

## The Man Who Knew Infinity

### Untutored Genius

R Tandon



*The Man Who Knew Infinity*  
*A Life of the Genius Ramanujan*

Robert Kanigel  
 Rupa & Co., 1992  
 pp.436, Rs.195

It is not very often that one sees the biography of a pure mathematician – not a mathematician like Newton who was also a physicist but a pure mathematician who worked in number theory, probably the purest realm of mathematics. Ramanujan's work may today have some applications in particle physics or in the calculation of  $\pi$  up to a very large number of decimal places but it would be misleading to stress this aspect of his work. Ramanujan did mathematics for its own sake, for the thrill that he got in seeing and discovering unusual relationships between various mathematical objects. The oft repeated anecdote about Ramanujan finding the number 1729 interesting because it is the smallest number that can be written as a sum of two cubes in two different ways,  $10^3+9^3$ ,  $12^3+1^3$  bears repetition only in that it gives a flavour of the kind of mathematics that Ramanujan was interested in – the kind of mathematics about which the sceptic will say, so what! and surely Ramanujan would have said, so what!

Ramanujan was born in a poor Tamil Brahmin family that resided in the town of Kumbakonam. He attended school there and did averagely well. While in school he came across a book entitled *A synopsis of elementary results in Pure and Applied Mathematics* by George Carr. This book is just a compendium of results on integrals, infinite series and other mathematical entities found in analysis. Yet it left a lasting impression on Ramanujan; in fact it virtually determined his mathematical style. He would later write mathematics as a string of results without proof or with the barest outline of a proof.

After school Ramanujan was hooked on mathematics. He spent all his time with his head over a slate working on problems in number theory that interested him and neglected everything else. The result was that he could never get through another examination. An early marriage as was usual in those times led to a frantic search for a job to earn an income. He became a clerk in the Madras Port Trust with the help of some well wishers. In the meantime Ramanujan kept showing his results to various people who he thought would be interested or would help him get a job that would give him a lot of time to do mathematics. He wrote to a couple of well known British mathematicians giving a list of some of the results he had obtained. They ignored him – thought he was a crank! Finally he wrote to one of the most distinguished English mathematicians of the time – a person who had done a lot of work on

number theory – G H Hardy. Hardy arranged for Ramanujan to come to Trinity College, Cambridge where he and Ramanujan met almost daily discussing mathematics for about three years. Starting from the early life of Ramanujan, Kanigel describes all this and much more in his beautiful story on Ramanujan.

Kanigel's book is not only a biography of Ramanujan but contains a minibiography of Hardy as well. On Hardy, Kanigel is brilliant. Though basically a conservative Englishman, Hardy was a revolutionary in the world of British mathematics. (The ethos of British mathematics of the time was determined by the famous Tripos examination. It is not unusual even today to hear someone of our father's generation boasting that so and so was a Wrangler – that is had acquired a high rank in the Tripos examination. To Hardy however the Tripos was an anachronism – it had outlived its usefulness.) Kanigel writes about all this with a great deal of perception, which is especially admirable in view of the constraints he worked with. To quote Kanigel himself: "In writing the life of Ramanujan, I faced the barriers of two foreign cultures, a challenging discipline, and a distant time. As I am expert in none of these, I owe a debt of gratitude to the many persons who have helped me surmount those barriers – who have consented to interviewing, spent hours explaining recondite areas of mathematics or Indian cultural life, guided me to out of the way documents in libraries and archives, read and criticized early drafts, befriended me in

England and India – and, back in Baltimore, offered a supportive hand or word of advice".

Kanigel covers in a most balanced manner two controversies that are usually associated with Ramanujan - one: whether Ramanujan drew upon divine or some sort of mystical inspiration to come up with his ideas or whether as was maintained by Hardy he was just a hard working, exceptionally original and creative person like other great mathematicians. The second controversy concerns the medical cause of Ramanujan's death.

So, what did I get from Robert Kanigel's book on Ramanujan? I think it reinforced my belief in the universality of the language of science. Here were two totally dissimilar people both culturally and temperamentally – from two totally different backgrounds. Each knew very little about aspects of the other's personal life, and when Hardy learnt later of Ramanujan's personal problems they came as a complete surprise to him. Of course, Hardy himself was too reserved to let Ramanujan get even a whiff of his own concerns. But when they met, which they did almost everyday for nearly three years, they were on exactly the same wavelength – they spoke exactly the same language – they were totally *intimate* with each other in the language of mathematics.

I would like to end by quoting from the last few pages of the book. It was 1936, Harvard University was celebrating the 300th

anniversary of its founding and as part of the celebrations it was honoring sixty eminent men of letters and science. The list included Einstein, Heisenberg, Piaget and Jung. They were also honoring Hardy. Hardy gave a series of lectures that later came out as a book entitled *Ramanujan: Twelve lectures on subjects suggested by his life and work*. Hardy said at the beginning of his lectures, and I quote from Kanigel's book:

"I have to form myself, as I have never really formed before, and to try to help you to form, some sort of reasoned estimate of the most romantic figure in the recent history of mathematics, a man whose career seems full of paradoxes and contradictions, who defies

almost all canons by which we are accustomed to judge one another and about whom all of us will probably agree in one judgement only, that he was in some sense a very great mathematician".

And then Hardy began to speak about his friend Ramanujan.

Kanigel tries to do the same. Hardy concentrated on the technical aspects of Ramanujan's work. Kanigel in his own meticulously researched style tells us more about Ramanujan the man.

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## A Mathematician's Apology

### Mathematics and Creativity

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*R Vittal Rao*



*A Mathematician's Apology*  
With a Foreword by C P Snow

G H Hardy  
Cambridge University Press, 1993  
pp153, Rs. 175



Every creative person – whether a painter, a poet or a scientist – reflects, at some time or the other in his life, on whether his work is worth doing and why he does it. It is these very questions that Hardy – one of the outstanding mathematicians of this century – takes upon himself, as a mathematician, to

answer, and “put forward an apology for mathematics”. The book has been reviewed, discussed and debated by several mathematicians. It is natural that the author's personal likes and dislikes play an important role in answering these questions. One must keep this in mind while reading the book. It is quite likely that a reader will get involved (as this reviewer did) in an argument and disagree with the author every now and then while reading through the book!

Another crucial aspect that a reader must keep in mind is that Hardy authored this book while he was in his sixties and felt that his creative powers were on the decline. No wonder, then, that he begins the book with the words, “It is a melancholy experience for