



Obituary

Subir Ghosh (1932–2008)



On October 30, 2008, we lost the eminent structural geologist Subir Kumar Ghosh, after he suffered a massive heart attack. Although he was seriously ill for the last five years, nonetheless, his death came to us as a great shock.

Subir Ghosh was born on March 1, 1932 in Calcutta, India. He completed his B.Sc., M.Sc. and D. Phil (Science) from Calcutta University. Ghosh joined the Department of Geological Sciences at Jadavpur University, Kolkata as a faculty, in 1958. His early work involved detailed field studies to work out 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 proved to be the watershed for his future research work. He was introduced to analogue modeling in order to simulate the development of natural structures. He conducted a series of innovative experiments on general principles of buckle folding of single layers and multilayers as well as on interfering buckle folds. In addition, he also did comprehensive field studies on the structural histories of two regions in Scandinavian caledonides. After two years of extensive research, in 1967 he received the Filosofi Doktorsgrad degree from Uppsala University. On his return to India in October 1967, he initiated an experimental laboratory in his office at Jadavpur University 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. I remember the trials and tribulations he had to go through to overcome many obstacles in order to design and obtain deformation machines as also to choose a variety of suitable model materials for particular types of experiments. This was the first time such a laboratory was set up in India and I believe, it was also one of the first few in the world. In those days, we had limited

contingent money and sometimes he paid for materials or machines out of his own pocket. In spite of next to nonexistent infrastructural facilities and a heavy load of teaching assignments, he conducted outstanding research work from that room, which was also his laboratory for several years.

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 (1976) paper on reorientation of inclusions in pure and simple shear became a benchmark paper that initiated a volume of future research on that aspect.

After his return to Jadavpur University, he continued to make significant contributions to a wide spectrum of structural geology. He combined detailed field investigations with theoretical and experimental studies. He was an expert on analogue and mathematical modeling and produced a large number of research papers on the fundamental aspects of development of structures. He was also a keen field geologist and carried out a variety of research work based on meticulous studies of mesoscopic structures in the actual field outcrops. The study of natural structures was a vital part of his research. All his works reflect this holistic approach of integration of field, laboratory and theoretical studies.

He made seminal contributions to diverse aspects of structural geology. Superposed buckling was one of his favourite topic and in a series of papers over a span of thirty years he made a comprehensive contribution to our understanding of buckle folding of single and multilayers, superposed buckle folding, buckling by constrictional deformation and hinge migration and hinge replacement of buckle folds in superposed deformations. In addition to a series of important papers on rotation of spherical and ellipsoidal inclusions, he made an interesting study of rotation of long tectonic clasts, where depending on the initial orientation of the clasts with respect to shear direction, these may show opposite sense of rotation on the same section. His study on deformation of early lineations showed that how the early lineation patterns over folds could be utilized to interpret the nature of deformation. He made valuable contributions to the problem of shearing on axial plane foliation, theoretical and experimental study for development of chocolate tablet boudinage, theoretical analysis of refolding by flexural flow, experimental investigation of ridge-offsets in transform faulting, classification of transpressional deformation etc. In his later years he concentrated on the study of shear zones in different parts of India and made important contributions on progressive evolution of structures in shear zones including development of planar, nonplanar and refolded sheath folds, development and

rotation of successive generations of folds and lineations. His studies of boudinage and composite boudinage in migmatitic terrains, diastrophic deformation of convolute structures, deserve special mention.

He received many awards including the prestigious Bhatnagar Prize of India and was a Fellow of the Indian National Science Academy and Indian Academy of Sciences. He was in the Editorial Advisory Board of the Journal of Structural Geology and Tectonophysics for many years.

Ghosh was an introvert and a shy person; in the words of Win Means – he was a gentleman and a gentle man. Except for a close group of friends and students, he was reticent and reserved. However, he was an excellent and affectionate teacher. He was innovative in his approach and always included recent researches in the curriculum; His style of teaching was simple and unobtrusive with a capacity to explain a complex subject in a very lucid manner. This lucid style of teaching is reflected in his book *Structural Geology: Fundamentals and Modern Developments*, which was published in 1993. After his death, we have received several messages from a large number of young researchers from different parts of the world, who considered themselves as students of Subir Ghosh through his book.

Structural Geology was his passion. Quite often, while supervising M.Sc or PhD students, he would get so involved with the work that he would carry out the experiments or the analyses himself. He enjoyed fieldwork immensely, where he would be transformed into a totally different person. During our numerous field works together over the years, I have seen how he would get excited like a child on seeing an interesting exposure. On such an occasion, once he told me that he feels that it is amazing that

he gets paid for something he loves to do. I have many memories of those field trips where we not only discussed structural geology but also spent hours talking about art, literature and politics.

He was an intellectual of varied tastes and many qualities. He was a voracious reader and almost always had a book in his hand. He enjoyed reading anything from classics to detective novels; poetry to science or politics based non-fiction. A poet himself, he learned French to read original French literature and translated many poems to Bengali. He enjoyed drawing and painting as well. His field notebooks over the years are a treasure trove of excellent sketches of complicated structures in the minutest details.

For the last five years he was under peritoneal dialysis thrice a day, 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 as active as ever. Subir Ghosh was a true scientist, a great teacher, a torchbearer for generations to come and most importantly a good human being. My heartfelt condolence goes to his wife Sheila who has faced the difficult time with courage and fortitude and his son, Abhik, who lost such an affectionate father.

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