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## Liquid Crystals

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## Professor Sivaramakrishna Chandrasekhar, FRS

On March 9, 2004 I received the sad news from his daughter Indira that Professor S. Chandrasekhar had died the previous day. He had suffered a mild heart attack and a stroke in January, but was recovering well when he had a fatal cerebral haemorrhage on March 7 and died on March 8. Together with the Editors of the Journal, the members of the Advisory Board and all the readership of *Liquid Crystals* I extend our deepest sympathy to his wife Ila, their family and their grandchildren on this saddest of occasions.

All of us in the field know of his research, his teaching and the extensive work that he did for the liquid crystal community and the enormous respect in which he was held by the scientific community worldwide, but to many of us, Chandra, as he was known affectionately, was more than that – a long standing and very dear friend whom we will miss very greatly.

Chandra went to the Department of Physics in the University of Mysore in the 1960s as Professor of Physics and there first became interested in liquid crystals. This was an important event, as liquid crystals became his main research pursuit from then on. After the death of Sir C. V. Raman in 1971, Chandra joined the Raman Research Institute in Bangalore where his Liquid Crystal group quickly developed and soon achieved international research status. A major event there was his discovery in 1977, together with his students B. K. Sadashiva and K. A. Suresh, of discotic liquids. These constituted a completely new class of liquid crystal materials, quite distinct from the classical rod-shaped liquid crystal systems, and Chandra and his group, with its combined synthetic capability and means to study physical properties, were ideally placed to extend the range of known discotic materials and explore their unique physical characteristics. As a result of this seminal work, discotic liquid crystals became an active research area in its own right, with the development of a range of technological applications for the materials. The year 1994 saw the award of one of the prestigious Royal Medals of the Royal Society of London to Chandra with a citation which specifically mentioned his invention of discotic liquid crystals and the elucidation of their remarkable physical properties.

His other work on liquid crystals is too extensive to do justice to here, but specific mention has to be made of his elegant studies of the unique optical properties of chiral liquid crystal materials and how these properties

vary with pitch length, birefringence and sample thickness. Out of this came his discovery of an effect similar to the Bowman effect in absorbing chiral nematic materials in the neighbourhood of the reflection band. Important too were his studies of the effect of high pressures on liquid crystal systems, whereby it was demonstrated that liquid crystal properties could be induced in non-mesomorphic materials by pressure, and conversely that mesophases in some systems could be suppressed. His publications on these systems were scrupulously detailed in terms of the different critical points of the systems involved.

The citation for the Royal Medal mentioned above also spoke of Chandra's book entitled simply *Liquid Crystals* first published in 1977 and in revised and re-edited form in 1992. This book has surely been a desk and bench text for all working in the field, setting out in detail as it does the remarkable physics and physical properties of liquid crystals, but in a readily assimilated form and with a really first class glossary of references to the literature of the field. Many students writing doctoral theses over the years have much therefore for which to thank him.

Chandra also did much for the international advancement of the subject over the years. In the early days the Biennial International Liquid Conferences were managed by a steering and planning committee, chaired originally by Professor Glenn Brown and later by me, and in the run in to the 1982 meeting which was to be held in Krakow we became increasingly concerned about the political situation in Poland, to an extent that it was decided that the conference could not be held there. It was with great relief that Chandra came forward with the offer to host the meeting in Bangalore. This was accepted and with remarkably little time for its organisation a really fine meeting was held as the Ninth International Liquid Crystal Conference of 1982, thanks to the effort and the fund raising achieved by Chandra, his research colleagues and his family. Later, the planning and steering committee for conferences became the Committee of a newly founded International Liquid Crystal Society with a President, of which Chandra was the first. The Society now has over 50 Chapters in different countries, over 1000 members, and in 1998 Chandra joined Professor P. G. de Gennes, Professor A. Saupe,

and the writer as one of the first four Honored Members of the ILCS.

Many other honours have of course come Chandra's way, one of the most cherished being Fellowship of the Royal Society of London in 1983. He was also awarded a Gold Medal for his contributions to the development of liquid crystals at the international symposium on Neils Bohr and the Evolution of Physics in the 20th Century organised in 1998 by the Neils Bohr Institute and UNESCO in Paris. Then in 1999 he was made Chevalier dans l'Ordre des Palmes Academiques by the French Government in recognition of his research and teaching.

Despite these accolades and honours, Chandra showed none of the arrogance of some who achieve a lot, and remained a humble, friendly and caring person, greatly devoted to his family, friends and fellow researchers. To remind readers of him, I thought of using a rather formal, posed photograph of him to head this obituary, but my wife and I decided in the long run that how we liked to remember him was as he is in a photograph taken in Capri in 1996 at the meeting organised by Professor Sven Lagerwall in honour of the writer's 70th birthday. It is very much Chandra and his wife Ila, and although taken over 7 years ago, he looked no different on the last occasions upon which we met at the Nineteenth International Conference in Edinburgh in the summer of 2002 and at the conference



Chandra and Ila in Capri in 1996.

held in November 2002 in the International Centre for Theoretical Physics in Trieste, Italy to mark the 25th anniversary of Chandra's discovery of Discotic Liquid Crystals.

We remember him with affection, and his memory and his mark on the subject of liquid crystals will be enduring.

*Professor George W. Gray*  
March 2004