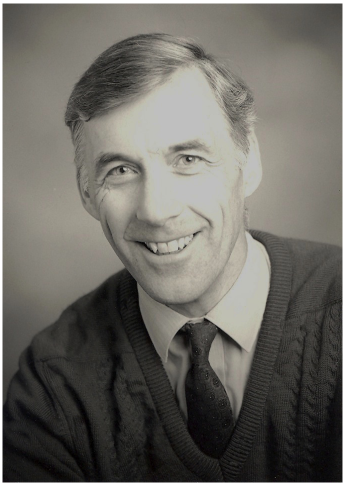
Obituary



Peter Pleasants
24 August 1939 – 20 April 2008

Peter Pleasants, who made substantial contributions to number theory and quasicrystallography, died on 20 April 2008 from lymphoma in Brisbane, the city where he also spent his first years in Australia in the early 1960s.

Peter Arthur Barry Pleasants was born on 24 August 1939 in Harrow in England, and grew up in the family terrace house. His father Horace was an auditor for London Transport, and this allowed Peter to travel free on the vast network of buses and underground trains during his school years. His mother, Florence, like many others at the time, stayed at home to look after the family.

Peter was educated at the Harrow County Grammar School, one in the top tier of state schools in England at that time. He won a place in 1957 to read mathematics at St John's College, University of Cambridge, where he also held various scholarships. Apparently he did rather well in his first year but less so in his second. Indeed, he thought that he might not have done enough to win a postgraduate place, and began telling his friends that he was going on a long trip after he finished his third year. His pessimism turned out to be unfounded, but although Harold Davenport offered to take him on as a research student, he decided to go on his long trip anyway.

Peter worked for about a year to save up enough money for his trip, and arrived in New Guinea after a long passage on a cargo boat. He was told that academic positions in Australia were available, made some applications, and took a junior lecturer position in the Mathematics Department at the University of Queensland in 1961. There he met Ann Johnman, a fellow junior lecturer, whom he married a few years later. Their devotion to each other has been the bed-rock of their family life and careers.

In 1963, Peter returned to St John's College, University of Cambridge, to embark on his research under Davenport, and Ann came to England soon after. On completing the work on his PhD, Peter became a Research Fellow at Sidney Sussex College in Cambridge, a post which he held until 1968. However, his thesis, entitled *The representation of primes by quadratic and cubic polynomials*, was not submitted until 1967. Peter was offered a lecturer position at the University of St Andrews, but he declined it in favour of Sidney Sussex College, at substantially lower remuneration. His pay in Cambridge would remain tax-free so long as he did not become Dr Pleasants!

In 1968, Peter joined the University College in Cardiff, where he subsequently became senior lecturer and remained for nearly 20 years. There he was part of a very active and successful research group in number theory. However, in the mid-1980s, the college refused to implement draconian cutbacks imposed by the then Conservative government. In the ensuing financial hardship and uncertainty, the Pleasants family made the decision to return to Australia in 1988. However, before they returned, Peter spent a year at the University of Texas, where he loved the system under which colleagues were given teaching duties and then left to get on with them without bureaucratic interference.

Before coming back to Australia, Peter had obtained a Master of Computing Science. He soon settled into a position in computing at Monash University. However, mathematics soon took over again, and Peter moved to a lectureship in mathematics at the University of New England while the family stayed in Melbourne. When Peter moved to a lectureship in mathematics at Macquarie University in 1992, he famously commented that the bus journeys back to Melbourne became overnight only half as long. Among his many and varied contributions was the supervision of the honours project of Fran Griffin who is now a continuing member of the academic staff.

Between 1997 and 2001, both Ann and Peter were at the University of the South Pacific, until the political uncertainties in Fiji persuaded them that it was perhaps time they retired. They returned to Brisbane where Peter became an honorary research consultant in the Department of Mathematics at the University of Queensland.

Outside mathematics, Peter enjoyed bush walking, and had done both the Larapinta Trail and the Carnarvon Gorge. However, perhaps it was cycling that was Peter's greatest sporting passion. He cycled to work in Cardiff before cycling became fashionable, and he took up long distance cycling the year he was in Texas. He took part on a number of occasions in the Sydney to the Gong cycle ride. In October 2007, he successfully negotiated the Brisbane to Gold Coast ride at a very competitive pace. Unfortunately, this was to be his final competitive ride.

Throughout his life, Peter was extremely dedicated to mathematics as well as his family. He continued working while seriously ill in hospital, and would surround himself with books and manuscripts, working on yet another problem. He was still correcting the proofs for a paper two weeks before he passed away.

Peter is survived by his wife Ann, sister Angela, brother Robert, children Simon, Robin and Zoë, and grandson Evan, born on 19 May 2008.

Some of Peter Pleasant's mathematical work

The work of Peter Pleasants is characterised by its depth, clarity of exposition and meticulous attention to detail. His early work is in mainstream number theory, analytic in nature but on occasions in somewhat algebraic settings. Subsequently he applied his number theoretic techniques to study problems in quasicrystallography which form the bulk of his most recent work.

During his time at Cambridge, Peter was heavily influenced by the work of H. Davenport and D.J. Lewis, and also by the work of G.L. Watson. His early papers were on the representation of primes by quadratic and cubic polynomials and on the representation of integers by cubic forms, utilising the well-known Hardy–Littlewood method and its variants. He later extended this study to settings over algebraic number fields.

In the 1970s, Peter expanded his interests in a number of ways. His work on word problems was influenced by M. Morse and G.A. Hedlund, while his work on forms over $\mathfrak{p}$-adic fields was influenced by R.R. Laxton and Lewis. Indeed, in the latter, Peter was able to replace the algebraic geometry by elementary methods and unify several known low-dimensional cases of the Artin conjecture regarding non-trivial zeros of forms over local fields. On another front, his work on a sum related to distribution modulo one gave rise to generalisations of some sieve inequalities due to Davenport and H. Halberstam. In the early 1980s, he added factorisations in an algebraic number field and prime factors of binomial coefficients to his expanding repertoire.

Peter became interested in quasicrystallography in the early 1980s. His first paper on the subject was, according to the reviewer, written two years before the discovery of quasicrystals and contributed in various ways to the theory of non-periodic patterns. In a second paper, written with W.F. Lunnon[1], a general method for constructing finite sets of aperiodic tiles was found.

In the 1990s, Peter began a very successful collaboration with M. Baake. With J. Roth, they applied elementary number theory to the theory of coincidences of $\mathbf{Z}$-modules generated by the vectors of a regular n-star, gave a complete description of the coincidence rotations when the cyclotomic field of n-th roots of unity has class number 1, and described in detail applications to two quasi-periodic tilings. With J. Hermisson, they computed the number of tilings in

[1]Ann Pleasants recalls the occasion when Peter was working on these problems on the beach in France during a family holiday. Peter had just made a discovery and wanted very badly to write to Lunnon as soon as possible. Unfortunately, they were rather short of money and the banks were closed over the weekend. Eventually, some money intended for ice cream was sacrificed in favour of postage stamps.

each local isomorphism class of a tiling which are invariant under various subgroups of the full symmetry group. With R.V. Moody, they studied the set V_L of all points of a lattice L in $\mathbf{R}^n$ that are visible from the origin and the set F_k of all k-th power-free integers, and showed that their diffraction measures are pure point, supported respectively on dense sets $\mathbf{Q}[L^*]$ and $\mathbf{Q}$, where L^* is the dual lattice of L. Now both V_L and F_k contain large holes and so are not Meyer sets. They thus gave the first examples of pure point diffractive discrete sets that are not Meyer.

In the last few years, Peter further expanded his list of collaborators as well as interests.

With J.C. Lagarias, he considered Delone sets, subsets of $\mathbf{R}^d$ that are uniformly discrete and relatively dense, studied their complexity via patch counting and repetitivity, and established their relationships to crystallinity and quasicrystallinity.

With A. Granville, he used Aurifeuillian factorisation to study factorisations of numbers of the form $b^n \pm 1$, where $b = 2, 3, \ldots$ are small. This is part of what is known as the Cunningham project, and in 1962, A. Schinzel gave a list of identities useful in this project. They showed that Schinzel's list is exhaustive in some sense, and also succeeded in factorising terms of the form $f(b^n)$ for any given polynomial f, using deep results of G. Faltings from algebraic geometry and M.D. Fried from the classification of finite simple groups.

With Baake and U. Rehmann, he showed that various results and conjectures related to the coincidence site lattice problem and its generalisation of $\mathbf{Z}$-modules in $\mathbf{R}^3$ can be proved in a unified way, making use of maximal orders in quaternion algebras of class number 1 over real algebraic number fields. In his final paper, Peter succeeded in generalising these results by removing many of the assumptions. In particular his methods work for quaternion algebras over arbitrary number fields, although his most precise result requires the quaternion algebra to satisfy the Eichler condition. He introduced the notion of a primefree ideal; these correspond bijectively to pairs of maximal orders. Peter showed that an ideal over a maximal order factors uniquely as the product of a 2-sided ideal and a primefree ideal.

Peter enjoyed combinatorics too. He also loved puzzles, and was the proud winner very recently of a $50 book voucher from the *Gazette of the Australian Mathematical Society* for one of his solutions!

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