lecturer explained that the red and violet rays traversing that atmosphere would suffer different amounts of absorption, for as red and violet rays did not occur simultaneously there would necessarily be a difference in the times of their minima. M. Nordmann's curves in the cases of β Lyræ and δ Cephei were exhibited, showing the variation in the form for the light-curve for red, green, and blue light; and the lecturer expressed the opinion that though M. Nordmann had failed to prove that dispersion of light occurred in stellar space, yet he had opened up a new method of studying, from which results of great importance might be confidently expected.

The lecturer then dealt with various points of interest which have recently come up in connection with the planet Saturn. After describing the discovery of the ninth satellite Phœbe by Pickering, he discussed the possible explanations of its retrograde motion, and gave a brief summary of Stratton's recent work on Pickering's theory of planetary inversion—an hypothesis which, starting with the assumption that the planets originally rotated in a retrograde direction, seeks to explain their direct rotation by means of solar-tidal friction. In the case of Saturn, Phœbe had been evolved from its primary before solar-tidal friction had succeeded in changing its retrograde direction into direct. The lecturer then discussed the peculiar condensations seen by Barnard and Lowell on the rings of Saturn when they recently passed through their "end on" position as seen from the earth, and gave a sketch of the different explanations of the phenomenon which had been put forward by Barnard, Lowell, and Russell. He then referred to the alleged discovery of an outer crape ring recently announced from the Geneva Observatory, and showed how the existence of such a ring would confirm the views set forth by Clerk Maxwell in 1856 as to the physical constitution of the rings and their ultimate destruction. He then alluded to Baldwin's research-work on the variability of Saturn's light with change of phase, from which it appears that the earlier views of Müller and Seeliger on this point are not confirmed.

At the conclusion of the address, on the motion of the Right Rev. Bishop Grimes, seconded by Mr. Hitchings, a hearty vote of thanks was accorded the lecturer.

SECOND MEETING: 2nd *June*, 1909.

Darwin Celebration.

Mr. G. W. Russell, M.P., in the chair.

There was a very large attendance.

Lectures.—On the life and work of Charles Darwin, with illustrations. Dr. Chilton showed slides of Down, in Kent, Darwin's residence; the last portrait of the great scientist; Henslow, the famous botanist, Darwin's teacher at Cambridge; Huxley, Wallace, and other notable contemporaries of the scientist; and views of his school and college. Among the pictures shown by Mr. Waite were many photographs and drawings illustrating portions of Darwin's work; while Dr. Cockayne showed characteristic plants, and Mr. Speight showed pictures illustrating geological formation in America, and the making of coral islands.

Copies of letters from Darwin to Captain Hutton and to Sir Julius von Haast were exhibited on the screen. The first letter acknowledged a favourable criticism which Captain Hutton had written in the *Geologist* on the appearance of the "Origin of Species," while the latter thanked Sir Julius von Haast for interesting observations on the New Zealand ground-parrot and on the plants and animals which had been acclimatised in New Zealand, and further acknowledged his election as a member of the Canterbury Philosophical Institute in the year 1864.

The Chairman briefly introduced the speakers, and touched on the vast importance to mankind of the work of Darwin.

Dr. Chilton said that Darwin, who was born on the 12th February, 1809, had at first attracted little attention, although he had come of a great family, and his grandfather had won some distinction as a scientist. He was born at Shrewsbury, and went to school there, but was not fortunate in his studies, which were strictly classical and not pleasing to him. He was always considered a very ordinary sort of boy, and Euclid

was the only thing that appealed to him. He had done a certain amount of experimental work in chemistry, and was sent to Edinburgh University to become a doctor. He described his studies there as irksome, and the lectures in his second year on geology and zoology as incredibly dull. Though he took little interest in his medical course, Darwin pursued his natural-history studies. His parents deemed him to be so unfitted for the medical profession that they sent him to Cambridge to study for the Church, and he spent a year there. It was at Cambridge that Darwin met Henslow, the famous botanist, who encouraged his taste for natural history, and eventually was instrumental in his joining the "Beagle," which was sent out to complete the survey of South America and to make astronomical observations in 1831. The importance of that voyage on his future work could hardly be overestimated, for it was then he laid the foundation-stone of his great theory. The ship arrived in New Zealand in 1835, but Darwin's experiences were not fortunate, and he left with the impression that the Maoris were a very inferior race. The voyage took five years, and he returned to London in 1836, where his reputation grew apace. He lived in London until 1842, and then settled down with his wife in Kent, where he lived until his death. His great work, "The Origin of Species," was suggested by the "Beagle" voyage. The first notes on the subject were made in July, 1837, and from then he gathered every possible fact bearing on the subject. In 1844 he had finished his first sketch of the theory, though the idea of organic evolution had previously been promulgated in the eighteenth century by Lamarck, and Darwin's grandfather had expressed the same views. Their belief was more or less theoretical, and it was left to Darwin to establish the basic theory. He worked slowly on, accumulating facts, and received great encouragement privately. Then occurred the "Wallace incident." While lying on a sick-bed in the tropics Wallace thought out a theory on the same lines as that of Darwin, and immediately communicated his observations to him. Darwin took Wallace's theory to other scientists in London, and the result was the publication of their joint papers. These attracted little attention, but in the following year, 1859, Darwin published an abstract of his great work, which raised an enormous conflict between scientists and supporters of Christianity. The work was warmly welcomed by the younger men of the day, and in 1861 Captain Hutton wrote a review of the book which brought a letter of thanks from Darwin. Later on Darwin and Captain Hutton became closely associated, and the great man was made a member of the New Zealand Institute. He was also elected to the Philosophical Institute, so that those present were celebrating the work of one of their own members. Dr. Chilton went on to speak of the great help Huxley extended to Darwin, and said that the theory soon gained ground. In France and America it was not so well taken up, but Haeckel made it well known in Germany. The full work was never published as a whole, but in books such as "The Descent of Man," "Animals and Plants in Domestication," and others, the main facts were given. Darwin died on the 9th April, 1881, and was buried in Westminster Abbey. The impulse which he gave to all branches of natural history had been enormous.

Mr. Waite referred to Darwin's great researches on the subject of earthworms, and to the many interesting facts presented by him in his work on animals and plants under domestication. He showed a number of pictures of the many quaint varieties of pigeons and poultry, all shown by Darwin to have sprung from a common ancestor, and went on to speak of Darwin's researches into the subject of sea-barnacles and insects generally.

Dr. Cockayne said that when Darwin's botanical studies commenced under Henslow at Cambridge the teachings of Linnæus still dominated the botanical world. Then the first business of a botanist was to make collections of dried plants, label, and stow them away. Above all, no attention was to be paid to variations: such was no affair of a botanist, but a nuisance rather. Certainly the science was making considerable progress; the improvement of the microscope had stimulated that anatomical research which was destined before long to yield in the hands of Hofmeister such a splendid harvest. Also, much was being done towards arranging genera in natural orders; notwithstanding that without the idea of descent such could be but conceptions of the mind, whilst their linear arrangement was altogether unnatural. Henslow's lectures taught Darwin little or nothing, but he expressed his admiration of the field-work. In the "Voyage of the 'Beagle'" one comes across certain botanical observations of considerable interest—for instance, the account of the peat-making habit of certain Fuegian plants while still alive, a characteristic, as we know now, of many subantarctic species.

Dr. Cockayne briefly touched on the various botanical publications of Darwin, showing by example how experiment formed the basis of his researches, and how, untrammelled by prejudice, and with an altogether open mind, he studied various classes of plants, having no care for their systematic relationships, but dealing with them entirely from the biological standpoint, and with the most brilliant success. Thus Darwin, leaving out of the question the intense stimulus evolution gave, by his example of looking on plants

as living organisms, and by using the experimental—*i.e.*, the truly scientific—method, infused new life into botanical science. He was speedily followed by many trained observers, especially in the domain of floral biology, so that now more than five thousand communications had been made in that subject alone, and various elaborate works published. Here, too, New Zealand early played her part in the excellent account of the fertilisation of the indigenous plants by Mr. G. M. Thomson. Darwin's work on climbing-plants was of the highest character, but it was perhaps surpassed by his epoch-making studies on *Drosera* and other carnivorous plants. In his "Animals and Plants under Domestication" there is a perfect mine of information regarding cultivated plants. It is interesting to note that Darwin was well aware of the existence of a stoneless plum, so that Burbank's so-called "creation" is very far from deserving that name. As for Darwin's position as a botanist, he himself never considered that he deserved such a title, but used to wish he only were such a one as Hooker; but, without intending to detract in the slightest degree from the high achievements of that truly great man, if originality of thought, success on little-trodden or unbeaten paths, and influence in advancing the science and stimulating research, count for anything, then Darwin really was the greater botanist.

Mr. Speight said that Darwin was in many respects a very eminent and distinguished geologist. He was essentially a pioneer, but even as a pioneer he showed marked ability. The position of geology as a science when he was a young man was unsatisfactory in the extreme. It was overweighted by theory and unsupported by observation, and it merited the scorn and distrust of the educated community. In the early part of the nineteenth century a marked advance was made, largely owing to the work of two great Englishmen, William Smith and Charles Lyell. The former was the founder of stratigraphical geology, and the latter insisted on the uniformity of geological processes in time past as in the present. His great work, "The Principles of Geology," which appeared in 1830, inspired Darwin with enthusiasm, and he sailed from England in the year 1831 determined to apply those principles in the lands he was to visit. Darwin's work as an active field geologist was practically restricted to the years 1832–37. The result of his observations he published in 1844. His geological writings, though limited in amount, were well worth careful study. The speaker referred briefly to Darwin's work on coral islands, on the structure of South America, and on volcanic islands. Special reference was made to his work on the cleavage and formation of rocks, and to the various theories which he advanced and which were not accepted in his day, but which later had received the approval of the geological world. Lantern-slides were exhibited to show the structure of volcanoes, the noted spine of Mont Pelée, various landscapes in southern Patagonia, and the formation of coral islands, and the scope and bearing of Darwin's work in these connections were briefly explained. The speaker concluded by pointing out that, though the year 1844 ended Darwin's special work as a geologist, the experience he had gained was invaluable when discussing the special palæontological evidence in support of his theory of natural selection.