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14–17 minutes

Sir Peter Francis Swinnerton-Dyer (1927–2018), by Patrick George, *c.* 1983

Dyer, Sir (Henry) Peter Francis Swinnerton- (1927–2018), mathematician, university administrator, and public servant, was born on 2 August 1927 at Birney Wood, Throckley, Northumberland, the only son and elder child of Sir Leonard Schroeder Swinnerton-Dyer, fifteenth baronet (1898–1975), engineer and businessman, and his wife, Barbara Winifred, *née* Brackenbury (1905–1990), daughter of Hereward Brackenbury, of Seaton Burn House, Northumberland, a wealthy Newcastle businessman. The family moved to Shropshire when he was about five. His father had served as a lieutenant in the Royal Field Artillery during the First World War; much later he was president of the British Chess Federation (1956–8) and chairman of Salop county council (1969–75). The baronetcy had been created in 1678 for

William Dyer, a lawyer, of Tottenham, who had married the heiress of Thomas Swinnerton, of Stanway Hall, Essex (himself the heir of Sir John Swinnerton, lord mayor of London). Peter Swinnerton-Dyer's ancestors were mostly naval or army officers; he was the first to go to a university.

Swinnerton-Dyer recalled that his mother was ‘interested in everything, very lively and vigorous’, and ‘much more interested in academic things than my father’ (Macfarlane, interview). It was she who first stimulated his love of mathematics: ‘my mother said that, from the age of two, the only way to keep me quiet in the bath was to give me sums’ (ibid.). He was educated at a dame school in Church Stretton, then in 1935 went to the Dragon School in Oxford, where he was taught mathematics by Geoffrey Meister and developed his lifelong antipathy to cricket. From there he went to Eton as a scholar, where he rowed, developed an interest in music, and again excelled at mathematics, publishing his first paper (‘A solution of $A^4 + B^4 = C^4 + D^4$’) in the *Journal of the London Mathematical Society* when he was fifteen.

From Eton, Swinnerton-Dyer won a major scholarship to Trinity College, Cambridge, where he was taught by J. E. Littlewood, captained the university chess team, and was president of the university bridge club. He was a talented bridge player, and later represented Great Britain in the European open teams championship twice: in 1953 at Helsinki he and Dimmie Fleming came second, and in 1962 in Beirut he and Ken Barbour came fourth. He represented England in the Camrose trophy five times, and was part of teams that won the Crockford's cup twice, and in 1963 both the gold cup and the Tollemache trophy. He was also, into middle age, a keen and skilful player of squash, tennis, and real tennis.

Swinnerton-Dyer said of Littlewood's technique for selecting research students that:

[it] was simple: he gave you a list of some twenty or thirty problems and told you to come back when you had done one of them … I only later learnt that the way that the list was compiled was that they were all problems which a mathematician who he respected had seriously tried and failed to do. (Macfarlane, interview)

Swinnerton-Dyer duly brought back a solution and, after graduating, began a four-year research fellowship at Trinity. His main interest was already number theory and the obvious choice for a supervisor would have been Louis Mordell, G. H. Hardy's successor in the Sadleirian chair at Cambridge, ‘but he was a devoted and very bad bridge player and if he had been my supervisor I would have had to play bridge with him about once a week and the prospect didn't attract me’; he therefore stuck with Littlewood, whom he described as ‘one of the greatest mathematicians of the twentieth century in a distinctly old-fashioned way’ (ibid.).

After a year (1954–5) as a Commonwealth Fund fellow at the University of Chicago, where he worked with André Weil—‘as far removed in style from Littlewood as you can conceivably imagine’ (Macfarlane, interview)—Swinnerton-Dyer returned to Trinity as a teaching fellow. At the time he was elected to his research fellowship, G. M. Trevelyan was still master, but ‘I scarcely had any conversation with him as he didn't have much interest in the scientists’ (ibid.). He did, however, forge close and lasting friendships with the historians Jack Gallagher and Peter Laslett. As a bachelor don, he frequently hosted parties for undergraduates and graduates, or organized (or dropped in on) evenings of board games.

Trinity, which was not as wealthy in the 1950s as it was later, was keen for all its teaching fellows also to hold university posts, to relieve the financial pressure. Despite a lengthening list of publications, Swinnerton-Dyer failed to win a university lectureship in mathematics, losing out one year to Michael Atiyah and another to Christopher Zeeman. In 1960, however, he succeeded in obtaining a lectureship at the university's mathematical laboratory (later renamed ‘the computer laboratory’), where he worked with David Wheeler and Bryan Birch, both also fellows of Trinity College.

As a mathematician, Swinnerton-Dyer is most famous for ‘the Birch and Swinnerton-Dyer conjecture’, which he developed with Birch in the mathematical laboratory after using the EDSAC computer to investigate the properties of elliptic curves; this was probably the first time that computers had a major impact in pure mathematics. Published in the *Journal für die reine und angewandte Mathematik* in 1965, the conjecture states that an elliptic curve has either an infinite number of rational points (solutions) or a finite number, according to whether an associated zeta function is equal or not equal to zero. The conjecture was proved in special cases, most notably by John Coates and Andrew Wiles in 1977, but has yet to be proven in full, despite its being listed as one of the Clay Institute's seven ‘millennium prize problems’, attracting $1 million for the first full proof. The conjecture went on to spawn a growth industry in number theory. Swinnerton-Dyer was elected a fellow of the Royal Society in 1967 and promoted to be professor of mathematics in 1971.

Swinnerton-Dyer was dean of Trinity College from 1963, and became actively involved in university politics from the 1960s: it was said that at one point he sat on some sixty committees. He was on the council of the senate in 1968 when the Old Schools were besieged by protesting students. ‘I was the member who was sent out to tell them that they were not going to get what they wanted’, he recalled; ‘they treated me better than Paris undergraduates would have greeted a corresponding figure’ (Macfarlane, interview). In 1973 he was elected master of St Catharine's College, attributing his success in part to his being a bachelor, ‘and the classic quarrel in a college is apt to be between the bursar and the master's wife’ (ibid.). St Catharine's was known as a sporting college, and the mastership involved much ‘touchline duty’, though ‘you can think about mathematics while standing there and cheering your team on’ (ibid.). In 1979–81 he became vice-chancellor of the university, then a largely ceremonial role. On 25 May 1983, shortly before stepping down as master of St Catharine's, he married Harriet Elizabeth Walston Crawford, *née* Browne (*b.* 1937), archaeologist, daughter of Sir Patrick Browne, lord justice of appeal. Harriet was a leading expert on early Mesopotamia and the surrounding region, and after their marriage Swinnerton-Dyer was often to be seen at archaeological meetings.

As vice-chancellor of Cambridge, Swinnerton-Dyer told his fellow vice-chancellors that they must ‘cut costs’, and that ‘it would be unwise to defend on academic grounds arrangements which we maintain largely from inertia’ (*The Times*, 26 Sept 1980); and in his valedictory speech in 1981 he criticized academics ‘who draw a full day's pay for half a day's work’ (*The Times*, 19 June 1986). Such views caught the attention of Sir Keith Joseph, secretary of state for education in Margaret Thatcher's administration, who was seeking to shake up higher education in the way that Thatcher was shaking up industry and the civil service. Despite ideological differences on other matters—Swinnerton-Dyer was a member of the Social Democratic Party, and an opponent of nuclear missiles—he found common ground with Joseph on the need for universities to deliver a better quality of education. He encountered similar views ‘in the top ranks of the civil service as well, who remembered university from the days when they had been undergraduates and thought there was an awful lot of rubbish

that needed cleaning out' (Macfarlane, interview). In 1983 he was appointed chairman of the Universities Grants Committee (UGC), in 1989 becoming chief executive of its successor, the Universities Funding Council (UFC).

Swinnerton-Dyer's time as head of the UGC and the UFC coincided with unprecedented pressures on higher education budgets. He became known as 'the radical scourge of the common room' (*The Times*, 19 June 1986) for his attacks on wasteful practices, and was criticized by academics who were on the receiving end of cuts, and by the academics' unions. Nevertheless he did his utmost to ensure that universities' core activities were protected. Sir Martin Harris, a member of the UGC (and later vice-chancellor first of the University of Essex and then of the University of Manchester) recalled that

In the mid-eighties, the University of Cardiff was wilfully mismanaged and bankruptcy loomed. Mrs Thatcher was predictably not impressed and as various efforts to get Cardiff's leadership to mend their ways failed, the danger of enforced closure became ever more real. Peter was having none of this. As the 1987 election approached, he suddenly called us to a special meeting and showed us—written in pencil on foolscap, as was his wont—one of the most extraordinary draft letters I have ever seen. 'Dear parent', it read, 'I regret to inform you that the University of Cardiff is to close. Unfortunately, no arrangements can be made for your son/daughter…'. Need I go on? Of course this letter never survived a minute's scrutiny, Cardiff was saved … [and] Peter was rightly praised for his steadfastness. (Harris, memorial service address)

In 1986 Swinnerton-Dyer introduced the first research assessment exercise in higher education in the UK, designed to assess the quality of research in different university departments, and to allocate a higher proportion of funding to the higher-performing departments. He advocated the exercise as a means of introducing greater transparency and efficiency in higher education funding at a time of financial stringency. It was widely criticized both for the extra levels of bureaucracy and for the way it reinforced inequalities between academic institutions but, as Harris pointed out more than thirty years later, 'without Peter's decision that research funding had to be selective and transparent, British academic research would be in a much weaker position today' (Harris, memorial service address).

Swinnerton-Dyer introduced a second, modified research assessment exercise in 1989. In 1990 he endured a heated session of the House of Commons public accounts committee where he was criticized for supposed complacency in the face of looming budget deficits in more than half of the UK's universities and medical schools, particularly after he suggested that most would not face acute problems for many years because of their assets or reserves. He stepped down from the UFC in 1991.

Swinnerton-Dyer chaired a number of university committees, including the committee on the academic organization of the University of London in 1980–82, which advocated the merger of smaller institutions, and the steering group that led the merger of Ulster Polytechnic and the New University of Ulster in 1984. He was chairman of the meteorological committee from 1983 to 1994, and chaired the inquiry into the Meteorological Office's failure to forecast the 'great storm' of October 1987. (He concluded that the lack of data from the Atlantic made such forecasting difficult, though he also criticized various aspects of procedure and organization at the Meteorological Office.) From 1986 to 1991 he chaired the Comité de Développement Européen de la Science et de la Technologie (CODEST), and after leaving the UFC was the first chair of the European Science and Technology Assembly (1994–7). He

was also chair of the secretary of state for national heritage's advisory committee on library and information services (1992–5) and a member of the library and information commission (1995–8).

Throughout his career in Cambridge and at the UGC and UFC, Swinnerton-Dyer continued his work as a mathematician: a bibliography published in 2004 listed eighty-eight papers up to 2002, of which thirty-two were published after 1983; further papers followed up to 2016, and he was still working on new problems until his final year. Of mathematical ability and age he said:

I find I have less energy than I used to, not necessarily less ability … Littlewood was still doing good research in his eighties; he finally had to give it up, not because he had run out of ability, but because he could no longer read his own handwriting. (Macfarlane, interview)

Swinnerton-Dyer had succeeded his father as sixteenth baronet in 1975 (and so became ‘sir’ through inheritance), but in 1987 was knighted KBE in his own right. He received an honorary DSc from Bath University in 1981 and after retiring from the UFC was awarded honorary doctorates by the universities of Aberdeen, Ulster, Wales, Birmingham, Newcastle, and Warwick. In 2006 he received the Sylvester medal of the Royal Society, which cited ‘his fundamental work in arithmetic geometry and his many contributions to the theory of ordinary differential equations’.

Swinnerton-Dyer was known for his gregariousness, hospitality, interest in other people (including especially students), wry humour, and self-deprecatory wit as well as his fierce intelligence. For many years he lived with his wife, Harriet, in Thriplow, between Royston and Cambridge, where he enjoyed tending his garden. He died at his home there on 26 December 2018, survived by Harriet. A memorial service was held in Trinity College chapel on 1 July 2019 and a four-day online meeting was hosted by the Isaac Newton Institute on 17–20 May 2021 to commemorate his achievements in number theory. He was succeeded as seventeenth baronet by his distant relative David Dyer-Bennet (*b.* 1954), of Minneapolis, USA.