

The Indian Clerk

Reviewed by Heini Halberstam

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David Leavitt

Bloomsbury USA, 2007

US\$24.95, 496 pages

ISBN 13: 978-15969-1040-9

The Indian Clerk is a fact-based work of fiction about the collaboration between Godfrey Harold Hardy and Srinivasa Ramanujan. David Leavitt, the author, is a very talented writer, and this is a very well written novel. Its protagonist is not as much Ramanujan, of whom there have been memoirs, movies, and biographies, as Hardy. The book follows Hardy in a series of flashbacks as, around the age of sixty, he muses on his collaboration with Ramanujan. While the book focuses primarily on the relationships between the characters, it is sprinkled with mathematical remarks to lend authenticity to the story. Knowledgeable readers will easily be able to supply corrections where these are called for.

Readers of the *Notices* will be familiar with at least the outline of the Hardy-Ramanujan collaboration. Many will have enjoyed the excellent biography of Ramanujan by Robert Kanigel, *The Man Who Knew Infinity*, which includes also pretty well all that is known, and likely ever to be known, of the private life of G. H. Hardy, Ramanujan's "discoverer". And some will have read about and perhaps studied, the voluminous papers of Ramanujan as these have been collected or discovered, deciphered, supplied with proofs, and annotated over the years, by several scholars but in the last thirty years or so most notably by the dedicated labors of George Andrews, Bruce Berndt, and their associates. A sample of their enthusiastic

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explorations appeared in these pages as recently as January of this year. So, as far as the history of this mathematical episode is concerned, readers will find few surprises in *The Indian Clerk*.

Hardy was the principal architect of a renaissance in British pure mathematics. His passionate advocacy on its behalf was partly to balance the dominance of applied mathematics that had prevailed in the U.K. since Newton's day; but whether consciously or unconsciously, it also echoed Oscar Wilde's defense of art for its own sake. Wilde wrote in his "The Decay of Lying":

Art never expresses anything but itself. It has an independent life, just as thought has, and develops purely on its own lines. It is not necessarily realistic in an age of realism, nor spiritual in an age of faith. So far from being the creation of its time, it is usually in direct opposition to it, and the only history that it preserves for us is the history of its own progress.

As of art, so of pure mathematics, Hardy thought; and he would argue along these lines later, in 1940, in his *A Mathematician's Apology*. He did make one "applied" contribution, to genetics, and this too has been the subject of a recent essay in the *Notices* (March 2008 issue).

In *The Indian Clerk* the reader meets Hardy for the first time at Harvard on the last day of August 1936, when he is about to launch into the first of his twelve lectures on Ramanujan; and in the very first lecture he describes his association with Ramanujan as "the one romantic incident" in his own life. Then, as he continues with descriptions of some of Ramanujan's discoveries, in his own mind he embarks on a parallel account of the romance as it evolved over five years against the grim background of the First World War; perhaps not quite as it happened, but as Leavitt imagined it.

Ramanujan's famous letter to Hardy arrived in late January 1913. At that time Hardy was thirty-six years old, a Fellow of the Royal Society since 1910, and approaching the height of his powers; collaboration with the twenty-eight-year-old Littlewood had begun a couple of years earlier. Also at that time Ramanujan was ten years younger, very poor, married to a girl who was little more than a child, and under the domination of a formidable mother, Kamalammal, who "was clever, possessive and exploitative". He already had many mostly unpublished results but only a clerical position with which to support substantial family responsibilities. He had by then failed to get a response from two other eminent British mathematicians.

Hardy studied the letter, passed it to Littlewood, who studied it too, and they decided that Ramanujan should come to Cambridge. As luck would have it, a young mathematical Fellow of Trinity, Eric Neville, and his wife, Alice, were about to leave for Madras, where he was to give some lectures at the university. Neville was charged with looking Ramanujan over and, if reassured, doing everything he could to persuade him to come to England. Neville was completely successful; not only did Ramanujan agree to come despite some religious objections, but Neville charmed Madras University into granting Ramanujan a stipend and travel expenses; and so all three, the Nevilles and Ramanujan, arrived in England in April 1914, just before the outbreak of war.

While they were waiting for this arrival, Hardy and Littlewood have been busy: Hardy has proved that the Riemann zeta function has infinitely many zeros on the critical line, and Littlewood has shown that, despite all available numerical evidence to the contrary, $\pi(x) - li(x)$ changes sign infinitely often as x tends to infinity, for the first time unimaginably far out. These exciting results have sharpened their appetite for Ramanujan's arrival; perhaps he will settle the Riemann Hypothesis! Also in this intervening period, the reader is introduced to Hardy's social circle, the Apostles, at one of their regular Saturday meetings. The Apostles are a (not so) "secret" society that numbered among its members at that time some of the most brilliant and influential men of the age, many of them gay, as Hardy was: we meet the philosophers G. E. Moore, Bertrand Russell, Wittgenstein, McTaggart—who wrote an eloquent defense of love between men—the economist Maynard Keynes, the historian Trevelyan, the writer Lytton Strachey, the poet Rupert Brooke, and Hardy of course. E. M. Forster was of that number too, but there is no mention of him in the book—he described homosexuals as standing "at a slight angle to the universe", and was one himself. Hardy speaks of these gifted people as "the men who will determine England's future". The Apostles were dedicated to tolerance, open-mindedness, and free discussion of topics taboo in Victorian/Edwardian

mores, homoeroticism for example; and at the meeting the reader encounters several homosexual affairs in full swing, but Hardy stands aloof on this occasion; he himself has had relations with Moore and Harry Norton, but just then (we are told) he dreams instead of Ramanujan, and visualizes him as not unlike a handsome Indian cricketer he has observed around town. His anticipation is keen.

As Hardy muses about the past, the reader learns about Hardy's youth, his smooth progress from Cranleigh prep school via Winchester to Trinity College Cambridge where, in 1900, he wins a Prize Fellowship; at the same time we learn about Ramanujan's early struggles. There is much about the mathematical Tripos, the formidable but atrophied examination hurdle that aspiring mathematicians had to overcome to get a foot on the career ladder; later Hardy would work hard to overhaul the system, but it remains formidable to this day, even if more in tune with the current state of the subject. In 1905 Littlewood had been Senior Wrangler, joint with James Mercer. Hardy had coached Mercer for the exam, and, Leavitt writes, had found Mercer attractive, with "his sea-glass beauty" and eyes that were "a luminous grey-green"; he felt proud of Mercer's success but realized that Mercer, coming from a modest background like his own, had reached his peak, whereas Littlewood, from a family with deep Cambridge roots and several years younger, stood fresh at the threshold of his career with all his powder dry. Littlewood's early mentor was Barnes, later Bishop of Birmingham, and he, noting Littlewood's talent early, had proposed the Riemann Hypothesis to him as a research problem!

At the time Hardy was coaching Mercer he was in the midst of a passionate affair with Russell K. Gaye, a promising classicist. They were sharing rooms and were devoted to each other and to their cats. Then Gaye lost his fellowship, and there is a suggestion in the book that perhaps Hardy's affection had cooled; later Gaye committed suicide by shooting himself. The affair is rarely far from Hardy's thoughts; self-reproach haunts him throughout the tale, and one feels that it will be with him for the rest of his life.

Early on the reader encounters Gertrude, Hardy's spinster sister, who is art mistress at St. Catherine's School, sister institution to Hardy's prep school in Cranleigh, Surrey, and also looks after their ailing mother. Watching Littlewood in Gertrude's company, Hardy realized that Littlewood liked women and that women liked him.

Alice Neville is a very engaging invention, based on the actual Mrs. Neville, and she is an important character in the story, often at odds with Hardy in the treatment of Ramanujan. The reader meets her first in Madras, in a hotel restaurant, observing the British colonials at their leisure and, with a guide-book at her side, dreaming of the mysterious

East that she would love to explore but knows she never will. Unlike Hardy or Littlewood, she shows a humane interest in Ramanujan's welfare and wants to mother him. Ramanujan lives with the Nevilles for his first six weeks in Cambridge, and Alice arranges dinner parties for him to meet university notables. She teaches him table manners and studies his dietary preferences; she understands from the first that food will be a major problem for him. She introduces him to Gilbert and Sullivan and to jig-saws, and falls in love with him. In contrast Hardy detests her cooking and is impatient to get Ramanujan away from her care and into mathematics. Later, in conversation with her husband, she will say:

I've always had the sense that Hardy looks upon him...as a sort of mathematician machine, to be milked for everything he's worth before he breaks down. But he doesn't care at all about the poor man's happiness, about what he might need, or how he's managing with the cold weather. He works him like a dray horse.

This is not entirely fair, because Hardy does try to engage Ramanujan in conversation and to get to know him; it is not easy at first because Ramanujan "rarely speaks except when spoken to, and when he is questioned, almost always answers by dipping into a reserve of stock replies, no doubt purchased on the same shopping trip in Madras during which he was supplied with trousers, socks, and underwear. Replies such as: 'Yes, it is very lovely', 'Thank you, my mother and wife are well', 'The political situation is indeed very complex'. Hardy can't begin to penetrate his carapace of cultivated inscrutability." And when it comes to talking mathematics, Ramanujan just isn't interested in proofs or the aesthetics of mathematics argument; "Hardy feels the man's soul is a mystery," his mind a vessel of intuitions.

Ramanujan is not so helpless as far as social contacts are concerned; he gets to know Indians studying in Cambridge, dines with them, and sometimes makes excursions to London in their company. When he leaves the Nevilles to go into rooms in college, he cooks for himself, and he has supplies sent from home. As the war progresses this becomes difficult, and good vegetables are hard to come by. He is in regular correspondence with his mother, but he worries about his young wife, who does not write and whose whereabouts are often uncertain. One thing becomes clear—Ramanujan is not interested in sex; not with Alice, although she feels he likes her, and not with Hardy. As Kanigel remarked of the two men, "their friendship would never ripen into intimacy." Indeed, there is some question whether intimacy of any kind with anyone is within Ramanujan's capacity; before his marriage he had been operated

on for a malignancy of the scrotum and could not have sex for a year—Leavitt writes, "he knew no conjugal happiness" with his wife Janaki. However my colleague Bruce Berndt tells me that when he last talked with Mrs. Ramanujan in 1993 (she died the following year aged 95), she was happy to contradict this remark! He learned also that when as a young woman she lived with her mother-in-law it would not have been proper for her to write directly to her husband; any messages she had for him would have had to be passed on by her mother-in-law.

Littlewood, straightforward, robust and confident of his powers, also has a secret private life, but in his case it is fulfilling; with Anne, his mistress hidden away in Treen in Cornwall, whom he visits at weekends as often as he can manage, and with whom eventually he has a daughter. Littlewood enlists early in the war in the Royal Artillery and spends the war years working on ballistics. His mathematical activity continues intermittently, and he finishes the war as a first lieutenant.

The war changes life in Cambridge. Young men enlist, word of casualties soon begins to trickle back, the college becomes a hospital, and landlords in the city suffer economic hardship. Russell is an ardent and vocal pacifist; Neville is a pacifist too, although he would have been excused service on medical grounds; and Hardy, though not a pacifist, strongly disapproves of the war and considers it to have been entirely unnecessary. He feels strong kinship with his German colleagues, especially those in Göttingen, the citadel of pure mathematics. Reports of German atrocities multiply and spread far and wide. The college authorities are strongly pro-war, increasingly so as the war progresses, and they come down heavily on fellows who oppose it. Hardy takes to visiting the wounded, and in the process the author has him initiate an affair with one soldier. Hardy himself has not enlisted, which at his age is not surprising. But if called up he'd serve; he views the trenches preferable to prison. Russell, vehemently against the war, would be arrested, sent to prison, and deprived of his Trinity Fellowship. Hardy defends Russell strenuously and works in vain to have him reinstated. However Russell doesn't mind being in prison, where he gets much work done. What would ruin an ordinary person leaves Russell's social status intact. Much later Hardy will write an account of the Russell affair for private circulation.

Eventually, Hardy did get past Ramanujan's "impenetrable" ways. He helped him to publish a paper in the *Oxford Quarterly Journal*, to get him off the ground, and he himself took up a subject that had been interesting Ramanujan for some time: the partition of integers; they began to work on $p(n)$, the numbers of ways of writing a natural number n as the sum of positive integers, and they arrived at a remarkably accurate formula

for it. Some readers will be familiar with the eloquent account Littlewood gave much later of this collaboration in his review of Ramanujan's *Collected Papers*. There was some heavy analysis that only Hardy could carry out, but on the way there, Ramanujan came up with two quite distinct, unexpected, and spectacular insights that were crucial, and Littlewood concluded: "We owe the theorem to a singularly happy collaboration of two men of quite unlike gifts, in which each contributed the best, most characteristic, and most fortunate work that was in him. Ramanujan's genius did have this one opportunity worthy of it." No less significant was the invention of the circle method in the course of this work; it led Hardy to his papers on the representation of numbers as sums of squares, and would lead Hardy and Littlewood, in the 1920s, to their famous sequence of papers on "Partitio Numerorum" and thence to a whole industry of work on Waring's Problem and allied additive questions. And there was their pioneering contribution to probabilistic number theory when they proved that almost all integers n have about $\log \log n$ prime divisors. There can be no doubt that Hardy was thrilled with these results. In 1917 he put Ramanujan up for a Trinity Fellowship, having previously secured for him, somehow, a Cambridge B.A.; but he failed, partly because of racial prejudice and partly because his anti-war advocacy had made him enemies. Undaunted, Hardy put Ramanujan up next for the Royal Society, having cleared the way with the physicist J. J. Thompson, then president of the R. S.; Ramanujan was elected at the first attempt—a remarkable achievement! It had taken Hardy himself three goes to get elected. Then Hardy and Littlewood put Ramanujan up again for a Trinity Fellowship, and this time they succeeded, not because prejudice had disappeared but because J. J. Thompson was now the new Master of Trinity and it would have been embarrassing to turn down an F.R.S.!

Hardy was all his adult life an active member of the London Mathematical Society (LMS); he would have seen it as a venue in which to promote the right kind of pure mathematics. He attended its meetings regularly and served twice as its secretary and twice as its president. Hardy used one occasion to present a result of Ramanujan's, and another time he lectured on their new joint work. In Leavitt's book it is reported that on neither occasion did it occur to Hardy to bring Ramanujan with him!

Hardy's mother dies, after lingering on the brink for many days. Gertrude struggles with her mother's demands in the last stages, with little help from her brother, who is preoccupied with his own affairs; also increasingly he is aware that Ramanujan is not well. There had been a break in their work on partitions when Ramanujan was ill, and Hardy had taken the opportunity to visit Harald Bohr in Denmark. On the occasion of the

return crossing Hardy, a convinced atheist, tries to outwit God, his enemy; he sends out postcards to Littlewood and others, claiming that he had proved RH. God will not tolerate this, he knows, and therefore will bring him back safely to England!

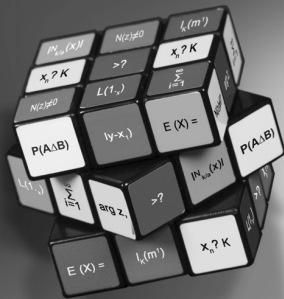
Ramanujan's illness had indeed been getting worse, and from the middle of 1917 he moved through a sequence of nursing homes and sanatoria, subject to a succession of diagnoses, all of which turned out to be wrong, and treatments, none of which helped. On one trip to London he was caught in a zeppelin air-raid, which he saw later as judgment on himself for having inadvertently ingested some powdered egg in a drink of Ovaltine at his London lodging; and on another he attempted suicide at Marble Arch Underground station. Hardy managed on that occasion to get him out of trouble with the law by describing Ramanujan, a little prematurely, as a very distinguished mathematician and an F.R.S.

The war ended, and Ramanujan's health improved for a time. He began to work again and to prepare his return home. Now Madras University was proud of his fame and offered him arrangements that he regarded if anything as too generous. He was back in Madras in 1919, now very comfortably housed, and he worked intensely for another year, mostly on mock-theta functions. He died on April 26, 1920, with Janaki, his wife, by his side.

As a biographical fragment the story Leavitt tells is not far from the truth, but I have no way of telling whether Hardy was quite as self-absorbed, and as inattentive to Ramanujan's problems, as the book suggests. The story is beautifully told in a manner that Hardy, himself a brilliant writer of English prose, would have admired. I don't doubt that the author was attracted to Hardy's personality because Hardy was a closeted homosexual in the time of the Apostles and of Bloomsbury, where he had many friends. There will be readers who do not want to know about this aspect of Hardy's nature—there are always people who don't want to know. But perhaps even they will be persuaded to read, or re-read, C. P. Snow's Foreword to Hardy's *A Mathematician's Apology*, a portrait of Hardy that is more flattering than Leavitt's but not out of tune with it. And of course, for sheer quality of style, the *Apology* is always worth re-reading, as also is Hardy's Oxford inaugural lecture.

Hardy moved to Oxford in 1920, tired of the squabbles that had been linked to the Russell affair, but returned to Cambridge in 1931, partly because at Trinity he would not have to move out of his rooms on retirement. Retirement was more of a problem in those days when pensions did not exist; and Hardy saved carefully for his old age. He died in December 1947, and I remember the announcement on the BBC evening news. As Snow reported, he had had a coronary thrombosis

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in 1937, and he had made, echoing Ramanujan, a unsuccessful suicide attempt the year before his death. He left all his savings to Gertrude, his sister, and she passed them on her death to the LMS. I happened to be on the Council of the LMS in the late 1950s when this news arrived, and I well remember the change that this, together with the royalties from his books, brought in the finances of the Society.

About Ramanujan's illness, there is a persuasive diagnosis by Dr. D. A. B. Young in an essay in *Ramanujan: Essays and Surveys*, edited by Bruce C. Berndt and Robert A. Rankin, published by the AMS and LMS as volume 22 of their *History of Mathematics* series in 2001; the conclusion is that he suffered from hepatic amoebiosis, a tropical disease, and, given the right treatment, might have been cured, even at quite a late stage. So the concerns attributed to Alice Neville in the story appear to have been justified, at least in some measure.

Neville lost his Trinity Fellowship as described in the book. He became professor of mathematics at the University of Reading, and I remember him, an amiable old gentleman with a head of white hair, from early meetings of the British Mathematical Colloquium. I did meet Littlewood a couple of times when dining at Trinity, but Oliver Atkin and Freeman Dyson, former students of Littlewood in this country, would have more vivid memories of him.