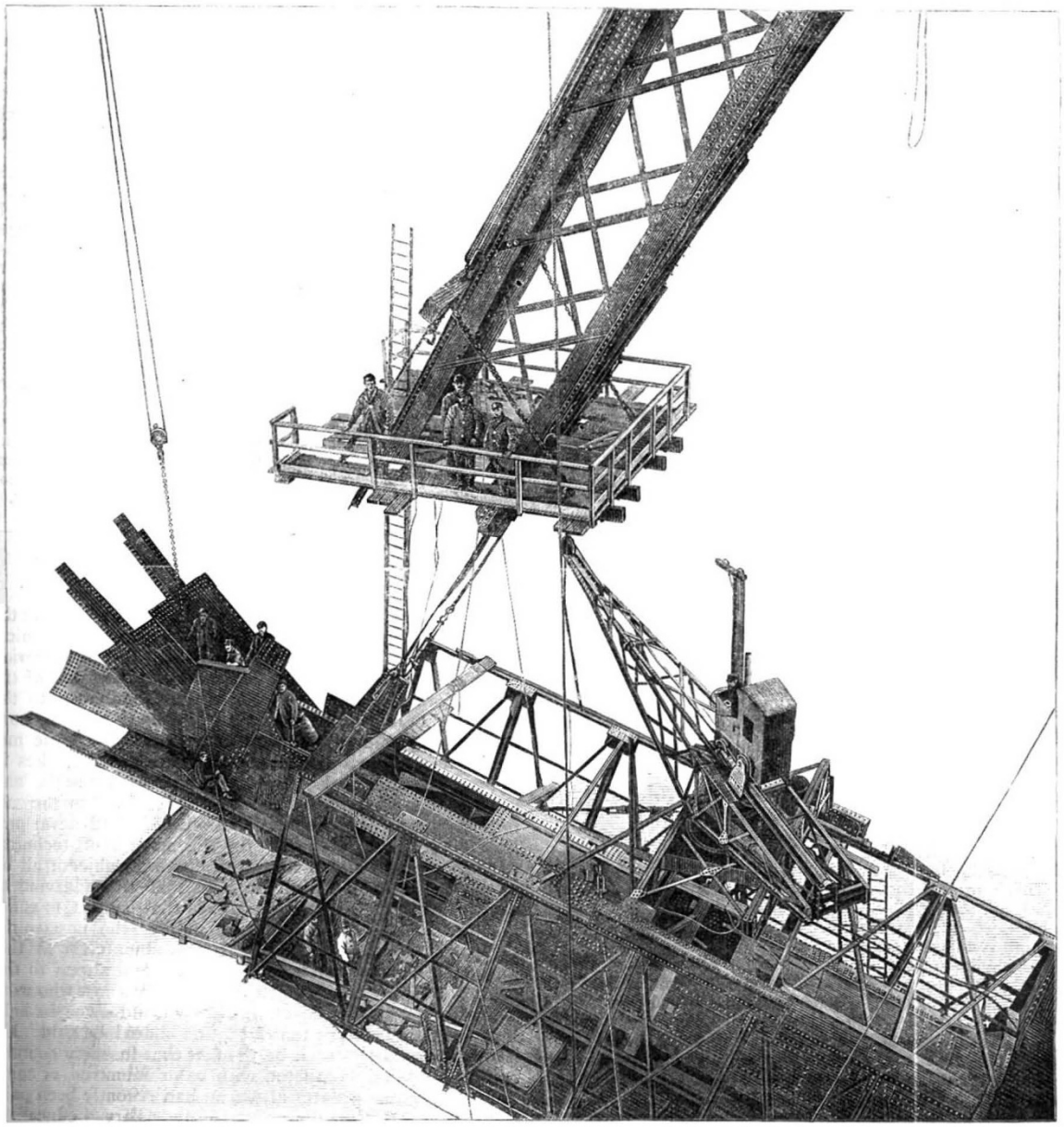
THE FORTH BRIDGE.

WE have been enabled, through the kindness of Mr. Baker, to reproduce one of the photographs of the Forth Bridge, showing what is known as the "junction" at the end of bay 1, between tie 1, strut 2, and the bottom member.

A general account of the Forth Bridge has been so recently placed before the readers of NATURE (vol. xxxvi. p. 79), in the lecture by Mr. Baker, on May 20, 1887, before the Royal Institution, that it is unnecessary to cover the same ground again. The progress made in erection since that date is indicated by our engraving, showing the successful completion of the lower portion of the first bay.

The junction we have illustrated is nothing more nor



less than the connection of the web of a lattice girder with one of its booms, but here the junction alone weighs as much as an ordinary iron railway bridge of 100 feet span. This mass of steel work is suspended 80 feet above high water, and projects 180 feet beyond the masonry piers. Considerable forces are sometimes needed to bring the tubes into their correct position; and as in the case of the Britannia Bridge, which on a hot day moves 3 inches horizontally and $2\frac{1}{4}$ inches vertically between sunrise and sunset, so here considerable movement takes place during the day, and by careful watching the great tubes can sometimes be caught and retained in proper position, without the intervention of hydraulic or other power.

The weight of steel employed in the junction now under consideration is about 90 tons. The attachments to the strut and tie are made by means of strong gusset

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