

suffice to refer to an imperfect skeleton of *Plesiosaurus homalospondylus*, and another of *Ichthyosaurus platyodon* from the Lias of Luxembourg. The special interest attaching to these specimens is that, unlike the majority of "halosaurians" from the English Lias, the bones are separate, so as to admit of the skeletons being mounted after the fashion of the Oxfordian plesiosaurs in the British Museum.

Turning to Tertiary fossils, the magnificent series of cetacean remains from the Pliocene of Antwerp is too well known to need more than passing reference. Special attention may, however, be directed to the beautifully preserved skulls of long-nosed dolphins (*Eurhinodelphis*) from the Miocene deposits of the same locality, which have been recently described by Dr. Abel, and are some of the most interesting of all cetacean fossils. Neither is the collection lacking in valuable remains of sireniens, one case containing no less than five more or less imperfect skeletons of a representative of the widely spread Oligocene genus *Halitherium*, while in a second is displayed the skeleton of the body of an allied Miocene type, for which Monsieur Dollo has proposed the name of *Miosiren*. Evidently a large and specialised form descended from *Halitherium*, this genus is characterised by the enormous stoutness and solid structure of the ribs, which are so close together as to simulate a massive carapace in the region of the thorax. The specimens of the rhynchocephalian *Champsosaurus*, from the Lower Eocene, are likewise unique treasures of the collection.

The collection of remains from the cavern and other Pleistocene deposits forms another striking feature of the museum. Among the mounted specimens are three skeletons of the cave-bear, one of the cave-lion, and three of the woolly rhinoceros. The mammoth skeleton from a superficial deposit is one of the finest in existence out of Russia; while of especial interest is the imperfect skull of a very young individual of the same species, with the earlier milk-molars in position. A skeleton of the much rarer *Elephas antiquus* is likewise noteworthy, first, because the tusks are strongly curved, and, secondly, on account of the peculiar manner in which their tips are worn. This curvature of the tusks suggests that the title of straight-tusked elephant, which has been proposed for this species, is not so diagnostic as it might be. As regards the tips of the tusks, each has been ground into a blunt wedge—a mode of wear never observable in those of either the Indian or African species, and the cause of which is at present inexplicable.

Owing to lack of space, the fossil collections are now mingled with the series of skins and skeletons of recent animals in a manner calculated to confuse the non-scientific visitor, while at the same time the proportions of many of the specimens are not so well displayed as is desirable. All this, however, will soon be remedied, for the magnificent new wing, destined to contain the entire collection of indigenous Belgian animals, is, as already mentioned, fast nearing completion, the whole of the building itself being finished. A notable feature is the entire absence of any architectural decoration in the interior, a feature which might advantageously have been adopted in our own museums. The main hall of this magnificent building is no less than 100 metres in length by 30 in width. The floor is on four different levels, rising in terraces one above the other from the entrance. On the entrance level will be arranged the recent and Quaternary vertebrates (other than fishes); on the first terrace the Tertiary vertebrates, on the second the Upper Cretaceous vertebrate fauna, and on the third and highest the iguanodons and other reptiles of the Wealden. The visitor will thus obtain a *coup-d'oeil*

of the whole effect immediately on entering. The iguanodons will be represented by no less than thirteen skeletons, of which nine are to be mounted and erect, while the remainder are to occupy a large tank-like excavation in the floor, in which they are to lie as in their native quarry. In the gallery running round this hall are to be arranged the recent and fossil fish-fauna of Belgium, while the invertebrates are to be housed on the floor above. By an ingenious arrangement of details, space has been found for a numerous series of large and well-lighted work-rooms. Some idea of the lavish scale on which the new building is planned may be gathered from the fact that the space available for the display of the Belgian fauna alone is four times as great as that allotted in the Paris Museum to the fossil vertebrate fauna of the whole world.

Eventually, I am told, it is hoped that a similar wing may be built on the opposite side of the museum for the exhibition of the fauna and products of the Congo Free State. At present the large collection from that territory (which is the private property of King Leopold) is housed at Tervueren, reached by a tram-ride of about fifty minutes from Brussels. In addition to many interesting anthropological and ethnological objects, the collection contains a fine mounted pair of okapis, as well as numerous antelopes and other representatives of the mammalian fauna of the Congo State, not to mention specimens of the birds, reptiles, fishes, and lower forms of life.

R. L.

TECHNICAL EDUCATION AND INDUSTRY.

THE national importance of a close and strong relationship between science and industry is shown by Sir William Ramsay in a letter in Monday's *Times*. Two points upon which emphasis is laid are that numerous scholarships awarded by county councils represent an expenditure of public funds which can do little to promote industrial progress, and that our manufacturers offer few openings for men who have received a sound and scientific education. Technical education, as it is understood in this country, and as most of our technical schools are compelled to understand it if they wish to obtain students, consists of lectures on the rudiments of science, illustrated by practical work of a very elementary kind. It is scarcely necessary to say that the training thus received is of little value to the students or to the community in comparison with the work carried on in the technical high schools of Germany. Sir William Ramsay recently had an opportunity of conversing with the manager of a large chemical works in Germany, which manufactures no product of which it sells less than 100 tons a year, and he directs the attention of our manufacturers to the following facts as to the connection between science and industry in Germany.

The company has seventy chemists, of whom twenty are employed in analysing the raw materials and intermediate and finished products; twenty-five are engaged in superintending the processes of manufacture; and the remaining twenty-five are exclusively employed in scientific work—*i.e.* in endeavouring to improve the present processes of manufacture, and in trying new suggestions, either their own, or those brought to the notice of the firm by patentees. Almost all these chemists have been trained in universities, but a few come from technical high schools or Polytechnika. It is common for the best of such men to receive a "call" to a chair in a university or a Polytechnikum, and it is also usual for a company to offer a lucrative post to one who already holds a chair, even though he may have had no technical experience, and in this way a close bond has been

established between science and industry to the enormous advantage of both.

A large part of the duties of the director consists in attending congresses and in every way keeping abreast of the most recent discovery, with the object, of course, of gaining information which may be turned to practical utility.

While in Germany there is thus a fairly lucrative career for a young chemist, in England, although there will soon be many well-trained men, the openings are few. Such as there are are filled by men whose minds are occupied with too many things. The chemist is often analyst, works-manager, and investigator all at once; and it is no wonder that he is not a success, and that manufacturers doubt his utility in their business. Moreover, it is very desirable that a closer touch between universities or university colleges and manufactures should be brought about, if possible, for it cannot fail to be to the advantage of both industry and science—to industry, in order that technical problems may receive scientific treatment, and to science, because some of the most interesting problems are often suggested by the technologist.

Now, we are producing trained engineers and chemists quite as inventive and capable as our German competitors. But the prospect of a reasonably remunerative career is generally wanting. It would obviously be to the advantage of manufacturers to engage such young men, not expecting them, of course, to be able at first to introduce improvements which will effect a saving; but by looking out for young men with some originality, by giving them time to learn their business, and by offering an ultimate inducement in the shape of a share of profits, our manufacturers will undoubtedly reap the benefits which have given our German competitors their lead in industries in which chemistry plays a part.

NOTES.

At the Institution of Civil Engineers on Tuesday, November 3, an inaugural address will be given by the president, Sir William H. White, K.C.B., F.R.S.; the medals and other awards made by the council will be presented, and there will be a reception in the library of the Institution.

MR. MARCONI arrived at Liverpool on board the *Lucania* last Saturday. The results of his experiments are said to have been very satisfactory; whilst in mid-Atlantic he was able to receive simultaneously communications from England and America. It is also stated that he hopes within six or eight months to re-establish commercial communication across the Atlantic.

THE trials of the high-speed electric cars on the Berlin-Zossen military line have been continued with much success. A maximum speed of $125\frac{1}{2}$ miles an hour was attained by the Siemens-Halske car last week; the average speed over the whole run of 14 miles, including the time of starting and stopping, was $100\frac{1}{2}$ miles an hour. The trials of the rival car, which the Allgemeine Elektrizitäts Gesellschaft is building, have yet to be made. The track has been relaid since the experimental runs last year, and it is stated that it is now thoroughly satisfactory. The result of the trials is looked upon as demonstrating the practicability of high speed working over long distances, and it is estimated that it will be possible to reduce the time taken over the journey from Berlin to Cologne from nine to three and a quarter hours.

THE secretary of the Institution of Electrical Engineers informs us that the bronze shield subscribed for by the students of the Institution at the beginning of the present year has now been placed upon the tomb of Volta at Camnago, near Como. The ceremony of fixing it in place was performed on Sunday, October 4, with many expressions of international good feeling, in the presence of

Prof. Count Alessandro Volta, Cav. Franchi, the Sindaco of Camnago, with several members of the Volta family and a number of other guests. The shield is mounted on a slab of green marble supported on granite in front of the tomb. The electrotype reproduction, which was officially deposited on the tomb on the occasion of the visit of the Institution in April last, has been transferred to the Civic Museum in Como, where it is placed in the collection of Volta relics.

DR. W. A. NOYES, of the Rose Polytechnic Institute, has accepted the position of chemist in the United States National Bureau of Standards.

DR. B. A. WHITELEGGE, C.B., His Majesty's Chief Inspector of Factories, has been appointed president of the Epidemiological Society in succession to the late Dr. W. H. Corfield.

AN International Fine Art and Horticultural Exhibition is to be opened at Düsseldorf on May 1, 1904. A hope is expressed that England will contribute largely to this exhibition.

REUTER reports that Prof. Langley's aerodrome, for which the U.S. Government granted a subvention of 15,000*l.*, was launched on October 7 from the railway over the flat boat on Whitewater, a section of the Potomac River. The machine balanced perfectly when it started, but soon struck the water, with the result that it was wrecked. Previous experiments have been made with models only, and this trial was the first made with the full-sized airship, which is constructed to carry a passenger.

THE Home Counties Nature-Study Exhibition, which is being organised by the Middlesex Field Club and Nature-Study Society, and delegates from the Selborne Society, will be held from October 30 to November 3 at the offices of the Civil Service Commission, Burlington Gardens, London, W. Intending exhibitors should communicate with the honorary secretary, Mr. Wilfred Mark Webb, 20 Hanover Square, London, W., who will be pleased to supply full information.

WE learn from *Science* that the American Grape Acid Association, 318 Front Street, San Francisco, Cal., offers a premium of 500*l.* for any person who devises a process or formula for the utilisation of California grapes containing more than 20 per cent. of saccharin, worth 2*l.* a ton, to produce tartaric acid at a price that would permit of exportation without loss. The decision in awarding the amount is to rest with a jury of five, of which Prof. E. W. Hilgard, of the University of California, is one. The offer closes on December 1, 1904.

THE first meeting of the Manchester Astronomical Society—a new local association of persons interested in astronomy and observational work—was held on Wednesday, October 7, when an address on solar parallax was given by the president, Prof. T. Gore. The Society has its centre and home in the Municipal School of Technology, Manchester, and members have the privilege of using the telescopes and other instruments in the new Godlee Observatory.

THE death is announced of Mr. Henry M. Brunel, the second son of I. K. Brunel, the engineer. Mr. Henry Brunel entered into partnership with Sir John Wolfe Barry in the 'seventies of last century, and took active interest in the scientific researches bearing upon naval architecture carried on by the late Mr. William Froude, F.R.S. He was largely associated in the work of Barry Dock, the railway bridge over the Thames at Blackfriars, the bridge erected at Connel Ferry, and with the Tower Bridge. He was a member of the Institution of Civil Engineers and of the Institute of Naval Architects.