

by Prof. Zimmermann, of Vienna; Holland, by M. Loeffelt; Italy, by Prof. A. de Gubernatis; Spain, by Don Riaño.

## SCIENCE

## THE LAKES OF CENTRAL AFRICA.

Athenæum Club, Dec. 2, 1875.

As I am upon the point of leaving England and may not have an opportunity of addressing you for some time, perhaps you will allow me room for a few remarks upon Col. Grant's valuable paper, read at the last meeting of the Royal Geographical Society (Nov. 29).

1. The lakes of Central Africa were known to geographers, not "as far back as the year 833," but before the days of Ptolemy and Marinus of Tyre. The Nile was made to rise first from two lakes, then from three, then from one, and, lastly, from fanciful variations of these numbers. Many suspected, but I was the first to prove, that "the centre of Africa is studded with lakes"—is a lake region to the fullest extent of the term.

2. The Arabs did not "inform" Capt. Speke, who was unable to converse with them. They told me about a great water to the north, but, as the expedition had already been grossly misinformed on the matter of a "Ziwa" (lake) which turned out to be a pool, I had my suspicions. Wanting privacy, however, and time to write out my notes, I despatched my late companion northwards—the result was the discovery of the Ukerewe portion of the Victoria Nyanza.

3. Col. Grant had better have been silent upon Sir R. Murchison's "Speke, we must send you back again!" Capt. Speke had voluntarily bound himself by a verbal promise, renewed in writing from Cairo, not to appear before the Royal Geographical Society until my arrival in England.

4. The reason why Sésé, Sesse, Sasse, Sessi, or Sessch Island did not appear in either of Capt. Speke's two maps (1, *Journal of the Discovery*, &c., and 2, *Journal of the Royal Geographical Society*, vol. xxxiii., of 1863, the latter authorized by his family) can only have been that my late companion suspected he was exploring another water.

5. Dr. Livingstone's *Journals* show that Mr. Stanley was suffering from sickness at the time of the "pleasant picnic" north of the Tanganyika Lake; thus, perhaps, we may explain why more care was not given to the exploration of this ancient point.

6. We are told that Capt. Speke gave the circumference of that monstrous bird-like shape, the Victoria Nyanza, as 645 miles, or 910 including the Baringo Lake, the head and beak of the dodo. Col. Grant's compass makes Stanley's lake measure 890 miles round, but he forgot to tell the meeting that in so doing he included the whole northern shore line, which the latest explorer has apparently placed some thirty miles too far north. Mr. E. G. Ravenstein, F.R.G.S., who has carefully measured the two areas, reduces to 20,000 square geographical miles what Capt. Speke made nearly double that space. Yet Col. Grant says, "The area of Victoria Nyanza, as made known to us by Mr. Stanley, proves that Speke far underrated its extent." Evidently geographers, like doctors, disagree.

7. Col. Grant tells us, "Capt. Burton did not seem to have any reason for his argument" against the unity of Capt. Speke's lake. My reason was simply the impossibility of a single water having four distinct outlets, and an inverted delta of inconceivable form. The "geographical world" did at first accept it, and caused me to wonder not a little at its credulity. At length, thanks to Mr. Stanley, the delta has undergone the fate of that marvellous horseshoe, "The Mountains of the Moon," which, built up on paper (see the fac-simile maps in my "Zanzibar"), has disfigured for a decade the surface of Central Africa.

8. Dr. Livingstone was, I think, right in stating that "Speke had turned his back upon the real sources of the Nile." The old hero-martyr held, apparently to the day of his death, that the ulti-

mate sources of the Nile are to be found in the highlands which shed the Lofu River to the north and the Chambeze south-westwards. Within a few months, or even weeks, we may hear that the energetic Col. Gordon or Mr. Stanley has abolished the Rusizi Lake, and substantiated the native reports, repeated so pleasantly to the meeting by Sir Samuel W. Baker, namely, that there is a canoe passage between the Tanganyika and the Luta (Mwutan) Nzige. If that be true, we shall return to the days of Ptolemy, and we shall find that the Nile gathers in two lakes, and we shall recognize in the Lofu the Caput Nili.

9. Col. Grant declares that I "said there must be several lakes, lagoons, anything, in fact, except the lake." This is hardly fair when I was, in fact, the "theoretical discoverer" (excuse the expression) of his Victoria Nyanza. What I really said was that a lake with four distinct outlets deserves to be split into four; and so far, I believe, the "geographical world" ought to be, as it at last was, with me. The lake laid down by me from Arab report may be found in Capt. Speke's map, inserted in his volume, "What Led to the Discovery of the Sources of the Nile." But I would not have this hearsay feature inserted either in my two volumes (the 'Lake Regions'), nor in the *Journal of the Royal Geographical Society*, nor in the little book called the 'Nile Basin.' So far from being "unjust," I wished only to be accurate; to show what had been seen, not what had been heard.

10. The Speke and Grant expedition alone must bear the blame for the errors of Messrs. A. Keith Johnston, E. Stanford, and E. Weller. These scientific mappers could hardly believe in the superficiality of observation and the geographical ignorance which gave four outlets to one lake. Consequently they divided the area into four, and they were fully justified in so doing. Mappers, like other men, cannot explain how two European travellers could traverse three streams, and yet mistake the direction of two of them.

11. Having seen the hippopotamus in the small "creeks" or rivulets of the East African coast, I fail to appreciate this sentence:—"The river Ugoweh, at the north-east corner of the lake, must be a considerable stream also, for hippopotami were seen in it."

In conclusion, I need not repeat to readers of the *Athenæum* my reasons for believing that the area occupied by Capt. Speke's two maps will be found to contain a lake region besides a lake. Mr. Stanley himself suggests that independent waters may be found to the north-east of the Victoria Nyanza, and I venture to express a hope that the Italian expedition, now setting out under the energetic Antinori, will add fresh lustre to the name of my distinguished friend, Cristoforo Negri, by finding and by mapping the lake region.

RICHARD F. BURTON.

## GEOGRAPHICAL NOTES.

As our Calendar shows, a paper by Mr. Octavius Stone, who accompanied Mr. Macfarlane in his explorations of the river lately discovered in New Guinea, will be read at the next meeting of the Royal Geographical Society. It is a detailed account, and alludes to the colossal bird which is described in the sensational narrative of the same journey published in a daily paper, as an exaggerated and untrustworthy report of the natives. Such a marvellous brute it would have been a credit even to Capt. Lawson to have discovered.

Mr. Lucas, the young Englishman who left England in August, on a private exploring expedition in Africa, was by the last accounts leaving Cairo for the west of the Albert Nyanza, *via* the West Nile, possibly through the Nyam-Nyam country.

The occupation of Brava and Kismaya is certainly an infringement of the sovereign rights of the Sultan of Zanzibar, who had garrisoned these and other places along the Galla and Somali coast some years ago, as may be seen by referring to the interesting Blue-book containing an account of Sir Bartle Frere's mission.

Gerhard Rohlfs, we hear, is lecturing at present

in the United States on his travels in Africa. German papers say that his reception has been enthusiastic, and his lecture-rooms are crowded. Surely America is the paradise of lecturers.

## GEOLOGICAL NOTES.

The last part of the *Zeitschrift* of the German Geological Society contains a number of interesting papers, among which may be specially mentioned a valuable petrological memoir by Prof. Vom Rath, of Bonn, in which he describes some of the eruptive rocks of the Andes, and the rocks of Monzoni, in South-Eastern Tyrol, which have been the subject of much discussion among petrologists.

Dr. Cope has published, in the *Transactions of the American Philosophical Society*, a supplement to his Synopsis of the extinct Batrachia and Reptiles of North America. This supplement describes the remains of air-breathing vertebrata from the coal-measures of Linton, Ohio, which have been collected by Prof. Newberry, the Director of the Geological Survey of that State. The writer believes that all these carboniferous air-breathing vertebrates were Batrachians, and that true reptiles did not then exist. The Linton remains include a large number of new species and several new genera.

The November number of the *Journal of the Geological Society* contains an unusually large number of good papers, including one by Mr. J. Clifton Ward, 'On the Granitic and Metamorphic Rocks of the Lake District.' Mr. H. F. Blanford has a paper 'On the Age of the Plant-bearing Series of India'; and Mr. Hicks discusses the physical conditions under which the Cambrian and Lower Silurian rocks were probably deposited.

It should be noted, in connexion with that great undertaking, the construction of a railway tunnel beneath the Straits of Dover, that MM. Larousse and Lavallée have been actively engaged during the past week in taking soundings near the English coast, and they express themselves perfectly satisfied with the results obtained.

The recent issue of the seventeenth part of the 'Reliquiæ Aquitanicæ' completes this work, which has been in course of publication during the last ten years. Both M. Lartet and Mr. Christy, its original projectors, have passed away, and the task of completing the work has been ably carried out, amid many difficulties, by Prof. Rupert Jones.

Did the cold of the Glacial Epoch extend over the Southern Hemisphere? This important question is answered in the negative by Capt. F. W. Hutton, who has contributed to the December number of the *Geological Magazine* a paper which embodies the results of his own observations in New Zealand. He maintains that the evidence is decidedly against the idea of a colder climate having formerly prevailed there.

The current number of the *Geological Magazine* opens with a paper by Dr. Ricketts, in which he discusses the cause of the Glacial Period, with reference to the British Isles.

Prof. James Orton, who has paid two visits to the Valley of the Amazons, has communicated to the November number of the *Annals of Natural History* an interesting paper on the geological structure of this locality. Although the sands and clays of the Amazons Valley had been regarded as quite unfossiliferous, he succeeded in discovering fossils in several beds; and an examination of these remains shows that the vast horizontal deposits of the Amazons Valley are of Tertiary age, probably Eocene.

Prof. Hull's address as President of the Royal Geological Society of Ireland is published in the last part of the *Society's Journal*. He is succeeded in the Presidency by Sir Robert Kane. The same number of the *Journal* contains a paper, by Mr. Kinahan, 'On the Estuary of the River Slaney in Co. Wexford,' and one by Mr. E. T. Hardman, 'On Some New Localities of Upper Boulder Clay in Ireland.'

The characters of the leading types of structure which may be recognized amongst Palæozoic Corals have been studied by Mr. Thomson, of Glasgow, and Prof. Nicholson, of St. Andrews.