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PAPERS READ
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DURING THE SESSION 1864-65.

[FORMING VOL. XXXV. OF THE SOCIETY'S JOURNAL.
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I.—*On Lake Tanganyika, Ptolemy's Western Lake-Reservoir of the Nile.* By RICHARD F. BURTON, Medallist R.G.S.

Read, November 14, 1864.

καὶ μὴν καὶ παρὰ τῶν ἀπὸ τῆς Ἀραβίας τῆς εὐδαίμονος δια περαιουμένων
ἐμπόρων ἐπὶ τὰ ῥαπτά . . . μανθάνομεν . . . τὰς λίμνας δὲ ἀφ' ὧν ὁ Νεῖλος βεῖ
. . . ἐνδοτέρῳ σύγχρῳ.—*Ptol.*, lib. i. ch. i. 17.

THE following pages contain a notice, purely geographical, of a paper "The Upper Basin of the Nile, from Inspection and Information," by Capt. J. H. Speke, F.R.G.S., published in the 'Journal of the Royal Geographical Society,' vol. xxxiii., 1863. The sad event which cast a gloom over our meetings at the memorable Bath Meeting of the British Association in 1864, precludes the possibility of my entering into any questions of a private or a personal nature. On the contrary, I would here publicly acknowledge my recognition of his many noble qualities, courage, energy, and perseverance, but I cannot accept his "settlement" of the Nile. There are five objections to deriving the true Nile from the supposed Victoria Nyanza.

1. The difference of the levels in the upper and the lower part of the lake.
2. The Mwerango River rising from hills in the middle of the lake.
3. The road through the lake.
4. The inundation of the southern part of the lake for 13 miles, when the low northern shore is never flooded.
5. The swelling of the lake during the dry period of the Nile, and *vice versâ*.

It may, however, be observed *in limine*, that whilst refusing to accept the present "settlement" of the Great Problem, I in no wise propose to settle the question myself. This must be left to time.

* * * * *

The intelligence lately brought home by Dr. Livingstone and his scientific co-operator, Dr. Kirk, throws a remarkable light upon a hitherto dark question. It verifies in a striking way a detail of Ptolomæan geography, until now either ignored or accounted for by an error of copyists. I allude to the northern drainage of the Tanganyika Lake, and to the southern limit of the great Nilotic basin, as far as the latter is at present known.

In a letter from Dr. Livingstone, read at the meeting of the Royal Geographical Society, June 13, 1864, occurs this highly interesting statement:—

"With regard to the existence of a large river flowing into the northern end of Nyassa from Tanganyika, Dr. Livingstone was assured by all the natives of whom he inquired that there was no such stream, but that two small rivers alone enter the lake from the north. The numerous streams met with on this journey (*viz.*, the last in 1863) flowing from the west seem to warrant the conclusion that no flow of water from Tanganyika is necessary to account for the great depth of the (Nyassa) lake and the perennial flow of the Shiré."

Dr. Kirk, who makes the Nyassa Water 200 miles long by 15 to 60 broad, stated, from personal observation, at the same meeting,—

"As to a river coming in from the north, the only ones we heard of were two small ones; one named in a generic way the Rovu, which simply means 'river,' and the other, which they describe as a small river coming in from a marsh."

Since that time, Dr. Kirk kindly placed in my hands, with permission to publish, the following valuable note:—

"The region between the Nyassa and Tanganyika Lakes being as yet unexplored, our knowledge of the animals inhabiting these waters becomes of some interest in guiding us to a solution of the vexed question as to their continuity or their separation. On the former supposition the Tanganyika must belong to the Zambesi hydrographic basin, otherwise it will pass to the Congo* or the Nile.

"When the Tanganyika was discovered, a collection of its shells was formed by Capt. Burton; the same has been done on the shores of the Nyassa by myself. Between these there is *no* community of species, while both contain many new forms.

"Among those from the Nyassa is one of a type for the first time observed

* My visit to the Rapids of the Congo River in August and September, 1863, convinced me that the north-eastern or smaller fork of that great river issues from an equatorial lake quite unconnected with the Tanganyika. At this moment it may have been visited by my enterprising friend Paul du Chaillu.

in Africa, being large and handsome it could not easily be overlooked were it present in the Tanganyika.

"On the other hand, Capt. Burton's collection possesses one allied to a species common on the Nile, and unknown on the Nyassa. This favours my opinion that no communication exists between the two waters.

"We now know that the fish of the Nyassa Lake are peculiar to itself, and differ from those of the Lower Shiré, its outlying stream, which is isolated from the upper part by a formidable series of falls and rapids. Of the fish of the Tanganyika nothing is known, otherwise this geographical question might be almost set at rest.

"The wide distribution of animals and plants over Tropical Africa is in strong contrast to the very local and peculiar nature of the fauna of its great fresh-water lakes.

"(Signed) J. KIRK."

Dr. Livingstone personally favoured me with details concerning a weed from which the accoents of the Nyassa extract their salt. That great traveller wrote:—"I thought that I had a specimen of the plant which floats ashore at Lake Nyassa, and from which the natives obtain a salt used in cooking, but I cannot find it. When chewed its taste is distinctly salt. If so used in Lake Tanganyika, it may account for the freshness, though I confess I feel more inclined to the theory of an outlet still unknown." This remarkable lacustrine production is wanting to the Tanganyika water, and its adjacent tribes are obliged to transport the condiment from various diggings lying at considerable distances. Dr. Kirk has thus explained the matter:—

"Understanding now your question, I may attempt a reply.

"The weed gathered and burned, whose ashes serve as a relish to food for the Nyassa natives, is the *Potamogeton pectinatus* of Linnaeus. With this is often mingled small quantities, perhaps accidentally, of *Valisneria spiralis*. Where salt is plenty, I have never known this used.

"Salt is washed at the south end of the Nyassa, and carried up its western bank for sale. It was a good way up the western shore, and at a distance from any salt-washings where I saw the weed collected.

"(Signed) J. KIRK."

Thus, it is evident that there is no connection between the Tanganyika and the Nyassa reservoirs. What, then, I would inquire, becomes of the surplus water from the Tanganyika Lake?

In company with the lamented Capt. Speke I explored, in February, 1858, that great basin since identified by Mr. Hogg with the "Zambre" or "Zambere" of old geographers.* We dwelt on its eastern borders till May 25, visiting (April 26) Uvira, our farthest northerly point, about 10 or 12 miles from the end of the lake. There my hopes of discovering the Nile Sources

* P. 4 of a learned paper, 'On some old Maps of Africa in which the Central Equatorial Lakes are laid down nearly in their true position.' From the Transactions of the Royal Society of Literature.

were rudely dashed to the ground. Receiving a visit from the three stalwart sons of the local sultan, Maruta, the subject of the mysterious stream which all my informants, Arab as well as African, had made to issue from the Tanganyika, and which for months we had looked upon as the Western Head-Stream of the Nile, was at once brought forward. All declared (probably falsely) that they had visited it: all asserted that the Rusizi River enters into, instead of flowing from, the Tanganyika. I felt sick at heart. The African's account of stream-direction is often diametrically opposed to fact: seldom the Arab's. In this point I differ totally from Capt. Speke. But our unruly crew of Wajiji savages would not suffer us to remain at Uvira, much less to penetrate northwards. We were therefore compelled to return hurriedly, and thus, as I have related ('Lake Regions of Central Africa,' vol. ii. p. 117), the problem was fated to remain a mystery.*

Respecting the Southern Tanganyika, the Arabs of Kazeh, who have frequently and in large parties visited the lands of the Marungu lying at the extremity which faces Nyassa, positively informed me (*loc. cit.* p. 153) that the "Runangwa or Marungu River, which drains the southern countries towards the Tanganyika, equals the Malagarazi (or eastern feeder of that lake) in volume;" and all agreed in making it an affluent, not an effluent. Had there been an important stream in that direction, the colony of Arab merchants which for several years has inhabited Lusenda or Usenda,† capital of the Cazembe, lying to the south-west of the Tanganyika Lake, would soon have found their way northwards. The same consideration renders Mr. Cooley's confusion of three lakes into one a moral impossibility. Like a navigable river in Arabia, such a waterway, 800 miles in length, would have altered the state of the whole African interior.

Returning to England in May, 1859, I found geographers unwilling to believe that a reservoir, 250 or 300 miles long, by 33 or 40 broad, and situated at a considerable altitude in the African zone of almost constant rain, can maintain its level without efflux. Moreover, they argued that the freshness of the water would under normal circumstances prove the escape of saline substances washed down by tributaries from the area of drainage.

The 'Journal of the Royal Geographical Society' (vol. xxx.

* I distinctly deny that any "misleading by my instructions from the Royal Geographical Society as to the position of the White Nile," left me unconscious of the vast importance of ascertaining the Rusizi River's direction. The fact is we were helpless; we did our best to reach it and we failed.

† First visited by Dr. Lacerda in 1798. Generally placed about s. lat. 8° 10' and e. long. 29°. Of late years many Arabs and Sawahilis have settled there.

1860) lost no time in offering a solution of the "strange hydrological puzzle." Earl de Grey's Address thus enters upon the question:—"The configuration of the country to the northward (of the Tanganyika) gives us excellent reason to believe that the northern tributary is correctly described; but whether the river mentioned as *entering* the lake at the south does not really run *out of it*, is a fair matter for discussion." The visits of Dr. Livingstone to the Shirwa and Nyassa Lakes, then not thoroughly explored, the circumstance that the three waters, Tanganyika, Nyassa, and Shirwa, were approximately at the same level,* and the possibility that the Tanganyika might be the highest of them all, afforded a satisfactory hypothetical solution. The connexion, with or without small intermediate waters, between the Tanganyika and the Nyassa, would account for the surplus waters of the former, and for the non-variation of height in the splendid Shiré River which drains the latter.

On the other hand, Capt. Speke, shortly after our return, published, much against my wish, two papers in 'Blackwood's Edinburgh Magazine' (No. lxxvii., August and September, 1859). They were accompanied by a sketch-map, in which, to my astonishment, appeared a huge range, estimated to rise 6000 or 8000 feet, and dubbed the "Mountains of the Moon." At first the segment of a circle, it gradually shaped itself into a colt's foot or a Lord Chancellor's wig, and it very effectually cut off all access from the Tanganyika to the Nile. Without recalling to mind things that should be now forgotten, I must record my unceasing struggle against the introduction of a feature which was frequently copied into popular maps abroad and at home.† All that Capt. Speke could say of the Lunar Horse-shoe was explained in our Journal (vol. xxxiii.) "Both the Arabs and the natives said the Rusizi (at the northern end) was a very large river, much greater than the Malagarazi River . . . for which reason I imagined the mountains encircling the head of the Tanganyika must necessarily attain an altitude of from 8000 to 10,000 feet." These heights, as the Editor of Volume xxxiii. justly remarks, were "not shown in Capt. Speke's map of the route sent home after the visit to the Tanganyika head; nor in his sketch-map sent in July, 1858. It

* Capt. Speke had placed the Tanganyika at 1844 feet above the sea. Dr. Livingstone gave 2000 feet of altitude to the Shirwa: difference, 166.

† "We find in the centre of Africa a high group of hills surrounding the head of the Tanganyika Lake, composed chiefly of argillaceous sandstones, which I suppose to be the Lunæ Montes (1) of Ptolemy, or the Soma Giri of the ancient Hindus" (??). Capt. Speke's 'Journal of the Discovery of the Source of the Nile,' Introd. p. xv. In p. 263, he owns to having built up these mountains "solely on scientific geographical reasonings," and he actually falls into the venerable error of deriving from almost the same source the Nile, the Congo, and the Zambesi.

was impossible to see them on either journey. In the first expedition the alleged north point was not approached within 160 miles, and the formation of the head of the lake prevented distant view in any direction. During the second exploration the nearest and highest point, the Mfumbiro Cone, raised to 10,000 feet, supposed to have been 50 miles distant, and the centre of the range is marked as 150 miles from the nearest point of the route." In Capt. Speke's original map, sent from Egypt to the Royal Geographical Society, and published by Mr. E. Stanford, June, 1863, this moon-shaped range is not laid down; the name is given to two parallel sierras flanking the northern end of the Tanganyika, and far south of the position attributed to the Mountains of the Moon in his later map.* The objectionable feature was, after three or four years, duly rejected.

During his last march, Capt. Speke apparently coincided with Earl de Grey's Address, using these words (vol. xxxiii. p. 324): "It was a pity I did not change the course I gave to the Marungu River (*i.e.* making it an affluent not an influent), but I forgot my lesson, and omitted to do so." In his Journal (p. 90), he thus expresses himself:—"Ever perplexed about the Tanganyika being a still lake, I inquired of Mohinna and other old friends what they thought about the Marungu River (at its southern extremity); did it run into or out of the lake? And they all still adhered to its running *into* the lake, which is the *most conclusive argument* that it does run *out* of the lake." A truly extraordinary train of reasoning!

Presently it became evident to every geographer who cast his eye upon the map produced by the Nile Expedition of 1860-1863, that the Rusizi River might drain the Tanganyika Lake either into the water called the Luta Nzigé—Dead Locust—or by some other means into the White River, through the Nile. Many years ago Mr. Macqueen received from a native of Unyamwezi the following remarkable statement, touching the Tanganyika:—"It is well known by all the people there, that the river which goes through Egypt takes its source and origin from the Lake." (Journal Royal Geographical Society, vol. xv. pp. 371-374.) Captain Speke, on return from his first trip to the Western Tanganyika, thus recorded the information given by Shaykh Hamed bin Sulazyim, a respectable Arab trader:—"A large river called

* Says Mr. Hogg (p. 38), "In the map published by Mr. Edward Stanford, June 22, 1863, and signed by Capt. Speke, '26 February, 1863,' the mountains termed by that traveller the 'Mountains of the Moon' are placed at the north extremity of Lake Tanganyika; but in his own map, published in his Journal in December last, Capt. Speke in the construction of it has altered their position and inserted them around the west and north sides of the more northern Lake Rusizi—N.B. manifestly a widening of the river—and has also given them a certain mythical colt's-foot form."

Marungu supplies the lake at its southern extremity; but except that and the Malagarazi River on the eastern shore, none of any considerable size pour their waters into the lake. But, on a visit to the northern end, *I saw one*, which was very much larger than either of them, and *which I am certain flowed out of the lake*; for, although I did not venture on it, in consequence of its banks being occupied by desperately savage negroes, inimical to all strangers, *I went so near its outlet that I could see and feel the outward drift of the water*:"—(Blackwood, Sept., 1859, and 'What led to the Discovery of the Sources of the Nile?' p. 21. N.B.—The italics are my own.) Several authors have recently recorded their adherence to this opinion. My learned friend Mr. W. S. W. Vaux ("On the Knowledge the Ancients possessed of the Sources of the Niger," from the 'Transactions of the Royal Society of Literature,' vol. viii. New Series, p. 29), thus expresses himself:—"I cannot myself help thinking that this Luta-Nzigé will be ultimately found to be one of a chain of lakes of which the Tanganyika is the largest and most southern; the more so, as I have already stated I feel no confidence in the emplacement of Capt. Speke's 'Mountains of the Moon,' which, on his map at least, would bar any outlet from the southern to the northern lake." Others have hypothesized a gorge or valley by which the Tanganyika waters might flow northwards through the "Colt's-foot Range," which has, I have said, now been abolished. Mr. John Hogg (*loc. cit.* p. 23) refers to his Plate III., a map published in 1623 by the most distinguished geographer of his age, Gerhard Kauffmann, who is better known by his Latin name of Mercator, he having been the inventor of the geographical Projection called after him. "In this system 'Nilus fl.,' as Ptolemy believed, derives his western fork from an immense water named Zaire or Zembre Lacus, and corresponding with our Tanganyika. The eastern arm issues from 'Zafan Lacus,' the *Zambesi* of some authors, and corresponds with the lake now called Maravi or Nyassa. Another branch of the 'Nilus,' at about 1° south of the Equator, flows from a smaller nameless lake, at the north extremity of which is a place called 'Garava.'" Mr. Hogg suggests this to be a corruption of "Ukerewe," meaning in the local tongue Island-land. Finally the south-easternmost feeder proceeds from a lake, "the *Barcena*, which is doubtless meant for the Baringa, for the word may also be written Barenca or *Bavenga*." It is clearly the Bahari-Ngo, the "Great Sea or Water," yet unexplored, and placed in our maps as the "Baringo." Dr. Beke, the traveller who had the solid merit of suggesting a feasible way to explore the Nile basin, quotes De Barros:—"The Nile has its origin in a great lake (the Tanganyika), and after traversing many miles northwards it enters a very large lake which lies under the

Equator." This would be either the Bahr el Ghazal (the Nile of Herodotus) or the Luta Nzigé; on the other hand, the Portuguese travellers were fond of distorting the Ptolomean geography. The same geographer, in an admirable lecture lately printed,* thus records his matured opinion:—"Whereas in the Map inserted in the 'Sources of the Nile,' I marked Tanganyika as being within the 'not impossible' limits of the basin of the Nile, I am now inclined to place this lake within the *probable* limits of that basin, and to make it, in fact, the upper course of the Giant River of Egypt."

An objection to the theory that the Tanganyika Lake drains into the Luta Nzigé at once suggests itself, and it would be fatal if reliance could be placed upon it. I allude to the levels. Lake Tanganyika is allowed but 1844 feet. Capt. Speke (p. 332 of the Journal of the Royal Geographical Society, vol. xxxiii.) argues that the Luta Nzigé is 2161 feet, or upwards of 300 feet above the Tanganyika. But his B.P. observation was made at Paira, a station distant from the stream, and even to obtain that altitude he was obliged to add the mean of certain differences, 368 feet: this emendation is not generally accepted. During our exploration of Tanganyika the state of our vision would, I am convinced, explain a greater difference than the fraction of a degree. Without reference to variation of barometric pressure, our thermometer had altered from first to last 1° (F.)=535 feet. On our return to Konduchi, a harbour on the eastern coast, our B.P. thermometer boiled at 214° (F.). This alone would give a difference of about 1000 feet. Thus the Nyanza water was made 3550 feet high by the first Expedition. The second raised it to 3745, and made it drain, by the Luchuro or Kitangule River, "Little Lake Windermere," which being placed at a figure of 3639, thus runs 106 feet up hill. I may also observe that whilst the "Ripon Falls" (12 feet high) are placed at 3308 feet above sea-level, the "Victoria Nyanza" rises 3740, which gives to the surface of the supposed single Lake a difference in level of 432 feet.

I adduce this case out of many, to show how unreliable are such approximations of altitude. It is, however, gratifying to find that Captain Speke places Gondokoro, which some have raised to 1600 feet, at a figure of 1298, whilst Mr. Consul Petherick (February 25, 1863) reduced it by a mean of three observations to 1265. Assuming Gondokoro in about 5° N. lat. to be even 1600 feet above sea-level, we still have from the head of the Tanganyika Lake, in 3° S. lat. ($8^\circ \times 60^\circ = 480$ direct miles), a fall of 244 feet. Captain Speke's and Mr. Petherick's observations would give 550 feet, an

* 'On the Sources of the Nile,' &c. &c., delivered in the Theatre of the London Institution, Jan. 30, 1864, by Charles T. Beke, Esq., PH. D., F.S.A.

ample inclination. Moreover the Luta Nzigé is theoretically placed 1000 to 1200 feet lower than the Nyanza Lake, that is to say, between 2350 and 2550 feet above sea-level, and the altitude has been further reduced to 2250.

But truth to say, very little fall is required for the 200 miles separating the Tanganyika and the Luta Nzigé, and the want of inclination explains the marshiness of "the sort of backwater to the great river." A correspondent of the 'Morning Advertiser' (March 22, 1864), supposed to be the African geographer, Mr. M'Queen, remarks of the Dead Locust Lake, "at this point should commence the supposed backwater of 166 miles in length towards the S.S.W. But how are we to arrange the subsequent descent of the river beyond the northern point of this lake. To the point where the river is met with beyond Paira, 120 miles from the Karuma Falls, the descent is stated to be 1000 feet (say 400 feet higher than Gondokoro), and consequently 300 feet below the level of the north point of the Luta Lake. How, then, could the Nile form a backwater for this? This is not thought of nor explained. The fact is that this backwater expanse was, we believe, made out in London in order to cobble something like consistency and unity, and also to account for the diminution of the river in magnitude, which they found as they advanced northwards."* Dr. Beke (*loc. cit.* p. 25), on the other hand, observes that "Captain Speke adopted the conjecture of Dr. Murie, whom he met in Gondokoro." This "backwater" enabled him to explain how, with a fall of 2.5 feet per mile, the waters of the river occupied 86 days in flowing down 200 geographical miles—in other words, 2.25 miles in 24 hours.

Thus by draining the Tanganyika, so as to maintain its surface at an almost constant level, the meaningless backwater would resolve itself into a link in the lake chain, the *Nili Paludes* of the ancients, now usually placed in N. lat. 5°. They are called *immensas paludes*,† a title which they deserve better than the No, Nuvier, or Bahr el Ghazal. In Seneca's account of the contemporary journey made by the two centurions despatched by Nero *ad investigandum caput Nili*, about 70 years before Ptolemy's day, we find that they travelled 800 to 890 Roman miles from the upper and more recent Meroe, that is to say, reaching N. lat. 3° or 4° ('Nat. Quæst,' lib. vi. chap. 8). The two rocks from

* What, however, does the learned reviewer mean by "Sellina Oros" in this passage? "But lest we should be mistaken, we called the attention of an Oxford scholar to it, and he told us that 'Sellina Oros,' Moon Mountain, in the singular was the correct reading. Can this be τὸ τῆς Σελήνης Ὀρος of Ptolemy (lib. 4, chap. 8)? If so, verily, 'Oros' hath been "translated."

† Why this water, being 160-180 miles long, should be called the *Little Luta Nzigé*, and where the Great one is, I am at a loss to determine.

which the vast force of the water broke forth is a feature remaining to be described; it may allude to a rapid at the southern extremity of the Luta Nzigé.*

The principal alterations which I would introduce into the map appended to Captain Speke's paper (vol. xxxiii. Journal Royal Geogr. Soc.) are as follows:—

1. Draining Lake Tanganyika into the Luta Nzigé.

2. Converting the Nyanza into a double lake, the northern part fed by rivers from the western highlands, and the southern by small streams from the south to the south-east. The former in Captain Speke's book appears to be merely a broadening of the Kitangule River, and thus only can we explain the phenomenon of six large outlets in 30 geographical miles.† He was no linguist, and we find in his journal that the (Great Victoria) Nyanza may mean "a pond in the palace," (p. 324)—"a piece of water, whether a pond, river, or lake" (p. 389), or "the Nile." Despite the traveller's prepossessions, we find (p. 469) that even in the moment of triumph he asked himself if the volume of the Kitangule River was not equal to that of "the Nile," and he answered the question in a very unsatisfactory way.

It will be remembered that, during his third expedition, Captain Speke, instead of striking as before the south of the Lake, and coasting or marching along it, nowhere sighted the Nyanza waters till he reached Mashondé, about 50 miles south of the Equator. His words are (Journal, p. 272): "We sought for and put up at a village beneath a small hill, from the top of which I saw the Victoria Nyanza for the first time on this march." He had then left unvisited a gap of $2^{\circ} 15'$ (= 135 miles) between this and the spot where he saw the Lake during the first expedition. Yet when returned to England he at once rejected the normal dotted line

* At the cataracts of Makedo, M. De Bono learned from the natives that the river fell some 9 perpendicular feet, and that four or five days south of these falls it rose from an immense lake into whose other extremity a river fell. M. Lejean at first conjectured this to be the Nyanza. After the second expedition he proposed the Luta Nzigé, *n. lat.* 0° — 3° . (Bulletin de la Société de Géographie. Cinquième Série, tome vi.)

† In Capt. Speke's Journal (p. 466), we find that the Waganda still call the "Ripon Falls" *stones*.

‡ Within a distance of 1° the map shows three first-rate streams, viz. the Mwerango, or Mwarango, the Luajerri, and the Napoleon Channel issuing from the Nyanza Lake. I believe this to be a physical impossibility, and the same is acknowledged by the Bulletin (p. 261). In p. 281 of his Journal, Capt. Speke was informed by "all the men of the country" that the Mwerango rose "in the hills to the southward," or came "from the lake;" and he adopted the latter, because it suited his preconceived opinions.

The 'Westminster Review,' vol. xxv. p. 315, New Series, suggests that Capt. Speke, in assuming his "Victoria Nyanza" to be a single lake, was mistaken just as were the Mombas missionaries with respect to their Ujiji or Unyamwezi Lake. I had not read that Review when the above was written.

that shows uncertainty, and inserted the regular survey trace. The northern water was probably a widening of the great Kitangule River, a projection of the extensive Luchuro Valley. He saw it at certain intervals as far eastward as the "Ripon Falls;" but the "spur of a hill" in Kira shut out his view of the outlet of Napoleon Channel. On the other hand, it may have been one huge lagoon, or several small lagoons. We may observe that nowhere in the cuts of the Journal (*e. g.* p. 390) is a sea-horizon shown. If the line of water be continuous, how is it that the Usoga defeated Mtesa's army, when a fleet of war-canoes could have been sent? His actual inspection of the Nyanza was about 50 out of 450 miles; all the rest was hearsay. He travelled in the conviction that the lake was on his right; but he never verified that conviction. When living with Rumanika of Karagweh, at some 60 direct miles from the Lake, he did not assure himself of its existence. The King of Uganda detained him two months in his palace without allowing him to see the water, distant a five hours' march. The offer made to him by King Mtesa, namely, to send him home in one month by a frequented route, doubtless through the Masai country on the east of Nyanza (p. 294), points to a direct road which can only be explained by the separation of the Nyanza into two or more waters. So in p. 187 of Captain Speke's Journal, Irungu of Uganda expressed his surprise that the traveller had come all the way round to Uganda, when he could have taken the short, safe, and well-known route *via* Masai-land and Usoga, by which an Arab caravan had travelled. His words are: "He (Irungu) then told me he was surprised that I had come all the way round to Uganda, when the road by the Masai country was so much shorter." In p. 130 the petty chief Makaka assures Captain Speke that "there were two lakes and not one": unfortunately the hearer understood that the Bahari-Ngo was alluded to. At Mtesa's court, Maribu, the officer sent to fetch Captain Grant, said he should *walk* (about half the way over hills and bad land) to the mouth of the Katonga influent, boat it to Sese Island, where Mtesa keeps all his large vessels, and be at Kitangule River in a very short time (p. 317). This would also suggest the widening of the Kitangule River above alluded to. In p. 197 he mistakes "the broad waters of Luero lo Urigi" for the Nyanza itself, and gives a fabulous account of how the former lake had "become a small swamp." In p. 428, Murondi, who had once travelled to the Masai frontier, said "it would take a month to go in boats from Kira to (the) Masai (country), where there is another Nyanza, joined by a strait to the big Nyanza, which King Mtesa's boats frequent for salt;" but the same distance could be accomplished in four days overland, and three days afterwards by boat. In p. 333 he hears from "Kidi officers" of a high mountain behind the Asua River, and a

lake navigated by the Galla "inhabitants" in very large vessels, but he never investigates the report. The islands offer a mass of difficulties, to be explained only by supposing a shallow bed, or that they are part of the mainland. The group, forty in number, called Sese (p. 399), one of which Captain Speke (p. 276) placed opposite Kituntu, off the mouth of the Katonga River, and where the King of Uganda keeps one of his canoe-fleets, were omitted, against the explorer's desire, from the map of the Royal Geographical Society, also the Kitiri Island (p. 399) on the way to Usoga, and the reefs and shoals (have Africans words for these fine distinctions?) are not indicated. Then he comes across another mysterious island, in which the African Neptune, Mgussa, dwells. Lastly (p. 492), there is an island on the Nyanza to which Captain Speke wished his deserters transported.

3. Detaching the Bahari-Ngo from the Nyanza waters. This reservoir (the Baharingo of M. Léon d'Avanchers and Mr. Missionary Erhardt, and vulgarly Baringo, as written by Mr. Missionary Krapf, who first heard of its existence) drains the mass of highlands between the Equator and 3° s. lat., and sends forth what M. Miani, the discoverer, calls Ascia or Acioà, and which Captain Speke names the Asua. I believe it to be the real White Nile, the so-called Nyanza effluents being of minor importance. "It is by no means improbable," says M. Vaux, "that we may hereafter discover, as Dr. Beke has urged more than once, a source of the Nile in a chain of mountains to the south-east of the lake Nyanza—a discovery which will confirm in a signal manner all the essential inferences he has deduced from his informants" (p. 24). In p. 598 of Captain Speke's Journal we are told that the Asua cannot issue from the Nyanza, "as its waters were falling and not much discoloured." Yet in his map he derives it from the Bahari-Ngo, and connects the latter with the Nyanza, directly contradicting himself. Only by assuming the Asua to be the true White Nile, and to head in highlands, can we account for the snows of Æschylus (*Æthiopsis Fragm.* 139, ed. Didot) and Ptolemy (*τὰς χιόνας*, lib. iv. chap. 8) with which the Moon Mountain feeds the two lake reservoirs of the Nile, and for the express statements of Brun-Rollet and other Piedmontese travellers, all of whom trace the Nile from the land of the Madi up to the mountains in the south-east. Thus, too, can we explain the Arab epithet "White" applied to the true Nile,* the colour of glacier water. Dr. Krapf

* The Bahr el Azrek, or Blue River, like the Rhone after issuing from the Lake of Geneva, the Bahr el Aswad, Tacagze, or Black River (Atbara, Astaboras of Ptolemy), so-called from its dark earthy tinge during the rains. The Bahr el Abyaz, or White River, distinctly points to glacier-water. A muddy stream can hardly issue from a lake.

"In a lecture delivered before the Literary and Philosophical Society of

also heard, when near Kenia, of a river running from the south-east, and forming the head-waters of the Nile. Since my return from Zanzibar in 1860, I have never ceased to recommend a reconnaissance of the Nile *via* Mombas, where a march of 300 instead of 1100 miles through an easy country, at a far less cost than 7000*l.*, would give very different results from the "gigantic ignis fatuus" that has lately amazed the public, and has reminded thoughtful men of a similar statement, as ecstatically made some ninety years ago by Abyssinian Bruce, and as unreasonably received by the unscientific public.

Viewed by this light, how admirably exact in A.D. 136 was Ptolemy the Græco-Egyptian's description of this mysterious region. His *Αἰθιοπες Ἀνθρωποφάγοι*, inhabiting the "Barbaric Gulf"—lands between Menuthias (Zanzibar) Island and the Mountain of the Moon (Kilima-njaro and its neighbours)—are the cannibal Wadoe. The melted snows have been discovered in Chhaga by Baron Carl von der Decken and his lamented companion Mr. Thornton, despite all the dicta of Mr. Cooley. The name "Mountain (chain) of the Moon" is manifestly a Greek translation or adaptation of Unyamwezi, which Mr. Cooley insists upon corrupting to "*Μονομοεζι*."* Ptolemy places this chain in 57° E. long. and 12° 31' s. lat., extending latitudinally 10' (= 600 miles) to 67° E. long., and 12° 30' s. lat. The longitude, as Mr. Hogg suggests, might have been computed from S. Antonio, and thus would answer to 32° and 40° east of Greenwich. This includes the ivory highlands of Chhaga, and the mass of mountains, Mfumbiro, &c., to the west of the supposed Nyanza. I have treated this question at length in my 'Lake Regions of Central Africa' (vol. ii. p. 178), and have not found reason to alter my opinions. The older theory (see M'Queen's 'Geographical Survey of Africa,' p. 240) which makes the Lunar Mountains extend from Camaroons in 3° 40' N. lat., in an E. by N., and E.N.E. direction to Guardafui, has long since been abandoned.

As regards Ptolemy's latitudes, it must be remembered that he and his predecessor, Marinus of Tyre (the Maury of antiquity), drew their information from the logs of traders who travelled on

Newcastle-upon-Tyne, Mr. Brayley expressed the opinion, that assuming snowy mountains to supply water to the Nyanza, that water must necessarily issue from glaciers: for from the relative properties of fluid and solid water, it is impossible for a body of perpetual snow—that is to say of snow at the lower limit of perpetual snow—to become a body of water, without first passing into the state of glacier-ice."—Dr. Beke (*loc. cit.* p. 26).

* Dr. Beke, as early as 1846-48, before the Snowy Alps of Eastern Africa, Kilima-njaro and Kenia, were discovered, converted Ptolemy's latitudinal into a meridional range of Lunar Mountains. I cannot believe that the learned Pelusian made any such mistake; and I find between E. long. 30° and 40°, and from the equator to s. lat. 3°, a mass of peaks and highlands forming a remarkable equatorial sierra.

the eastern coast. He places the Prom. Aromatum, our Guardafui, in 6° N. lat., an error of 5° 48' 50" too far south, that well-known cape lying in 11° 48' 50". This misinformation touching a crucial station from which his departures down the East African coast are apparently calculated, would necessarily throw out his lower latitudes. Yet if the great water-parting be assumed to be at the head of the Marungu River, Ptolemy will have erred by only 2° 30':—12° 30' instead of 10° south. And as Dr. Beke has remarked, "The recondite Jesuit, Athanasius Archer, will be found right in substance if not in form, when stating, as he does in his 'Mundus Subterraneus' (vol. i. p. 72 *et seq.*), that in the Mountains of the Moon is the great Hydrophylacium of Africa, the central point of division between the waters flowing to the Mediterranean, to the Atlantic, and to the Indian Ocean."

Ptolemy also shows an Eastern lake in E. long. 65° and S. lat. 7°, and a Western in E. long. 57° and S. lat. 6°, which is nearly the centre of the Tanganyika Lake. It must not be forgotten that some geographers have represented Ptolemy's waters to be three: in one place (lib. iv. chap. 8) he speaks of them in the plural, *αἱ τοῦ Νεῖλου λίμναι*; in another (lib. iv. chap. 7) they are expressly stated to be two, *δύο λίμνῶν*. But this might refer to two largest in a Lake Region where for years every traveller will discover some fresh lacustrine feature. Well may Mr. Hogg—following D'Anville—conclude: "It must, therefore, be acknowledged that these accounts of Ptolemy, which relate to the upper portion of the Nile and to the reservoir lakes beyond the Equator, to the head-streams of that mighty river, and to a range of mountains termed 'of the Moon,' from whence descend as well as from whose roots spring the waters and sources that feed those central lakes, are in the main correct." I believe Ptolemy's Niger to be not less exactly laid down than his Nile, and that he knew more about it than Europe did before the days of Richard Lander. And in confidence of his sagacity I cannot but believe the Tanganyika to be the Western lake-reservoir of Father Nile. The word "source" is expressly avoided, in the belief, with Mr. M'Queen, that a lake, unless it be a mere "eye" of water, cannot be taken as the head of a river, though the river may issue from it. "Lake Baikal is not the head of the Yenesei River, Lake Zana is not the head of the Blue Nile, Lake Geneva is not the head of the Rhone, Lake Lausanne is not the head of the Rhine, Lake Superior is not the head of the St. Lawrence, nor Lake Winnipeg the head of the Saskatchewan, and so of other rivers on this globe."*

I will now make a statement which to some may appear paradoxical, namely, that the real sources of the Nile—the "great

* See also Dr. Beke (*loc. cit.* p. 25).

Nile problem"—so far from being "settled for ever" by the late exploration, are thrown farther from discovery than before. They are not, we have been told, *in nubibus*, but they elude our vision. The exploratory labours of years, perhaps of a whole generation, must be lavished before even a rough survey of the southern Nilotic basin can treat the subject with approximate correctness of detail. "Mais les sources du Nil, sont-elles decouvertes?" enquires our fellow-labourer in the field of geographical science, M. V. A. Malte-Brun. "*Nous ne le croyons pas.*" No geographer does, no geographer can, believe in the actual "settlement" of the Nile sources. That the Tanganyika is the Western "top-head"—not source—of the Great Nile, and that the Bahari-Ngo, which supplies the Tubiri, is the Eastern, I have little doubt. But the Arcanum Magnum of Old-World Geography has not yet been solved. The old lines—

"Arcanum natura caput non prodidit ulli;
Nec licuit populis parvum te, Nile, videre,"

have lost none of their force: it still remains to this generation, as to its forefathers, "Caput quærere Nili"—to close the Canon of Geographical Discovery.

II.—Notes on a Journey to Kilima-ndjaro, made in Company of the Baron von der Decken. By the late RICHARD THORNTON, Geologist to the Expedition; compiled from the Journals of the Author.*

Read, November 14, 1864.

THE narrative of Mr. Thornton, the scientific companion of the Baron von der Decken on his first journey to the snow-clad peaks of Kilima-ndjaro in 1861, commences with the departure of the expedition from Mombas on the East African coast. The party consisted of fifty-eight men, including the Baron, Mr. Thornton, Coralli (the Baron's valet), three leaders, five servants, and forty-seven carriers. Seven of the men were armed and paid by Mr. Thornton himself; one of them being a native of the Zambesi, named Sigwati, who had accompanied him since he had left the Livingstone expedition in that region.

Early in the morning of the 29th of June they commenced their march, and proceeded for the first two days, in straggling order, over the rugged hills and valleys which lead from the coast into the interior. The country was peopled by the Wanika and Wakamba tribes, and their numerous villages were mostly sur-

* See Map, Journal R. G. S., vol. xxxiv. p. 1.