

THURSDAY, NOVEMBER 18, 1869

LECTURES TO WORKING MEN

THE workmen of England wish for more education. I speak of the better classes of them; those who can read and write and cast up accounts in some sort of fashion, though it may in many cases be a poor one. There is a great desire, which is very widely spread among them, for some kind of higher education: they wish to learn something of Science. They cannot learn it at school, and they cannot get all they want from books; so that they must look to a great extent for what they require to evening lectures. Now in these there are two things which they dread. The first is that they should only hear a string of technical terms, which they cannot understand; and the second is that they should have what ordinarily go by the name of "Popular Lectures on Science," lectures which are often illustrated by inconsequent "experiments." We have not to go far to find the reason of their dislike to such lectures: the fact is, they distrust them. The English workman is a clear-headed, shrewd man, and he has a good intuition of what is worth having. That is the reason he cares for scientific knowledge. He knows very well that science is "one of the best things going;" and he has also a very thorough appreciation of everything of the nature of humbug in any line whatsoever. Perhaps there is no audience in the world who, on the one hand, recognises readily the existence of humbug, and, on the other, recognises what is genuine, so well as an audience of intelligent English working men. I have often conversed with such men, and while I have heard them express the greatest desire for scientific information, I have heard them also speak most disrespectfully of that which is too often presented to them instead of it; and I have, over and over again, heard this said, "What is the use of our going to lectures, when we are to hear no more of the subject again?" Such sentiments as these find practical expression in the fact that I have found courses of a few consecutive and carefully digested lectures to workmen always well attended by a persistent audience. It is nothing desultory that these men want, but something solid—something which will give them real information. What they want is not a single lecture, or bits of the thing shown to them in a random sort of way, but a piece of real teaching, something which helps them to see their way a little through some subject, and gives them a better grasp of the thing which they are seeking for, namely, the method and facts of science. To be told only a number of the facts and results of science without the method is what workmen do *not* want; they are greedy for the facts of science, but they want something more. On the other hand, to try to impart to them the method of science without doing so by some particular instance, is to engage them in a kind of vague philosophising, suitable perhaps for the learned, but not for the ignorant. Ignorant people do not want, and cannot profit by, abstractions.

I believe, therefore, that a real demand amongst working men is supplied by short courses of lectures on scientific subjects, given in the evenings in some Institute or Mechanics' Hall. The lectures should not occur more than twice, or perhaps once, a week. We must never forget

that it is a hard matter for a working man to get to a lecture in an evening. To give such a set of lectures to working men calls for those who are well versed in the subject with which they are to deal; for it is only such who can speak free from technicalities. It must be remembered that workmen have no previous information, no knowledge of mathematics or of technical terms, which may enable us to shorten demonstrations or explanations. Everything requires to be explained to them *ab initio*; and it is only a man well versed in the subject down to the minutest particulars who can do this well. It is only such a man who can bring forward the first rudiments of a subject shortly, distinctly, and so as to interest his audience, *without being superficial*. Others speak from too bare a mind. But a man deeply versed in a subject can put it in a perfectly elementary way, and yet weave about it the interest of its most advanced portions. We have to show workmen the main points of an argument; they cannot come to, nor can we afford to give them, thirty or forty lectures, as we should do at the University. We can only give them three or four, and we must do the best we can in these. The best we can do seems to me to be this, to choose from the branch of science, which we wish to bring before them, some one of its most characteristic parts; and, while following out the great steps of that particular argument, to so illustrate it as to suggest and open up the rest of the subject, at the same time taking care to bring all to bear on one thing. A great point to aim at is, that all that we speak about should have a relation to the subject in hand, and such a relation as our audience will easily perceive—that we should not, in fact, bring before them isolated facts or theories, but always something connected, something logical. This indeed is the great end of teaching science: to get people into a better style of thinking about things; and this is just what, as soon as these men find it, they greedily snatch at; for they aim at some knowledge of science for a reason which is perhaps not quite clear to their own minds; but when they get the thing they want, they recognise that it is what they want.

Our English workmen, in fact, have not quite enough logicalness about them. They are apt to be led away by wrong arguments, by conclusions which do not quite follow from the premises. And, what is more, they (at least the best of them) know that quite well. And that is just the very point where some instruction in science helps them; where the scientific method—the method of getting hold of facts and putting them together, and doing so in a strict and careful way—helps people. And this is just what the workmen of this country need, and what a large number of them feel that they need, and the very reason for which they desire scientific knowledge. Now where this desire exists, do not let us hear them ask for bread and give them a stone. The future of England depends on these men. They are hard-headed, honest, straightforward men; and they think a deal; and they have got their faults, and not the least of them is this fault of being somewhat illogical. I have heard both employers and workmen say, "It is because our men are too apt to be led away by inconclusive arguments, that half the errors which they commit are committed." To any one who has studied the matter of the failure of so many workmen's Benefit Societies, the truth of these

remarks will be evident. I am not here expressing any opinion as to the rights or wrongs of many things at which workmen aim, and in which they engage. But totally irrespective of opinion, it is evident that there are many important questions the management and the decision of which are in the hands of the working men, and a right view of the respective importance of facts and of argument is the only safeguard against being misled. It is just at this very point that scientific teaching helps to set men right. I am not saying whether or not I believe that Science is to be the regenerator of mankind. But this is certain, that there is a great benefit to be gained from scientific teaching, that it supplies to working men that which as a class they are deficient, and that which as a class they are desirous of having; and that here there is open before all who care for these matters a wide field of direct and immediate utility.

I have seen six hundred men, on a tempestuous winter evening, come to a lecture on Astronomy at one of our great workshops in the North. It is a wonderful sight to see so many faces intelligent and seeking for knowledge. Working men are a peculiar audience: they are rather fond of cheering; and I have often had to check a piece of applause arising just before the conclusion of a demonstration which was tying together, so to speak, in a knot, several threads of argument. Such applause, coming, as I have so often seen it, *just before* the completion of an argument, indicates the satisfaction which all feel, and which these men are unsophisticated enough to express, when there just begins to dawn upon them the feeling of seeing, without being told, what some things have got to do with one another; the feeling in fact of making a discovery. And I can fancy nothing more encouraging to a lecturer who loves his subject than such facts, and nothing which more bears out the assertion that I have made, that there is among working men a true desire for, and a true appreciation of, something genuine in science. Working men—at least those with whom I am acquainted, and I am acquainted chiefly with the northern districts of England—have a strong perception of right and wrong, a strong moral character, a clear and open way of giving everything a fair hearing—that natural honesty which is the backbone of a nation. And if we add to this the powerful logic and the wide information which the true teaching of science imparts, we bid fair to make the democracy of England a model for that of all other countries.

JAMES STUART

DR. LIVINGSTONE'S EXPLORATIONS

THE letters from Dr. Livingstone lately read at the Royal Geographical Society, give the grateful assurance, not only that he was in good health and spirits in July 1868, but also that he was under no apprehension of ill-treatment from the Cazembe. Visiting that chief without a numerous escort, he created no alarm. He has, in truth, notwithstanding seeming difficulties, been singularly fortunate; for his rumoured death and expected captivity have created a sensation of much greater value to him than the discovery of the Nile's sources. Dr. Livingstone's account of his journey northwards from the Aroangoa is in general reconcilable with those given by the Portuguese expeditions, with some difference, how-

ever, arising from difference of route. He seems to have crossed that river much further to the west than Monteiro, whose line of march was ten or twelve miles more west than that of Lacerda. He saw mountains, he tells us, and the Portuguese saw none. Herein he is greatly mistaken: Monteiro's expedition crossed over the flanks of a wondrous mountain, supposed to be a Portuguese league (about 20,000 feet) high, with trees, population, but no snow on its broad summit. The account of this mountain, called by mistake Muchingue (the glen or defile), given by a writer in the Journal of the Royal Geographical Society (vol. xxvi.), improves the original by a precise statement of longitude and latitude, and by a description of the panoramic view from the summit to a distance of 200 miles.

The high land which culminates towards the east in Muchingue was ascended on leaving the valley of the Aroangoa. The traveller then came in lat. $10^{\circ} 34' S.$, to the river Chambezi, called by Lacerda the New Zambezi, flowing from east to west, and rarely fordable. He remarks that it resembles the Zambezi, not in name only, but also in the abundance of food found in the stream or on its banks. He forgets that the critic who denied his explanation of the name Zambezi (river *par excellence*), showed that in all its forms, Liambegi, Chambezi, Yabengi, &c., it means simply (river) "of meat" or animal food. The Chambezi abounds in oysters, but we know nothing of their flavour. This river, according to Dr. Livingstone, forms in the west the great Lake Bengweolo, from which it again issues to the north under the name of Luapula; but we believe it would be more correct to say that it joins the Luapula, a much larger river, the great marsh Pampage, which is, doubtless, often overflowed and converted into a lake, lying in the angle between the two rivers. Then we are told—"The Luapula flows down north past the town of Cazembe, and twelve miles below it enters the Lake Moero." From this it might be concluded that the river flows by the chief's town, and that twelve miles lower down, or further north, it enters the lake, but this cannot possibly be the traveller's meaning. Lake Moero forms a remarkable feature in Dr. Livingstone's latest discoveries, but his account of it is singularly perplexed and obscure. We know that the Luapula flows to the north or N.N.E., some eight or ten miles west of the Cazembe. Lake Moero, by our traveller's account, is fifty miles long, and from 30 to 60 miles wide. "Passing down," he says, "the eastern side of Moero, we came to the Cazembe;" and again he states that "the Cazembe's town stands on the north-east bank of the lakelet Mofwe, two or three miles broad and four long, totally unconnected with Lake Moero." In endeavouring to reconcile these statements it is necessary to beware of rash conclusions and inaccurate expressions. It is a hazardous thing to pronounce upon the length, breadth, and boundaries of lakes without surveying them. The Portuguese officers in 1831 obtained leave to examine Lake Mofwo or Mofwe, and for that purpose went four and a half leagues N.N.E. along its shore, till they came to the Lounde, a river, as they called it, two miles wide, where they expected to find boats. These, however, had been purposely removed, so that the explorers were brought to a stand. They had proceeded far enough, however, to perceive that the lake turned to the north-west. They did not see the end of it,