Peter Swinnerton-Dyer
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Warwick mathematics announces with great sorrow that Professor Sir Peter Swinnerton-Dyer FRS died aged 91 on 26th December 2018; Peter held a Warwick honorary degree and was Honorary Professor at Warwick since 2001 or earlier. The Obituary below is a collaborative effort of Jean-Louis Colliot-Thélène (Paris-Sud), Miles Reid, Gregory Sankaran (Bath), Alexei Skorobagatov (Imperial) and Colin Sparrow; it will be copyright the Guardian when they accept it. Our thoughts are with Peter's widow Harriet Crawford.

Obituary: Peter Swinnerton-Dyer
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Peter Swinnerton-Dyer, who died on 26th December 2018 aged 91, is famous among mathematicians as one author of the Birch--Swinnerton-Dyer conjecture in number theory. Published in 1965, this was immediately influential, becoming even more prominent in 1999 as one of the Clay Mathematics Institute's million-dollar Millennium Prize problems, alongside the Riemann Hypothesis.

Swinnerton-Dyer's first published paper appeared in 1943, when he was 16 and still at Eton. His most recent publications, which are substantial, date from 2012-16, and he was still pursuing major new research directions well into his final year. In between he served as Master of St Catharine's College, Cambridge and Vice-Chancellor of Cambridge University, before moving to the civil service as chair of the University Grants Committee (UGC).

The B-SD conjecture was made on the basis of computer calculations, the first serious application of computers in pure mathematical research. However, the computing facilities available at the time were rudimentary; to the point that Swinnerton-Dyer himself wrote the first operating system for Titan, the successor at the Cambridge Computer Laboratory to the EDSAC2 on which he carried out the computations with Bryan Birch. He later described himself on occasions as a computer scientist masquerading as a pure mathematician.

Given a cubic equation in two variables with integer coefficients, the B-SD conjecture states that the number of rational solutions is governed precisely by the L-function of the elliptic curve it defines. (L-functions of elliptic curves also play a central role in Wiles's proof of Fermat's Last Theorem). While the B-SD conjecture is a key problem in modern mathematics, and much is known about it, a complete proof remains elusive.

Professor Sir Henry Peter Francis Swinnerton-Dyer, Bt, KBE, FRS was born in Northumberland in 1927, the son of Sir Leopold Swinnerton-Dyer and Barbara, née Brackenbury. The family moved to Shropshire early in his childhood. His father's family were landed gentry, with no university history, but Peter cited his mother as an early intellectual influence. Peter's mathematical aptitude was soon apparent, and he won a scholarship to Eton and in 1945 proceeded thence to Trinity College, Cambridge. As a graduate student he studied under J.E. Littlewood, but never completed a PhD. However, he became a Fellow of Trinity, and remained there until 1973, with a crucial year's
visit to Chicago in the 1950s, where he worked with André Weil, an influence that set him on course to the famous conjecture and to much else besides.

Peter's role at Trinity included a spell as Dean, responsible for discipline. His sympathy with students and liking for their company (especially with cider, or evening board games) made him a less than feared figure (the Swinnerton family motto is "Terrere Nolo Timere Nescio", roughly "Unthreatening; undaunted"). In 1973, at the relatively young age of 46, he was elected Master of St Catharine's. He remained there for ten years, frequently preferring student company to that of the Fellows. During this time the character of the College was immeasurably enriched by the admission of women. He also served as Cambridge Vice-Chancellor, a demanding executive role in university administration.

1983 brought abrupt change: he resigned from St Catharine's, took up the UGC chair, and married the distinguished archaeologist Harriet Crawford. This was a turbulent time in university finances: Peter worked closely with Sir Keith Joseph, then Education Secretary. Though himself an SDP member, he respected both Mrs Thatcher and Joseph and was influential in informing them of the importance of research quality in judging universities. While by no means perfect, the "Research Assessment" system then introduced has contributed to the competitiveness of UK universities in the world. Not all his decisions were popular. A contentious enquiry into the finance and structures of the University of London, which led to substantial reorganisation, was never fully accepted.

Swinnerton-Dyer was knighted in 1987, adding a second "Sir" to his hereditary baronetcy. He won the Sylvester Medal of the Royal Society and the 2006 Pólya Prize of the London Mathematical Society, and was awarded honorary degrees at Bath and at Warwick.

Swinnerton-Dyer left the Universities Funding Council (successor to UGC) in 1991. Even as head of the UGC-UFC, he had never ceased to do mathematics; he has several major papers during the 1980. Peter's mathematical work is remarkable for its originality, freely mixing ideas from different areas to attain unexpected insights. He was fearless in his choice of problems. From the 1990s, Peter pursued work on 2-descent (a method going back to Fermat) as a way to study rational points on varieties fibred in elliptic curves; the aim being practical calculations to determine for interesting classes of algebraic surfaces (etc.) whether rational points exist, and if so, how many. This sometimes involves highbrow modern theory, but not as a first preference. The quest for a beautiful theory never ruled out cobbling together a messy or convoluted solution that actually worked. Despite the seemingly modest viewpoint, he obtained very significant results, several in areas previously considered intractable. One of his papers was conceived while on a tour of eastern Anatolia with Harriet: latterly he often accompanied her to archaeological meetings.

Stories about Swinnerton-Dyer abound. In addition to his love of student company and board games, Swinnerton-Dyer was more than competent at squash, tennis and real tennis. He played chess well, and bridge to international standard: he played in the British team that came second in the 1953 European Championship. In a tournament, Peter once scuttled his opponents' grand slam by bidding eight clubs; the rules at the time invalidated an
impossible bid made by mistake or oversight, so Peter first called the
tournament director to make clear his bid was intentional. The rules of
bridge were subsequently revised to prevent this.

Swinnerton–Dyer was an inspirational if idiosyncratic teacher. His genial
personality, exceptional erudition and unfailingly generous support for
students and younger colleagues won him many lasting friends and disciples,
several of whom have contributed to this obituary.

He is survived by his wife Professor Harriet Crawford.

Professor Sir Henry Peter Francis Swinnerton–Dyer, Bt, KBE, FRS,
Mathematician, university administrator and civil servant,
born 2nd August 1927 – died 26th December 2018

Miles Reid, University of Warwick