

THURSDAY, MARCH 5, 1874

PROFESSOR HUXLEY AT ABERDEEN

THE Address just given by the Lord Rector of Aberdeen University, and published *in extenso* in the March number of the *Contemporary Review*, is second in importance to none of the similar utterances which have been heard of late years. It bears in every line the stamp of a master mind. The many topics touched on, the apparent diversity of which has alarmed the shallow critic of the *Times*, are all grouped round one central idea—the advancement of Science; and there is not only a splendid unity throughout the Address, and no “uncertain sound,” which, coming as it does from a Royal Commissioner charged with a special survey of our scientific needs, as well as a Lord Rector, may well fill us with confidence for his advocacy, even if one despairs of much improvement being effected in the lifetime of the present generation. It is indeed to be feared, as Mr. Huxley himself anticipates, that on many points he will be “The Rector who was always beaten;” if so, it is none the less certain that his defeats will become “victories in the hands of his successors.”

It is especially fitting that the Address, dealing, as it did by its title, with “Universities: Actual and Ideal,” should have been delivered in connection with one of the Scotch Universities, which, in regard to scientific research and teaching, rank higher than the older English Universities, given up in the main to “elementary teaching of youths under twenty,” as the ideal University must take rank above them. We cannot too much thank Prof. Huxley for bringing out this point sharply, and quoting Mr. Mark Pattison to intensify it, all the more because the *Times* has taken hold of another sentence of the address, to point out the importance of a “pause” in the Reforms at Oxford and Cambridge, as if things were moving too fast! Surely the older English Universities may at least approach the level of the Scotch Universities, to say nothing of the French and German ones, in the matter of the higher teaching and of research before this “pause” is insisted on?

And, more than this, we conceive it to be possible that the present Government may not treat the Report of the Commission appointed to inquire into the Revenues of the Colleges at Oxford and Cambridge as mere waste paper. It has frequently been roundly asserted that the political distinctions between Liberals and Conservatives by no means represent the line of demarcation between those most and least anxious for University reforms. However this may be, it is well known that one of the most enlightened and far-seeing among University reformers, so far as the highest functions of a University are concerned, is a member of the present Government. Let us hope, therefore, that the magnitude of the pause may have been exaggerated; that the Heads after all may not oversleep themselves, that the last of Endowment may be even as the first, Endowment being, according to Professor Huxley, a foreign element,

“Which silently dropped into the soil of Universities like the grain of mustard-seed in the parable;

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and, like that grain, grew into a tree in whose branches a whole aviary of fowls took shelter. . . . It differed from the preceding, in its original design to serve as a prop to the young plant, not to be a parasite upon it. The charitable and the humane, blessed with wealth, were very early penetrated by the misery of the poor student. And the wise saw that intellectual ability is not so common or so unimportant a gift that it should be allowed to run to waste upon mere handicrafts and chares. The man who was a blessing to his contemporaries, but who so often has been converted into a curse, by the blind adherence of his posterity to the letter, rather than to the spirit, of his wishes—I mean the ‘pious founder’—gave money and lands, that the student who was rich in brain and poor in all else might be taken from the plough or from the stithy, and enabled to devote himself to the higher service of mankind; and built colleges and halls in which he might be not only housed and fed, but taught.

“The colleges were very generally placed in strict subordination to the University by their founders; but, in many cases, their endowment, consisting of land, has undergone an ‘unearned increment,’ which has given these societies a continually increasing weight and importance as against the unendowed, or fixedly endowed, University. In Pharaoh’s dream the seven lean kine ate up the seven fat ones. In the reality of historical fact, the fat Colleges have eaten up the lean Universities.”

We have already, in NATURE, referred to Prof. Huxley’s suggested reforms in respect to the Medical Curriculum, and we may therefore pass lightly over this part of his Address, expressing a hope, however, that his reference to this subject at length may be indicative that it will be considered by the Commission of which he is so distinguished a member.

The Lord Rector points out that while he would drop Zoology and Botany in the Medical Curriculum, he would make them part of the Arts Curriculum; and after remarking that the Faculties of Theology, Law, and Medicine are technical schools, intended to equip men who have received general culture with the special knowledge which is needed for the proper performance of the duties of clergymen, lawyers, and medical practitioners, he adds,—

“I have no sort of doubt that, in view of the relation of Physical Science to the practical life of the present day, it has the same right as Theology, Law, and Medicine, to a Faculty of its own in which men shall be trained to be professional men of science. It may be doubted whether Universities are the places for technical schools of Engineering, or Applied Chemistry, or Agriculture. But there can surely be little question that instruction in the branches of Science which lie at the foundation of these Arts, of a far more advanced and special character than could, with any propriety, be included in the ordinary Arts Curriculum, ought to be obtainable by means of a duly organised Faculty of Science in every University.

“The establishment of such a Faculty would have the additional advantage of providing, in some measure, for one of the greatest wants of our time and country. I mean the proper support and encouragement of original research.”

This at once brings us to what we consider by far the most important part of the Address, the Lord Rector’s opinions on the endowment of unremunerative research:—

“The other day, an emphatic friend of mine committed himself to the opinion that, in England, it is better for a man’s worldly prospects to be a drunkard,

than to be smitten with the divine dipsomania of the original investigator. I am inclined to think he was not far wrong. And, be it observed, that the question is not, whether such a man shall be able to make as much out of his abilities as his brother, of like ability, who goes into Law, or Engineering, or Commerce; it is not a question of 'maintaining a due number of saddle horses,' as George Eliot somewhere puts it—it is a question of living or starving.

"If a student of my own subject shows power and originality, I dare not advise him to adopt a scientific career; for, supposing he is able to maintain himself until he has attained distinction, I cannot give him the assurance that any amount of proficiency in the Biological Sciences will be convertible into, even the most modest, bread and cheese. And I believe that the case is as bad, or perhaps worse, with other branches of Science. In this respect Britain, whose immense wealth and prosperity hang upon the thread of Applied Science, is far behind France, and infinitely behind Germany.

"And the worst of it is, that it is very difficult to see one's way to any immediate remedy for this state of affairs which shall be free from a tendency to become worse than the disease.

"Great schemes for the Endowment of Research have been proposed. It has been suggested, that Laboratories for all branches of Physical Science, provided with every apparatus needed by the investigator, shall be established by the State; and shall be accessible, under due conditions and regulations, to all properly qualified persons. I see no objection to the principle of such a proposal. If it be legitimate to spend great sums of money on public Libraries and public Collections of Painting and Sculpture, in aid of the man of letters, or the Artist, or for the mere sake of affording pleasure to the general public, I apprehend that it cannot be illegitimate to do as much for the promotion of scientific investigation. To take the lowest ground, as a mere investment of money, the latter is likely to be much more immediately profitable. To my mind, the difficulty in the way of such schemes is not theoretical, but practical. Given the laboratories, how are the investigators to be maintained? What career is open to those who have been thus encouraged to leave bread-winning pursuits? If they are to be provided for by endowment, we come back to the College Fellowship system, the results of which, for Literature, have not been so brilliant that one would wish to see it extended to Science; unless some much better securities than at present exist can be taken that it will foster real work. You know that among the Bees, it depends on the kind of cell in which the egg is deposited, and the quantity and quality of food which is supplied to the grub, whether it shall turn out a busy little worker or a big idle queen. And, in the human hive, the cells of the endowed larvae are always tending to enlarge, and their food to improve, until we get queens, beautiful to behold, but which gather no honey and build no comb.

"I do not say that these difficulties may not be overcome, but their gravity is not to be lightly estimated."

It is pointed out that the creation of Faculties of Science will, to a certain extent, remedy the present lamentable condition of things to which we have so often called attention.

"It is possible to place the scientific inquirer in a position in which he shall have ample leisure and opportunity for original work, and yet shall give a fair and tangible equivalent for those privileges. The establishment of a Faculty of Science in every University implies that of a corresponding number of Professorial chairs, the incumbents of which need not be so burdened with teaching as to deprive them of ample leisure for original work. I do not think that it is any impediment to an original investigator to have to devote a moderate portion

of his time to lecturing, or superintending practical instruction. On the contrary, I think it may be, and often is, a benefit to be obliged to take a comprehensive survey of your subject; or to bring your results to a point, and give them, as it were, a tangible objective existence. The besetting sins of the investigator are two: the one is the desire to put aside a subject, the general bearings of which he has mastered himself, and pass on to something which has the attraction of novelty; and the other, the desire for too much perfection, which leads him to

"Add and alter many times
Till all be ripe and rotten;"

to spend the energies which should be reserved for action, in whitening the decks and polishing the guns.

"The necessity for producing results for the instruction of others, seems to me to be a more effectual check on these tendencies than even the love of usefulness or the ambition of fame."

It would indeed be a happy solution of the difficulty if it could be solved in this way, but we confess that on this point we fear that the system advocated by Mr. Huxley will not be all that is needed.

In the first place, take the present appointments to Chairs; are they, as a rule, given to the most distinguished investigators? If not, why not, and why should the present system be altered? In our opinion the present system of appointing teachers is good so long as large ranges of knowledge have to be professed. Take many of our present professors; are they as encumbered by teaching as the German professors are for instance? and yet where are their researches? do they not figure much more often in the "List of Examiners" than in the "Philosophical Transactions"? If these things are so, no benefit will accrue from a mere increase of numbers unless the present pay be largely increased.

There is also another most important point, and here again we quote from the Address:—

"It is commonly supposed that anyone who knows a subject is competent to teach it; and no one seems to doubt that anyone who knows a subject is competent to examine in it. I believe both these opinions to be serious mistakes: the latter, perhaps, the more serious of the two. In the first place, I do not believe that anyone who is not, or has not been, a teacher is really qualified to examine advanced students. And in the second place, examination is an art, and a difficult one, which has to be learned like all other arts."

Are then investigators to be made teachers and examiners in order that they may live, regardless of the fact that they cannot teach, and though they may be ignorant of the "art" of examining?

We believe that powers of teaching and powers of investigation by no means go together, though they are united in some great men like Mr. Huxley; and we believe, further, that on this ground alone the idea of making a man teach in order that he may carry on researches is bad in principle: it is even worse than this, because it is apt to cause the public to underrate research—to think that the end of all research is to teach, while in point of fact the end and aim of the acquisition and teaching of all old knowledge is the acquirement of new knowledge.

It is a source of satisfaction to us that Prof. Huxley agrees with us on the main point, for we are certain that when once the principle is conceded, practical methods of carrying it out, among which undoubtedly that in-

sisted on by the Lord Rector will find place, can easily be found; methods against which no objection can be urged, and from the application of which a tremendous increase in the rate of advancement of knowledge in this country may be anticipated.

POST-TERTIARY GEOLOGY*

The Great Ice-Age and its relation to the Antiquity of Man. By James Geikie. (W. Isbister and Co. 1874.)

II.

WE must next turn to beds which furnish conclusive proof of a return of cold conditions, the well-known shell-bearing clays found here and there along the coast of Scotland. The fossils and the physical condition of these beds both concur in telling the same tale, that an Arctic climate again prevailed in Britain. These deposits are marine, and have not been met with at a greater height above the sea than 360 feet, and they were therefore formed towards the termination of the period during which the land was emerging from the sea. Evidence of a similar change of climate is, however, found in the interior of the country. In the Highland glens and the high valleys of the Southern Uplands morainic deposits, distinguishable from those of the earlier ice period, are of common occurrence, sometimes scattered loosely over the mountain slopes, sometimes arranged in ridges or lines of mounds across the valleys after the fashion of terminal moraines. The climate, therefore, must have become again severe enough to allow of the accumulation of ice; but, since the second set of glaciers is shown by the moraines which they have left behind them to have been confined to the high ground, and each restricted to its own valley, the cold must have been far less intense than during the period of the first glaciation.

The second period of cold, however, passed away, and the record of its gradual disappearance is written for us in this way. In many of the upland valleys concentric lines of mounds, each marking the terminal moraine of a glacier, are arranged one within the other, and as we ascend these piles are found to grow more and more puny, till they at last vanish altogether. From this we see, as clearly as if the operation had gone on before our eyes, how each glacier shrank back step by step into the heart of the mountain glens, and at last yielded to the gradual amelioration of the climate, and melted entirely away. Another train of reasoning leads us to the same conclusion. The rising of the land was not continuous, but broken every now and then by pauses, and during each of these the sea cut a notch or shelf in the rocks and occasionally spread out terraces of shingle and silt, forming what are known as Raised Beaches. These beaches occur at many different levels, from 1,500 feet down to a few yards above the mean-tide level. The higher of these beaches furnish evidence of somewhat Arctic conditions, but as we descend in the series these traces become less pronounced.

We are now approaching the close of the glacial epoch, and the climate, though still colder than now, was approximating to what it is at present.

The author goes on to show, from a consideration of submerged forests, how the elevation of the land went on

till Britain was raised above its present level, and probably connected by a land surface with the mainland of Europe; and points out how the continental climate thus produced will account for the dense forests which formerly clothed our island, while a return to insular conditions resulted in a decay of the woods and the growth of peat mosses.

Lastly, our country became again dis severed from the continent, and the submergence which brought about this change went on till the land was sunk somewhat below its present level; while it rose into its present position, low level raised beaches were formed, among which the well-known 25-feet-beach is most conspicuous.

Such then is the succession of physical changes which the Drift-deposits show has taken place in our island.

The author has passed in review also the contemporaneous formations of Scandinavia, Switzerland, and North America, and pointed out how the story they tell agrees in its main features with that deduced from our own glacial formations.

Had he done no more than this he would have produced a work of surpassing interest and value, but the concluding chapters of his book will perhaps attract more attention than any other part of it, for they deal with a question that comes in a measure personally home to us, the antiquity of man and the date of his first appearance in Britain.

The oldest races of men of which traces have yet been discovered are known as the Stone-folk, because they fashioned their implements out of stone and seem to have been unacquainted with the use of metals. These Stone-folk are clearly distinguishable into two classes—the older, known as Palæolithic, merely chipped stones into shape; the later, or Neolithic, had advanced a step farther, and constructed tools highly polished and otherwise more finished than those of their predecessors. We also find associated with the traces of Palæolithic man a group of mammals now wholly or locally extinct, while the mammals accompanying the remains of Neolithic man are many of them still indigenous to the country. In connection with this subject the author has brought prominently into notice a fact which had not received the attention it deserves, that nowhere have any signs been detected of gradual improvement on the part of Palæolithic man, by which he may have passed from abject barbarism to the more advanced skill of his Neolithic successor, but that, on the contrary, the two races are everywhere sharply marked off from one another. In the same way the accompanying groups of mammals are essentially distinct, and we nowhere find traces of the dying out of the one and the gradual coming in of the other. But one inference can be drawn from these facts: between the time when the Palæolithic race inhabited Britain and the coming in of the Neolithic race a long interval must have elapsed, during which man was by some means or other driven out of the country, and went through elsewhere the long series of modifications by which he was himself advanced in civilisation, while at the same time the group of animals associated with him became totally changed. Now we know of no physical change since the second glaciation of the country which could have been the cause of such a migration, for all the evidence both here and elsewhere tends to show, that whatever change of climate has occurred between that event and the present day has been

* Continued from p. 321.