

MacMahon, Percy Alexander | Encyclopedia.com

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(*b.* Malta, 26 September 1854; *d.* Bognor Regis, England, 25 December 1929)

mathematics.

MacMahon was the son of Brigadier General P. W. MacMahon. He entered the army in 1871, rising to the rank of major in 1889. He served as instructor in mathematics at the Royal Military Academy from 1882 to 1888, as assistant inspector at Woolwich arsenal to 1891, and as professor of physics at the Artillery college until his retirement in 1898. Afterward, he was deputy warden of standards at the Board of Trade from 1906 to 1920. A fellow of the [Royal Society](#) in 1890, he was president of the London Mathematical Society in 1894-1896, and president of the Royal Astronomical Society in 1917.

MacMahon was a master of classical algebra, who had remarkable insight into algebraic form and structure, together with a power of rapid and precise calculation. His early work dealt with invariants, following the studies of Cayley and Sylvester. He noticed that the partial differential equation for semi-invariants is fundamentally the same as that for general symmetric functions. MacMahon made use of the concept of generating functions, and of U. Hammond's symbolic calculus of differential operators in connection with symmetric functions. His power of calculation helped him in the work of tabulation and enumeration.

The study of symmetric functions led to MacMahon's interest in partitions and to the enumeration of Euler's Latin squares. His presidential address to the London Mathematical Society gave a survey of combinatorial analysis, and his two-volume treatise of 1915-1916 is a classic in this field. It identified and clarified the master theorems, and indicated a wealth of applications. An introductory version was published in 1920.

MacMahon's interest in repeating patterns and space-filling solids began in his childhood with observations of piles of shot found in his military environment. He revived this interest in latter years, writing a book on mathematical pastimes.

BIBLIOGRAPHY

I. Original Works. The presidential address on combinatorial analysis is printed in the *Proceedings of the London Mathematical Society*, 1st ser, **28** (1897). Some ninety research papers are listed in the obituary notice by H. F. Baker, cited below. Works by MacMahon were *Combinatorial Analysis*, I-II (Cambridge, 1915-1916); *An Introduction to Combinatorial Analysis* (Cambridge, 1920); and *New Mathematical Pastimes* (Cambridge, 1921).

II. Secondary Literature. The obituary notice by H. F. Baker in the *Journal of the London Mathematical Society*, **5** (1930), 305-318, gives a brief sketch of MacMahon's life and a substantial account and analysis of his mathematical work.

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