

BIRTH CENTENARY OF PROFESSOR SUSHIL KUMAR MUKHERJEE : A TRIBUTE

PRADIP K. DATTA*

This year (2013) we are observing the birth centenary of internationally renowned scientist, ideal educationalist and great humanist Professor Sushil Kumar Mukherjee. In this article the life, scientific work and social activities of Professor Mukherjee have been discussed.

Introduction

This year (2013) we are observing the birth centenary of internationally reputed scientist, ideal educationalist and great humanist Professor Sushil Kumar Mukherjee. He may be called the last legend of Bengal Renaissance that was initiated by Raja Rammohun Roy and Pandit Iswarchandra Vidyasagar. He lived a very simple life and dedicated his life for education and social cause. His greatest contribution was his service to humanity. He never wavered from his ideology and commitments. He did not hesitate to criticize anything unjust. He grew up in an atmosphere of remnant patriotic idealism of the 19th century. At the beckoning of his teacher-mentor Acharya S. N. Bose, he gave up lucrative assignments abroad and came back to India for the service of propagating and developing science and scientific bent of mind in the society of his own country. Professor Mukherjee was a selfless, dedicated and very popular teacher as well as a committed seeker of scientific truth.

Early Life and Education

Professor Mukherjee was born on 13th October, 1914 in a small village in Barisal in undivided Bengal. Since he was underage at the time of appearing at the Matriculation examination his date of birth had to be increased to 1st

January, 1914. His father Bhagabati Charan Mukherjee was a homeopathy physician and was involved in freedom movement. After primary education in his village Professor Mukherjee came to Kolkata and was admitted to Hindu School. He stood first in the M.Sc. examination of Calcutta University in Chemistry in 1936 with specialization in Physical Chemistry. He then started research at Calcutta University in soil science and agricultural chemistry under Professor Jnanendra Nath Mukherjee who was the pioneer of Colloid Chemistry in India. In 1945 he obtained D.Sc. degree in Chemistry from Calcutta University for his thesis, "Electrochemical properties of hydrogen clays". At the inspiration of Professor J.N. Mukherjee Professor Mukherjee joined the two years' Associateship course in the Division of Soil Science & Agricultural Chemistry of Imperial (now Indian) Agricultural Research Institute and completed the course in 1938.

As a student he came in close contact with Acharya P. C. Ray, father of Indian Chemistry and Indian Chemical industry. He was motivated by Acharya Ray into social service.

Career

Professor Mukherjee began his professional career in 1943 with All India Survey. A National project, All India Soil Survey, commenced under Professor J.N. Mukherjee to make an inventory of soil resources. This was the first soil survey in India undertaken by Imperial (now Indian) Agricultural Research Institute, Pusa, New Delhi. Professor

* Kalpana Chawla Centre for Space and Nano Sciences
Retired Reader and Head, Department of Physics, Presidency
College, Kolkata-73
dattapradip@rediffmail.com, dattapradip@gmail.com

Mukherjee was In-charge of Eastern India. He made a strenuous survey on the agricultural resources on the hilly areas of Assam, Jungles of Orissa and inaccessible coastal regions of East Bengal. He had to live in country boats for several weeks. In 1947 he joined Calcutta University as a Lecturer in Pure Chemistry and Applied Chemistry. During the period from 1948 to 1950 he went to the University of Missouri, Columbia, USA as the prestigious Ghosh Travelling Fellow of Calcutta University to work on membrane electrodes and micro-calorimetric estimation of heat of ion exchange on clay colloids in the laboratory of the famous Clay Mineralogist Professor C.E. Marshall. By controlling the orientation of clay particle he developed a membrane having semiconducting properties. The Nobel Laureate Linus Pauling took keen interest in Professor Mukherjee's work.

Professor Mukherjee was like guardians of the Indian students at the University of Missouri. The subjects which Professor Marshall taught were very difficult and most of the students could not understand the subjects. Almost every evening Professor Mukherjee explained the subjects to the students. Though the progress of his own research was affected to some extent he happily undertook the voluntary service. He returned India in 1950 and joined Calcutta University. Like Acharya P. C. Ray he lived in the laboratory, worked the whole day, went to bed after midnight and slept on a wooden table without a pillow and mattress. About twenty students always worked under his guidance for their Ph.D. degree on various problems on Soil Science, Physical Chemistry and Chemical Technology. But he did not allow including his name in the research publications so that the whole credit goes to his students.

In 1957 he went to Indonesia on a three-year term as a UNESCO Consultant for establishing the Faculty of Science. In Indonesia he also taught Chemistry at Universitas Andalas, an university located at Bukittinggi in the Padang Island. As Indonesia was under Dutch occupation for a long period the medium of education there was mostly Dutch, especially at the higher level. But in Indonesia he found that the medium of communication everywhere was Indonesian language. Greatly influenced by Acharya Satyendranath Bose he firmly believed in disseminating science through mother tongue. He was a linguist by nature with an excellent command over German, French and Russian. He learnt Dutch and Indonesian language and taught in Indonesian language. But there was a dearth of good books in science subjects in Indonesian language. Professor Mukherjee felt the difficulties faced by the students and wrote several books not only of Chemistry

but Physics and Mathematics as well. After writing a book he invited suggestions from some senior and intelligent students on the improvement of the book. He did not accept any money for the books.

He took special care to conduct the practical classes. To overcome the difficulties of procuring good quality chemicals Professor Mukherjee had to devise ingenious means. In 1960 he returned to Kolkata and joined Indian Association for the Cultivation of Science as Professor of Macromolecules. In the same year Kalyani University was established on 1st November and he was invited by Professor Sachindranath Dasgupta, the first Vice-Chancellor of Kalyani University to join the University as Professor & Head of the Department of Chemistry and Dean, Faculty of Science. He started the department from scratch with utmost devotion and soon the department earned fame. In addition, he also regularly taught at the Agricultural Faculty of the University. During this period he conducted a joint research project, with British Biochemist Nobel Laureate R.L. Syngé, with far reaching consequence of origin of life on earth at the Indian Statistical Institute. He lived in Kalyani and was associated with the social and cultural activities there. He was the founder President of Kalyani Town Club.

In 1965 he joined Calcutta University at the newly established Agricultural Chemistry department as Acharya Prafulla Chandra Ray Professor of Agricultural Chemistry. He was the first to chair the post. Here again he had to start from scratch. In 1968 he became the Vice-Chancellor of Kalyani University. (Bidhan Chandra Krishi Viswavidyalay, Uttar Banga Krishi Viswavidyalay and University of Animal Science and Fisheries were all within it.) In the same year he became a member of Committee on Science and Technology, Govt. of India.

In 1970 he went to Delhi to join as a full-time member of the National Commission on Agriculture. The reports of the Commission on different aspects (such as education, research, extension, etc.) of agriculture, including animal husbandry, fisheries and social forestry, were published in several volumes. Among these the volume on education, research and extension was written solely by Professor Mukherjee. This bears the testimony of his painstaking work and far-sighted concepts. After the expiry of the 5-year term of the Commission, in 1976, he returned to Kolkata as Director, Bose Institute. After a few months he became the Vice-Chancellor of Calcutta University wherefrom he retired on December, 1978.

In 1978 went to USSR to attend the Congress of the World Federation of Scientific Workers. In 1986 he went

to France as a member of the Indian delegation to participate in discussions related to rural development programmes in France. In 1984 he went to Vietnam on an international delegation of scientists to gather *in situ* evidence for the extensive pollution of soil, water, aquatic life as well as human deformations resulting from the chemical warfare launched by American soldiers against Vietnam during 1965-75.

Professor Sushil Kumar Mukherjee breathed his last on November 18, 2006. He is survived by his wife, Professor K.K. Rohatgi-Mukherjee and a vast community of colleagues, students and admirers.

Research Works

Professor Mukherjee carried out research in various fields. He has published more than 200 research papers. Here a few of his research works will be briefly discussed. In his initial years his research was mainly on clay mineralogy. Later he shifted to soil organic matter. He established a School of Humus Research that is till today the most recognized Indian centre at the international level. He studied extensively the mineralogy, genesis and transformation of soils in the field in Eastern India.

Many methods have been proposed to determine the exchange capacity of clays. The results vary with the concentration of ions used for exchange and the pH. Professor Mukherjee studied the causes of the differences and formulated conditions under which fairly reliable results might be obtained. He developed the KCl-KOH method which gives rapid and reliable results.

Professor Mukherjee studied ion-exchange and calculated thermodynamic quantities of exchange reactions utilizing ion activity measurements by membrane electrodes. He applied in a novel way the Donnan membrane equilibrium concept for the determination of ion activity in colloidal clays. He studied the nature of exchange and interchangeability of various metal ions. He studied the absorption characteristics of proteins, sugars, alkaloids, krillium, urea, cetyltrimethyl ammonium bromide and humic acids on smectite and showed that non-ionic organic molecules of polar character could be absorbed on its basal plane surfaces. He investigated the absorption of quaternary ammonium compounds on different clay minerals and their mixtures. The results are of much interest for the identification and separation of component clay minerals from mixtures. He studied the absorption characteristics of cationic dyes such as methylene blue, crystal violet, etc. Results were used for determining orientation of these molecules at the surface as well as surface area of the clay.

Towards the end of his research career, Professor Mukherjee studied soil organic matter. The macromolecular character of soil humus and its various fractions were systematically and thoroughly studied by taking recourse to electrometric, viscometric, osmometric, diffusion, light scattering and spectral measurements. His research work on physical chemistry of humus laid the foundation for the development of macromolecular structures of humic substances.

Honours and Awards

As a recognition of his contributions he has own several distinctions and awards. He was a Fellow of the Indian National Science Academy and the National Academy of Agricultural Sciences. He obtained the J.B. Chatterjee Memorial Medal of the Calcutta School of Tropical Medicine(1980), Acharya J.C. Ghosh Memorial Medal of the Indian Chemical Society (1983), Golden Jubilee Award of the Indian Society of Soil Science(1984), Distinguished Service Award of the Indian Science Congress Association during its Platinum Jubilee (1990), Honorary membership of the International Society of Soil Science (presently renamed as the International Union of Soil Science)(1966) (he was the first Indian who received the recognition), Dr. B. C. Roy Birth Centenary Oration (1992). He delivered Indian National Science Academy Silver Jubilee Commemoration Medal Lecture on Agricultural Sciences at Madurai in 1988. He was conferred the Honorary D. Sc. Degrees of the University of Kalyani (1983), University of Burdwan (1988) and Bidhan Chandra Krishi Viswavidyalaya (2006).

He was actively associated with many organizations. To name a few, he was the President, Indian Association for the Cultivation of Science; Vice-President, Asiatic Society; founder President, Clay Minerals Society of India; founder President, Scientific Research Workers' Association; Secretary and Editor, Research Workers' Association of India; President, Ramakrishna Mission Seva Pratisthan; President, The Calcutta Heart Clinic and Hospital Society; founder and first elected President of West Bengal Academy of Science and Technology; Secretary, Indian Chemical Society; Editor, Indian Journal of History of Science; Editor-in-Chief, Everyman's Science, a journal of the Indian Science Congress Association. His editorials were admixture of science and social cause. In one of his editorials in Everyman's Science (Vol. 35, No.2 (2000) he cautioned against the exploitation of multinational companies like Monsanto in pushing Genetically Modified (GM) seeds into the Indian scenario and destroying the bio-diversity of the country . He earned the displeasure of

the proponents of GM seeds and was relieved from the post of Editor, Everyman's Science.

Social Activities

In addition to his teaching and research Professor Mukherjee was involved in various social and cultural activities. He had been associated with a number of learned organizations and institutions. He invariably rose to the occasion and provided leadership when situation demanded. He founded the Calcutta University Teachers' Association and was its first General Secretary. After coming to power in 1977 the Left Front Government in West Bengal abolished English and pass-fail system at the primary level. Alongwith the renowned linguist Sukumar Sen, Dr. Nihar Ranjan Roy, Dr. Rabindra Kumar Dasgupta and many other distinguished educationists Professor Mukherjee was deeply involved in the movement to re-introduce English and pass-fail system at the primary level. At the same time, to resist the fall in the standard of primary education as a result of abolition of English and pass-fail system at the primary level he formed Primary Education Development Board, West Bengal and introduced Primary Final Examination (popularly known as the Britti Pariksha) for the students of Class IV. He was the founder President of the Board and was its President till his death. It is remarkable that a person of the stature of Professor Mukherjee was so concerned for primary education. In 1986 the Govt. of India declared its National Education Policy (NPE, 1986). Educationist felt that the policy was highly anti-people and to resist the policy they formed All India Save Education Committee. Justice V. R. Krishna Iyer was its President and Professor Mukherjee was its General Secretary. They not only criticised and opposed NPE, 1986 they placed before the government "An Alternative Draft

Education Policy" after thorough discussion by educationists throughout the country. To fight against imperialism he formed All India Anti-imperialist Forum and was its founder General Secretary. At the initiative of this forum an international organization to fight against imperialism was formed with Mr. Ramsay Clerk, former Attorney General of USA, as its President. He meticulously followed science in daily life and wanted to eradicate unscientific beliefs among the people and develop scientific bent of mind in them. So he associated himself with Breakthrough Science Society as its Founder Chairman, Advisory Board.

Conclusion

Professor Sushil Kumar Mukherjee was not only an internationally reputed scientist and educationist; but he upheld the glorious legacy in the present decadent society. By virtue of his selfless devotion, relentless efforts for the cause of science and society he will be remembered as the doyen of Indian science and torch-bearer of the Indian Renaissance. We can give true homage to Professor Mukherjee by following his ideals and being involved in movements for the cause of education and society.

Acknowledgement

The author is indebted to Professor Sushil Kumar Mukherjee Birth Centenary Celebration Committee, Indian Chemical Society. □

References

1. *Journal of the Indian Society of Soil Science*, **54**, 519-520 (2006)
2. <http://www.rcais.res.in/skm.htm>
3. <http://lists.econ.utah.edu/pipermail/rad-green/2006-November/023431.html>