

## SHORTER NOTICES

*Collected Papers of Srinivasa Ramanujan*, edited by G. H. Hardy, P. V. Seshu Aiyar and B. M. Wilson. Cambridge University Press, 1927. xxxvi+355 pp.

Ramanujan's great and extremely individual work is now too well known to all who specialize in the theory of numbers to require detailed comment by any reviewer. The editors of his works have reprinted thirty-seven of his papers, each one of which merits the closest attention by students of algebra, the theory of numbers, and analysis. In addition they have added two extremely helpful appendices, the first consisting of notes on the papers, the second of further extracts from Ramanujan's letters to G. H. Hardy. Ramanujan's brilliant and tragic career is feelingly portrayed in the introduction. Without doubt, he was one of the few great mathematicians who have had a superlative genius for numbers, and it is indeed a tragedy that he, like Eisenstein, had to leave the world so early.

To attempt a detailed review of any of these great papers would be impertinent. We may glance, however, at one or two human problems raised by the general color of Ramanujan's brilliant work. The first of these concerns editors of mathematical journals. To the reviewer it is incredible that certain of these papers would have been accepted for publication in at least one of our American periodicals, and the like holds for more than one European journal. It is easy to deny this after Ramanujan's genius has been accepted and established. Yet on these same doubtful papers the stamp of genius is flamingly apparent to all who are not blighted by the rot of academic rigor. What does it matter, some may say, that many of his most original ideas are not backed by anything that even faintly resembles proof, when these same ideas of Ramanujan have already initiated what our successors may perhaps look back on as the first golden age of the analytic theory of numbers? The critical reader will recognize the justice of these remarks on a careful study of those papers designated by Professor Hardy as Ramanujan's greatest. To these may be added number 20, *On the expression of a number in the form  $ax^2+by^2+cz^2+du^2$* . If this be sifted to the bottom, it will be found that little, if anything, is *proved*. The defects, of course, have since been supplied by later writers. Still, if proof means anything in mathematics, it should surely mean something in the theory of numbers above all other branches.

A second observation is this. The one theorem, or formula, selected by Major MacMahon as the most beautiful in all of Ramanujan's work, is indeed a thing of beauty. But, as recognized by the editors, this, and many more of equal elegance, are already implicit in the neglected papers of Professor L. J. Rogers. This assertion is not meant to detract in any way from the brilliancy of Ramanujan's totally independent rediscovery of a beautiful theorem. It is meant to direct the attention of young mathematicians to much formal, unfashionable, and unadvertised work on the