

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

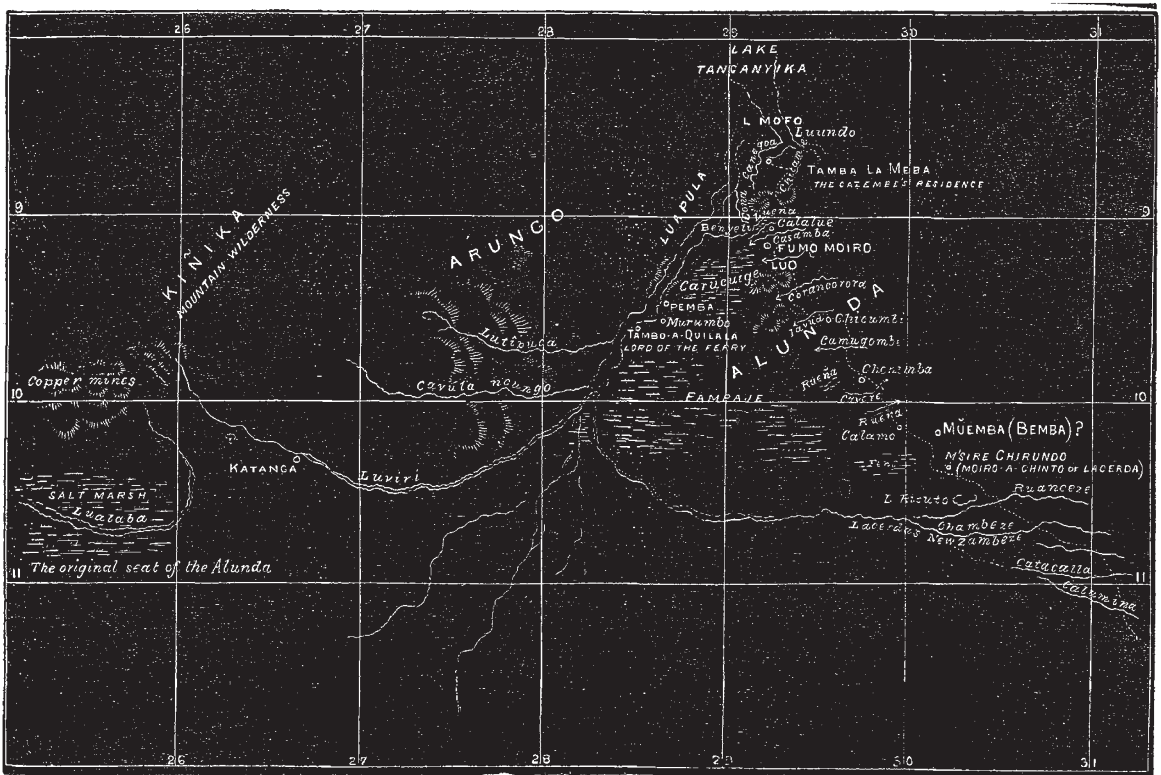
THE letters from Dr. Livingstone lately read at the Royal Geographical Society, give the grateful assurance, not only that he was in good health and spirits in July 1868, but also that he was under no apprehension of ill-treatment from the Cazembe. Visiting that chief without a numerous escort, he created 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 Mofu 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,

but state distinctly that it communicates with other large lakes. Dr. Livingstone, describing the flooded state of the country, tells his experience of two rivers which flow into the north end of Moero; the Luo, which was crossed by the Portuguese, thirty miles south of the Cazembe's town; and the Chungu, near which Lacerda died, about ten miles south of that place. From these particulars we cannot help concluding that the Moero of our traveller, who has found the country in a state of flood, is the Caruige of the Portuguese, or at least that these names apply to parts of the same great marsh or lagoon. At the eastern side of it, visited by Dr. Livingstone, is the Fumo Moiro, whose title is probably taken from his district. Manoel Gaetano Pereira, who first visited the Cazembe, related, that near the chief's

river into many branches. "These branches," he goes on to say, "are all gathered up by the Lufira. . . . I have not seen the Lufira; but, pointed out west of 11° S., it is there asserted always to require canoes. . . . This is purely native information." Now it is quite possible that the traveller totally misunderstood his native informants. They spoke of the waters to the S.W., and he understood them to speak of the N. or N.E. The great river Luviri, called by the Arabs Lufira, flows into the Luapula from the west, about 100 miles S.W. or S.S.W. from the Cazembe. The Lualaba, the sacred river of the Alunda, whence their forefathers emigrated, still farther west (a month's journey), falls into the Luluia, and so joins the Zaire. The great salt marshes, which chiefly supply the interior of Africa, are situated on its banks at its southern



town he spent a whole day wading breast-deep through a lagoon. It was subsequently found that the lagoon in question was Caruige. The strength of the Cazembe's position lies in the difficulty of approaching it through a labyrinth of swamps, lakes, and wide drains. The Portuguese spent some hours in crossing a river, as they called it, two miles wide, on matted vegetation which sank under their feet. This and the Loñde above mentioned were probably the connecting arms of large lakes.

Our traveller informs us, that "the Luapula, leaving Moero at its northern end by a rent in the mountains of Rua, takes the name of Lualaba, and, passing on N.N.W., forms Ulenge in the country west of Tanganyika." He saw the Luapula only at this gap in the mountains. Ulenge is a lake with many islands, or a separation of the

bend; these may be the Ulenze above described, if it be not a marshy tract lying between the sources of the two rivers. The native information here given cannot be received as perfectly pure. When our author speaks of the Luviri entering Tanganyika at Uvira, he evidently casts the dimly discerned views of the natives into his own preconceived mould, and clothes them in his own language.

Respecting the language of this country, our author informs us that "the people are known by the initial Ba instead of the initial Lo or U for the country." This is not merely confused, but also, we believe, wholly erroneous. The initial U never forms the name of a nation, but the collective name of a nation, chief, and people. The Portuguese, who on this point are the best authorities, use

the names Alunda, Arungo, Acumbe, not Balunda, &c. They tell us that the Alunda never pronounce the letter r, and that in writing the names Arungo, Moiro, &c., in which that letter occurs, they have adhered to the Maravi dialect. We thence conclude that for the names Rua, Moero, Lufira, &c., and perhaps for the initial Ba above alluded to, Dr. Livingstone is probably indebted to his Arab friends, who rest satisfied with a jargon, in some degree intelligible everywhere, and nowhere perfect.

Dr. Livingstone seems to be elated with the discovery that "the chief sources of the Nile arise between 10° and 12° S. lat., or nearly in the position assigned to them by Ptolemy, whose river Rhapta (?) is probably the Rovuma." Here two different problems are attempted to be solved at once—one touching the Sources of the White Nile, and the other, those of Ptolemy's Nile. With respect to these latter, it will be enough to observe that Ptolemy's Lakes of the Nile, two in number, 8 degrees asunder, are placed by him respectively in lats. 6° and 7° S., but his graduation being defective, through an imperfect estimate of the length of a degree, the positions thus assigned to the lakes fall under true graduation, to 11" N., and 40" S. of the equator. Ptolemy's Lakes, therefore, have not been reached by the zealous traveller.

With respect to the sources of the Bahr el Abyad, they may of course be traced to the head waters of the Luapula, provided that the results of Capt. Burton's observations on the altitude of Nyanza and the character of its northern end are completely thrown aside. With a greater elevation, and an outlet through Speke's Mountains of the Moon, the waters of the lake may reach Egypt.

It is to be regretted that Dr. Livingstone missed the opportunity of viewing the highest mountain in this part of the world, now known only by a ridiculously exaggerated description; and also a most interesting point in the centre of Africa. The great town, Katanga, as described by the Arabs, is near the copper mines, where 75 lbs. of copper may be bought for 4 cubits of American sheeting. The town is larger than Roonda (the Cazembe's town), and has good bazaars; it stands on the Rafira (Luvira) which joins the Ruapura (Luapula). The people are peaceable, and kind to strangers. The people from Zanzibar learned the language almost immediately.

F.R.G.S.

[We give a map of the region recently traversed by Livingstone, showing its connection with the known points in this part of Africa. We owe this map to the courtesy of the officers of the Royal Geographical Society.—Ed.]

CUCKOWS' EGGS

SCARCELY any bird has so much occupied the attention, not merely of naturalists, but of people generally, as the Common Cuckow of Europe, and (we might almost add, consequently) scarcely any bird has had so many idle tales connected with it. Setting aside several of its habits wherein it differs from the common run of birds, its strange, and, according to the experience of most persons, its singular mode of entrusting its offspring to foster-parents, is enough to account for much of the interest which has been so long felt in its history. Within the last twenty years a theory (which is, as I shall pre-

sently show, by no means a new one) with respect to an important fact in its economy, has attracted a good deal of attention, first in Germany, and latterly in England; and as this theory seems to be especially open to misconception, and in some quarters to have been entirely misunderstood, I shall endeavour to give an account of it in a manner more distinct than has yet (I think) been done; and to show that there is no good ground for believing it to be irrational, as some have supposed, and for scouting it as something beneath contempt.

It has long been notorious to oologists that the eggs of the Cuckow are subject to very great variety in colour, and that a large number of birds laying eggs of very different colours enjoy the doubtful advantage of acting as foster-parents to the young Cuckow. Now the theory to which I refer is that "the egg of the Cuckow is approximately coloured and marked like those of the bird in whose nest it is deposited, that it may be the less easily recognised by the foster-parents as a substituted one."

This theory is old enough, for it was announced and criticised nearly a hundred years ago by Salerne,* who, after mentioning that he had seen two Stonechats' nests, each containing eggs of that bird, as well as a Cuckow's (which was as blue as the others, but twice [?] as large), goes on to say that he was assured by an inhabitant of Sologne (a district in France to the south of Orleans), that the Cuckow's egg is always blue; and then comes this remarkable statement:—"As to the assertion of another Solognot who says that the hen Cuckow lays its eggs precisely of the same colour as those in the nest of which she makes use, it is an incomprehensible thing." Many of my readers will, I doubt not, be at once inclined to agree with Salerne.

Little attention seems to have been paid to this passage by succeeding naturalists;† but in 1853 the same theory was prominently and (I believe) independently brought forward by Dr. Baldamus, then editor of *Naumannia*, a German ornithological magazine, now defunct; so far as I know, however, it was not until April, 1865, that an article in the English ornithological journal, the *Ibis*, by Mr. Dawson Rowley, gave anything like an idea of it to the public of this country. Some months later (14th September) Mr. A. C. Smith introduced the subject to the Wiltshire Archæological and Natural History Society, and the paper he then read, having been since printed in the *Wiltshire Magazine* (vol. ix. p. 57), and elsewhere, has, with Mr. Rowley's article, made the theory very generally known. Mr. Smith also published, subsequently, in the *Zoologist* for 1868, a translation of Dr. Baldamus's elaborate essay; but this translation being unaccompanied by the coloured plate which illustrated the original, unfortunately fails to do justice to the Doctor's theory, for without seeing the specimens on which this is founded, or good figures of them, the evidence in its favour can scarcely be appreciated fully.

Dr. Baldamus's theory had been some time known to me, when in 1861 I had the pleasure of being shown by him his collection of Cuckows' eggs, and I can declare

* L'histoire naturelle, éclaircie dans une de ses parties principales, l'ornithologie, &c. Paris; 1767, p. 42.

† Montbeillard (Hist. Nat. des Ois, vi. p. 309) mentions it, but I am not aware of any one else who has done so, until M. Vian in the *Revue et Magasin de Zoologie* for 1865 (p. 40), referred to it, and from this reference I became acquainted with it.