

The British Association at Edinburgh.

A RETROSPECT.

FROM every point of view the visit of the British Association to Edinburgh has been an unqualified success. With the exception of the last day of the meeting the weather was highly favourable; and even on that day the rain was confined to the early forenoon hours. Every morning the reception room, the old Parliament Hall, was crowded with members whose eager happy looks showed that they were enjoying the meetings to the full. The citizens of Edinburgh gave themselves up to the spirit of scientific gaiety, and the visitors heartily responded. Every section had its own devoted band of disciples; and what specially impressed those who remembered the last Edinburgh meeting in 1892 was the proportionately greater number of women members. This, of course, added a brilliancy to the gatherings, particularly when two or more sections met for a common discussion.

These common discussions formed indeed one of the distinctive features of the Edinburgh meeting: physicists and chemists together inquiring into the structure of molecules; physicists, geologists, and biologists comparing views on the age of the earth; chemists and physiologists solving the mysteries of biochemistry; botanists and geologists discussing in lively fashion the oldest land flora; geographers and anthropologists striving to discover the origin of the Scottish people; geologists and engineers trying to come to an agreement on the Mid-Scotland canal; and so on in other cases. The popularity of these combined discussions was demonstrated by the crowded attendances which strained to the very utmost the accommodation provided by the largest classrooms of the university.

Fortunately for the presidential address and the various evening lectures and addresses splendid accommodation was afforded by the Usher Hall, which was completed just before the outbreak of the war. Owing to his regrettable illness Sir Edward Thorpe was unable to deliver his address in person, and it was not until the last day but one of the meeting that the members of the Association were able to rejoice in the presence of their president. The citizens of Edinburgh took full advantage of the special lectures prepared for them. Sir Oliver Lodge discoursed with his well known ease and lucidity on "The Principles of Wireless Telephony"; Prof. Dendy delighted a large audience with a finely-planned lecture on "The Stream of Life," and Prof. Fleure gave a suggestive and highly interesting disquisition on countries as personalities, in which special prominence was given to Scotland. The two evening discourses given to the members of the Association were both of great local interest, one being a comparison of the Forth and Quebec Bridges, by Prof. C. E. Inglis, O.B.E., and the other on "Edinburgh and Oceanography," by Prof. Herdman, C.B.E., F.R.S. Both lectures were profusely illustrated

by lantern slides, and were greatly appreciated by large audiences.

The great reception given by the Lord Provost was held, as usual, in the Royal Scottish Museum, the large hall and galleries of which formed an appropriate setting for this large and brilliant gathering. Huge though the assembly was in point of numbers, there was no uncomfortable crowding. Endless streams of friendly groups meandered through the treasures of art and science in the various halls and along the great galleries from which a bird's eye view could be obtained of the ever shifting scene below. Music added to the charm, provided the listener was not too near, when conversation became almost impossible. It is doubtful if there exists a finer place for a reception than a building of the nature of the Royal Scottish Museum, where even the solitary wanderer can find interest in the varied contents of the cases displayed to view.

The excursions arranged by the local committee were well patronised, the most popular perhaps being that to Rosyth and Hopetoun House, where the visitors were received and entertained by the Marquess of Linlithgow, and the visit to Dunfermline, on the invitation of the Carnegie Trustees. The long excursions to the Scott country and to the Trossachs also attracted many sightseers. Unfortunately those who visited the West encountered heavy rains; and one section of the party was driven the wrong way, thereby missing the stage at which lunch was provided, and returning home hungry and miserable after a twelve hours' fast. Particularly interesting also were the small excursions arranged for Old Edinburgh, for Swanston, the early home of R. L. Stevenson, and for other interesting places in the immediate vicinity. The garden party given by the local committee was, in a certain sense, an excursion to the finely appointed Zoological Park. This was on the Tuesday afternoon just as the weather became somewhat threatening. Fortunately the rain held off until the evening, and the members thoroughly enjoyed their visit to a park the natural beauties of which have been skilfully adapted to the needs of all types of wild animals.

The Senatus of the University of Edinburgh took advantage of the presence of the British Association to confer the honorary degree of Doctor of Laws on nine of the eminent strangers visiting the city. These were Sir Edward Thorpe, the President of the Association; Prof. Arrhenius, Director of the Physico-Chemical Department of the Nobel Institute, Stockholm; Prof. Kapteyn, of Groningen, the discoverer of the two star streams; Prof. Krogh, the eminent physiologist of Copenhagen and Nobel Laureate; Dr. Irving Langmuir, Schenectady, New York, well known for his electrical work and his investigations into the structure of atoms; Sir Oliver Lodge, probably the best known man of science in our midst; Sir William Ridgeway, Professor of Archæology

at Cambridge; Professor Vito Volterra, one of the foremost mathematicians of the day; and Prof. R. W. Wood, of Johns Hopkins University, Baltimore, famous for his brilliant experimental researches in optics. These outstanding representatives of science in its various branches were presented to the Vice-Chancellor, Sir Alfred Ewing, by Prof. Whittaker (acting for the Dean of the Faculty of Law), who hit off the characteristic work of each in the happiest phrasing.

Another side issue of the British Association meeting was the Royal Societies' dinner, at which the fellows of the Royal Societies of Edinburgh entertained as their guests the fellows of the Royal Society of London, the members of the Royal Irish Academy, and eminent foreign visitors to the meeting. The Maharaj Rana of Jhalawar was also a guest. This brilliant function was held in the Masonic Hall, probably the most artistic hall in Edinburgh. Nearly two hundred were present, and the guests and hosts were arranged in such a way that those representative of any one science formed a group at one of the tables. The toasts were proposed and responded to by speakers selected on a broad international basis, and the speeches were

short, congratulatory, breezy, and humorous. One point referred to by Sir James Dewar is worth chronicling on account of its historic interest, and might have found a place in the handbook "Edinburgh's Place in Scientific Progress." Some seventy-five years ago a young extra-mural teacher, Dr. Samuel M. Brown, gave four lectures on the atomic theory and, to a large intellectual audience packed into his lecture room, broached ideas regarding the complicated nature of atomic structure which were far in advance of his day, and closely approximated to the ideas now so prevalent. Samuel Brown died at the age of thirty-nine, and Edinburgh lost a brilliant son who, had he lived, would have brought renown to his city.

For one glorious week the people of Edinburgh rejoiced in the British Association—just as profoundly as the visiting members of the Association rejoiced in Edinburgh. There was exhilaration in the very air, and the profoundest problems were tackled in a cheerful spirit. Two thousand seven hundred and sixty-eight members drawn together from all parts of the world shared in this intellectual feast of good things, the golden memories of which will be a life-long possession.

C. G. K.

Science and Crop Production.¹

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THE beginning of much of our scientific work on crop production goes back to the year 1843, when Lawes and Gilbert set out to discover why farmyard manure is such an excellent fertiliser. Two opposing explanations were offered by the chemists of the day; the older view, coming down from the eighteenth century, was that the fertilising value lay in the organic matter; the newer view put forward by Liebig in 1840 was that it lay in the ash constituents—the potash, phosphates, etc.—left after the manure is burnt. Lawes and Gilbert considered that it lay in the ash constituents *plus* the nitrogen of the organic matter, and they devised a critical field experiment to decide the matter. They divided a field of wheat into plots of equal size, of which one received farmyard manure at the rate of 14 tons per acre, another received the ashes of exactly the same dressing of farmyard manure, a third received the mineral matter of the ashes *plus* some of the combined nitrogen that had been dissipated on burning, and a fourth lay unmanured. The results were very striking:—

Broadbalk Wheat Field, 1843.

	Grain. Tons per acre.	Straw. Cwts. per acre.
Farmyard manure	22	13
No manure	16	10
Ashes of farmyard manure	16	10
Mineral matter of ash <i>plus</i> sulphate of ammonia to supply combined nitrogen	26½	15½

¹ Abstract of a farmers' lecture of the British Association delivered at Edinburgh on September 7.

The ashes proved ineffective, but the ashes *plus* the combined nitrogen acted just as well as farmyard manure; it is therefore these that constitute the fertilising constituents of the manure. Thus the old controversy was decided in a way not uncommon in science; neither side proved to be entirely correct, but both sides were found to have some basis of truth. Lawes and Gilbert did not rest content with this purely judicial and scientific conclusion; they saw that they could make up this effective mixture of ashes and combined nitrogen from mineral substances without using farmyard manure. Even in their day farmers were unable to obtain sufficient farmyard manure, and it was therefore a great achievement to be able to supplement the limited supplies by this mixture. A factory was set up, and the manufacture of the so-called artificial fertilisers began. Subsequent experience showed that the ash constituents are not all equally necessary; in practice only two of them, potash and phosphates, need be supplied in addition to nitrogen.

Chemists are rightly proud of artificial fertilisers, for they have proved extraordinarily successful in augmenting crop production all over the world. The demand for them is enormous, and in consequence prices have risen considerably within the last thirty years. Agricultural chemists are always looking out for new substances, and even during the war a new fertiliser, ammonium chloride, was added to the list and new plant has been erected for its manufacture. Modern