THURSDAY, OCTOBER 27, 1870

THE REPRESENTATION OF SCIENCE AT THE SCHOOL BOARD

AN impression seems to prevail that only those persons should be placed on the Metropolitan School Board who are already acquainted with the details of education. Against this principle we protest. We hope the new schools will be great improvements upon those which already exist. When we are told by the Bishop of Manchester that a third of these schools only are efficient, that a third are inefficient, and that a third are wholly useless, if not pernicious, it is high time that the whole system should be looked into by those who will come fresh to the inquiry, unencumbered with the ideas that have led to such disastrous results. We think, then, the public should look to that instructed body of men who are known as cultivators of science to represent them on the London School Board. Already we are glad to see signs that the class of persons we have named have found favour in the eyes of London electors. The selection of Professor Huxley and Dr. Elizabeth Garrett, as candidates for Marylebone, is highly creditable to that district of the metropolis; but their hands must be upheld by a very much larger number of candidates, if common sense and intelligence are to prevail at the councils of the School Board.

The points to which we think the earliest attention of the School Board ought to be directed, and in which men of science are likely to give the greatest assistance, are the following :—

1. *The sanitary condition of the schools.*—It is well known that in many cases our schools are foci of contagion, and the means of spreading contagious diseases. Children are frequently sent to school, not only from families where contagious diseases are present, but actually with disease upon them. No trouble should be spared to prevent this, and if necessary a short clause should be added by Act of Parliament to the Education Act, in order to punish those who in this way are the means of spreading around the destructive diseases. Nor is this all that is required. The school-rooms should be well ventilated, clean, and not overcrowded. Every Government school should be placed under the superintendence of the medical officer of health of the district in which it is placed, and he should report periodically to the School Board on the state of the school and on any departure from sanitary rules. Cleanliness should especially be encouraged and insisted on amongst the children attending the school, and if no means exist at home, baths and lavatories should be provided at the schools.

2. *The times of study.*—It is a fact well known to the physiologist, that the attention of the human mind can only be given with success to a particular subject for a limited time. The younger the brain is, the less the time during which knowledge can be taken in or retained. In opposition to these obvious facts, children are kept at their studies or in school for much longer periods than they can successfully learn. The consequence is that they remain in the close school-room whilst they ought to have been in the yard at play. This system is doubly wasteful, for both health and learning are sacrificed. The whole system of hours of study, and of play or of work, requires to be revised in our primary schools. The importance of play-grounds in the open air can hardly be overrated. It is only the practical physiologist who can appreciate the real value of muscular exercise, and the influence of fresh air from time to time during the day, to enable children to pursue their studies with success.

3. *The course of studies to be pursued.*—Here is where the Augean stable of a past education needs to be purified. The notion that when a child has learned to read, write, and cipher, he is educated, must be eradicated. These are at best but means, and are only the instruments by which education is conducted. It will be for the man of science to show his colleagues on the School Board that perhaps the better half of a liberal education may be obtained without books at all. This is the error that lies at the foundation of all our systems of education, whether conducted in our highest, middle-class, or national schools. The education of the senses by which the man is to get his living and to perform his duties in life is entirely neglected. Where attempts have been made to introduce the study of the natural sciences, it has been done solely by the aid of books, and not with that demonstration of the facts to the senses which is the only way in which such knowledge can be made useful. In a word, henceforward there must be a portion of every day taken up with teaching children by objects, specimens, or experiments, the nature of the great laws by which the universe is governed. We cannot argue here on the necessity for this knowledge. Look at that great German army, recently spoken of as the most wonderful military engine ever seen on the face of the earth. What makes it so? The intelligence of each individual of which it is composed. It is the same with wheels and pistons, spindles, hammers, chisels, and ploughs, as with guns and bayonets: the more intelligent the man is who wields or superintends them, the more successfully and prosperously will they do their work. Ten years ago Mr. Whitworth astonished the Manchester manufacturers with the account of the machines he had seen in America. "Why should we not have such machines here?" said the Manchester men. "Because," said Mr. Whitworth, "you have not intelligent hands to work them." And for these long ten years we have gone on talking about educating our working classes, and allowing priceless treasures to pass out of our hands. Every portion of Europe, as well as the United States of America, is stealing something of our rightful wealth and increasing our pauperism, because of our stolid indifference to the introduction of those branches of human knowledge which alone can properly develop the powers of industry and application, of which the English people are so wonderfully capable.

This great question of the introduction of Natural Science into all schools must be taken up by our School Boards throughout the kingdom. To delay it is to shelve it, and to commit an irretrievable error. It is now or never. If the present opportunity is neglected, all is lost. Let no heed be given to the cry that it is impossible to find teachers. If teachers cannot be found they must be made, and all old teachers must be told that unless they qualify in this respect they will be of no use. The cry of the example of our Universities must not be listened to.

We have nothing to do here with their failure to teach Natural Science, and thus to mislead where they ought to have led. What we now ask the people of England, and especially the people of London, is to put Men of Science on their School Boards.

E. LANKESTER

THE GLACIATION OF BRAZIL

Thayer Expedition: Scientific Results of a Journey in Brazil, by Louis Agassiz and his travelling Companions. Geology and Physical Geography of Brazil. By Ch. Fred. Hartt, Professor of Geology in Cornell University. With Illustrations and Maps. (Trübner and Co.)

THIS thick volume of 620 pages is the result of two visits to Brazil, the first with the Thayer Expedition, the second during a vacation holiday of "some months." The author has proposed to combine with his own personal observations all the information on this subject obtainable from other sources, and thus give a complete view of the present state of our knowledge of the geology and physical geography of this vast and interesting region. The design is an admirable one, but the execution of it is, in some respects, disappointing.

The first great fault of the book is, that it has been swelled by the introduction of much irrelevant matter. Mr. Hartt's own journeys were mainly along the coast, from Rio Janeiro to the Amazon, with occasional trips of a hundred miles or so into the interior, and he inflicts upon us pages of unimportant detail on the topography of small rivers, creeks, and harbours, which have no bearing on the geology or physical geography of the country. Detailed descriptions of the marine animals and fossils collected would also have been better in an appendix than in the body of the work where they are given. The arrangement of the book, too, is faulty, since it treats of the provinces of Brazil in succession, and makes no attempt to indicate the great physical divisions of the country, and there is not a single geological or physical map of Brazil, or of any part of it; the maps alluded to in the title-page being mere outline or sketch maps of small districts, or plans of harbours and mouths of rivers. Another strange defect is the absence of all measurement of heights. The author travelled without barometer or aneroid; he, consequently, everywhere roughly estimates his heights, and gives no sections, but a few "ideal" ones. Notwithstanding the bulk of this volume, it does not complete the geology of the voyage, for we are informed that Mr. St. John, another geologist attached to the expedition, who travelled more in the interior of the country, will give the results of his observations in a separate work.

But although we have thus plainly indicated the defects of the book, there is much valuable matter to be found in it. The author has been very diligent in examining all the chief authorities on Brazil, and has extracted from them most of their geological matter; and among the extracts from Spix and Martius, Prince Neu Wied, Darwin, Gardner, Halfield, and others, are to be found many interesting passages descriptive of the peculiarities of the scenery and geology of the country. The chapters on the coral reefs of the Abrolhos and on the gold mines of Brazil, the account of the exploration of the bone-caves by Lund, and the appendix on the Botocudos Indians, will furnish some interesting matter for the general reader, while the student of science will obtain (though with some difficulty) a notion of the general physical and geological characteristics of an almost unexplored region.

The most striking geological feature of tropical South America east of the Andes is the enormous extension of gneissic rocks, which appear to form the whole foundation and much of the surface of the country, from the cataracts of the Orinooko to Paraguay and the southern frontier of Brazil. All the great mountain tracts of Brazil and Guiana, as well as the low plain which separates the watersheds of the Orinooko and Amazon, are of this rock, which is considered to be of Laurentian age. Its characteristic features are the great dome-like masses and the conical peaks or pillars, generally of more or less smooth and rounded outlines, a peculiarity dependent on the decomposition of all exposed surfaces, which fall away in concentric flakes. Great hemispherical domes up to a thousand feet in diameter are one of the results of this decomposition wherever a more resisting mass has occurred. Still more extraordinary are the vertical pillars of rock, that rise up at intervals out of the forest to some hundreds, or, in the case of the Pedra lisa, in the province of Rio de Janeiro, to more than three thousand feet high. Similarly formed peaks or pillars in Fernando, Noronha, and St. Helena have been formed by injections of fluid felspathic lava. What an enormous amount of denudation do these isolated pillars indicate!

In South Brazil a few tracts of Silurian and Carboniferous rocks occur, but the next formation of any extent is the Cretaceous, which consists of sandstones, generally upheaved and fractured. Other sandstones, which cover an immense extent of country, and form the ranges of flat-topped hills from one to nearly three thousand feet high, called *taboleiros*, are in perfectly horizontal strata, and as these lie unconformably on the cretaceous rocks they are presumed to be tertiary, although no fossils have yet been found in them.

We now come to a very wide-spread, yet recent and superficial deposit, which is at once the most puzzling and the most interesting feature in Brazilian geology. This is a layer of clay or loam, varying in thickness from a few feet to one hundred, and wrapping in its folds hill and valley, over vast tracts of country, including the steep slopes and summits of some of the highest mountains. All Rio de Janeiro, and all the coast provinces visited by our author, were thus covered. It has been described in Minaes Geraes and San Paulo, and Prof. Agassiz has observed it in all the northern provinces as far as the Amazon valley. It covers alike the gneiss and the tertiary formations. This clay is of a red colour, and is evidently formed of the materials of the adjacent and under-lying rocks, but ground up and thoroughly mixed. There is never the least sign of stratification throughout its mass, although it very frequently rests on a thin layer of quartz pebbles. It contains, scattered through it, rounded and angular boulders of quartz, gneiss, and other rocks, and the surfaces upon which it rests are always more or less smooth and rounded. Our author always speaks of this formation as "drift," and he agrees with