plates, the bottom member itself being strengthened internally at the junction by suitable diaphragms

The importance of this junction will be readily understood, when it is stated that a load of some 6000 tons—the weight of an American liner—will be transmitted through it, in the finished structure, on its way to the masonry pier. Some 16,000 rivets are required for the junction; and large as this number may appear, it bears but a small ratio to the eight million rivets used in the whole structure. The method of construction of the junction was that uniformly adopted in dealing with these members. The junction was erected on the drill roads attached to the workshops at South Queensferry, all holes drilled by specially designed plant; and, having been marked for re-erection, it was taken down and transported plate by plate, and finally hoisted into position in the finished structure from a steam barge, by a crane working from the internal viaduct.

The tie was built downwards from the top of the vertical column; the timber cage—shown in our illustration—in which the men worked being attached to and following it as length by length was added. To design and build a structure of steel to bear a load of some 6000 tons is no mean task in itself, but what shall we say of the whole undertaking, when this junction alone contains but one five-hundredth of the material required for the completed Forth Bridge?

FLORA OF THE ANTARCTIC ISLANDS.

MR. W. B. HEMSLEY, who elaborated at Kew the collections made during the *Challenger* expedition illustrative of the floras of oceanic islands, has handed to me the following interesting letter from Dr. Guppy. The materials and notes accumulated by this skilful observer during his travels in the Western Pacific threw a good deal of light on the mode in which oceanic islands were stocked with plants, and Mr. Hemsley was able to make an advantageous use of them in discussing the collections made in the same region by Prof. Moseley.

I myself am very much impressed with the probable truth of the views expressed by Dr. Guppy. It would be very desirable to obtain additional observations which would serve to test their accuracy. It is with this object that I have obtained Dr. Guppy's permission to communicate his letter to NATURE.

W. T. THISELTON DYER.

Royal Gardens, Kew, April 28.

17 *Woodlane, Falmouth, April* 8, 1888.

As I am likely to be proceeding soon to the South Seas, I have been re-perusing your volume of the "Botany of the *Challenger*," more especially the remarks concerning the dispersal of plants, which I hope to take the opportunity of following up in a more systematic way than before.

I was thinking that if you thought it worth while you might direct the attention of masters of ships going round the Horn and the Cape of Good Hope to the chance of finding seeds in the crops of the oceanic birds that follow the ships in the regions of the westerly winds. I am inclined to believe that important results would be obtained. Judging from my experience, about one bird in twenty-five would contain a seed in its crop.

I am still inclined, if you will pardon my saying so, to the belief that the agency of birds like the Cape pigeons may explain some of the difficulties in the floras of the islands in the Southern Ocean. To return to the instance of my seed, I have since found an account where a Cape pigeon, around the neck of which a ribbon had been tied, followed a ship on its way home from Australia for no less than 5000 miles (Coppinger's "Cruise of the *Alert*," 1885, p. 18); and on consulting other voyages I find that the Cape pigeon appears to perform the circuit of the globe in the region of the Westerlies, so that my seed might readily have been transferred from Tristan d'Acunha to Amsterdam.

A remarkable point has occurred to me whilst reading your remarks (doubtless you have already thought of it). In a botanical sense, and also in a geographical sense, the Antarctic Islands seem to be arranged in two parallel zones. Tristan d'Acunha, Amsterdam, and St. Paul's, lying between the parallels of 37° to 40° S. lat., have similar floras. Further south is the second zone, between 47° and 55° (*circa*), in which the land and islands (Fuegia, Crozets, Kerguelen, Macquarie, &c.) are characterized by their common floras. Now, how are these two parallel botanical zones to be explained? It seems to me that if you grant that the northern zone may largely derive its common characters by the agency of birds following the westerly winds, such as I believe to have been the case, you are almost forced to the conclusion that the floras of Fuegia, Kerguelen, Macquarie Island, &c., in the southern zone have obtained their common characters in the same way. Of course the distinctiveness between the floras of the two parallel zones would then be explained by the difference in the climatic conditions arising from difference in latitude. For my own part I do not think the hypothesis of a sunken southern tract (or tracts) of land to be supported by geological evidence. Is not the geological character of the remote oceanic islands strongly negative of the idea that they are portions of ancient submerged tracts? Can Kerguelen, Amsterdam, &c., be in any sense *continental* islands as regards their rocks? With reference to New Zealand, if geologists are right in regarding it as lying along the same volcanic line that extends southward through the Western Pacific from New Guinea, then it is probable that the vast post-Tertiary upheaval of the island groups (Solomon Islands, New Hebrides, &c.) which I have shown to have taken place along this line of volcanic activity in the Western Pacific, has been represented in New Zealand by elevation rather than depression. I believe that subsequent investigation will confirm my belief that the great island groups of the Western Pacific, with New Caledonia and New Zealand, have been always insular. This is, I think, the great lesson I learned in the Solomon Islands.

H. B. GUPPY.

LORD HARTINGTON ON TECHNICAL EDUCATION.

THE Marquis of Hartington was the chief guest at the anniversary banquet of the Institution of Mechanical Engineers held on Friday, May 4, at the Criterion Restaurant. Mr. Edward H. Carbutt, President of the Institution, occupied the chair. In responding to the toast of "Our Guest," proposed by the Chairman, Lord Hartington, after speaking of the part which the mechanical engineering profession of this country takes in the maintenance and the extension of our material and industrial supremacy in the world, referred to the vast importance of technical education. He had never professed to be an authority on the subject of technical education—he was no authority on that subject; all he could do in the position he held was to endeavour to arouse such interest as he could in that subject, to enlist in the minds of the ordinary public—the unscientific public of whom he formed a part—an interest in this question, and to listen to the advice and attend to the counsel which were given to the public by those who were authorities on the subject, and to whose advice he held it was most important that attention should be paid. He had been greatly struck by the fact that in every country in Europe which competed with us in industrial or commercial pursuits greater attention had recently been paid to giving a practical direction to the national education than had hitherto been considered necessary in England. We had, like other countries—perhaps somewhat in arrear of them—established a national and tolerably complete instruction; but they, earlier than we, had embraced the idea of making that national instruction not only a literary instruction, but a technical and commercial education. But he could not help thinking that in that respect they had gained some considerable advantages over ourselves. He did not think there was any occasion for us to take a desponding or a pessimistic view of the

situation. He had great confidence in the energy, the skill, and the intelligence of our people. But he believed there were facts which it would be madness on our part to ignore. If a new process, a new invention, were discovered in any other country—if a new process of manufacture were discovered greatly superior to that which was in existence among ourselves—we should at once admit that it was necessary for us either to improve that invention or else to resign ourselves to being defeated in the competition for the production of that article. But if it were true, as he believed it was, that the system of national education in other countries was being devoted to purposes which made the manual labour of the working population more intelligent, more skilled, and therefore more valuable, that was a fact which was just as important and which had consequences of exactly the same character as if foreign nations were to discover an invention which was not available for our own use. These facts had been investigated by a Royal Commission, and by a great number of private individuals for their own purposes; and there was no sort of doubt that foreign countries had not only attempted to give, but had to a very considerable extent succeeded in giving, a more practical turn to the education of their people in all branches of industry and commerce where science and art could be usefully and successfully applied. If it were the fact that we had fallen behind in this branch of the instruction of our people, it appeared to him that it would be worse than idle, it would be criminal, on our part if we were for a moment to ignore the consequences of those facts, and the consequences which might result not only to our temporary commercial and manufacturing position in the world, but to the future industrial position of England. He was sure there were none to whose advice great employers and leaders of industry in this country would more cheerfully and more willing listen, none who exercised a greater influence over the public mind of this country, than those whom he had the honour of addressing; and it was a great satisfaction to him to be assured by the words that had fallen from their Chairman that they were giving their earnest and anxious attention to the subject of technical education.

NOTES.

A ROYAL COMMISSION has been appointed to inquire "whether any and what kind of new University or powers is or are required for the advancement of higher education in London." The Commissioners are Lord Selborne, Chairman; Sir James Hannen, Sir William Thomson, Dr. J. T. Ball, Mr. G. C. Brodrick, the Rev. J. E. C. Welldon, and Prof. Stokes, P.R.S. Mr. J. L. Goddard is appointed Secretary to the Commission.

MUCH trouble was taken to secure the success of the annual *conversazione* of the Royal Society held last night. We shall give some account of it next week.

THE Emperor Frederick has marked the opening of his reign by conferring personal honours on some eminent Germans. Dr. Werner Siemens, the electrician, is one of those who have been ennobled or dignified with the prefix "Von."

THE Donders Memorial Fund, to which we called attention some time ago, now amounts to about £2000, of which £250 has been subscribed in England. Prof. Donders' seventieth birthday falls on Sunday, the 27th inst.; but it has been decided that the celebration in his honour shall take place on the following day. The subscription list, so far as this country is concerned, will be closed on the 14th inst.

AT the general monthly meeting of the Royal Institution, on Monday last, Dr. Tyndall was elected Honorary Professor, and Lord Rayleigh Professor, of Natural Philosophy.

A PRELIMINARY meeting, called by invitation of the Council of the Yorkshire Philosophical Society, to consider the desirability of forming a Museum Association, was held in York on May 3. Among the Museums represented at the meeting were those of Liverpool, Manchester, York, Sheffield, Nottingham, Bolton, Bradford, Sunderland, and Warrington. It was unanimously decided that a Museum Association should be formed, and that it should consist of curators or those engaged in the active work of Museums, and also of representatives of the Committees or Councils of Management of Museums. The Association will consider (1) whether it may not be possible to secure a compendious index of the contents of all provincial museums and collections; (2) the most effectual methods of facilitating the interchange of specimens and books between various museums; (3) the best plans for arranging museums and classifying their contents; (4) the organization of some concerted action for the obtaining of such Government publications as are interesting or important from a scientific point of view.

PROF. ARTHUR SCHUSTER, F.R.S., has been appointed to the Langworthy Professorship of Physics and Directorship of the Physical Laboratory at the Owens College, in succession to the late Prof. Balfour Stewart.

THE Gaekwar of Baroda is reported to have decided to send a number of young men, carefully selected for the purpose, to study scientific and technical subjects in England, under the supervision of Mr. Gajjar, Professor of Biology in the Baroda College.

THE Government of Ceylon have sanctioned the opening of a Forest School at Kandy.

WE regret to have to record the death of Sir Charles Bright, the eminent electrician. He died last Thursday, at the age of fifty-six.

DR. SIGISMOND WRÓBLEWSKI, Professor of Experimental Physics at the Polish University of Cracow, died on April 16 last, in consequence of injuries received through the explosion of some petroleum lamps. Prof. Wróblewski lived for some time in London, and was afterwards a Professor at the University of Strasburg. He also worked in the laboratory of Prof. Debray in the École Normale, Paris. He accepted the appointment at Cracow in 1882. His researches on the liquefaction of gases are well known.

THE sodium salt of a new sulphur acid, of the composition $H_2S_4O_8$, has been prepared by M. Villiers (*Bull. de Soc. Chim.*, 1888, 671). It was obtained by the action of sulphur dioxide upon a strong solution of sodium thiosulphate, and is tolerably stable, crystallizing in well-developed prisms. A quantity of crystalline sodium thiosulphate contained in a flask was treated with an amount of water insufficient for complete solution; the flask was immersed in iced water, and a current of sulphur dioxide passed, with constant agitation, until the solution was saturated and all or nearly all the thiosulphate had dissolved. If any of the latter crystals remained undissolved, a little more water was added, and the solution again saturated with the gas, repeating this treatment until all had passed into solution. After leaving the liquid thus obtained at the ordinary temperature for two or three days, it was found to be capable of taking up a further considerable volume of sulphur dioxide, the former quantity having evidently entered into chemical combination in some way or other. It was therefore again saturated, and left for another day or two, after which the solution was evaporated *in vacuo* over sulphuric acid. It was then found that a precipitate of sulphur was gradually deposited upon the base of the containing dish, while fine white prisms of brilliant lustre were formed at the surface. On analysis they were found to be