

Rex Dark, 1942-2022

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Rex Dark in 2005 (Photograph: Tracy Feldman)

Rex Dark was born in Huddersfield and raised in Leatherhead. An excellent student from the start, he won several scholarships: first to his preparatory school, then to the

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prestigious Charterhouse School in Godalming, Surrey and from there to Magdalene College, Cambridge. Having achieved a double first degree he undertook research in Group Theory under the supervision of J. E. Roseblade. This led to the award of a Ph.D in 1968, for a thesis entitled “Nilpotent products of groups of prime order”. After a few years teaching in Cambridge, Rex came to University College, Galway (later NUIG, now University of Galway) in 1973 on what was originally a one-year appointment. Fortunately for the UCG Mathematics department - and indeed for the college and local community - Rex liked what he found and decided to stay. He remained in Galway for the rest of his working life, taking early retirement in 2003 having reached the age of 60. After he retired from teaching, Rex continued to work on a variety of problems in soluble and insoluble groups. His latest works, with collaborators from Spain and the US, were published in 2022, and he left nearly completed manuscripts that will be submitted for publication by his collaborators.

Rex was a wonderful colleague, and his contributions to the UCG Mathematics department - and to the wider mathematical community - were substantial and very much appreciated. As a lecturer Rex was known for the clarity of his presentations and his willingness to help students with their work in and out of the classroom. His research talks were equally well-organized, clear, and insightful. In addition to the normal teaching and research duties, he undertook his full share of the administrative chores. He was one of the founders of the Irish Mathematics Society and of the series of annual Groups in Galway meetings. He remained a staunch supporter of both through the years, including in his retirement.

Rex was a master of the example and counterexample. His examples were beautifully constructed using his vast knowledge of techniques, including those of his own invention. Underlying them was his broad and deep understanding of groups coupled with extraordinary attention to detail, often involving intricate computations, generally done by hand. He had an extraordinary mental capacity, able to develop intricate computations before writing them down, but also created computer programs as needed. He was endlessly patient, working to perfect any project, producing draft after draft of increasingly comprehensive, impeccably expressed, carefully referenced results until he was satisfied that he had accounted for everything possible.

The impact of Rex’s work was substantial. He made significant contributions, either alone or in different collaborations, particularly answering open questions and conjectures by various authors. Early in his career, he produced the first complete group of odd order (further tricky constructions provided an example of a complete group of the smallest possible odd order). His contribution to the study of Camina groups was also remarkable.

The impact of his work in the theory of Fitting classes and injectors deserves special mention; the name of Rex Dark appears among the most relevant figures in the development of the theory. His 1972 paper “Some examples in the theory of injectors of finite soluble groups” so greatly changed the way group theorists looked at Fitting classes that Doerk and Hawkes, in their comprehensive 1992 volume *Finite Soluble Groups*, devoted two complete sections, more than 45 pages, to what they termed “Dark’s construction – the theme & variations”. This paper contains the first publication of a Fitting class whose Fischer \mathfrak{F} -subgroups were not \mathfrak{F} -injectors. (Later, he would discover also the first Fitting set with non-pronormal Fischer \mathfrak{F} -subgroups.) B. Hartley, in the review about this paper published in the *Mathematical Reviews*, wrote referring to this example: “Fitting classes of any intricacy seem rather difficult to handle, and the problem is to select one that is sufficiently complicated but still tractable. This the author succeeds in doing with considerable ingenuity.” The main example presented in that 1972 paper was actually less complicated than the first one Rex discovered. This more complicated,

unpublished example was modified slightly in Lockett's 1973 paper presenting the first group with non-system-permutable \mathfrak{F} -injectors. More than 45 years later, Rex modernized the construction of that unpublished example for use in a paper showing that said example was in a technical sense the smallest possible.

The number of basic questions remaining unanswered in the Theory of Fitting classes indicates the difficulty of the theory, especially in constructing suitable examples, and shows the value of Rex's work. That work also contributed answers to other related fundamental questions, including different constructions of the associated injectors, and permutability, for the dominant Fitting class of finite soluble groups with central π -socle, as well as characterizations of injectors without recourse to the concept of a Fitting set.

His most recent papers involved generalizations of Carter subgroups and injectors in π -separable groups, groups with automorphism groups of smaller order than the groups themselves, and π -special modules. Referring to the first result just mentioned, in the corresponding review published in the *Mathematical Reviews*, Luis M. Ezquerro writes: "In my opinion, this is the best tribute to Carter on the occasion of his recent death on February 21, 2022."

Rex was also very committed to many non-mathematical interests. In college, for example, he was an active union member and was shop steward for a while. He was also a long-time member of the UCG Mountaineering Club. In addition he was deeply involved with the Galway branch of Alliance Francaise and with the Galway Mountain Rescue Team. Outside UCG, his primary loyalty was perhaps to Saint Nicholas' Collegiate Church. He was a chorister there for a while, and took on the position of treasurer for six years. Moreover, he took to the stage with the Lamplighters, a drama group associated with the church. He continued his service to the Church of Ireland in Westport, where he spent the last of his retirement years.

Rex was a familiar figure making his regular cycling commute from Moycullen to UCG. He also had a small folding bike — one of the first around Galway — which he kept in college to use for quick trips into town. If he wasn't cycling, he was probably walking, thinking nothing of the six mile journey from Valencia to the maths department of the university in an outlying suburb. He would take the train with colleagues to be sociable, but walk when on his own.

He was also an inveterate traveller. In addition to regular journeys to his home in France he attended conferences in many places. He spent sabbaticals and/or working visits with collaborators in Germany, Italy, Spain and the United States. Moreover, he made many trips to see his brother Michael (his only sibling) when the latter worked abroad. Although he eventually acquired a debit card, he traveled without ever having a credit card, a feat that became more extraordinary with every year that passed.

Many warm tributes have been paid to him by former colleagues who remarked in particular on his courtesy, helpfulness, quiet but wry sense of humour and of course his brilliant mind. Former students also remember him with affection. They recall his patient mentoring and his generosity with his time, as well as his enthusiastic and inspiring lectures. Collaborators reported that it was an honor and a privilege to work with him, since Rex contributed his ideas, effort, and knowledge unreservedly, generously and with incredible humility.

Throughout his life Rex was very close to Michael and his family. In the beautiful eulogy given at his funeral, his niece caught the essence of the man when she concluded that he remained the same always — kind, modest, brilliant, and completely original.

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