Transactions of the Sanitary Institute of Great Britain. York Congress, 1886.

THE valuable work done by the Sanitary Institute cannot be altogether gauged by the annual volumes of Transactions, one of which now lies before us. It must be remembered that, besides the reading of papers and holding of discussions on subjects of sanitary interest, the Sanitary Institute endeavours, by means of its Congresses and annual Exhibitions, to arouse the interest of the inhabitants no less than of Town Councils and municipal authorities in the health and well-being of the towns visited. That such visitations have a beneficial influence, by awakening public interest in measures of sanitary reform, both local and general, can hardly be doubted; and, as pointed out by Sir Spencer Wells in his Presidential Address, if further legislation on sanitary matters is not to be ridiculous, it must be accompanied by increased knowledge on the part both of the persons charged with administering the Sanitary Acts as well as of the public themselves.

The modern science of hygiene is hybrid, embracing as it does special branches of most of the leading sciences—medicine, engineering, architecture, geology, chemistry, meteorology, &c. The subjects treated of by means of papers in such a Congress must be very varied, and such we find to be the case; but as far as possible the papers are relegated to one of three sections, where their merits will be best understood and most adequately discussed. The standard of the papers submitted to the York Congress is fully up to the average, many of them treating of subjects of wide interest, or having important bearings on the prevention of disease and maintenance of the public health.

Science Sketches. By David Starr Jordan. (Chicago: A. C. McClurg and Co., 1888.)

IN this neat and handy little volume we have a very interesting and intellectual collection of sketches and addresses more or less scientific. Some of the articles, which, as the author tells us, have been published before, have been freely retouched or re-written; but the papers on "The Dispersion of Fresh-water Fishes," "The Evolution of the College Curriculum," and the address on "Darwin" appear for the first time. The subjects treated are of various kinds, so that anyone who takes up the book will be sure to find in it something that will interest him. The appendix contains a list of the scientific papers of the author, and we hope it will not be long before we are favoured with another such book as the above.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

"Coral Formations."

SINCE writing the letter published in NATURE, March 22 (p. 488), I have checked Mr. Ross's figures. The result is somewhat surprising. Instead of 8400 tons of carbonate of lime removed from $12\frac{1}{2}$ square miles of lagoon representing a sheet half an inch thick, it really only amounts to a film of that area $\frac{1}{25\frac{1}{2}}$ of an inch thick.

At this rate per annum it would in round figures take eighteen thousand years to dissolve out a lagoon a fathom deep, or a *million* years for the creation of a lagoon 60 fathoms deep. When we consider that this could only happen on the impossible assumption of the atoll remaining stationary for a million years, while no accumulation of coral sediment or organic calcareous growth took place in the lagoon, it is at once seen, on the showing of its own supporters, how impotent is the solution theory to account for the formation of lagoons in atolls.

To represent the figures in a familiar way, I may point out that the film removed annually would be a little less in thickness than one of the pages of "Prestwich's Geology." A volume of 36,000 pages (18,000 leaves), minus covers and well pressed, would be a fathom thick. No one acquainted with my geological work will accuse me of being parsimonious of geological time, but this is really beyond my mark altogether.

Mr. Irvine asks (NATURE, March 29, p. 509): "Can Mr. Reade give any observations or figures in support of his view of the rate of accumulation of oceanic calcareous deposits?"

If Mr. Irvine will refer to Mr. Murray's paper (NATURE, vol. xxii. p. 352), he will see that the pelagic life in a square mile of ocean water 100 fathoms deep is estimated by him to represent sixteen tons of carbonate of lime.

I am not aware of the length of life of such organisms, but if they lived on an average *only one day*, and the whole of their tests were rained down on to a submarine peak at the rate of sixteen tons per diem, *and none were dissolved by sea-water*, it would take twenty-nine years to accumulate 1 inch in thickness of solid carbonate of lime in this pelagic cemetery. In this way, if anything so improbable were to happen, a submarine peak half a mile below the range of coral growth might be levelled up into a suitable platform in 900,000 years. I could add much more, but respect for your valuable space bids me conclude.

T. MELLARD READE.

Park Corner, Blundellsands, April 3.

"The Dispersion of Seeds and Plants."

IN support of the views expressed in Mr. D. Morris's interesting article on the above subject (NATURE, March 15, p. 466), I beg to be allowed to state the following facts. In the Island of Porto Rico, the *Panicum barbinode*, called there "malojilla," has been cultivated for many years in the low humid lands, and it is a current opinion among farmers that it is reproduced by means of the animals feeding on it. Some fruit-bearing trees and shrubs, which are a favourite food for the wild *Columba leucocephala* and *Columba corensis*—among them the *Solanum stramonifolium*, the *Bucida Buceras*, the wild coffee, *Coffea occidentalis*, the palm-tree, *Oredoxa regia*—appear in some mountains and regions where they were formerly unknown, and there is no doubt that they have sprung from fruits and seeds transported by these pigeons. The *Anona muricata* (soursop), the *Anona reticulata* (custard apple), the *Carica papaya* (papaw tree), whose hard seeds are sometimes uninjured by the processes of mastication and digestion, are also believed to be planted accidentally by birds, and sometimes by hogs, horses, and other Mammalia. They grow all about in pastures where these animals are fed. The statement made about the orange-tree in Jamaica also holds good for Porto Rico. Very few orange-trees were planted in the interior of the country, and the tree is now wild in all that zone by the agency of birds in great part. There is no doubt, as Mr. Morris says, that birds and cattle have been the means of distributing plants all over the island.

ANTONIO J. AMADEO.

"Balbin's Quaternions."

NATURE of December 15, 1887 (p. 145), which has lately reached me, contains a notice of a treatise on Quaternions, by Prof. Valentin Balbin, in which the reviewer alludes to the "slight alterations" introduced into the notation of quaternions by Messrs. Houel and Laisant, and apparently visits them all with equal condemnation.

To me it appears that a distinction should be made between the two points in which the French notation differs from the English. The use of letters in different type to denote different kinds of quantities, the same type being always reserved for the same kind, seems to render the processes sometimes clearer and the results more immediately and easily available for students. In spite, therefore, of the ugliness of the black-letter symbols, it would not perhaps be altogether a loss if English mathematicians would adopt this part of the French scheme.

The other change introduced by M. Houel, that of the order of the factors, writing $q\,q'$ where Hamilton writes $q'\,q$, seems, on the contrary, to be an entirely retrograde step. That, as a rule, the symbol for the operator should be written before that of the operand, is a necessity in all modern symbolic processes. The alteration can only lead to confusion. In my "Text-book of Algebra" I have suggested that while the symbol $a \times b$