a physicist, he always emphasized that there were certain things in life, which could not be explained by science. God, the creator, was omnipotent and in his own kind way ruled over the entire Universe... All, intelligent human beings are bound to acknowledge this universal truth, without the slightest hesitation."

Besides being an ideal teacher and a dedicated researcher, Professor Khastgir had been a life-long learner too. The author vividly remembers one such occasion, in support of his statement. When Dr Khastgir joined the Bose Institute, the author was one of the Readers in the Department of Radio Physics and Electronics. Professor Khastgir used to ring him up very often and the author also visited his laboratory frequently. He was particularly interested to know from the author about the recent advances in the new science of Radio Astronomy, in which the author had worked in the early fifties, at the Jodrell Bank Experimental Station, University of Manchester, UK.

One afternoon, Dr Khastgir personally came to see the author in his laboratory on the third floor, climbing up the stairs (the lift was yet to be installed). He came in search for a paper published in the Journal of the Institution of Electrical and Electronics Engineering (IEEE). The author was highly embarrassed and told him that he could have sent someone with a note or could have asked him. The answer he gave was a lesson to the author. He remarked "I have personally come so that in case of non-availability of the paper, you might suggest alternatives. Personal contacts are always useful". He then enquired about our activities, particularly about other colleagues' studies on signals received from the artificial satellites and visited the laboratory. Such was his inquisitiveness and the urge to learn more about the new frontiers of science and technology.

Before this short life sketch of Professor SK Khastgir is closed, the author shall be failing in his duty if he does not place on record the debt he owes to his revered Professor. He was one of his students in the BSc Physics Honours, session 1942-45 and in the MSc wireless special class in the session 1946.



the Department of Physics, Dacca University. The author had his first research training on studies on Atmospherics and on Radio receivers and did his MSc dissertation under Dr Khastgir's able guidance. That gave him a chance of coming very close not only to Professor Khastgir but also to the Khastgir family. The author still vividly remembers many pleasant mornings and evenings that he spent at his residence in Nilkhet (Ramna, Dacca) discussing matters, writing papers and the dissertation. He became, as if, a member of the family in no time and earned a great affection also of Mrs Khastgir, a highly cultured lady with a pleasing personality.

The author, dedicates this biographical memoir to the sacred memory of his most esteemed 'Mentor'. Satisranjan Khastgir, an 'Aristocrat' and a true 'Karmayogin' as his humble 'GURUDAKSHINA', on the eve of his birth centenary year.

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The author is indeed very grateful to his elder brother, Mr Arun Kumar Das Gupta (since deceased), who was also a student of Professor Khastgir during the Session 1937-40 at the University of Dacca. Besides useful discussions, he had constantly inspired him to write this biographical memoir. Professors RS Singh and Suresh Chandra of the Physics Department, Banaras Hindu University; Drs Sumon Ganguli and TC Bhadra (since deceased) of the Bose Institute, Calcutta were kind enough to send their reminiscences. Dr Sisutosh Samanta, Principal, Surendranath College, Calcutta, who had been the last doctoral student of the Professor, helped in updating the bibliography. The author had some fruitful discussions with Mr Shivranjan Khastgir, who has written a few lines about the human side of his father. Lastly, Mr Shymal Maiti and Mr Sunil Banerjee helped in typing the manuscript meticulously. The author places on record his deepest sense of gratitude to all of them.

The author is extremely grateful to the authorities of the Indian National Science Academy for giving him this opportunity of writing the biographical memoir of his esteemed mentor

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