OBITUARY

DAVID BERNARD SCOTT

Bernard Scott was born in London on 27 August 1915. At the time of his birth his name was Schultz. He was the only son of a Jewish family of fur and skin merchants who lived in North London; he had two sisters.

Bernard attended the City of London School from 1925 to 1934. From school records it appears that he evinced an early taste for argument and debate. There is also testimony of his enthusiasm for sport, especially rugby. His talents for mathematics and for chess became evident at an early stage. While mathematics became his profession, it was the game of chess that aroused in him an abiding passion and made him a first-class player throughout his life.

Bernard won an Open Scholarship in Mathematics to Magdalene College, Cambridge. He graduated with First Class Honours and a Distinction in Part III of the Mathematical Tripos in 1937. While pursuing his mathematical studies with evident success, he continued to cultivate his talent as a chess player. B. H. Neumann, who was a research student at Cambridge at that time, relates that he and Bernard Schultz (as he then was) went to London to take part in a weekend tournament and returned with all the prize money between them (about £7).

Bernard stayed on at Cambridge to be a research student of W. V. D. Hodge. It was he who stimulated Bernard's interest in algebraic geometry, to which most of his papers were henceforth devoted. The value of his original work was soon recognized. He was awarded the Rayley Prize in 1939 and the Junior Berwick Prize of the London Mathematical Society in 1951. (Incidentally, the same distinction was gained by his son Peter 35 years later.) Among his research papers, the innovative ideas about point-curve correspondences on algebraic surfaces [**2**, **4**, **6**, **7**, **9**] attracted a great deal of attention and praise. The papers on tangent-direction bundles [**13**, **14**] are related to results of S. S. Chern, as are the later papers [**24**], [**27**] and [**29**].

Bernard maintained close links with the influential school of Italian geometers. Some of its members were personal friends. He paid several visits to Pisa and to other Italian universities. Also, he spent a fruitful sabbatical leave in Israel, which, among other things, gave rise to the short but ingenious note [**23**].

With the ever-increasing threat from Nazi Germany in the 1930s, Bernard thought it prudent to change his German-sounding name, and he adopted the surname Scott. During his stay at Cambridge he met Barbara Noel Smith, a brilliant and charming graduate in English. They were married just before the outbreak of the war. Bernard and Barbara had four sons. The marriage was dissolved in 1972.

After a short period as a school teacher, Bernard was appointed to a lectureship at Queen Mary College, London. He held this position from 1939 to 1946. During part of this period, he was engaged in war work carried out partly in London and partly as a member of the brilliant team at Bletchley Park.

After the war, when universities were again recruiting staff, Bernard moved to Aberdeen. But he stayed there less than a year, and returned to London to take up

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a Lectureship at King's College, London (1947–53), proceeding in due course to a Readership (1953–62). It was during his tenure of office at King's College that his potential as a mathematician came to full fruition. He shared his research interests with a wider audience by giving postgraduate lectures in geometry and arranging seminars, often with eminent guest speakers. In particular, it was an unusual enterprise on his part to offer in the 1950s a course on combinatorial topology based on the text by Seifert and Threlfall ⟨**3**⟩. He was awarded the DSc degree in 1953.

Bernard was keenly interested in improving the undergraduate courses. One of the fruits of his endeavours was the joint book with S. R. Timms [**19**] on mathematical analysis. This text has many attractive features, the well-chosen collection of exercises and examples being especially valuable.

The climax of his career came in 1962 when he was appointed to be the first Professor of Mathematics at the newly-founded University of Sussex. This was to be no ordinary university; its creation was indeed a major event in higher education, eloquently described in ⟨**2**⟩. Most of the founding fathers had been senior members of Oxford University and, understandably, tried to transfer some of the ancient traditions to the 'Balliol-by-the-Sea' (albeit more than three miles from the shore). In particular, there was to be an emphasis on tutorial teaching in small groups. However, the most important novel feature was the insistence on interdisciplinary courses: there were going to be schools comprising several related subject groups, but no departments. Thus a degree in mathematics had to be with something else. To be sure, most frequently it was mathematics with physics in the traditional manner; but, for example, it might be mathematics with economics or with philosophy. Bernard was not happy about these alien bedfellows of mathematics, and he did not always conceal his reservations. On the other hand, he was fully committed to the aim of providing first-class teaching and care for the students. Many of the ideas and practices which he introduced with marked ingenuity are still in force and have benefited successive generations of students.

In later years there was occasional criticism of the excessive amount of time and energy expended on teaching, and a few faculty members left because they wanted to have more opportunities for research.

However, under Bernard's leadership, the mathematics staff at Sussex rapidly grew into a vigorous and happy team of academics. Also, his personal reputation resulted in visits from some eminent mathematicians, who greatly enhanced the mathematical experience of staff and students. Being originally in 1962 the only professor of mathematics at Sussex, he was the head of the division and remained in this position until 1966, when the university introduced a system of rotating chairmanships. In the administration of the subject group, he did not disdain democratic institutions, like weekly division meetings; these were relaxed occasions, with coffee and biscuits being served. But when it came to making plans or decisions, he expected his proposals to be adopted. He had an excellent command of language, and would argue his case eloquently and wittily, some times with obscure reference to 'Scott's Laws'. In the design of the syllabus he favoured classical topics. He expressed his scepticism about excessive abstraction by referring to it as 'ju-ju', the superstition that by naming an object one can gain power over it.

To mark the Silver Jubilee of Sussex University in 1986, a collection of essays was published ⟨**1**⟩, which reviewed the progress of various subjects during the preceding twenty-five years. Most of the contributions make rather melancholy reading, the authors bemoaning the erosion of the original Sussex ideals through Government parsimony and lack of support. By contrast, Bernard's piece on 'The queen of the sciences' is written in a much more optimistic vein: he was justly proud of what the mathematics division had achieved through his initiative and guidance.

After his retirement in 1980, he want to live first in Rye, and then in Hastings so that he could be near the Hastings Chess Club, of which he was a respected member. Having had many years of experience as a champion player, he remained a strong opponent at the chess board literally until the end; he suffered a fatal heart attack during a game of chess, and died on 7 November 1993.

Bernard enjoyed listening to music of all kinds, and he was passionately fond of opera. His taste ranged widely, but it excluded Richard Wagner. His love for opera developed early: in his student days, he would join the queue at Covent Garden in the morning to obtain access to the gallery. He became personally acquainted with some of the most famous singers. As a member of the Glyndebourne Opera Company, he was able to obtain an ample supply of tickets for operas of his choice. He also remained a frequent visitor to Covent Garden (in more comfortable seats). With characteristic generosity, he always invited friends to share these supreme musical treats with him.

Bernard was a man with a complex and colourful personality. He could at times be irritating and even harsh. But he was always a loyal and supporting colleague. He and Barbara were a most hospitable couple, generously receiving in their home students and faculty members, especially when they had recently arrived in Sussex. At the university, Bernard took great care to ensure that visitors were suitably catered for, usually with Madeira and Madeira cake. He had stipulated in his will that these refreshments should be offered to the congregation after his funeral, and his wishes were indeed carried out. He spared no effort to arrange sumptuous parties for special birthdays or the retirement of colleagues, for which the first of the present writers owes him a profound and lasting debt of gratitude.

We are grateful to friends, colleagues and students of Bernard's who have provided information incorporated in this article. In particular, we should like to thank B. Chafferty, Nancie Craig, Barbara Cullingworth, Ali Frölich, John Haigh, Aubrey Ingleton, Tony Knight, Arnold Lynch, Bernard Neumann, Susan Oakes, Peter Robinson, Derek Taunt and Beryl Williams. We should also like to thank the *Evening Argus* of Brighton for permission to reproduce the photograph.

We are also very grateful to Professor I. G. Macdonald, FRS, and to Professor A. T. Lascu for providing the following comments upon Bernard mathematical work.

Macdonald writes as follows. 'Almost all of Bernard Scott's published papers are in the realm of algebraic geometry. The earlier papers ([**1**–**10**] in the bibliography) are devoted to the theory of algebraic surfaces, and more particularly to correspondences between two surfaces. A correspondence $T: C_1 \to C_2$ between two algebraic curves C_1, C_2 is determined by its graph G, which is a curve (or 2-cycle) on the product $C_1 \times C_2$; if $x_1 \in C_1$, then $T(x_1)$ is the projection on C_2 of the intersection of $\{x_1\} \times C_2$ with G. For almost all x_1 in C_1, the image $T(x_1)$ is a finite set of points of C_2.

For surfaces, however, there are two possibilities: if $T: S_1 \to S_2$ is a correspondence between two algebraic surfaces S_1, S_2, with graph $G \subset S_1 \times S_2$, then the dimension of G can be either 2 (point-point correspondence) or 3 (point-curve correspondence). Point-point correspondences had been investigated, and some results obtained, by the Italian geometers (Severi, Albanese), and several of Scott's earlier papers are devoted to point-curve correspondences. It should be said that the period when these papers were written (the 1940s and early 1950s) was the evening of the golden age of Italian algebraic geometry. Much effort had been directed towards extending to surfaces and varieties of higher dimension the highly successful and well-established theory of algebraic curves and correspondences between curves; but it was becoming increasingly clear that the foundations of the subject were insecure, and the results obtained sometimes uncertain. For example, in the theory of curves an important notion is that of a correspondence with valency, and it is a basic result that if $T: C \to C$ has valency v (a rational integer), then the inverse correspondence T^{-1} also has valency v. For point-point correspondences on an algebraic surface S, Albanese had defined a notion of correspondence with valency (the precise definition need not concern us here), and claimed that if $T: S \to S$ has valency v, then (as for curves) T^{-1} also has valency v. Scott **[10]** showed by example that this assertion is false.

In the middle 1950s, the pioneering work of geometers such as Hirzebruch, Borel, Serre and Grothendieck transformed the whole landscape of algebraic geometry. The introduction of fibre bundles, sheaves, sheaf cohomology and homological algebra now provided the algebraic geometer with vastly more powerful and precise tools than those available previously. It is to Bernard Scott's credit that he made a serious attempt to master and apply these new techniques, and his later papers bear witness to this. Thus, for example, **[13]** investigates the geometry and cohomology of the projectivized tangent bundle of a nonsingular variety X of arbitrary dimension, and the papers **[24–27]** (written jointly with A. T. Lascu) are concerned with the cohomology, Chern classes, etc., of the variety X' obtained by blowing up a closed subvariety of X. In particular, **[25]** gives an elementary proof of a conjectured formula of Grothendieck relating to the Chow ring of X'. These papers are perhaps his most enduring work.'

Lascu writes as follows. 'In a relaxed overview of Bernard Scott's research work, one can easily find a vivid geometric intuition backed up by a special penchant for slick algebraic manipulation. There is a continuity in the whole production. But for two exceptions, **[11]** and **[23]**, a natural logic relates the development of all his publications. The first paper's topic, namely invariant groups associated with an algebraic surface, undoubtedly interesting in itself, provides the tool for subsequently constructing a minimal system of generators for the homology ring of an algebraic surface. This in its turn enables him to deal successfully with the algebraic correspondences between algebraic surfaces with respect to some problems of Hodge and Severi.

To pursue this research further, a new idea comes into the picture, namely that of extending a given correspondence to the tangent direction bundles. The structure of the homology (or Chow) ring of the tangent direction bundle, as an algebra over the base ring, is generated by one element. This was well known to topologists in connection with the theory of Stiefel–Whitney classes, and extended by Chern to unitary vector bundles. Scott found a geometrical construction of precisely this generator, by what he calls the "invariant lift" of a linear pencil! In its turn, the invariant lift provides the main tool in Ingleton and Scott's formulas for the classical and the generalized Jacobian of a linear system. At this point one is already lead to abandon the homology ring for the subtler and more specific Chow ring for rational equivalence. The last decade of his research is concerned with some basic formulas in the theory of rational equivalence and the Chow ring: Scott's formula, the blowing-up formula, the self-intersection formula and Grothendieck's formule-clef. The last paper gives a full account of the Chow ring of the Grassmann bundle of an algebraic vector bundle, which generalizes the classical intersection theory of Grassmann varieties (standard and complementary bases, the Pieri and Giambelli formulas), and concludes with a new proof of the Kempf–Laksov determinantal formula. It is perhaps worthwhile pointing out that Scott's lesser known earlier work is still waiting for current algebraic geometers to examine it for inspiration and to shed new light on these problems.

Bernard Scott's research work extends over a period of about forty years (1940–84). It is concerned exclusively with algebraic geometry, in a time when its foundations and methods underwent successive major changes. "Fashions in contemporary mathematics change as fast as those for women's clothes," said André Weil in the foreword of the second edition of his *Foundations of algebraic geometry*! To someone whose formation belonged mainly to the classical English and Italian tradition, the whole sophisticated modern machinery of sheaves, cohomology, schemes, etc., might have sometimes seemed a plot to keep away the classical geometers! Nevertheless, he was able to update his work successfully. The rate of his production is not as slow as it might seem, if one overlooks the two gaps of five years each in the list of his publications. The first one (1940–45) is accounted for by the second world war. It is worthwhile mentioning his warm support at that time of B. Segre and his family, a later consequence of which was a three months' visit to Sussex in 1967. The second gap coincided with his move to Sussex and his commitment to the administrative and academic duties required by the newly-created University.'

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