

OBITUARY



Subir Kumar Ghosh
(1932-2008)

Professor Subir Kumar Ghosh, the doyen of modern structural geology, breathed his last on 30 October, 2008 after a massive heart attack. Though he was seriously ill for the last five years, his death came as a great shock. He was not only my teacher, but also my friend, philosopher and guide for more than 40 years.

He initiated the modern trend in structural geology in the country by combining experimental and mathematical models with detailed field studies. In a span of fifty years of research, he has covered a wide spectrum of topics in structural geology and made significant contributions in each of them. The scientific work of a person is judged not by the number of papers but by the impact of his research on the subject as a whole. Ghosh's research was able to create that kind of enduring impact on the subjects he dealt with. For this reason, he was much admired by fellow researchers from all over the world. Susan Treagus, who was the Chief Editor of *Journal of Structural Geology* for nearly twenty years, considered Subir Ghosh to be one of the greatest structural geologists of the 20th century.

Born in 1932, Subir Ghosh completed his BSc, MSc and Ph.D degrees from Calcutta University. He joined the Department of Geological Sciences of Jadavpur University in 1958. His early research involved detailed field studies to work out the time-correlation of the structural and metamorphic histories of a complex terrain in the Kuilapal area in eastern India. In 1965 he went to Uppsala University, Sweden and carried out research in collaboration with Hans Ramberg. This visit completely changed the course of his future research. He was introduced to analogue modeling to simulate the development of natural structures. He conducted a series of innovative experiments on general

principles of buckle folding of single layers and multi-layers as well as on interfering buckle folds. The results of this research were published in several papers in *Tectonophysics* and became landmark classics. In addition, he also carried out comprehensive field studies on the structural histories of two regions in Scandinavian caledonides. After two years of extensive research, he received the Filosofi Doktorsgrad degree from Uppsala University in 1967. Ghosh visited Uppsala again for two years in 1977 and published a number of important research papers on the kinematics of rotation of rigid bodies in relation to a deformable matrix. Ghosh and Ramberg's paper on rotation of spherical and ellipsoidal inclusions in pure shear, simple shear and complex deformation (published in 1976) became a benchmark paper that initiated a volume of future research on that aspect.

He initiated an experimental laboratory in his office at Jadavpur University in 1967 with very basic facilities and negligible financial support. During this period, I had the privilege to start my Ph.D. programme under his supervision on pebble deformation which combined experimental, theoretical and field studies. This was the first time such a laboratory was set up in India and it was also one of the first few in the world. In those days, we hardly had any contingent money. I remember the trials and tribulations he had to go through to overcome many obstacles in order to design and obtain deformation machines with the help of local carpenters. He also prepared a variety of suitable model materials using locally available cheaper ingredients for particular types of experiments. In spite of many hurdles and a heavy load of teaching assignments, he conducted world-class research from that room, which was also his laboratory for several years. Over the years, the small

makeshift laboratory became a full-fledged experimental deformation unit and a large number of students carried out research for Ph.D or M.Sc degrees.

He was an enthusiastic field geologist and gave due importance to the study of natural structures and used mathematics and experiments as important tools to study the mechanism of development of those structures. All his work reflects a holistic approach of integrating field, laboratory and theoretical studies. In addition to his pioneering work on the study of rotation of inclusions in a deformable matrix, he made outstanding contributions on different aspects of superposed buckle folding showing how different modes of interfering folds develop depending on the initial tightness of the early folds. His works on the theory and experimental study for development of chocolate tablet boudinage and study on boudinage and composite boudinage in a migmatitic terrain deserve special mention. In later part of his research, he concentrated on evolution of ductile shear zone structures in Singhbhum, Kolar and showed how early folds develop at high angle to the mylonitic lineation and then gradually rotate towards the stretching direction. His study in the Phulad shear zone dealt with development of a variety of sheath folds and rotation of long tectonic clasts in a transpressional shear zone. His theoretical studies include the problem of shearing on axial plane foliation, deformation of early lineations in shear zones, refolding by flexural flow, classification of transpressional deformation and rotation of long tectonic clasts in a transpressional shear zone. Other important researches are study of diastrophic deformation of convolute structures, experimental investigation of ridge-offsets in transform faulting, analysis, tectonics of Jharia coal basin etc.

Ghosh was a true scientist and an ideal researcher – always innovative and original in his thinking. He was also a perfect teacher who could inspire his students to pursue creative thinking rather than merely repeating text book topics. He had a very simple style of explaining complex subjects in a lucid manner. This lucid style of teaching is reflected in his book *Structural Geology:*

Fundamentals and Modern Developments which was published in 1993.

He received the Bhatnagar Prize of CSIR, K. Naha Memorial award of INSA and was a Fellow of the Indian National Science Academy and Indian Academy of Sciences. He was with the Editorial Advisory Board of the Journal of Structural Geology and Tectonophysics for many years.

He was an intellectual with varied tastes and many sterling qualities. Although structural geology was his first love, he was very much interested in art and literature. A poet himself, he learned French in order to read original French literature and translated them to Bengali. He had a thorough knowledge of impressionist, post-impressionist, modern and post modern painting and enjoyed drawing and painting himself. His field notebooks over the years are a treasure trove of excellent sketches of complicated structures in the minutest details. He was an avid reader – not only of the classics and poetry but also of other books of subjects ranging from politics and economics to detective novels. For the last five years he was undergoing peritoneal dialysis, with a very delicate heart condition and was not allowed to venture out of his residence. But despite his physical discomfort, he did not lose his zest for life and was mentally very active. In these years, whenever I returned from a field trip, he would be eager to know each detail and would get excited on seeing an uncommon specimen. Even during the later stages of his illness, he retained his ‘never give up’ attitude towards life. He painted, wrote a comprehensive treatise of Indian history since independence, composed Bengali poems, translated long French papers, read all kinds of books and of course discussed our research plans.

He is survived by wife Sheila and son Abhik, who is a professor of Chemistry of international repute. Professor Subir Ghosh will always remain as an inspiration to the students and researchers of structural geology.

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