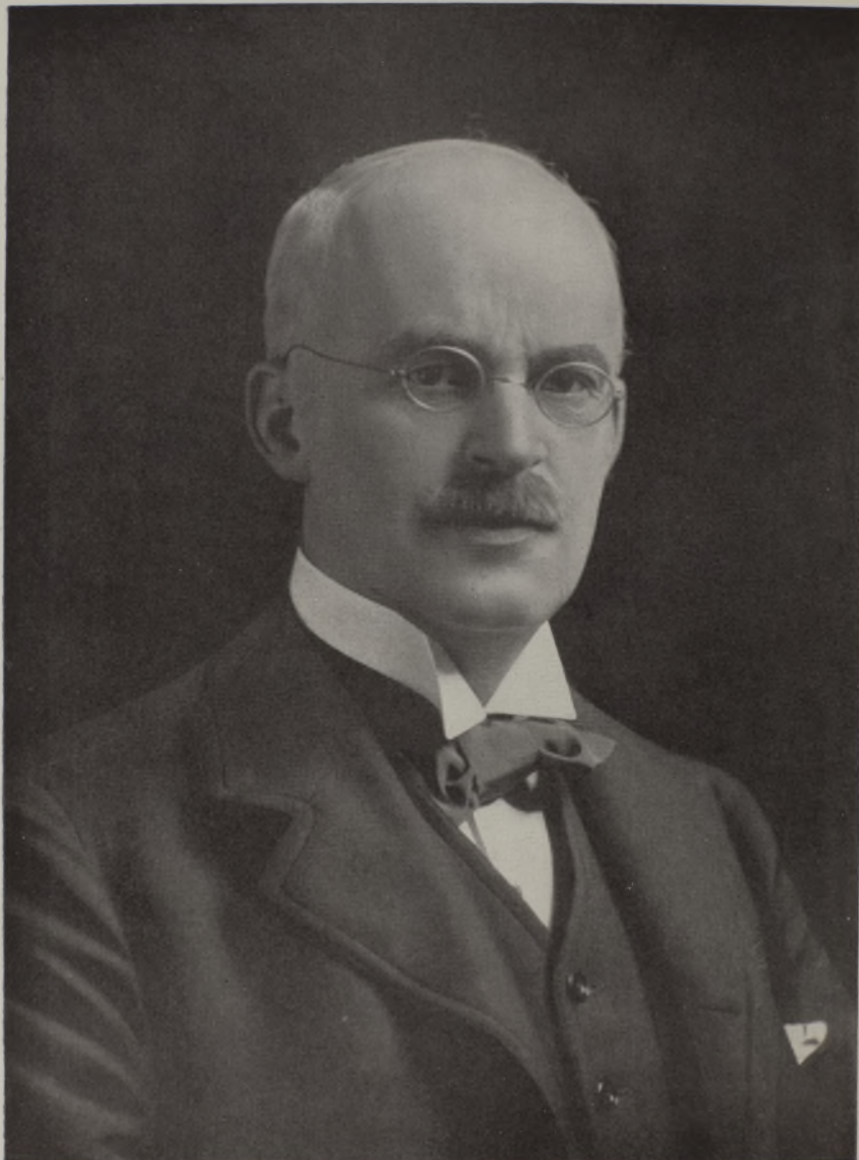

J. E. Campbell.

JOHN EDWARD CAMPBELL—1862-1924.

The death of John Edward Campbell on October 1, 1924, was distressingly sudden. His powers were at their full, his health had seemed perfect, and for a wonder he was not at the time even working too hard. The loss is not only irreparable to his own family, but a grievous one to many admiring friends, to his College, and to fellow-workers at mathematics in Oxford and out of it.

He was born on May 27, 1862, at Lisburn, Co. Antrim, where his father, John Campbell, M.D., the son of an earlier Dr. Campbell, was in practice. He once intended to enter the medical profession himself, as a brother did, and as his own eldest son has since done. In 1889 he married Sarah, eldest daughter of Mr. Joseph Hardman, cotton spinner, of Waterhead, Oldham. She survives him, as do two sons and a daughter. Another son, a scholar of his own College, fell near Ypres in October, 1914, only a few days after landing as a hastily trained young officer.

After earlier education at home and at the Methodist College, Belfast, he entered Queen's College, Belfast, where he presently graduated in the Queen's University. He always remained a very loyal Ulsterman, in every sense, and expressed warm gratitude to those under whom he studied in his first University. Nor did Belfast forget him as he was earning distinction elsewhere. It conferred on him the Honorary Degree of D.Sc. in 1919.

In 1884 he came from Belfast to Oxford, with a scholarship, which could be held by one a little over the usual age, at the newly revived foundation, Hertford College. After getting in succession all the University distinctions open to a mathematical man, he became Fellow and Tutor of the same College. Later, for a good many years, he was also Lecturer of University College.

Of his devotion to duty in Oxford it is impossible to speak too highly, and the general affection felt for him can hardly be exaggerated. His success with pupils was marked, all the more marked because all saw that he was at home, mathematically, in regions above them, and wondered that he could come down to their modest level. He possessed capacity for administration also, serving his College well as Vice-Principal, with Principal's authority, and as Bursar, at times of special need. He was a man of singular personal charm, cheery, unaffected, trust-inspiring. There was no selfishness in him. Differences of opinion, where principle was not at stake, did not worry him. He knew how to be sorry without complaining if misfortune or disappointment came his way.

His family are anxious that he should not be thought of only as a distinguished mathematician who was always at work. To them he was also the model of a sympathetic and truly Christian father, happy in sharing the interests of young people, and always ready to be straightforward with them, as intelligent friends, when they needed guidance. They felt that he instilled sincerity, courage and fairness by daily example no less than by outspoken advice. His relaxations, other than domestic, were social among humble folk in a certain poor parish, but besides there was always a favourite book by Scott or Dickens or Jane Austen in his pocket, ready to hand for one more reading.

He was elected F.R.S. in 1905. For two years from November, 1918, he was President of the London Mathematical Society. Quite recently he greatly appreciated the honour, a new one for an Oxford man, of being called upon to examine for the Cambridge Mathematical Tripos. He was understood to have things to tell us for our good from the sister University, but the opportunity will not come.

As a researcher in, and writer of, mathematics, he disliked the petty, and was all for the general. Finding himself, one may almost say by accident of environment, a student of geometry, but having all the same a decided bent towards differential analysis with a big object, he looked abroad for analysis bearing on geometry which needed making known at home, and began by saturating himself with knowledge obtained from Sophus Lie's "Transformations-Gruppen." A first period of great productiveness followed, as to the outcome of which Professor Burnside, the best qualified of judges, has kindly written the paragraph next following :—

"Mr. Campbell's interest in the theory of continuous groups was first shown in two papers on 'A Law of Combination of Operators,' in vols. 28 and 29 of the 'Proc. L.M.S.' In these papers he deals, from a point of view which is essentially his own, with the formal results which are at the base of Lie's theory. In a paper published two years later, 'On the Theory of Simultaneous Partial Differential Equations,' he develops a system of formulæ by which it may be determined whether such a system is or is not integrable. His next contribution to the subject ('Proc. L.M.S.,' vol. 33) was a 'Proof of the Third Fundamental Theorem in Lie's Theory.' The proof given is essentially simpler than Lie's own ; and, though it was subsequently criticised by Engel, it is recognised as being substantially complete. In 1903, not very long after the date of the last paper, Mr. Campbell's 'Introductory Treatise on Lie's Theory of Finite Continuous Transformation Groups' was published. By writing this book he put English mathematicians under a lasting debt of gratitude. It gives a wonderfully clear and complete account of a modern theory which, although it already had a literature of its own on the Continent, had, at the time when the book was published, attracted little or no attention in this country. Moreover, the book is not, in any sense whatever, a mere compilation from outside sources. It is full of points of view and illustrations which are Mr. Campbell's own. The chapters on contact transformations and on differential invariants may be specially referred to. The theory in which Mr. Campbell was so specially interested underlies most of his more recent work on differential geometry in general, and on that particular branch of it connected with Einstein's gravitation-theory."

The last sentence in the above indicates how Campbell was led on to researches in the general differential geometry of surfaces and higher spaces, as associated by Gauss and his followers with the analysis of differential quadratic forms, and so to another study much pursued in other countries, but much neglected here. What may be looked upon as the second series of writings with which his name will be associated began in 1906 with a long and searching paper, "On Backlund's Transformation and the Partial Differential Equation $s = F(x, y, z)$" ('Proc. L.M.S.,' Ser. 2, vol. 5). Another paper in the next volume introduced an application of quaternion methods to the problem of the infinitesimal deformation of a surface, which in later work he followed up by considerable use of vectors and quaternions, and by the introduction of a notation of his own. His second period, thus begun, was to last—with a break—for the rest of his life. It gave him great pleasure in 1909 to be invited by the delegates of the Common University Fund to give a special course of lectures in the University of Oxford on the subject of the differential geometry of surfaces which he had now made his own.

After the war period, during which Campbell lived as one unconscious of the existence of mathematics or of anything but his country and duties of service, he returned with fervour to his differential geometry (as well as his tutorial work). Now he began to attend, not only to the geometry of surfaces in Euclidean space, which had been his main concern beforehand, but to the geometry of quadratic differential forms in higher spaces, and in particular to the four-way space of the general theory of relativity. Though he never tired of confessing that he knew little about Physics, there is no doubt that the doctrine of gravitation according to Einstein appealed to him strongly. His valedictory address as President of the London Mathematical Society in November, 1920, is a memorable pronouncement, from a pure mathematician's standpoint, about the wonder that a hypothesis in the study of differential geometry, which he found natural, "should tell us about facts of the universe." The subject of the address was one that he returned to in at least one later paper.

A book on differential geometry was naturally expected from him—expected by some perhaps ever since his lectures of 1909—and he lived just long enough to write such a book. It is hoped that this will soon be published. It is complete, so far as he had intended it to go, except that a contemplated final chapter on the connexion of what had preceded with the theory of Einstein is only represented among writings that can be found by a fragment, if at all. In writing the book he is believed by his friends to have had in view, not so much the extension of knowledge, except in the chapters on higher spaces, as the enforcement of the usefulness and convenience of novel and neglected methods, those of the calculus of tensors and of vector geometry.

It must not be pretended that Campbell's work is easy reading. His analysis proceeds steadily, but is inevitably laborious because of his preference for attacking problems in full generality, and of the small breathing space which he allows in the course of protracted investigations. Moreover, though when making a new start he carefully words an introduction descriptive of the aim of what is coming, there is sometimes not quite enough expression of the earlier stages of thought by which he has in the first place put the known, as derived from authorities or even from his own previous pages, in the form which is going to help him on. Yet there is a glowing enthusiasm about his confident advance which incites to determination in following him. He writes with the zeal of one who has a message to deliver ; and the message will be carried on. His methods in differential geometry will receive the attention which they deserve. It may be expected that followers will improve on them, but his leadership will be recognised, and his actual production is not for the present day only.

E. B. E.