Watson, George Neville | Encyclopedia.com

(*b*. Westward Ho!, Devon, England, 31 January 1886: *d*Leamington Spa, England. 2 February 1965) *mathematics*.

Watson went up to Cambridge University in 1904 as a major scholar of Trinity College, to which he was intensely devoted throughout his life, and held a fellowship there from 1910 to 1916. After a brief period at University College, London, he went to Birmingham in 1918 as professor of mathematics and remained in this post until his retirement in 1951.

Almost all Watson's work was done in complex variable theory. Within this field he was no narrow specialist, his interests ranging widely over problems arising in the theories of difference and differential equations, number theory, special functions, and asymptotic expansions. As a classical analyst Watson showed great power and an outstanding ability to find rigorous and manageable approximations to complicated mathematical expressions; unlike many pure mathematicians, he was not averse to numerical computation, which he performed on his own Brunsviga machine and in which he found relaxation.

Watson wrote over 150 mathematical papers and three books. The first of these books, a Cambridge tract on complex intergration, is now rarely consulted; but the remaining two had, and still have, a wide influence, particularly among applied mathematicians and theoretical physicists. The second, *A Course of Modern Analysis*, was written in collaboration with E.T.Whittaker, who had been one of the younger fellows of Trinity when Watson was an undergraduate. The first edition had appeared in 1902 under Whittaker's sole authorship and Watson offered to share the work of preparing the second, which appeared in 1915 and was a considerably expanded version of the original work. The first part of the book develops the basic principles and techniques of analysis and these are applied in the second part to obtain the properties of the many special functions that occur in applications. "Whittaker and Watson" has appeared in several editions and numerous reprints; Watson never lost his interest in it and, in his retirement, embarked upon a much enlarged version, which was never published.

The first fifty of Watson's mathematical papers are concerned mainly with properties and expansions of special mathematical functions. These investigations culminated in the publication of his monumental and definitive *Treatise on the Theory of Bessel Functions* (1922). A second edition, containing only minimal alterations, appeared in 1944; for by then Watson had lost interest in the subject and, unfortunately for the mathematical public, was not prepared to undertake the continuous revision and expansion that would have kept the book up to date. By 1929, also, he had already embarked on his "Ramanujan period" ; and during the next ten years a succession of papers appeared in which he proved and extended numerous results that had been stated in the notebooks of the Indian mathematical genius Srinivasa Ramanujan, who had died in 1920. Watson and B. M. Wilson of Liverpool were invited by the University of Madras to become joint editors of a projected work, of an estimated 600 pages, which would contain proofs of Ramanujan's results.

Both editors made considerable progress, and much of their work was published as original papers. The mass of Ramanujan material was so extensive, however, that the fruit of their combined labors never reached the stage of publication in book form. Wilson died in 1935; and by 1939 Watson's impetus had diminished, possibly because of his increased administrative and teaching commitments following the outbreak of World War II. His work not only had provided proofs of formulas and congruences stated by Ramanujan, but also had considerably extended Ramanujan's work on singular moduli and set his work on mock theta functions on a proper foundation. These investigations were admirably suited to Watson's analytical abilities, since they demanded not only great ingenuity but also enormous industry. Much of this work would now be regarded as being outside the main stream of mathematics; but fashions change! His efforts during this period were not devoted solely to problems arising from Ramanujan's notebooks; his important work on what are now called Watson transforms also dates from this time.

With the exception of his investigations on periodic sigma functions, Watson's papers during the last twenty years of his life are of lesser interest.

BIBLIOGRAPHY

A complete list of Watson's mathematical writings is in the obituary notice by R. A. Rankin that appeared in *Journal of the London Mathematical Society*, **41** (1966), 551 – 565, where a more detailed discussion of some of his work is given. See also the obituary notice by J. M. Whittaker in *Biographical Memoirs of Fellows of the Royal Society*, **12** (1966), 521 – 530, which supplements the latter and includes a photograph.

Watson's unpublished work on the Ramanujan notebooks is in a collection of MSS deposited in the library of Trinity College, Cambridge.

R. A. Rankin