

If we assume that the proton originated from a transformation of the nitrogen nucleus, the question of the rationale of the transmutation becomes urgent. Photographic evidence showed the *capture* by the nucleus of an α -particle accompanied by the *emission* of a proton. If then a nitrogen nucleus of mass 14 and charge 7, assimilates an α -particle of mass 4 and charge 2, with the *emission* of a proton of mass 1 and charge 1, we are left with a nuclear structure of mass 17 and charge 8—an isotope of oxygen, in fact. In a similar manner, other transmutations may be checked, remembering that all such changes must obey what may be termed *general* energy conditions, that is, we must take into account not only kinetic energy, but also the masses involved, remembering that, in some sense, mass and energy are convertible terms. It will be seen that in the instance considered, the new element has a mass three units higher and a charge one unit higher than that of the element which has suffered transmutation.

Beryllium, of mass 9 and charge 4, when bombarded, captures an α -particle of mass 4 and charge 2, giving rise to a structure of mass 12 and charge 6 and emitting a *neutron* of mass 1 and charge zero.

It is not difficult to picture the changes which ensue when neutrons are fired into oxygen or nitrogen with the consequent emission of an α -particle, and indeed it is certain that future experiments will show that the neutron is a very powerful weapon of research. Five years ago it became evident that the methods of attack developed must be supplemented by the use of other types of fast particle if more information were to be forthcoming, and it was found possible to obtain from an electric discharge large supplies of particles the speeds of which might be raised by travel through an electric field. This demand has resulted in the development of laboratory methods for the production of high potentials. Lately, assistance has been given by developments of wave mechanics which have shown that

particles which could not surmount a potential barrier might yet get through, so that there is a possibility of successful attack by using intense streams of particles at low voltages. One timely word of warning was issued to those who look for sources of power in atomic transmutations—such expectations are the merest moonshine.

It was fortunate that Sir Oliver Lodge was able to be present at the discussion. His charming and reminiscent speech in moving a vote of thanks to Lord Rutherford was a fitting tribute to a remarkable survey.

Space will not permit of the detailed consideration of the symposium which followed the opening address. As has been remarked, the nuclear theory developed by Gamow indicates the possibility of disintegrating the nuclei of the lighter elements by protons having energies corresponding to a few hundred thousand volts. Dr. J. D. Cockcroft and Dr. E. T. S. Walton described an apparatus capable of producing protons having energies of 700 kilovolts. With these protons they have disintegrated lithium, boron and fluorine, the disintegration in every instance being accompanied by the ejection of an α -particle. Lithium splits up into two α -particles and boron into three. Dr. M. L. Oliphant described experiments in which elements in a very pure state have been bombarded with protons and ions of 'heavy' hydrogen—the isotope of hydrogen of mass 2. The heavy elements are not disintegrated appreciably by bombardment at energies below 220 kilovolts. The disintegration of lithium by protons and 'deutons' was described, the last-named particle being remarkably efficient as a disintegrating agent. Mr. P. I. Dee showed some remarkably interesting photographic tracks obtained with the expansion chamber, and Prof. P. M. S. Blackett developed the story of the discovery and possible genesis of the positive electron, thus closing a symposium as striking as any of those that have been associated in the past with the work of Section A of the British Association. A. F.

Obituary

THE RIGHT HON. VISCOUNT GREY OF FALLODON,
K.G., F.R.S.

ALTHOUGH the first Viscount Grey of Fallodon, Northumberland, devoted nearly the whole of his life to political work, his death, on September 7, at the age of seventy-one years, has removed from ornithological circles, and bird protection bodies in particular, a keen and devoted student.

Lord Grey's wild birds' sanctuary at Fallodon has become widely known and many are the naturalists who have benefited from his courtesy, and visited it. Waterfowl were Lord Grey's especial interest and the fact that for twelve years none of the foreign species bred at Fallodon were

pinioned, but left to find their own nest-sites, hatch their own eggs and bring their broods on to the ponds unaided, living a perfectly wild existence excepting for wheat-feeding in morning and evening, the addition of a fox-proof fence and the destruction of stoats and rats, and in the case of the wood-ducks, the supplying of small barrels on the boughs to allow for the insufficiency of natural nesting holes in the trees, adds considerably to the scientific value of the observations.

In a paper read before the Berwickshire Naturalists' Club in 1921, Lord Grey described the breeding of ten species of British duck, mallard, wigeon, pintail, shoveller, garganey, teal, tufted duck, common pochard, red-crested and

white-eyed pochard, and of thirteen species of foreign duck, spotted-bill, Carolina or North American wood-duck, mandarin, chiloe wigeon, Chilian pintail, Bahama pintail, Chilian teal, rosy-billed duck, jalcated duck, Brazilian teal, blue-winged teal, Japanese teal and the versicolor teal on the ponds at Fallodon. The breeding of the versicolor duck, when eight young were reared, was stated to be the first occurrence in Great Britain.

When pinioning was carried out, hybrids occurred between the wood-duck and Brazilian teal, and the wood-duck and the ring-necked teal, in both instances the mother being a wood-duck (Grey, "Habits and Breeding of Mandarin and North American Wood-Ducks", *Nat. Hist. Mag.*, No. 16, Vol. 11, Oct., 1930), but in 1929 a male wood-duck paired with a female mandarin, both birds being unpinioned. This duck, like many of the mandarins, had the habit of flying on to Lord Grey's head at feeding time. A large number of the mandarins have been reported many miles from Fallodon, where they have nested near woods and the little burns, but the wood-duck does not seem to have wandered away. Lord Grey concluded that young mandarins are more clever, more hardy, and grow faster than young wood-duck. It was possible at Fallodon to see twelve or so mandarin drakes all courting together in the middle of one of the ponds. The longest-lived bird at the sanctuary was a male chiloe wigeon, bought fully grown in October 1888, which died of every sign of old age in October 1908 ("Fallodon Papers", 1926). A valuable record was a fourteen-year old tufted duck, marked with a ring from Alnwick, which died at Fallodon in 1929.

Of wild birds at Fallodon, Lord Grey has noted ("The Charm of Birds", 1927) the green sandpiper on regular passage in August, a flock of waxwings, the great grey shrike, the jack snipe and brambling regularly in winter, and wild specimens of pintail, shoveller and teal. The walk of Lord Grey and President Theodore Roosevelt through the New Forest in 1910 has become historic because of the birds they noted, and last May Lord Grey chose the spot for the bird group, drawn by Mr. G. E. Lodge, which is to memorialise the occasion.

Lord Grey had been Chancellor of the University of Oxford since 1928, was president of Armstrong College, Newcastle, in 1918, and was also a trustee of the British Museum. He was born on April 25, 1862. He took an active interest in the bird protection movement, becoming a life associate of the Royal Society for the Protection of Birds in 1893, and being elected, with the first Lady Grey, a vice-president in 1895. Speaking at the annual meeting of the Society at the Middlesex Guildhall, Westminster, last year, Lord Grey made a strong plea for the more careful protection of the rare British birds and opposed the habit of egg-collecting, stating the present law is far too weak for combating it. As a member of Parliament, and of the Cabinet, Lord Grey gave valuable

assistance to bills relating to wild birds. It is stated that President Theodore Roosevelt said of him: "He knows the songs and ways of English birds as few do know them." E. H.

SIR PHILIP MAGNUS, BT.

THE death of Sir Philip Magnus on August 29 at the age of ninety years removes the last survivor of the pioneers of technical education in Great Britain. In 1880, an advertisement appeared in *NATURE* for an "Organising Director and Secretary" of the City and Guilds of London Institute for the Advancement of Technical Education, a voluntary undertaking on the part of the City Guilds, which were anxious to recognise their hereditary obligation towards technical instruction. Magnus was given the appointment and soon embarked on an ambitious programme of work. This included the building and equipment of a central institution originally intended for the training of technical teachers, now the City and Guilds Engineering College at South Kensington. He was concerned also with the foundation of the Finsbury Technical College (since closed) of which for a time he acted as principal.

Some of the impetus of the technical education movement came from foreign commercial rivalry. Curiously, as Magnus points out in his chapter on the Movement, included in his "Educational Aims and Efforts 1880-1910", the attitude of the Government towards the movement was inspired by the philosophy of the old economists and by the principles of free trade. State assistance was deprecated as discouraging individual initiative, and any interference with trade was taboo.

Under this influence the ideals of the Science and Art Department, though established originally to assist trade, became cultural rather than technical; but the Government was induced to appoint in 1881 a Royal Commission to inquire into the instruction of the industrial classes of certain foreign countries, Bernhard Samuelson being the chairman and Magnus and Roscoe being included among the members. Their work gave Magnus the opportunity to study the technical education systems of the Continent and he was greatly impressed, especially by the German system of education. Magnus showed missionary zeal in the cause, and many of our large cities were privileged to hear his addresses on the subject. These, as he modestly said, "helped, no doubt, to fulfil their purpose". History, he observed, will award no small measure of praise to the patriotic efforts of the City of London and the ancient Livery Companies of London for their contribution towards the promotion of technical education. With equal justice, Magnus's pioneer work in the cause should receive grateful recognition.

The movement having been successfully started, the Institute established a Department of Technology with training classes throughout the country