its day a discovery of no slight scientific importance. It solved in a very satisfactory way for practical purposes of experimenting the problem of how to obtain a voltaic battery of high electromotive force and moderate resistance, free from the paralysing effects of polarization when used to generate large currents for fairly long intervals of time. The battery soon became a great favourite for experiments involving heavy currents, such as the production of the electric light by means of an arc between carbon points; and it was that used by Faraday in his electro-optic experiments.

From the age of twenty-five to fifty Mr. Grove, though pursuing the profession of the Law, was actively engaged in scientific work, and at a comparatively early age was elected a Fellow of the Royal Society. Just fifty years ago he was awarded a Royal medal for his paper "On Certain Phenomena of Voltaic Ignition and the Decomposition of Water into its Constituent Gases by Heat," which formed the Bakerian Lecture for 1846. His papers are numerous and deal mainly with the phenomena of the voltaic cell, and of electrolytic decomposition generally. The subject of the polarization of gases in particular occupied much of his attention, and he discovered the well-known gas-cell, so interesting from a theoretical point of view, and especially now as being the forerunner of the modern secondary battery. Besides these Mr. Grove studied electrical discharge, the effect of light on polarised electrodes, and other subjects which, investigated with the aid of modern appliances and instruments, have yielded a rich harvest of valuable results.

The most active part of Mr. Grove's scientific career may be said to have ended about the time of his presidency of the British Association at the Nottingham meeting in 1866. His presidential address was on his favourite subject "The Continuity of Natural Phenomena," and he had then the satisfaction of finding the views he so early held now shared by all scientific workers, and illustrated by a great mass of recent scientific discovery. In 1871 he was made a Judge, and shortly afterwards received the dignity of knighthood. In 1875 the honorary degree of D.C.L. was conferred on him by the University of Oxford, and was followed in 1879 by that of LL.D. from the University of Cambridge. For sixteen years he devoted himself unremittingly to his legal duties, but in 1887, when he retired from the Bench, his former scientific interests and activity, never extinct by any means, in great measure returned. But at his now very advanced age arduous scientific work was impossible, and his contributions to scientific literature were limited to such lectures and addresses as his strength enabled him to deliver.

In the preface of his essay on the Correlation of Physical Forces, Sir William Grove represented himself as standing on the vantage ground obtained by the labours of others, and therefore as able perhaps to see somewhat further than those who had gone before. It is ever thus: the men of to-day work more surely and swiftly because such men as he have lived and worked before them. It has been given to few to witness, as did Sir William Grove, almost all the scientific progress of the nineteenth century, and it must have well rewarded his scientific spirit to see the younger generation enter into the labours of the founders of the theory of energy with so much eagerness and so great a promise of fruitful achievement.

A. GRAY.

PROFESSOR HUBERT A. NEWTON.

AT the time when the attention of astronomers is again directed to the return of the nucleus of the November meteors, the sad intelligence reaches us of the death of Prof. Newton, of Yale College, whose reputation is largely connected with the history of this shower, and who, perhaps more than any other, has advanced the position of meteoric astronomy to that it now holds. He thus rendered a great service to astronomy, and had he no other claims to remembrance this would ensure a grateful recollection. Prior to his historical researches the observation of meteors possessed but a languid and feeble interest, lacking that coherence and purpose which method, founded on a suggestive hypothesis, alone can give. The collection and discussion of the original accounts of thirteen meteoric displays, all of a similar description, and distributed over a period of more than nine hundred years, demonstrated the permanent character of the phenomenon, rendered prediction possible, and invited hopeful inquiry. The fact that he left the inquiry incomplete scarcely diminishes the extent of his service, since he showed that the problem came within the range of celestial dynamics, and he at once indicated the method and supplied the means which it was certain would be effective in the hands of a master of profound and subtle analysis. It is not necessary to pursue the subject further, or to more than mention the interest subsequently added to meteoric inquiry by the discovery of Schiaparelli and others working in this fruitful field; the impulse had been given, and the subject of shooting-stars became vividly and permanently a subject of astronomical notice.

Prof. Newton's connection with the observatory of Yale University has been long and honourable. Perhaps one is not quite justified in calling him the Director of the Yale Observatory, but his position seems rather difficult to define as the Secretary to the Board of Managers, who annually present a report to the President and Fellows of Yale College. For two years, 1882–4, he certainly held the position of Director; but he seems to have preferred his old position of Secretary, leaving the head of each department to make a separate report. There can be no doubt, however, but that his was the directing mind, and determined the character of the observatory. It was while he held the position of titular chief that the heliometer, which in the trained hands of Dr. Elkin has proved itself of such value, was mounted, and probably it was his suggestion that the observatory should possess an instrument of exact measurement rather than one of those gigantic equatorials, which elsewhere in America have appealed to the fancy, and satisfied the ambition of the millionaire. Certainly he subscribed liberally to the guarantee fund which ensured its use by a skilled astronomer, and the work that has issued from the observatory under his management, whether it be parallactic inquiry or stellar triangulation, has amply justified the expenditure, and placed the institution in the front rank of those devoted to extra-meridianal work. Not but that the utilitarian side of astronomy has also been ardently pursued at Yale. The distribution of time signals, the testing of chronometers and philosophic apparatus have long been a part of the routine work, and the observatory has worthily striven to maintain a high standard of workmanship.

Prof. Newton's services to science are by no means exhausted by the fulfilment of the duties of his chair or of the direction of the observatory. He has held the post of President of the American Association for the Advancement of Science, and been the author of many papers, generally connected with meteoric or cometary astronomy. More particularly may be mentioned his inquiry into the capture of comets by Jupiter or other planets, in which he has shown that the perturbing action of the planets on parabolic orbits of every possible inclination to the ecliptic tends to produce elliptic orbits of short period, moderately inclined to the ecliptic and with direct motion.

The Royal Society recognised the eminent services Prof. Newton had rendered to astronomy by placing his name on the roll of foreign members in 1892.

W. E. P