

J. H. MACLAGAN WEDDERBURN, F.R.S.

1882-1948

Professor J. H. M. WEDDERBURN, of the Department of Mathematics in the University of Princeton, New Jersey, U.S.A., retired in 1945 before the statutory time, at the age of sixty-three, becoming Professor Emeritus. He survived his retirement only three years, dying at Princeton on 9th October 1948.

Joseph Henry Maclagan Wedderburn was born at Forfar on 26th February 1882, the tenth in a family of fourteen. His father was Alexander Stormonth Maclagan Wedderburn, M.D. On the paternal side his ancestry had associations with the ministry of the Free Church, on the maternal side with the law. Thus his paternal grandfather, after being parish minister at Kinfauns, had become a professor in the Free Church College, Aberdeen, while his maternal grandfather had been a lawyer in Dundee. His younger brother, Sir Ernest Maclagan Wedderburn, is a well-known citizen of Edinburgh, Deputy Keeper of the Signet and distinguished alike in the legal, academic and civic life of the capital, showing also in his own career the proclivity of the family for the law, the ministry and mathematics.

J. H. M. Wedderburn was educated from 1887 to 1895 at Forfar Academy, then at George Watson's College, Edinburgh, from 1895 to 1898, entering the University at the age of sixteen and a half. He graduated in 1903 with First Class Honours in Mathematics and Natural Philosophy. In 1903 he had the unusual distinction, while still an undergraduate, of being elected a Fellow of the Royal Society of Edinburgh. His first published paper, *On the isoclinal lines of a differential equation of the first order*, had already appeared in its *Proceedings*, and was followed by two other papers in the same year.

His first post-graduate academic year was spent, in the winter, at the University of Leipzig, in the summer of 1904 at the University of Berlin; and here it must have been that the impress of the work of Frobenius and Schur on groups and group representation permanently fixed his mind in the direction of abstract linear algebra. In 1904, as a Carnegie Fellow, he did a further year of study at Chicago, where the influence of E. H. Moore and L. E. Dickson confirmed the tendency already acquired. The titles of his papers of this time, published in the *Transactions of the American Mathematical Society*, are sufficiently

indicative; the first (with S. Epstein), *On the structure of hypercomplex systems*; the second, *A theorem on finite algebras*.

By the autumn of 1905 he had returned to Edinburgh, where for four years, until 1909, he was Lecturer in Mathematics in the University, under Professor George Chrystal. It is of some personal interest that it was he who first introduced into the Honours curriculum the course in general analysis. During these four years he continued to publish, partly in America and partly in Britain, papers mostly on hypercomplex numbers, that is to say, linear associative algebra. One of these, *Non-Desarguesian and non-Pascalian geometries* (*Trans. Amer. Math. Soc.* 8, 1907, p. 379), foreshadowed a future association; for it was a joint paper, and his collaborator was Oswald Veblen.

It is of special interest to the Edinburgh Mathematical Society that besides publishing two papers in our *Proceedings*, one on hypercomplex numbers and the other on certain determinants, Wedderburn was Editor of the *Proceedings* from 1906 to 1909.

In 1909 he left Edinburgh, and Scotland, and permanently fixed his career and his life in Princeton, where he had been appointed a Preceptor in Mathematics in the University. In this subject there were five newly appointed Preceptors. The recital of their names, forty years later, carries with it a sound of impressive achievement; Birkhoff, Bliss, Eisenhart, Veblen and Wedderburn. The two first-named completed their distinguished careers elsewhere; the other three continued at Princeton, though Veblen moved over in 1932 to the Institute of Advanced Study.

Wedderburn settled down well to the academic life of Princeton, continuing to write papers on matrices and linear algebra, with occasional returns towards his earlier interests, acquired under Chrystal, in differential equations and dynamics. Upon this ordered and congenial existence, as upon that of everyone else at the time in the nations directly affected, the first World War descended like the fall of a guillotine, making the irretrievable severance now too well-known to history. In Wedderburn the response was instantaneous. He at once left Princeton (it was during vacation) for Scotland, where he enlisted, such was his characteristic modesty, as a private soldier in the Seaforth Highlanders. Naturally such qualities of mind and leadership could not long be hidden under a bushel; he was gazetted Lieutenant in November 1914, Captain in January 1915. He served in France, being transferred in early 1918 to the Royal Engineers, where he was Captain of the 4th Field Survey Battalion. Here his training under Chrystal stood him once again in

good stead; he made important contributions to the theory and practice of sound-ranging, and was mentioned in despatches.

On demobilisation in May 1919 he had to his credit a length of service in the first World War equalled by very few, and punctuated by the minimum amount of leave. He returned to Princeton, where he was Assistant Professor in 1920-21, Associate Professor from 1921 to 1928, and Professor from 1928 until his retirement in 1945. From 1912 to 1928 he was Editor-in-Chief of the *Annals of Mathematics*, which in 1911 had become the charge of the Department of Mathematics at Princeton, and it was during this tenure that the *Annals* rose to their present distinguished position among the mathematical periodicals of the world. The volume for 1946 was in effect a *Festschrift* specially dedicated to his honour; for frontispiece it has a happy and characteristic photograph.

Meanwhile his achievement in mathematics did not pass unrecognised or unrewarded in his native country. In 1921 he was awarded the Makdougall-Brisbane prize and medal of the Royal Society of Edinburgh for his investigations into hypercomplex numbers. In 1933 he was elected a Fellow of the Royal Society.

The list of Wedderburn's published works is not extensive. It is given in the *Obituary Notices of Fellows of the Royal Society* for November 1949, p. 625, and comprises thirty-eight papers and a textbook, *Lectures on Matrices*, 1934, one of the American Mathematical Society Colloquium Publications. (The writer of the present notice takes opportunity here to express his indebtedness to the above obituary and to its author, Professor H. S. Taylor, Dean of the Graduate School of Princeton, for details, otherwise difficult to obtain, of Wedderburn's life in Princeton.) It is very evident that Wedderburn would never allow himself to write a *parergon*, would never consider publication unless he was satisfied he had something of importance to communicate. The greater part of his work is on linear associative algebra, and the theorems to which his name is attached, established quite early in his career, from 1905 to 1908, belong to this domain. They have reference to the structure of linear algebras, their relation to their invariant subalgebras, their matrix representation, and their resolution into direct sums or direct products of simpler algebras. The essential advance made by Wedderburn was that not only were the theorems new, but the proofs were abstract and adapted to general fields. The most accessible account of these theorems and their background is to be found in the last chapter, Chapter X, of *Lectures on Matrices*, pp. 147-168. The

book closes with the theorem that a group algebra is semi-simple and is therefore the direct sum of simple algebras, and so (with extension if necessary of the coefficient field) of simple matrix algebras; and then the consequent possibility of giving groups a matrix representation is dismissed in a sentence. This may seem abrupt, since this last topic had so greatly preoccupied Frobenius and Schur; but from the more general standpoint there is indeed no more to be said. It is fitting in conclusion to draw attention to an article (*Bull. Amer. Math. Soc.* 56, 1950, pp. 65-72) by E. Artin, *The influence of J. H. M. Wedderburn on the development of modern algebra*, which gives a historical survey of Wedderburn's theorem on simple algebras and its later extensions at the hands of other authors.

Wedderburn, who never married, was always of a retiring disposition, which would appear to have become accentuated towards the end of his life. He preferred to spend his vacations in rough active life in the wilds of northern Canada, or latterly on a remote farm in the Adirondacks.

Of mathematicians born in Scotland during the last three-quarters of a century, or more, Wedderburn must count as the most distinguished and, considering the number of his American pupils who are now themselves algebraists of high distinction, the most influential. The transference of his activities from Scotland to America might be regarded, though only from a very limited point of view, as a loss to Scotland; but in fact the ultimate gain to mathematics has been all the greater, since in Princeton he found, as he could hardly have found in any other country, a vigorous and exuberant mental climate, in which his professional teaching and his private research flourished with equal advantage.

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