Cytogenet. Cell Genet., 1995, **70**, 95–101).

Armed with the new and powerful technology, ATN and co-workers explored many basic questions on the formation of radiation-induced chromosomal aberrations such as individual chromosome sensitivity, translocations versus dicentrics, rings versus inversions, reciprocal and non-reciprocal translocations, etc.

Basic research invariably gives room for varied interpretations of the data derived from similar and entirely different designs of experiments. Thus, ATN had serious disagreements with the paper published by Carrano *et al*. (*Nature*, 1978, **271**, 551–553) on the correlation between sister-chromatid exchanges (SCEs) and mutagenesis. In fact, the paper suggested that SCEs could be used as an indicator of mutagenesis. ATN disagreed with this view.

ATN has also made monumental contributions to the elucidation of two major pathways of repair of dsbs, namely non-homologous end joining (NHEJ) and homologous recombination (HR). His notable contribution in this regard is that NHEJ operates at all of the cell-cycle phases and HR largely operates in S and G_2. There is no doubt that knowledge gained from basic research should solve specific problems of humanity. Basic research conducted by ATN has been useful to assess human health problems arising from accidental exposure to ionizing radiation. In 1987, the International Atomic Energy Agency (IAEA) requested ATN to establish a Biological Dosimetry Laboratory in Rio de Janeiro, Brazil, mainly using frequencies of radiation-induced dicentrics for estimating the absorbed dose in accidents involving ionizing radiation. After the notorious Chernobyl accident in the former USSR, a relatively minor radiation accident occurred in Goiania, Brazil. The newly established Biological Dosimetry Laboratory was useful in making initial dose estimates in about 100 exposed people (*Radiat. Prot. Dosim*., 1988, **25**, 97–100). ATN also assessed the stability of translocations using FISH. An interesting finding was that the stability of translocations was only valid at low doses (<1 Gy); at higher doses, the frequencies reduced with time (*Mutation Res*., 1988, **400**, 299–312).

ATN also carried out biological dosimetric studies in the Chernobyl radiation accident on populations living in the contaminated areas (Gomel Region) and in Estonian Clean-up workers using FISH technique.

7 August 2005 marked the 80th Birthday of MSS. The *Current Science* with P. Balaram as the then editor had come forward to provide a special section in honour of MSS. ATN and PCK were the guest editors, and the title of the Special Section was 'Chromosomes to food security'. It represented the initial beginning point of MSS in cytogenetics and then his long journey to the destination of a Hunger-free world.

ATN's journey in science has covered studies on pollen grains of plants to the elucidation of molecular mechanisms in the action of ionizing radiation on mammalian (including human) chromosomes.

Despite his busy schedule ATN always made it time to come to Chennai in December every year to attend the music festival. The bonds that ATN established with MSS and his family as well as numerous friends would take a long long time to wane after his demise.

ATN is survived by his daughter and grandchildren.

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Supriya Mohan Sengupta (1932–2017)

Professor Supriya Mohan Sengupta breathed his last on 29 August 2017 in Kolkata. He has left a legacy of novel thinking and conducting innovative scientific research. While accepting the universal inevitability, we celebrate his contributions.

Ever interested in scientific and mathematical rigour, the young Sengupta realized during his fieldwork that linear averaging of azimuthal, hence circularly distributed, palaeocurrent data is statistically invalid. His appointment in the Geological Studies Unit (GSU) of the Indian Statistical Institute (ISI, Kolkata) provided him with the opportunity to do something about the then inadequacy. He collaborated with statisticians and the first paper on the solution – a short 10 pages in *Sankhya* (1966) – had an immediate impact. It is said that this paper with J. S. Rao (now known as S. Rao Jammalamadaka) convinced a Review Committee visiting ISI at the time that solutions to problems in natural sciences

needed new theoretical advances in statistics and hence the importance of maintaining GSU and other units of natural science in ISI. Several statisticians followed up on this new and interesting topic that has now blossomed as a full-fledged area of statistical research known as circular or directional statistics. This new statistics applies to all directional data such as those of wind directions, mineral lineations, plunges of folds, quartz *c*-axis orientations, etc. but has not become popular with geologists. The area is still wide open for new research.

Sengupta also inspired other colleagues to formulate a statistical device to assess the boundary between mappable units, the outcrops of which are generally disconnected in the field. This approach has not been tested extensively in geological mapping and remains an open area for further research.

Rigorous experimental sedimentology had barely past its infancy when

Sengupta visited the laboratories of Ph. H. Kuenen (Groningen) and A. Sundborg (Upsaala) in early 1960s. He not only conducted new experiments, but also learnt about designing flumes. While an M Sc student in the 1950s, his acumen in innovation and instrumentation contributed to his designing a petrographic slide-rule. This quality of his mind led to the design and construction of a recirculating flume in ISI (the first in India) and subsequently two in IIT Kharagpur, to quantitatively study sediment movement in water currents. The phenomenon of entrainment of grains from an incoherent substrate and their size-distribution in suspension fascinated him. He subscribed to the idea that fundamental scientific understanding of all natural phenomena begins with setting up continuity equations, even if one has to make many assumptions. Thus, running flume experiments intimately involved collaboration with experts in fluid mechanics and statistics. A lifelong collaboration with Dr B. S. Mazumder and Dr J. K. Ghosh ensued. Experiments in these flume labs and others (e.g. IIT Madras) encouraged robust research and resulted in many seminal publications culminating in three international conferences at ISI (2006–2010). By then formally retired, Sengupta attended all as a specially invited guest. These labs are populated mostly by researchers from fields other than geology, due to the intellectual inspiration spurred by Sengupta.

In 1960s when he began to study the Gondwana rocks that hosted the remains of the dinosaur *Barapasaurus tagorei*, Sengupta immediately discovered a fallacy in the standard stratigraphy of the time. The mappable sedimentary rock units in a basin – Formations – were considered as lithified remains of sediments deposited in a fixed bracket of time. Formations were stacked up and listed, layer upon layer, in relative order of the inferred ages of original sedimentation in all textbooks. Characteristically, Sengupta did not simply bring up a contest, but worked to find the solution. Long before the concept of 'sequence stratigraphy' was proposed and later established, he figured out that the architecture of a sedimentary basin was built with much smaller genetic units of sedimentation (e.g. river sands, floodplain muds, wetland bogs, death beds of organisms, etc.) that were all interrelated, if not interconnected as well, and distributed in both space and time. These smaller units could be bundled into larger mappable formations, each with a dominant motif, which would not be coeval; they may stack-up in an interfingering architecture in a single 3-D geographic domain. His incisive paper (*J. Sediment. Res*., 1970) on the pattern of Gondwana sedimentation was far ahead of its time and is still to be appreciated fully in studying the architecture of sedimentary basins in India.

Sengupta taught methodically and took his students through steps of logic and reasoning. He used simple familiar examples. For instance, asking beginning students to hold their hand-lenses close to their eyes – as if they were wearing prescription glasses – instead of next to a hand specimen or a rock-outcrop. His book *Introduction to Sedimentology* (Oxford/Balkema, 1994, p. 314; 2007, 2nd edn, p. 339), written from a teacher's perspective and easy access, is the standard text in India.

Sengupta was an avid reader. If one were to visit him at his residence in Hindusthan Park, Kolkata on a Sunday morning, one would likely find a bookseller delivering books on various topics. Rabindranath Tagore and Sunil Gangopadhyaya were his favourite authors. He loved Tagore songs. He often recited a poem by Tagore, a recurring thought in which was never to stop striving in one's journey to infinity.

He was *a gem of purest ray serene …*

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