

Obituaries

Dame Mary Cartwright 1900-1997

Dame Mary Cartwright was one of the most distinguished British mathematicians of this century. She was one of the first women to be elected a Fellow of the Royal Society, the first woman President of the Mathematical Association, President of the London Mathematical Society and Mistress of Girton College, Cambridge.

Born in Aynho, Northamptonshire, where her father was curate and later rector, Mary was first educated at home. Then, at age 11, she was sent to Leamington High School and subsequently to the Godolphin School, Salisbury where she was taught by a Miss Hancock. Mary paid tribute to her as an excellent mathematics teacher who prepared her for the Senior Cambridge examination and suggested that she study at Oxford. In 1919 she went up to St. Hugh's College to read mathematics. There were just five women studying mathematics in the whole university and she was the only one who lasted until finals, the others having changed subjects. In her third year, in a move which was crucial to her subsequent career, she began to attend the famous Monday evening classes of Professor G. H. Hardy. These classes were essentially informal seminars dealing with topics beyond the undergraduate syllabus and they brought her into the orbit of Hardy and Littlewood, the leading British analysts of the time.

On graduating with a First in 1923 she went into school teaching as she did not want to impose further on her father for finance. She taught mathematics at the Alice Ottley School, Worcester and then at Wycombe Abbey School. As an inexperienced teacher, she had to teach as directed by the Senior Mathematics Mistress and this she found frustrating, with little scope for developing new ideas. After three and a half years she decided to give up school teaching to go into research. However, her experiences had made her sympathetic to teachers and their problems and many years later she organised meetings in Cambridge for mathematics teachers to widen their horizons and enhance their self-esteem. Throughout her life she maintained a keen interest in education and shared the aims of the Mathematical Association.

In January 1928 she returned to Oxford to do research under Hardy. Her thesis, which she completed in under three years, was on 'Zeros of Integral Functions of Special Types'. On the strength of this she was awarded the Yarrow Research Fellowship at Girton College. This brought her into contact with Littlewood and, fortunately, Hardy moved back to Cambridge shortly after, so that she found herself in the right place at the right time. For some years she continued to work in the theory of functions and obtained outstanding results relating to zeros of integral functions, maximum and minimum moduli and functions of finite order in an angle. This brought her close to the topic now known as fractals.

Then, in 1938, with war on the horizon, there came a drastic change of direction. The Radio Research Board of the Department of Science and

Industrial Research appealed to the London Mathematical Society for assistance in dealing with problems arising in defence. Responding to this appeal, Cartwright and Littlewood turned their attention to non-linear differential equations – in particular the equation of Van der Pol, introduced to describe the oscillation of radio waves. There followed a long fruitful collaboration resulting in significant results on the periodicity and stability of solutions of non-linear differential equations, which form the basis of the modern theory of dynamical systems and chaos. In her presidential address to the Mathematical Association in 1952 'Non-linear vibrations: a chapter in mathematical history', she gives a very clear account of the subject and of the work being done in the United States and Russia. With the advent of powerful computers and their capacity to display complex geometrical patterns on the screen, the subject pioneered by Cartwright and Littlewood has attracted increasing attention and is at the centre of much current research. Chaos and fractals have moved from being esoteric parts of analysis to almost excessive popularity, glibly quoted by journalists and politicians alike.

From 1936-1949 Mary Cartwright was Director of Studies in Mathematics at Girton and this involved a considerable amount of teaching. Her students found her friendly and understanding of their difficulties. By her enthusiasm she encouraged them to greater effort and the supervisions were enlivened by a wry sense of humour. In 1949 she became Mistress of Girton and I met her in that capacity when I came to Girton from Edinburgh. I attended her lectures and two years later, despite her many other commitments, she agreed to take me on as a research student. I found her stimulating and supportive. She understood the frustrations faced by research students, especially in their first year. Often, after a depressing week, I would go along to the supervision ready to give up. She would be waiting with my paltry script in her hand and immediately launch into a discussion of the points raised. This would lead her on to other topics upon which she would expand with enthusiasm and suggest that I should explore them. Armed with her encouragement, I left feeling buoyant and ready to tackle the problems. It was a great privilege to be supervised by her.

During Mary Cartwright's Mistress-ship 1949-1968 (the longest tenure of any Mistress) there were many changes at Girton. The women's colleges had become fully incorporated into the university at the end of her predecessor's term of office. Under Cartwright's leadership Girton took its place quietly and effectively in the day-to-day work and long-range planning of the university.

Many honours were bestowed on her. She was awarded the Sylvester medal of the Royal Society, the De Morgan Medal of the London Mathematical Society and many honorary degrees from universities at home and abroad. In 1969 she was appointed DBE and in retirement she held visiting professorships in American and European universities.

Because of her mathematical eminence, and the important positions she held, Mary Cartwright became a role model and an inspiration for

subsequent generations. The increasing number of women mathematicians in British universities is an effective tribute to her influence.

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Sir James Lighthill F.R.S. 1924-1998

A personal reminiscence by Sir Bryan Thwaites

Not for me, now, the typical tribute to a man of stupendous intellect and achievement – such has already been paid in obituary columns, notably of *The Times* (20 July 1998) and *The Independent* (22 July 1998). And in due course we shall have his entry in the Biographical Memoirs of The Royal Society which will describe his scientific achievements with an authority beyond my own capacity. Instead, I would like to offer to the members of The Mathematical Association some glimpses of James – as I shall call him here – which perhaps even those who knew him through mathematics may not have seen, and with which younger members might enhance their more distant perception of a mathematical colossus.

Winchester College is, I suppose, the most academic of all schools and its seventy scholars, at least when they enter, are clever far beyond normal reckoning. But what hit the school in 1936 was, even by its standards, quite remarkable – a pair of mathematical wizards intellectually out of reach of ordinary Wykehamists like myself. I think that James had only one inferiority complex in the whole of his life and that was against Freeman Dyson: Freeman even beat James by one year to his F.R.S. (but both, uniquely in modern times, before the age of thirty). And if James was not all that attached to his old school – as was hinted in the oration at his funeral service – it was probably because neither boy felt the need for ordinary teaching as a supplement to the resources of his own intelligence. Certainly this theory can be supported by James's amazing gift, later in life, for picking up languages by himself through bed-side reading.

So in those days my contact as an exact contemporary of both was confined mainly to the Chapel Choir where, as a bass, I was in a good position to observe his alto's strange tuft of silver hair among the brown which I fancifully regarded as the aerial which picked up inspiration from the aether. His music, however was more pianistic than choral, and he used to insist that the Hammerklavier was the greatest of keyboard works. But if this was arguable – and not much was ever arguable with James – it led him to meet a cellist named Nancy whom he married, typically precociously, at the age of twenty-one. The great happiness that the two of them then shared throughout their life together was itself an inspiration to their friends, especially so because of the difficulties they courageously surmounted over children's early illnesses; and only they know the pain of a daughter so seriously handicapped that she has never lived with them.

Nancy has always been the only person to exert any meaningful influence on James (apart from the likes of Littlewood in his days at Trinity