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Notes on the Country between Lake Nyasa and Victoria Nyanza

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the change in the magnetism of the Earth, and consequent disturbance of the magnetic needle. I have been to Shide, and have seen Prof. Milne's apparatus there, and I was particularly struck with the delicacy of those instruments. He made fast a thread to the top of a lamp-post such as we have in the street, that lamp-post being embedded firmly in the chalk. The smallest pull on that thread was most beautifully marked upon his apparatus. You could tell the slightest motion. Now, I do not think any of our magnetometers would be shaken in that way, so I am rather inclined to think he is right in saying it is not tilting, and I hark back upon the compression as being the cause of the needle disturbance. Then the lecturer spoke of the differences between different observatories. I think he is perfectly right in saying it is the density of the mass below some observatories which causes the magnetic change when it is subject to compression. In others there is no magnetic mass to compress. If we go to Edinburgh, I can imagine the volcanic rocks being exceedingly compressed during an earthquake. That is a direction in which we should make further inquiry, and I think Prof. Milne has been so far wise in calling this question of magnetism to his aid, and I hope he will continue to work with magneticians.

The PRESIDENT: I think the meeting has listened with very great interest to the splendid paper which has been communicated to us by Prof. Milne. In the name of the Council I must congratulate him, in the first place, on his apparently great success in establishing or getting established, in various parts of the world, the observatories which are so necessary for the advancement of his investigations. We should have been glad to have furthered his views, and I myself did make some efforts to assist him some years ago in that way. I see that we have three or four observatories in North America, and two in South America, which are registering the phenomena of earthquakes. I have no doubt, therefore, that Prof. Milne will be able to collect all the existing records on the subject. Some years ago now, I remember making a list of earthquakes on the west coast of South America, going back three centuries, and since that time I note that a much fuller and more elaborate list has been made of the same phenomena along the west coast. I have no doubt similar records may exist in other parts of the world. It only remains for us now to accord a unanimous vote of thanks to Prof. Milne for his most valuable and interesting paper.

NOTES ON THE COUNTRY BETWEEN LAKE NYASA AND VICTORIA NYANZA.*

By OTTO L. BERINGER, Assoc. M. Inst. C.E., F.R.G.S.

THE surveys on which the accompanying route-map is based were carried out between the years 1897 and 1901. No astronomical observations were made, the positions of Karonga and Abercorn being taken from the observations of the Anglo-German boundary commissioners, and Kisumu from the Uganda railway survey.

The work was done throughout for the African Trans-continental Telegraph Company, the author being their chief surveyor. As far north as Ujiji preliminary surveys were made by plane-table, and these were subsequently corrected from the survey of the telegraph line,

* Map, p. 108.

carried out with a 5-inch theodolite and chain. Between Ujiji and Kisumu the map cannot be classed as other than a route-sketch, a prismatic compass, watch, and aneroid barometer being the only instruments used.*

Much has already been written, both as to the physical aspect and the native inhabitants of the country between Usisia and Kituta at the south end of Lake Tanganyika. Particularly striking is the rocky and mountainous nature of the coast north and south of Usisia, terminating in the former direction at the well-known precipitous landmark, Mount Waller, whence, as a reference to the map will show, the mountain range trends inland, so that if we start from Karonga, along the Stevenson road, we meet with it again at Mount Virauke. Apart from

WEST LAKE NYASA, NKATA BAY.

isolated ranges of hills, the intervening land is very flat, and shows at different elevations three and four different old coast-lines, which prove

* Mr. Beringer plotted his plane-table survey, Usisia to Ujiji, on the scale of 1 : 250,000, and his prismatic-compass survey, Ujiji to Kisumu, near Port Florence, on the scale of 1 : 500,000. The prismatic-compass survey was enlarged to the scale of the plane-table survey and laid down on a sinusoidal projection, fixing one end at Kisumu. The plane-table survey was also laid down on the projection with one end fixed at Abercorn; the other met at Ujiji, and the point of meeting fell within some 3 minutes of longitude of the position observed by Mr. Fergusson and Dr. Kohlschütter. As this position ($29^{\circ} 40' 12''$) is about 20 minutes westward of the hitherto accepted position, the coincidence is not only remarkable, but supports the accuracy of the very arduous piece of work successfully accomplished by Mr. Beringer.

the lake to have at one time approached, or even actually washed, the base of this range, leaving the hills, such as those directly north of Deep bay, as islands. Whether the present conditions are owing to the upheaval of this part of the lake or its secular drying up must be left to the theories of others; certain, however, it is that the forces concerned reach their maximum of activity at long but well-defined intervals. The sharp and rocky pinnacles bordering the Nyika plateau as seen from Karonga are indeed magnificent, many of the towering and needle-like points being quite inaccessible.

The Tanganyika plateau traversed by the Stevenson road reaches its highest points at Mambwe and at Fwambo pass near Abercorn, the

CORNFIELDS, LIVINGSTONIA MISSION, NEAR MOUNT WALLER.

former being on the watershed between the Saisi river draining into Lake Rukwa, and the Chambezi draining *via* Lakes Bangweulu and Mweru into the Congo; the latter on that between the Saisi and Tanganyika. Hills and mountains rising right and left of the Stevenson road make the scenery at places and at certain times of the year very beautiful. A peculiar sensation is felt by those unused to the climbing of plateau slopes in ascending from Karonga: what look like mountain peaks are, when passed, no longer visible, and this occurs from step to step, as it were, for some 40 miles, until the higher slopes of the plateau proper are surmounted, and the hills and mountains, quite to one's satisfaction, are found to be genuine all round. The road has to a great extent been reconstructed, and waggons can run freely

from Fort Hill to Tanganyika. The chief stations in this part of the territory may be here enumerated. On Deep bay, Lake Nyasa, there is a station of the British Central Africa Administration, usually filled by one European only. The following occur along the Tanganyika plateau road: *Karonga*, where is stationed a collector of the B.C.A.A., contains several stores, an operating station of the African Trans-continental Telegraph Company, and a branch of the Livingstonia Mission, the headquarters of which are at Kondowe, behind Mount Waller. *Fort Hill* is a sub-collecting station of the B.C.A.A., with usually one European resident. Then, as we cross the Nyala stream into North-Eastern Rhodesia, we reach *Nyala*, a sub-collecting station; but, owing to its seemingly unhealthy situation, no European resides there. *Fife*, where a small township has been laid out, is inhabited by several officers of North-Eastern Rhodesia Administration, an operator of the A.T.T.C., and several storekeepers and traders. A few miles further on, and on the left of the road, is a station of the London Missionary Society; and then shortly a very substantial station belonging to the African Lakes Trading Corporation, usually the quarters of three Europeans. *Mambwe*, formerly a mission station of French Catholics, was made into a sub-collecting station of the N.E.R.A., then sold, and has now no fixed resident, but is much used as a resting-place; it is situated over 5000 feet above sea-level, and during the months of June, July, and August is very bleak.

Kawimbi, another station of the London Missionary Society, is next met with. It contains a church, school, shops, and houses for the three or four Europeans stationed there. Gardening and carpentry are taught, and the excellent results in both departments are very much appreciated by the residents at Abercorn and elsewhere; nor should the hospitality and medical care ungrudgingly given by its inmates to the numerous Europeans continually calling, be passed over without commendation. *Abercorn*, another township, situated some 14 miles from the south end of Lake Tanganyika, comes next. It is a large and important station, the quarters of a collector, assistant-collector, and other officers of the N.E.R.A., and has a telegraph office of the A.T.T.C., besides stores and offices of several trading companies. Near by is Lake Chiuta, a small and picturesque sheet of water, the haunt of many ducks and geese and other wildfowl. Eight miles further on the road commences to descend, and *Kituta*, on Lake Tanganyika, is reached, or, by branching to the left, the new station of *Kasakalawe*, also on the lake. Between Kituta and the lake proper a mile of low flat country intervenes, sandy and difficult to walk on in the dry season, and a quagmire in the wet. Kasakalawe, on the other hand, has the advantage of a dry and well-timbered shore, with deep water a few feet off it affording a satisfactory shelter, and is altogether a far superior place to the older Kituta. At both these stations Europeans reside.

The Tanganyika plateau is well timbered, though the trees are not usually of large circumference. In places, such as the ravines of some of the mountains and the surface of the Msuku uplands, areas of virgin forest exist, and generally along the banks of the larger streams trees of immense girth grow. A prominent exception is formed by the banks of the large and swampy Saisi river, where, on account of the flatness of the land and the ill-defined banks, the country is usually flooded, this preventing the growth of anything but reeds and grass. The population is peaceful, but close to the main roads it is practically *nil*. The usual food-stuffs, such as maize, millet, sweet potatoes, peas, beans, etc., are

TANGANYIKA PLATEAU.

grown. Game is fairly plentiful off the roads, and much slaughtered by the natives by means of pits.

Leaving Kituta and following the lake round the south-east corner and north to the German station of Bismarckburg—formerly Kasanga—we find the country to be generally broken and mountainous, more especially after crossing the Anglo-German boundary at the Kalambo river, from which point it was found impossible to take the telegraph-line into Bismarckburg without climbing over 1000 feet to a step of the plateau, and then descending again very steeply. A few miles from the mouth of the Kalambo river very magnificent falls occur, a large volume of water falling a sheer 600 feet or more over a rocky lip of horseshoe shape. It then winds in a silvery line through a gradually widening but impenetrable valley with progressively lower cliffs until it reaches the lake. It is thus impossible to see the falls except from above, but

the somewhat steep and rugged climb to the upper plateau will always well repay the exertion, as plenty of water flows all the year round. No finer falls, not excluding those of the Ruu, have been seen by the present writer during the ten years he has spent in Central Africa.

Bismarckburg, which is shut in on all sides by mountains, is the southernmost station of the German East African Administration on Lake Tanganyika. A fine well-appointed boma or fort is now being built, and there are quarters for about five German officers and non-commissioned officers, besides a few traders and a number of Sudanese and other soldiers. As at Kituta, the heat is at times almost overpowering—at least, to those whose duty takes them away from the comparatively cool verandahs. On the coast between Bismarckburg and Ujiji there are four stations—Kala, Kirando, Utinta, and Ujiji—all occupied by the Algerian “White Fathers,” and possessing fine churches, schools, and other stone buildings.

It was soon apparent that the telegraph would once again have to scale the mountains and reach the plateau, the coast-line north of Bismarckburg being quite impossible. This plateau I found very beautiful, being high, well watered, and grass-covered to a large extent, with pretty hills covered with grass and trees rising on each side; the country seemingly fertile, but somewhat sparsely inhabited. I travelled first along the country to the east of the telegraph-line, following a native path; but, finding the Fwisi and its tributaries very swampy, I decided to keep on somewhat rougher country to the west, more nearly on the watershed between Tanganyika and the Fwisi, which flows into Lake Rukwa. As it was imperative to again skirt the lake at Karema, I had reluctantly to leave this high ground when east of Kirando, and gradually descend again through fairly well-timbered country. The natives of this district are well clothed, being supplied by the Arabs with coloured cloths, white calico, and beads, in exchange for the rubber collected by them, mostly in the virgin forest which fills up the ravines draining into Lake Tanganyika. There was hardly a village where two or more of these born traders were not found. As is the case with nearly all the mountain-girt lakes of Central Africa, the tribes inhabiting the shores are different from those on the higher mountain slopes or plateaux, and were it not for the presence of officials at Bismarckburg and Ujiji they would be constantly raiding and counter-raiding as of old. As it is, they now carry on a more or less friendly barter of fish on the one hand for salt and iron on the other. North and east of Karema is a wide and comparatively flat country, generally well-timbered, but swampy here and there in the rainy seasons and waterless in the dry. Mimosa-thorn trees abound, and giraffe are plentiful. On the lake and in the neighbourhood of Katunka's the population is large. This Katunka is a powerful chief, noted for the murders he has committed, and is a constant source of trouble to the German officials.

The rough nature of the country north of Katunka, together with the configuration of the lake-shores and the swamps between Karema and Katunka, again necessitated the continuance of the survey on the higher land, and only after a wide extent of country had been examined was it possible to get the better of the swamps, virgin forests, and a number of extraordinarily deep ravines or cañons that had to be manœuvred between Kapurola and Mulire. The natives, too, gave constant trouble, numbers not having seen, and few having before worked for, a white man. They preferred hunting the large herds of elephants and other game roaming about, or collecting rubber, to the more monotonous and restricted work demanded by Europeans, and, being well armed, they

LAKE TANGANYIKA, KITUTA.

had no hesitation in saying so. They are well clothed in Arab clothes, own a few cattle and large herds of goats and sheep, while their villages are extremely well stockaded. They do not paint, but the women wear large ear and lip rings. Kapurola is a big and quarrelsome chief, and has likewise given considerable trouble to the Ujiji officials. When last seen by the author he was a refugee a few miles up the right bank of the Luajeri river, on a small rising ground surrounded by an almost impenetrable swamp of reeds.

The Lugufu, Malagarasi, and Liuchi rivers all overflow their banks and are very swampy in the rainy season. The Malagarasi is probably the largest river flowing into the lake. All these rivers are full of crocodiles and hippopotamuses, which in the rainy season are found near their sources.

Between Maswa and Ujiji the population is large, and the country by the lake opens out, terminating at Ujiji in undulating ground. This, however, is much cut up by sharp and comparatively deep ravines, the nature of which can only be judged by walking over the country away from the winding but well-engineered paths of the natives. All along this coast swamps at lake-level lap into the land—just dry from July to November and December, and impassable the rest of the year.

Leaving Ujiji in August, 1901, the expedition crossed a minor but still swampy branch of the Luichi river, and after getting over some low but very broken country, the Luichi itself, at a place where it had a considerable fall, with well-defined banks and no overflow. Then a mountain with steep face was climbed, and a lovely and cool plateau reached, densely populated, well watered, and supporting large herds of cattle. The natives were friendly, wore skins and copper and wooden bracelets, of which, however, the latter only were seen by the author. Their huts were particularly well constructed, and not stockaded. A descent was made somewhat abruptly, and with much reluctance, to the valley of the Msukwe river, the country then alternating between grass-covered and well-wooded land, until the Malagarasi was reached on August 31. It seemed scarcely smaller than when crossed at its mouth. After crossing the river and following up its left bank for some distance, sometimes on dry and other times over muddy land, our route left it, and some undulating, well-timbered, but quite dry country was crossed. This brought us to the Mugana river, quite dry at the time; and a few miles further on the Mtindi was crossed. This, in the wet season, is in itself 5 miles broad, and forms a huge swamp, extending down to the Malagarasi and up-stream for some 50 or 60 miles or so from this crossing. The Mtindi was crossed at a favourable place on September 6, and even here, before the other side was reached, seven channels had to be crossed, the largest 300 yards in width, and with 4 feet 6 inches depth of water. In the rainy season, the entire country between the Mugana and the Mtindi river is under water—a width of 14 miles, with a maximum depth of 7 feet. The Mtindi never dries up, and is only fordable at one or two places for about three months in the year. This far from pleasant natural barrier divides the people of Uha on the right bank from the Wasumba and Wahinga tribes on the left.

Between the Mtindi river and the south of Smith sound of the Victoria Nyanza, the country is, apart from the paths and native clearings, largely covered with an almost impenetrable thorn scrub. The trunks or limbs of the bushes are up to 8 inches in diameter, with thick minor branches and shoots, the whole densely interwoven and covered with very formidable thorns. In the dry season there is no surface or running water whatever, the natives all resorting to wells dug to a

depth of about 20 feet; needless to say, that towards the end of the dry season the stuff contained in them is far from refreshing. The Kagoni river is seemingly dry for five or six months during the year.

The villages are generally large and well kept, the natives peaceful and well clad. They trade largely in conjunction with the Tabora Arabs, for whom they travel great distances in search of ivory. Cattle are plentiful, and are all of the humped variety. The Swahili language is understood by nearly all the elder men, headmen, and chiefs. Between the Mtindi river and Smith sound, the author found most encouraging signs of civilization—more, indeed, than he had previously witnessed in Central Africa. The chiefs are designated “Sultani.”

BAOBAB TREE NEAR SLEEP BAY.

Kapula village—formerly Ghiya—was visited by Speke and Grant in 1861, and by Stanley in 1876. Here hilly country commences, the hills being well covered with timber, the plains alternating between grass and the aforementioned thorn scrub, the former swampy in the rains. Between Ngombe and Mpina villages, the country, which is drained directly into Smith sound, is dotted over with low timber and grass-covered hills. It is nearly all very rocky, with boulders of gneiss, and is so flat that practically all the plains up to the lower slopes of the hills are under water during, and for some time after, the rains. The ground crossed in September was hard baked, and so cracked that, after a careful mental calculation, the void made by these fissures was found to exceed the area of the earth surface. The heat, with the

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unpleasant and distorting vibrations of the atmosphere above these parched plains, together with the enforced slowness of our progress, rendered travel anything but a pleasure. It was impossible, except at long intervals, to satisfy the intense thirst of the caravan, and then, with what! Game, curiously, was plentiful, ostriches, *Gazella Thomsoni*, and topi being most in evidence.

Further on the plains, undulating somewhat, became at parts densely populated, and immense herds of cattle were everywhere seen, all seemingly plump and in good condition, though apparently being fed only on the very dry grass then existing. At places, of course, *e.g.* at Stuhlmann sound and the other point of Smith sound, the route led close to water, and then green vegetation could be found all the year round. The natives were now found to wear little or no calico or cloth, but were more or less clothed in skins. Stony kopjes are freely dotted about this land, and huts and lean-to's are built on them. The Simiyu, a large river with flowing water, was crossed 15 miles from Nassa, a station of the Church Missionary Society. The station had then a clerical and a lay missionary, the former being away at the German station of Mwanza at the time of my visit. The buildings had seen better days, and little missionary influence seems to have made itself felt among the natives.

After a much-appreciated rest of two days, a further start was made along the shores of Speke gulf. The country soon became less flat, rising perceptibly away from the lake, and becoming covered with bush and timber. It was thinly populated except close to the lake, and seemingly dry and waterless inland. Crossing the river Balagete, in which a considerable body of water was flowing, the caravan traversed a flat, and in the rainy season swampy, country, now intersected by cracks, and then crossed the Luwana, a nearly dry but broad and deep river-bed at the foot of a mountain range. The numbers and variety of game seen in this plain were almost incredible—buffalo, gnu, hartebeeste, water-buck, topi, mswala, *Gazella Granti* and *Thomsoni*, and immense herds of zebra predominating. Climbing the escarpment, we reached Kiteresia village, and then proceeded over grassy and undulating plateau lands, well watered and thickly populated. A descent was made from Madutu village, and another very large but better-drained plain was reached, containing miles upon miles of grass land teeming with game, and, best of all, without cracks. Somewhere about the middle of the plain an island of thick thorn scrub was seen, and from it, to every one's surprise, a number of natives—afterwards found to be refugee Sotik people—issued, carrying long swords and formidable-looking Masai spears. They were nude, painted with plain and coloured clay, the men averaging over 6 feet high. They advanced towards the caravan, all the members of which, except the writer, were unarmed. This, our unwarlike appearance, and the evident surprise expressed,

together with a large quantity of meat we had with us, saved the day, as not a single word could be understood between the two parties, all subsequent communication being carried on by signs, a very humorous spectacle. Even such words as fire, water, river, common over a large area of Africa, were in every case used by the writer's cosmopolitan caravan without any sign of recognition on the part of our new acquaintances. Their hair was made up into two or three pigtales slightly erect, greased, and thickly coloured with brilliant vermilion, making a distinctly fantastic coiffure.

After climbing up the face of another very steep escarpment, the village of Mutaga was reached, and it became evident that the natives now saw a white man for the first time. Continuing along the well-watered and timbered plateau, broken by outcrops of gneiss, on which we found a fairly large population, we made another descent, and crossed a well-timbered valley drained by the large river Mala. This river was found to divide two by no means friendly tribes, for whilst encamped at Marua's village on the right bank we saw a small foraging party return from a stealthy visit to some villages on the other side, carrying spears, bows, and poisoned arrows, and having amongst their number some badly wounded men, one with an arrow through his chest. About here the topi—an antelope probably nearly akin to the hartebeeste—and marabout stocks were everywhere visible.

Another stiff climb up the face of the escarpment brought us to a large grass-covered undulating plateau, with a gradual slope towards the west, as usual well watered, and fairly thickly populated by the Walianjoka tribe, who possessed immense herds of cattle. Beyond Utende village, a well-timbered but uninhabited country was met with, and, apart from a party of professional elephant-hunters, no natives or villages were met with until the large Mori river was crossed. In this solitude large herds of elephants made their home, roaming about the country both on the level ground and on the steep slopes of the higher portions of the escarpment to the east. After crossing the Mori river we mounted gradually to the higher slopes of the plateau, which were again undulating, grassy, and especially well watered. The natives, a different tribe from those beyond the Mori, were found to be quite nude, both male and female, the former elaborately painted. Their villages were all enclosed by mud walls about 18 inches thick and some 5 feet in height, the huts primitive, and built largely of solid mud. The soil about here is of a brilliant red. Immense herds of cattle, goats, and sheep thrive well. The size of these savages, and the brilliant and variously coloured patterns painted on their faces, together with an easy and withal graceful bearing, make an imposing impression, while their countless numbers make them a formidable tribe. During this time great difficulty was found in keeping on friendly terms with the natives and at the same time feeding the

carriers; language on both sides was quite unintelligible, and, to complicate matters, calico, coloured cloth, and beads were in such plenty as to be quite at a discount among them.

A gradual descent to Kavirondo bay, with a dense population on all sides, brought us to the Kavirondo tribe proper, very similar to those of the mud walls, their dress being quite the same, while they owned large herds of cattle as before. It very soon became evident that a white man was now no longer a stranger, though not until the swampy and papyrus-grown shores of Kavirondo bay had been well rounded and Kisumu nearly reached was there any outward appearance to indicate that the great Uganda railway was already laid to within some 40 miles of the Lake, or even that white men were only a few miles in front.

Kisumu, the terminus of the Uganda railway, was reached on October 28, 1901.

THE EASTERN BORDERLANDS OF KIKUYU.*

By Captain B. DICKSON, R.A.

BETWEEN Nairobi, the capital of the Ukamba Province of British East Africa, and the Meranga district south of Mount Kenya, the country consists, for the most part, of a fairly level triangular plateau, enclosed between the Kikuyu cultivated lands on the north-west, the Kamahua and Boinzero ranges on the east, and Doinyo Sabuk on the south, though in the last direction a part of the same plateau extends to the Lukenya and Mwar hills. The surface slopes from west to east and is drained by numerous streams flowing in deep beds to the Athi or Tana. Both the Athi itself and the Thika, a tributary of the Tana, make their exit between Doinyo Sabuk and the Boinzero range, both becoming broken by rapids and flowing in deep rifts as they enter the more hilly country to the east. At the north end of the plateau the streams pass either through gorges in the Kamahua range or to the north of this. All these rivers take their rise in the Kikua (Kikuyu) hills, from which innumerable streams flow down in deep narrow gorges, and on uniting in the plain at first form papyrus-covered marshes, but are subsequently confined in regular channels, eventually dropping by waterfalls or rapids into valleys or cañons 100 feet deep and varying in breadth from 200 to 800 yards. The actual river-banks are covered with large trees, but the valley-sides are rough and rocky, covered with mimosa trees, long grass and bush, which extend for a little distance over the plain above. During the rains the streams rise to a great height, in the case of the Athi 30 feet in places, so that any attempt to make bridges, except for foot traffic, would be a costly undertaking.

* Map, p. 108.

MAP OF THE COUNTRY BETWEEN
LAKE NYASA & VICTORIA NYANZA

REDUCED FROM THE
SURVEYS MADE BY OTTO L. BERINGER, A.M. Inst. C.E.
BETWEEN THE YEARS
1897 AND 1901.

Telegraph Line (A.T.T.Co.)

M^r Beringer's route

Scale, 1:2,000,000., 31.56 Eng. Miles to 1 Inch

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