according to size, in a bath containing shellac dissolved in alcohol, one part of shellac to three parts of alcohol at 94° C. When the bones were taken out of the bath they were washed with alcohol to remove the excess of shellac, and then they were left to dry in a current of air at the ordinary temperature while the solution completely impregnated them. The process was repeated once, and the bones were then ready for the preparators, who mended cracks and other deficiencies. Finally, a weaker solution of shellac, one part to four parts of alcohol, was driven by a compressed-air syringe into the surface of the bones, and they were again left to dry. This process was repeated three times, and the specimens were then re-mounted on their supports.

All the mounted skeletons of *Iguanodon* are now complete, and it is anticipated that all the bones exposed in the rock masses will be treated before the end of this year. The skeletons of the associated fossil crocodiles, *Goniopholis* and *Bernissartia*, will then be preserved from decay in the same manner. The Belgian Government and Dr. V. Van Straelen, the director of the Brussels Museum, and his staff, are to be congratulated on their success in an important scientific undertaking. A. S. W.

Obituary Notices

Sir Herbert Jackson, K.B.E., F.R.S.

SIR HERBERT JACKSON, whose death occurred on December 10 after a very brief illness, was born on March 17, 1863. After attending King's College School, he entered King's College, London, in 1879 as a special student of chemistry, and for a number of years he worked both as student and student-demonstrator in Prof. C. L. Bloxam's private laboratory. His association with King's College continued without interruption until 1918. He held successively the positions of lecturer, assistant professor (1902), and professor of organic chemistry (1905); he was elected a fellow of King's College in 1907, and was finally appointed Daniell professor of chemistry on the retirement of Prof. John Millar Thomson in 1914. He was regarded with affection by all the students of the College for the zest with which he participated in their social and athletic activities, which affection was enhanced among those who studied under him by their recognition of his admirable teaching capabilities.

During this period, Sir Herbert Jackson's research activities covered an extraordinarily wide range. He carried out a lengthy investigation into the production of phosphorescent materials, and made an extensive study of the phosphorescent and fluorescent phenomena produced in various materials by ultra-violet light or by electric discharge in low-vacuum and high-vacuum discharge tubes. In the course of his experiments with high-vacuum tubes he observed that in some instances phosphorescent materials in close proximity to the tubes gave a luminous response when the tubes were excited. This observation was not followed up immediately as it did not fall into the general line of investigation which was being pursued at the time, otherwise the discovery of X-rays, which was announced by Röntgen a few months later, might well have been made by Sir Herbert Jackson. Immediately Röntgen's discovery was published, Sir Herbert Jackson constructed an X-ray tube of the type described by Röntgen—the first X-ray tube to be produced in Great Britain—and thereafter he devoted a considerable amount of attention to a study of the effects which could be produced by the 'new' rays and to the development of X-ray tubes of improved forms. The 'Jackson' focus-tube, which he devised—and which he refused to patent—was a development of very great importance, since it provided practically a point source of X-rays and thus ensured sharp definition in X-ray photographs; the curved cathode which was its essential feature was adopted universally.

It is impossible to give any complete account of the many lines of investigation which Sir Herbert Jackson pursued while he was at King's College, but by way of contrast to the foregoing, mention may perhaps be made of two other items. He made a considerable study of the detergent action of alkalis, oils, soaps and chemical solvents, and of their behaviour on fabrics of different types. His work in this direction and the lectures and demonstrations which he gave to special classes for launderers are gratefully remembered by the laundry industry as a whole for their immense practical value. Sir Herbert also brought his scientific knowledge to bear on methods of protecting stonework against weathering action, and for many years devoted a good deal of attention to this important problem.

Sir Herbert Jackson was recognized as a microscopist of the first rank. In the widely varied types of scientific work which he had undertaken he had made very considerable use of his microscope, and he was, in consequence, familiar with the appearances presented under all available types of illumination, by bacilli, crystals, diatoms, fibres, gratings, powders, rulings, metals and all the more usual microscopic objects. He had also made a considerable study of the microstructure of porcelains, glazes, opal and coloured glasses, etc., and his observations, backed by his chemical knowledge, enabled him to draw important and far-reaching conclusions relating to the methods which had been employed in the production of Chinese and other ceramic wares, ancient beads, ancient glasses, etc. He was always ready to place his expert microscope technique at the disposal of others, whether to enable them to acquire some small measure of his skill or to help in the elucidation of problems on which critical microscopic observation might be able to throw some light. In his hands, the microscope was an all-revealing instrument, and it was at once a pleasure and an education to be allowed to join with him when there was microscope work to be done.

Very early during the Great War, Sir Herbert Jackson was asked to advise on a variety of urgent chemical problems, and as the extent of his knowledge and the value of the suggestions which he could invariably put forward became more widely known, his advice was increasingly sought. Chief among his many war-time activities must be counted his experimental work on glasses needed for chemical purposes and for X-ray tubes, and, later, his working out of the formulæ for many types of optical glasses not previously manufactured in Great Britain, but essential for such instruments as gun-sighting telescopes, and other optical munitions. In recognition of his valuable war-work, in particular of his work on glass, he was created Knight Commander of the British Empire in 1917, and was elected to the fellowship of the Royal Society in the same year.

When the British Scientific Instrument Research Association was in process of formation under the research association scheme of the Department of Scientific and Industrial Research, Sir Herbert Jackson was invited to become its first director of research. His versatility and his remarkable experimental ability, combined with his keenly analytical mind and quick grasp of essentials, fitted him admirably for this position. Under his guidance, the Association came to be regarded more and more as a source to which any matter concerning the development or manufacture of scientific instruments could be referred with the certainty that useful suggestions would be forthcoming practically at once, if, indeed, a complete solution of the particular problem submitted could not be immediately put forward. Sir Herbert Jackson filled this position with distinction from 1918 until he retired in 1933; he afterwards acted as consultant to the Association, and served as a member of the Association's Research Committee up to the time of his death.

Sir Herbert Jackson held office as president of the Röntgen Society (1901–3) and as president of the Institute of Chemistry (1918–21), and was for some years a member of the senate of the University of London. He served as chairman or as a member of many scientific and advisory Committees, including the Adhesives Committee and the Building Research Advisory Committee of the Department of Scientific and Industrial Research, the Interdepartmental Committee on Optical Glass, the Advisory Committee on Research of the L.M.S. Railway, and others of equal importance.

His death removes one who has rendered valuable service in very many fields, and is deplored by all who were privileged to work with him and to be included in his wide circle of friends.

Captain Oscar Wisting

CAPTAIN OSCAR WISTING, the Norwegian arctic explorer, was born in 1871 and at the age of sixteen years went to sea and in 1892 joined the Norwegian navy. His tastes, however, led him to polar seas, and after a few voyages in whalers and sealers he joined the expedition of R. Amundsen in 1909.

This expedition was originally intended to be an arctic venture but on news of Peary's attainment of the Pole reaching Europe, Amundsen decided to change his plans and make for the Antarctic. The *Fram*, Nansen's famous old ship, carried the party to the Ross Sea and their base on the Ice Barrier. Wisting was one of the four men who reached the South Pole on December 14, 1914. Amundsen attributed not a little of their success to Wisting's careful work in making the sledges, clothing and tents for the journey.

Amundsen's next expedition, the exploration of the Arctic Ocean, was delayed by War conditions and the necessity of building a new ship, but when he sailed in 1917 Wisting was his second in command. After three winters in the ice, the *Maud*, making the North-East passage, reached Alaska, only to return for another winter on the Siberian coast, this time in charge of Wisting, who had only three other men with him. After refitting at Seattle, Wisting again took the *Maud* north in 1922 and returned five years later, having failed to penetrate the inner arctic seas.

In 1926 Wisting was one of the men who accompanied Amundsen in the airship *Norge* in its flight of 3,393 miles from Spitsbergen across the Pole to Teller, in Alaska. When Nobile's airship *Italia* came to grief in 1928, Amundsen flew to the rescue from Norway. On the disappearance of his aeroplane Wisting went to Spitsbergen to join the vain search.

In 1926 Wisting retired from the navy with the rank of captain and in recent years had been custodian of the *Fram*, which is now kept on land at Oslo as a polar museum. It was on board the *Fram* that he died on December 4. R. N. R. B.

Señor Don Juan de la Cierva

THE death of Señor Cierva in the accident to a Dutch air liner on December 9 is a grave loss to aeronautical science. Fourteen years ago he invented the main principles of the autogiro, and in the intervening years he was assiduous in working, chiefly in England, on schemes for its improvement. His very latest model, the direct lift type, after being successfully demonstrated, has now reached the point of being built in numbers. Hence its inventor may be said to have lived just long enough to see his invention reach the fullest development attainable by that type of aircraft.

Señor Cierva was born in 1895 at Murcia in Spain. He received his scientific training at the Civil Engineering School in Madrid, and four years later he began his work on rotating wing aircraft, being convinced from his experience of the fixed wing type that the danger of accident by stalling was irremovable by other means. In his new plans he