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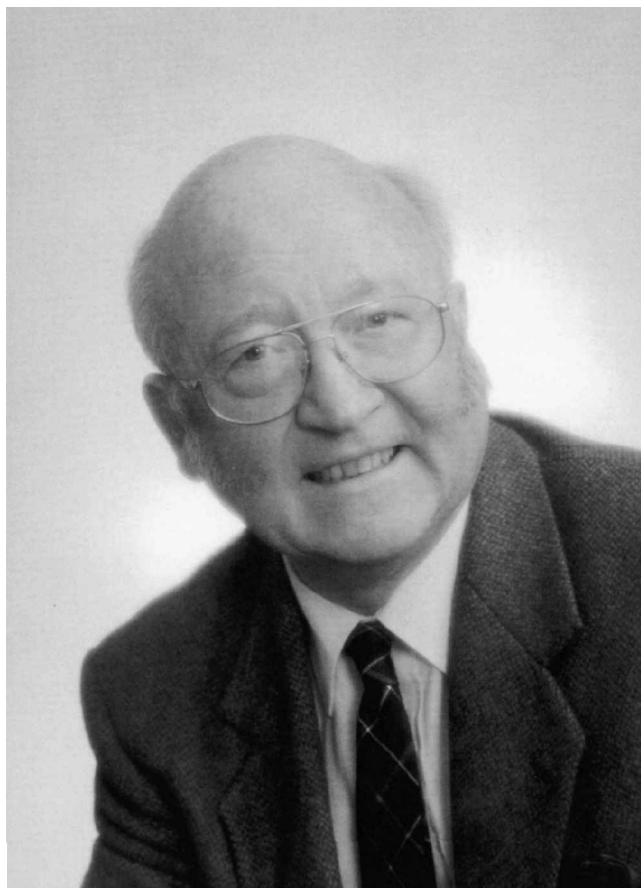
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Obituary

Professor Frank M. Leslie FRS (1935–2000)



Following complications after what should have been a relatively minor hip replacement operation, Professor Frank Leslie died on Thursday 15 June, 2000. His premature death, at the age of only 65, shortly before his retirement and while still scientifically active, brings great sadness to all who knew him. He was a fine scientist and a warm human being, and will be much missed within the liquid crystal and mathematics communities.

Frank Leslie was born in Dundee on March 8 1935. He received his secondary education at the Harris Academy in Dundee, before proceeding to Queen's College, Dundee (the predecessor of the University of Dundee, but then a constituent college of the University of St. Andrews), from where he obtained a first class honours in Mathematics in 1957. He then moved to Manchester, receiving there his Ph.D. for a thesis on fluid flow in the open thermosyphon in 1961. This research,

which involved the study of viscoelasticity in fluids, only related tangentially to the work for which he later became famous, in that his interests were already tending toward the behaviour of complex fluids. The thesis was formally supervised by Professor M. J. (later Sir James) Lighthill and Dr B. Morton, but in fact Leslie, already by this time an assistant lecturer in the Mathematics Department in Manchester, needed little supervision.

After completing his Ph.D., Frank Leslie was awarded a one year position as a Research Associate at the Massachusetts Institute of Technology. It was at MIT that his attention was first drawn to the work of Jerry Ericksen on anisotropic fluids. However, he did not return to the topic until after his return to Britain, where he took up a position as a lecturer in mathematics at the University of Newcastle in 1962. He stayed in Newcastle until 1968, apart from a sabbatical year in the US.

This sabbatical year was of crucial importance in the history of liquid crystal science. It was spent, at the invitation of Jerry Ericksen, as a visiting assistant professor in mechanics at the Johns Hopkins University in Baltimore, Maryland. At that time Johns Hopkins was a major centre for the study of the continuum mechanics of complex fluids of all types. Following Ericksen's suggestion, Frank Leslie investigated the continuum mechanics of anisotropic fluids, building on a series of papers by Ericksen himself on the hydrostatics of anisotropic fluids in the early 1960s.

The results of this work were published in two articles in 1966 and 1968. The first of these articles, in the *Quarterly Journal of Mechanics and Applied Mathematics*, 19, 357–70, was entitled 'Some constitutive equations for anisotropic fluids'. At this stage, the anisotropic fluids could not be definitively identified as liquid crystals, for there were 15 viscosity coefficients, and a parting comment that 'since the present theory does not reduce to Frank's hydrostatic theory of liquid crystals, it would appear that it is inadequate to describe these materials'.

However, in fact, Leslie was working hard in an effort to generalize the Frank theory. F. C. Frank's theory was in fact merely a consolidation of a static theory due to the Swedish theoretical physicist Carl Wilhelm Oseen (1879–1944). Oseen's student and successor Adolf Anzelius had attempted to generalize Oseen's theory to the dynamical regime, but had not been entirely successful. Ericksen had handed Leslie a copy of Anzelius's thesis, and after some thought, Leslie was able to overcome

the problems which had foiled Anzelius. The result was published after Leslie's return to Newcastle, under the modest title 'Some constitutive equations for liquid crystals', in *The Archives of Rational Mechanics*, 28, 265–83, and has become, with some minor additions, the standard continuum theory of liquid crystals.

These two papers were sufficient to make Frank Leslie's reputation. The paper he is not famous for, but perhaps ought to be, is entitled 'Distortion of twisted orientation patterns in liquid crystals by magnetic fields', and was presented at the international liquid crystal conference held in the summer of 1970 in Berlin. Unbeknown to Leslie, this was (apart from the trivial replacement of magnetic by electric fields) the theory of the twisted nematic cell which was shortly thereafter patented by Schadt and Helfrich from Hoffman-LaRoche in Switzerland and by Ferguson in the US. Frank Leslie, at that time a naive theoretician, was unaware of the technological possibilities, and missed being a millionaire by millimetres!

Frank Leslie's subsequent career corrected this lacuna. After 1975 he collaborated actively with the display device group at RRE Malvern, providing theories of relaxation in nematic liquid crystal display devices, and later constructing successful theories of smectic liquid crystals as well. In 1968 he moved to Strathclyde University as a senior lecturer, and was subsequently promoted to a readership in 1971, to a personal chair in 1979, and to an established chair in 1982. At Strathclyde he supervised several students, as well as welcoming a large number of visitors from abroad, of whom Tomas Carlsson and Masahiro Nakagawa are the best-known. His work at Strathclyde will live on in the group of talented young liquid crystal theorists, such as Jeff McKay, Iain Stewart and Nigel Mottram, that he had gathered around him in recent years.

His talents were widely recognized not only in this country, but also abroad. In this country he performed sterling service as Chairman of the British Liquid Crystal Society between 1987 and 1991. Perhaps his final public act, as a prelude to his anticipated retirement, was to host the British Liquid Crystal Society annual meeting in Glasgow in mid-April. At this meeting, surrounded by friends, he delivered an uproariously funny welcoming address which few present will forget.

He was in high demand as a speaker at international conferences (which he enjoyed attending, even when the mountainous terrain prevented any exercise of his golfing skills). In later years he often attended these meetings accompanied by his wife Ellen. He had been a visiting professor in the United States, Italy and Japan, and had served on the editorial board of several journals (including *Liquid Crystals*).

Leslie also received a number of honours. Apart from the Sykes Gold medal of the University of St. Andrews (1996), and the George Gray medal of the British Liquid Crystal Society (1997), he was elected Fellow of the Royal Society of Edinburgh in 1980, and as a pinnacle to his career was elected a fellow of the Royal Society of London in 1995.

Outside his work, Frank Leslie took great joy in his family, and celebrated his new status as a grandfather. He enjoyed hill-walking, golf and football as a Dundee supporter. Those of us who spent many happy hour together with him at conferences abroad and at home will miss his quiet sense of humour and analytical skill. We express our sympathy to his wife Ellen and his family at the loss of a much-loved husband, father and grandfather.

TIM SLUCKIN