Surveys and Studies in Uganda (Continued)

Author(s): C. Delme-Radcliffe

Source: *The Geographical Journal*, Vol. 26, No. 6 (Dec., 1905), pp. 616-632

Published by: geographicalj

Stable URL: <http://www.jstor.org/stable/1776070>

Accessed: 27-06-2016 05:36 UTC

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at
<http://about.jstor.org/terms>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

The Royal Geographical Society (with the Institute of British Geographers), Wiley are collaborating with JSTOR to digitize, preserve and extend access to *The Geographical Journal*

Japan and Germany slow changes in position of a horizontal pendulum have been recorded as accompanying changes in barometric pressure. And Prof. Darwin speaking of the effect of atmospheric pressure on the Earth's crust, considered that when the barometer is very high we are at least 3 inches nearer to the Earth's centre than when it is very low. He also computed that with the ebb and flow of the tide along a shore like that of Europe, there is a depression of the sea-bed under high water and an elevation under low water, due to the loading and unloading of the crust, and a corresponding tilting of the land surface adjoining towards or away from the sea; and he considered that this tilting, due to the tide, may be detected up to 100 miles from the coast. Prof. Milne gives the following instances of alteration of level due to varying load on the crust. He found, while experimenting with a pendulum in Tokyo, that the emptying of a well 104 feet away from the pendulum station of about 2 tons of water produced a tilt of 1.36 second. He also found that a horizontal pendulum at Shide, in the Isle of Wight, oriented north and south, invariably crept round towards a valley on the west at time of rain, owing to the loading of this valley by the water, and he further says "on a hill, change of level may be due to the accumulation of moisture acting as a dead weight in the valley below." Mr. H. C. Russell, when testing the Kater pendulums at Sydney, proved conclusively that even the addition of a small weight produced a measurable depression of the crust; a man and a boy standing near a delicately adjusted pendulum producing large deflections, and that produced by a 7-lb. weight, being quite appreciable. Prof. Turner and Prof. Milne measured at Oxford the deflection produced in a pier by a man and two boys moving to different parts of a floor, covered by concrete, round the base of the pier. A horizontal pendulum may be set swinging by standing near the base of its pier; and, more remarkable still, Prof. Milne says it can be adjusted by shifting the position of a 10-lb. weight on the concrete floor carrying the pier.

All these deflections are small, but they are produced by small weights, and seem to indicate a certain susceptibility to depression, or flexibility in the Earth's crust, which, under a great weight like that of a thick ice-cap applied for a long period, might amount to a considerable quantity.

SURVEYS AND STUDIES IN UGANDA.*

By Lieut.-Colonel C. DELME-RADCLIFFE, C.M.G., M.V.O.

The most important physical feature in the area surveyed west of the lake is the Kagera, the largest river running into Lake Victoria. It rises a long way south near the northern end of Lake Tanganyika, and flows nearly directly north as far as the 1st parallel south latitude. It then turns abruptly eastwards, and follows the first parallel more or less closely until it reaches the lake just north of Mizinda harbour. As far as the Mihingame rapids, about 70 miles from the lake, its course is obstructed by a few falls, slight rapids, and rocks. From the Mihingame rapids to its mouth it is easily navigable for a launch or small steamer.

* Continued from p. 497. In the November number of the *Journal*, the illustration on p. 483 is from a photograph by Dr. Hodges; on p. 485, by Captain Dugmore, D.S.O.; on p. 487, by Colonel Coles, C.M.S., D.S.O.

The chief obstacles in the upper part are the Amrun cascades, the Kansori falls, and the Mihingame rapids. At the Amrun cascade the river contracts to a breadth of about 40 yards, and dashes over some rocks into a broader pool 20 feet below. Just above the Kansori falls, which are about a mile above Nsongezi, the river is divided by two beautifully wooded islands into three channels; each of these has a fall or two of its own, hidden by the overhanging trees. Just below the islands the river reunites and jumps over a ledge of rocks 6 feet in height, forming a pretty fall into a broad pool. The Mihingame rapids are quite short, and the fall is only about 5 feet. The width of clear water—about 100 yards in the part surveyed—is maintained with curious regularity all this way. On each side all the way, too, is a belt of papyrus, varying

VIEW ON THE KAGERA RIVER.

from a few feet to some hundreds of yards in width, making the water difficult of access except at a very few points. Where the river flows through the trough-like valleys between the Ankole and Karagwe mountains it has cut a deep bed for itself, the cliff-like banks on each side being sometimes 70 feet in height. Beyond this to the lake the banks gradually get flatter. The depth near the lake is about 18 feet, and the discharge, which I measured about half a mile from the mouth, was calculated by Sir William Garstin to be about 143 cms. per second.

Practically, the only affluents which bring the Kagera any water are the Kakitumba on the left bank, and the Ngonzo on the right. The former is made up by the Rufua, which comes from Lake Karengé, and the Kachwamba. In the rainy season it has a width of about 30 feet, and a

depth of from 8 to 10 feet. The Ngono is about 60 feet wide, 6 feet deep, and has a current of about a mile per hour.

The absence of surface water is very peculiar, and leads to the suggestion that much of the drainage must be subterranean. It rains a good deal, and the vegetation is never withered, although every watercourse may be quite dry.

Just west of the Karenga lake is the Ruakatenge swamp, practically on the watershed between the Kagera and Lake Albert Edward. The Kahenji, or Chombo, which flows from Kazara into Lake Albert Edward, is often a considerable stream, as Captain Harman once found to his cost, for, returning from work after dark, he was carried away and almost drowned. He had to spend the night on the cold, cold ground in his wet clothes, looking at his comfortable camp only 100 yards off across the stream.

The curious big swampy streams in the Ruchigga mountains drain into the Chombo. One of these merits description.

In such steep mountains, and at such an elevation, it would be reasonable to expect an important drainage artery to take the form of a turbulent river, rushing over rocks with frequent cascades and falls. The Kaniamagogo, however, is an extraordinary swamp. In some respects its course resembles that of a glacier. Were it not for the consideration that no impacting of the vegetable matter appears to occur at any point, as might be the case if any general flow of the mass were taking place, it would seem that the whole of this deep mud must be slowly flowing or oozing away in a north-westerly direction. In spite of the frequent heavy rain over this region, no apparent stream exists, except near its junction with the Chombo, and there is only one small patch of open water. I had the mud probed in various directions, but the longest sticks we could procure or join together passed downwards, meeting with no resistance as far as they could reach. The surface is covered with a dense growth of reeds, in some places papyrus. The natives cross it at certain points by jumping from tuft to tuft of the vegetation. In spite of all statements to the contrary, I found it easy to construct an efficient causeway across it, using bundles of reeds and grass as a foundation in layers on the surface. The natives on either side had never made anything of the same sort for themselves. This may, perhaps, be owing to their universal lack of social cohesion, which prevents anything requiring joint effort being undertaken. Perhaps, also, it may be because on both sides they regard the awkward swamp as a protection against each other.

The Nyakafunzo lake or swamp and Lake Karenga are the only sheets of water of any size in the area surveyed. The former is completely choked with papyrus, and in the dry season contains practically the only water to be found in Bukanga. Lake Karenga, on the other hand, is a very pretty little lake, perfectly open, with grassy banks,

several tiny islands, and clear water. Its elevation above the sea is 4500 feet.

Looking west from the shores of Lake Victoria, the country appears for the first 15 or 20 miles a vast swamp, out of which rise isolated hills 4000 or 4300 feet above the sea. It seems quite likely that the lake really covered this area not very long ago. The Koki hills are an extraordinary irregular and tangled mass of hills. They have knife-like ridges, rounded slopes, deep-clefted ravines so choked with vegetation that it is impossible to cross them, and irregular valleys running in all directions. Their peculiar formation made the work of surveying them very laborious and slow.

The Ankole and Karagwe mountains are similar, but reach elevations of 6000 feet, compared with the 5000 feet of extreme elevations in Koki, and entailed so much the more climbing. The Ruchigga mountains resemble the others in formation, but reach elevations of 9000 feet.

Just outside the main chain of the Ruchigga mountains lies an isolated hill called Ihunga, a very bold and striking mass 7165 feet high. This

RUCHIGGA MOUNTAINS.

mountain plays rather an important part in the boundary delimitation work. On its summit are the last beacons of the British and German Boundary Commissions Triangulations, and also the beacon furthest north of the German-Congo Lake Kivu Boundary Commissions. From the top of Ihunga, on a clear day, the view in all directions is splendid. Far away, 70 miles to the south-west, can be seen the truncated cones of some, and the needle-like points of other, peaks of the volcanic Mfumbiro group. Nearer, 35 miles south-west, lies one single great sugar loaf, Muhavurra, rising above the other mountains, like Teneriffe out of the sea, to a height of 13,621 feet. Northwards, across the basin, where Lake Albert Edward is known to lie, I saw Ruwenzori, by great good luck, once, and once only. It was in the evening, and the clouds hid everything. Suddenly a gap opened, and a glorious vision of snow-peaks, blazing crimson in the setting sun as if incandescent, came into view. Streaming from the peaks to leeward were clouds looking dark and smoky, still more heightening the impression of a mountain on fire. The whole seemed to be floating high up in the air. For five minutes only the view lasted, and then the clouds closed in again. Observations were taken from several points in the Survey to a peak on Ruwenzori, which I have called peak "B," in recognition of the fact that Lieut. Behrens took the observations, and from these I have computed the height to be 16,757 feet. I think it possible, however, that even higher peaks may be found further north. To return to the view from Ihunga: due east lies the valley of the Kagera, the largest river flowing into Lake Victoria, consequently the original Nile. Not far away south-west are streams joining the Congo system. The scene, the geographical position, the inhabitants, the fauna and flora, all combine to strengthen the impression that about here lies the focus of Africa, the point where north and south, east and west, may be said to meet.

Near Lake Victoria, in Buddu and Koki, the population is almost entirely Roman Catholic Baganda. Bukanga is also inhabited by Baganda, but Mohammedans, under a most efficient chief named Abdul Effendi, who gave us more assistance than any other along the boundary, and had his people in better order and under better control than any other.

Near the lake the isolated hills only are inhabited, and throughout the country the natives seemed to prefer to live on or between the steepest hills. The change in the population from Buddu to Ankole became apparent on reaching Ngarama. Bark cloth as an article of dress becomes rarer, and the natives are more naked, wearing sometimes goatskins on their shoulders or round their waists. The language is different, resembling that of Unyoro; indeed, they are often referred to as Banyoro. Their huts are not so well built as those of the Baganda, and bananas are less and less cultivated. Bahima types in face and figure are more frequently met with. In short, it is at once evident

that this people is a different one. The chief of Ruampara is Duhara, an intelligent Roman Catholic Mganda.

In Kisrebombo's country—Mpororo, Duhama, Rufua, Kahenda, and Kavungo—commences the mixture of the ruling Bahima aristocratic, cattle-owning tribe, with the agricultural Bahororo. This distribution of races continues through Lugarama's country, Wiskatto and Kazara to the eastern half of Makaburi's country, Ruzumburu, and close up to the eastern edge of the Ruchigga mountains. It is a curious and interesting combination. The Bahororo are the original inhabitants of Mpororo, a name now confined to the small area between the Kagera

BOUNDARY PILLAR, TOP OF IHUNGA MOUNTAINS.

and Kachwamba streams. At one time it applied to the whole country now called Wiskatto, Kazara, Rushenyi, Nontarra, all Kisrebombo's country, and southern Ruampara as far as Nsongezi. The Queen Niawingi, now a decrepit and discredited old chieftainess, is said to have been the last ruler of Mpororo. She undoubtedly once possessed much influence, partly due to superstitious fear. She claimed the power of intercourse with the spirit world, and surrounded herself with much mystery. She lived completely hidden in a hut, from which she was supposed never to emerge. When approached for any purpose, the replies to questions were given in a high, squeaky voice, intended to be accepted as the voices of spirits. This queen lived latterly in the Shagasha valley at the edge of the Ruchigga mountains.

The Bahororo natives live in untidy, badly built huts. They cultivate very industriously, exchanging produce with the Bahima for milk, butter, etc. They do not keep chickens, and eggs in this part of the world are impossible to obtain. They have a few goats, but no cattle, which are the exclusive property of the Bahima. The Bahororo are a quiet, inoffensive race, rarely seen with arms in their hands, and usually dress in skins.

Next to Mpororo, westwards, lies the district known as Rushenyi, under the Bahima chief Muhumuz. From the edge of the hills to the Rufua this district is open, undulating, and grassy, like Mpororo. Near the hills are a few settlements, and some cultivation of the Bahoro; but the open country is quite deserted, except by large herds of zebra, eland, and hartebeeste, and perhaps, at certain seasons of the year, grazing cattle. South of Rushenyi stretches the district known as Nomtarra, under the chief Katereya. It resembles Rushenyi in all particulars.

Westward of Rushenyi, Kavungo, and Ruampara come the districts under the Bahima chief Lugarama. The northern larger and more important part, Kazara, lies entirely north of the Rufua stream and the Karengé lake. The southern part, Wiskattu, is almost all grazing country, though in it are some hills exceeding 6000 feet in elevation.

Wiskattu contains only a comparatively small number of Bohororo, and a small extent of cultivation. The cattle kraals are, however, numerous, and huge herds, numbering thousands, belonging to Lugarama and his Bahima sub-chiefs, are to be seen in all directions. In Kazara, on the other hand, the proportion of cultivated area is very great. The population is denser here than in any other part visited by the Boundary Commission.

North and west of the Kahenji or Chombo lies the country known as Ruzumburu, under the chief Makaburi. Makaburi and Lugarama were the two chiefs from whom we were led to expect a hostile reception. I had been requested to deal with these two men by Her Majesty's Commissioner for the Uganda Protectorate, who gave me a free hand in the matter. Lugarama I saw and made friends with, after his fears had been overcome. Eventually I persuaded him to go to the Government station of Mbarara with Captain Harman. When he returned, he came to me in great delight, and said his heart and that of his people were now still. Makaburi I was unable to see personally, but I sent him messages and presents. I received civil messages in reply, especially after he had heard of my relations with Lugarama, and the treatment this chief had met with. Finally, he was persuaded by Lieut. Behrens, acting under my orders, to accompany him to Mbarara. Thus good relations had been established at last with both these chiefs, without the necessity of firing a single shot. It was a matter of great

satisfaction that from first to last it has not been necessary to fire a single shot anywhere on the British side of the boundary.

The population of the eastern part of Ruzumburu adjoining Kazara is very similar in all respects to that of Kazara. The Bohororo form the bulk, as there are not many Bahima in this part. The area is not very suitable for grazing, and is much taken up for cultivation. To the west of Kazara the surface of the country commences a general slope towards the basin of Lake Albert Edward.

The Bahima are an extremely interesting race; obviously intruders in this part of the world, their origin is still shrouded in mystery. Tall, well-bred looking, and naturally intelligent, they devote themselves wholly to their cattle. Their villages are filthy and badly built. Except as stock-raisers, they are at present very useless. Although they possess huge herds, it is extremely difficult to induce them to sell any even at exorbitant prices. Cattle have for them a peculiar significance, and they have superstitious fears of parting with them.

In time to come the Bahima country should become a magnificent cattle country, with a large industry fostered by the security of British rule.

The natives of Ruchigga are a curious mixture of the Bantu races of Central Africa. They call themselves Basiggi. Among them are a number of people styled Mugahe, the name signifying "those seeking asylum," who have sought refuge here from some persecution in Ruanda, near Lake Kivu. The Mugahe are externally undistinguishable from the Basiggi. All are a very wild, savage-looking people. Men of extraordinary muscular development are common among them. They state they own allegiance to no chiefs, each man or head of a small group of huts acting according to his own lights. They are usually seen carrying arms in the shape of spears and shields, and occasionally bows and arrows, and they showed at first great suspicion of our intentions.

All the natives in Ruchigga build untidy thatched huts in small groups inside zarebas. They cultivate the soil with great assiduity; beans, Indian corn, peas, millet, pumpkins, sweet potatoes, etc., are plentifully produced. The language spoken by these people is a Bantu tongue, but it was very little understood by the Baganda or Ankole natives. It was said to resemble Kiruanda. The Basiggi and Mugahe keep a considerable number of chickens, goats, and cattle. The Bahima do not appear to penetrate into these hills at all.

In German territory near Lake Victoria the natives are Bahaya and Basiba. They resemble the Baganda in many particulars, but appear a more vigorous, cleaner, and superior race compared with the Baganda of Buddu. The large number of sturdy children among them was in marked contrast to the few rather sickly specimens which represented the coming generation in Southern Buddu. Their fields were very well

cultivated, and the produce was in great variety. Missionary effort has not been so successful south of the Kagera as north of the river. Near the lake-shore the Basiba natives may be seen wearing a singular dress made from the fibre of the raphia palm. The women also wear bark cloth and rather curious puttees of bark cloth with metal rings. They also frequently put a broad band of a strip of yellow grass round their heads, which has rather a striking effect.

Near Kivumberu, in German territory, is a large settlement of coast Arabs, a relic of old slave-dealing times, probably. It was quite surprising to come suddenly on the large settlement, stretching a long way up and down the river, with broad streets, well-built rectangular houses with thatched roofs, large gardens, and plantations.

The trees near the lake-shore are large, among which are species

CANOE COMING ASHORE THROUGH THE AMBACH, DAGUSI ISLAND.

allied to the gutta-percha producing trees of the Malayan peninsula. There is a thick undergrowth of shrubs, and the trees are festooned with numerous species of woody climbers, of which many display conspicuous flowers or winged fruits. The only coniferous tree met with was also found here.

A closer inspection of the trees revealed parasitic growths and epiphytes, orchids, ferns, and a cactaceous plant with pendulous, fleshy, cylindrical stems. At the mouth of the Kagera a few ambach trees make their appearance in the shallow water. Mimosa shrubs and plants of the mallow order are to be seen on the sandy banks at the mouth of the Kagera. At the edge of the swamp near the Kagera are large-leaved plants of the ginger order, and low trees allied to the myrtle. The swamp itself, besides papyrus, is occupied by grasses and reeds, with a few herbaceous plants displaying conspicuous flowers, such as the balsams. Near the edges the raphia and the wild date palm are found.

On the hills the natives cultivate many kinds of bananas, also sweet potatoes, yams, ground-nuts, colocasia, tobacco, Indian corn, manioc, coffee, and bark cloth yielding fig-trees. Coffee trees are to be seen in great numbers in every plantation, and the value of systematic cultivation of this plant at once suggests itself. On the hills, also, conspicuous

features are the magnificent isolated incense trees, with their rounded domes of dense foliage and huge stems. Very common and conspicuous on various trees is a parasite with dark-red flowers, allied to the mistletoe.

Ten miles west of the lake commences the only piece of real virgin forest met with. It is throughout a dense virgin forest, and almost impenetrable. It consists of very large trees of many varieties, which still require identification, the vegetation generally being different to that of Buddu and Uganda. The upper parts of the tall trees are festooned with a light greyish-green mass, hanging in long streamers, and giving to the forest a very fantastic appearance. When these long streamers are agitated by a storm, they make the whole forest, seen from one of the hills near, look like a rough sea. Again, when the sun is vertical the whole forest appears dark, but when the sun is low the general effect on the sunny side is curiously light. The large trees are bound together with innumerable lianas and creeping plants. Between the stems is a dense tangled mass of lesser vegetation. The forest stands to a great extent in the water and mud of the swamp. A singular feature of it is the abruptness with which it commences and ceases on the plain. The grassy swamp or open country reaches to the mighty wall of trees, which continue in the same density from one side to the other of the mass. There is no smaller wood or scrub outside, forming a transition from the open plain to the forest. Inside, the silence and gloom are accentuated by the apparent absence of animal or bird life. There are some herds of buffaloes that make it a headquarters, elephants visit it occasionally, monkeys and parrots are sometimes seen, and a harnessed antelope now and then appears at the edge; but the general impression left is one of lifelessness.

Specimens of the prevailing trees could not be obtained, owing to the difficulty of marching near or through the forest, and the short time which was spent in this neighbourhood. It must be mentioned that during the brief inspection which was possible no rubber vines were actually seen. On the fringes of the forest near the river, but especially south of the river, wild date palms are very numerous.

The undulating grassy plains in Bukanga are dotted with ant-hills crowned with shrubs, for the most part thorny and partially covered with succulent and fibrous climbers. On the slightly higher ground are sprinkled thorny acacias. Among the shrubs are some, mostly thorny, capers. Others were seen allied to the spindle-tree. Some species of asparagus were numerous. Most conspicuous among the vegetation were huge candelabra-formed euphorbias, standing out round and black and supplying a positive note to the landscape.

In this area the grass grows irregularly. It is usually less than 2½ feet high, except in the valleys. In the dry season it is burnt, and at the beginning of the rains many bulbs develop brilliant flowers,

No. VI.—DECEMBER, 1905.]

2 T

which show to great advantage on the short, bright-green grass. A stumpy, succulent aloe is very common. Before the grass is burnt this plant is almost hidden, causing one to stumble in the most irritating manner if one leaves the path. Numerous vines, usually succulent, are also to be seen. The large *kigelia*, with its strange pods, like giant sausages hanging from thin ropes, is also met with here, though it does not appear in the damper region near the lake-shore.

On the hill-sides large acacias are common, also three species of *albizzia*, a low shrubby *gardenia*, and a *protea*. On one hill situated in Bukanga a rubber vine (*landolphia*) abounded. Among the Ankole hills the gullies, seen from above, are a remarkable sight from the number of shrubs they harbour. It appears that the fires rarely penetrate to their depths. The general size of the trees throughout this district is small. Very few exceed 40 feet, except the acacias, and they but rarely, except along the deep bed of the Kagera river. Here a tall feathery acacia stretches long branches up to heights of 60 or 70 feet. Further west, in the ankole mountains in Ruampara, were the masses of a thorny species of *acanthus* with mauve flowers. This plant was, in places, a most serious obstacle to the survey work, as, when combined with tall grasses in the valleys, it formed a compact mass exceedingly difficult to pass through. On each side of the Kagera river itself is a dense strip of vegetation, consisting of shrubs and creepers under the tall green-stemmed acacia trees referred to above. The wild date palm is conspicuous above this mass in places, as also are certain cactaceous plants, and an arboreal species of aloe, 15 feet or more in height, terminating in a conspicuous red inflorescence.

The fringe of papyrus at the water's edge is matted with the runners and tendrils of a mauve water-convolvulus. Where the water is sufficiently stagnant, two species of water-lily are to be seen—the one purple and the other white; both extremely handsome flowers.

The natives in Buddu, Ngarama, Ruampara, and westwards, cultivate sweet potatoes, ground-nuts, beans, peas, manioc, a little maize, and tobacco. Yams are plentifully cultivated south of the Kagera, but not north of the river. Bananas are little cultivated to the west of Ngarama, and bark cloth fig-trees coincide with the cultivation of the banana. In Ruampara the plants chiefly cultivated were sweet potato, manioc, a small grain called talabun or wimbi, and castor-oil. In the gullies in the valleys of the hills all round the plains shrubs and trees abound. At the edge of one swampy stream a buttercup was found.

The vegetation of all this district continues to bear the same general character as far west as the Ruchigga mountains. Here, however, it changes very abruptly as one crosses the watershed between the drainage systems of Lake Victoria Nyanza and Lake Albert Edward.

The altitudes are upwards of 6000 feet. Small forests of bracken fern, reaching a height of 10 feet, occur at the tops of the hills, which are further well wooded with various species of the Boraginæ, Sapindaceæ, Meliaceæ and other orders, but no acacias. The trees, as a rule, are of no great size, but have rough bark and a plentiful covering of orchids, mosses, and lichens. Almost all of them have a profusion of orchids, which bear witness to the fact that the mountain-tops are frequently enveloped in cloud, and that the rainfall is considerable. Ground orchids are also extremely common. The grass everywhere is short, resembling turf in England, and the display of showy flowers is very remarkable.

Out of the bracken rises a species of *Polygala* with purple flowers, and a coleus of candelabra-form habit with dense spikes of light-blue flowers set off by red calyces and red leaves below the inflorescence. A shrub suggesting broom in flower is common, and also a plant resembling mullein. Many plants can be at once recognized as closely allied to species at home. Among these are a St. John's wort, a clover, a meadow rue with singularly long flower-stalks, a wild geranium, a vetch, a chickweed, and a hounds-tongue, closely resembling forget-me-not; also a shrub allied to heath. The lower limit of the giant lobelias was just reached, and one was obtained with a flower-spike 5 feet 8 inches in length. In the depths of the deep narrow valleys, standing in the cultivation of the natives, clumps of dark green, almost black, dracænas were conspicuous, giving a weird, old-world touch to the scenery.

On the return journey of the Boundary Commission three weeks were spent on Buvuma island, during which astronomical observations were being made. This gave an opportunity for an examination of the flora of the island, which disclosed many points of very considerable interest.

The island, which at its highest point is about 600 feet above the level of the lake—not 2000 feet, as has been stated—has a great number of plants which make a more detailed study of the flora, especially from the point of view of its economic value, a matter of the greatest interest. Such a study, to be complete, should be extended over the different seasons of the year, as an examination confined to one portion of the year must necessarily omit a large number of plants which flower at other periods. There is no doubt, however, that a number of plants of great commercial value are to be found on Buvuma island; probably also on the other islands near and on the mainland of Usoga and Uganda.

It is impossible to refer to the botanical collections in closer detail within the limits of this paper. It is sufficient to say that the specimens included a large variety of timber, gum, rubber, drugs, food, oil, fodder, and fibre-producing trees. As coffee, and probably cotton, cocoa, and

kola, do very well, also European wheat and vegetables in Ankole, the latter fit for a horticultural exhibition, it will be seen that the agricultural possibilities are great. The collections on the whole indicated an affinity with West African species—even with those of Angola and Togoland. Of South African species a pappea, a *chætacanthus*, and a *pavetta* were found, which have not before been collected in tropical Africa. Several orchids found near the western boundary correspond with species collected by Scott-Elliot on Ruwenzori and the Mau plateau. Several new orchids of well-known African genera were found in the Ruchigga mountains. Some species of *lannea* were found which had been previously collected by Stuhlmann and Fisher. The novelties have been found chiefly among the *Gamopitælæ* (35), among the *Polypitælæ* (15), among the liliaceous plants, *Amaryllidæ*, and orchids (10). In all, sixty plants hitherto unknown to science were discovered. The collection, for which the whole credit is due to Dr. Bagshawe, numbered in all 640 specimens.*

A small collection of rocks was brought home, the larger portion, unfortunately, being lost in transit.

Generally speaking, the geology may be described as alluvial near the lake-shore. Out of this rise isolated hills consisting of sandstone and shales belonging to the Palæozoic series, which have an affinity with the Hospital Hill series of the Transvaal. The Karagwe-Ankole mountains consist for the most part of sandstones, quartzite, and shales. Now and then the basement gneisses and schists make an appearance. In south-western Ruampara a distinctive outcrop of granite is encountered, and the groups of granite hills resemble kopjes in South Africa. Near this group of hills a large pocket of china clay was found, with layers of mica. This was evidently derived from decomposition of the granite. North of the Kagera, in the southern Ankole hills, were ferruginous sandstones with geodes lined with quartz crystals, some of them amethystine in character. In places, large blocks of pure white quartz are scattered on the hillsides. In Koki a pearl-grey sandstone with horizontal ferruginous bands was conspicuous. The amount of ironstone was remarkable in places—on Ihunga mountain, for instance; and in Ruchigga generally the natives smelt a good deal for the manufacture of their hoes and weapons. The valley of the Kagera is alluvial throughout, and is crossed at a few points by ridges of rocks, which give rise to the rapids and falls. No trace of volcanic rock was actually found. The great volcanic region lies chiefly to the east of the lake, round the Mfumbiro volcanoes and Ruwenzori.

The hot springs, Ntagata, on the south side of the Rukatengi

* Notes on the mammals and birds of the districts visited will appear in the *Proceedings of the Zoological Society of London*.

swamp, are interesting as indicating possibly the relics of volcanic action. The water bubbled out from these springs close together, and was highly charged with sulphuretted hydrogen. The temperature of the water was too high to allow of the hand being kept in it. The natives use the springs for bathing (where the water mixes with other cold water), and for medicinal purposes, internally and externally. Earthquakes were experienced on several occasions, and are said by the natives to be frequent. A seismograph station in this part of the world should yield most interesting results.

None of the stones in the collection disclosed minerals likely to be commercially valuable, and no trace of coal was found.

In a general sense the country in Ankole, Karagwe, and further west appears extremely healthy for Europeans, and admirably suited for colonization. This practically applies to any part of the country exceeding 4500 feet in altitude.

The climate at the Victoria Nyanza end of the boundary was similar to that of Entebbe and other places on the lake. Complete data cannot be given, owing to the want of meteorological instruments, but from the temperatures registered during the technical work of the Boundary Commission, it may be stated that the night temperatures in the open air at 10 p.m. during December and January averaged 68°. The day temperatures at Mizinda in the sun during the same months averaged 78°. At the western end of the boundary the night temperatures at 10 p.m. in the months of June and July averaged 60°.

At camp Msozi mosquitoes were numerous. At Mizinda, on the other hand, mosquitoes were rarely seen, the reason being that Mizinda camp lay a little distance from the lake-shore on a grassy hill. The camp at Mizinda was on a cliff close to the lake, and incessantly swept by the strong breezes from the east across the lake. It was noticeable throughout the eastern districts nearer the lake that mosquitoes were very numerous on the tops of the grassy hills, while down by the swamps they were comparatively rarely seen. For instance, in the swamp near Mizinda, where the base had been laid out, a camp was pitched actually in the swamp itself for the purposes of the base measurements. At this camp, although lights were used in the open air, and the atmosphere was absolutely still, no insects of any description whatever were seen at night. *Anopheles* mosquitoes were not observed, and all the species seen appeared innocent.

Sleeping-sickness tsetse fly (*Glossina palpalis*) was absent near the mouth of the Kagera.

Camp Mulema was reached towards the end of the dry season, when the grass had been burnt to a large extent. The days were then warm, the nights pleasantly cool. After the rains began the heat was never excessive. Here, too, mosquitoes were common, but of an innocent species, as far as could be observed.

At Burumba, 5200 feet above the sea, the temperatures ruled lower. On dull days the thermometer did not rise above 58° in the huts, and at night and in the early morning the air felt very cold. The camp was exposed to wind blowing up the Kagera valley from the south-east. There were no mosquitoes here, but the health of the natives was not good owing to the cold winds. At Rukirra camp, again, the night temperatures were low, but the camp less exposed, and the days were of pleasant warmth.

On the Ruchigga mountains there was a decided fall of temperature due to the altitudes, 7000 feet and over. The air had an invigorating character that suggested the value of these hills as a sanatorium. When the sun shone it was never unpleasantly cold, but when the hilltops were enveloped in cloud the effect was chilling. On these occasions at night fires were very much needed. There were no mosquitoes on the Ruchigga mountains.

The flat valley of the Kagera lends itself most admirably to the construction of roads. From the mouth of the river to the 30th meridian a road might be traced without any appreciable change of level. Bridges would be almost unnecessary, and a few very small culverts only would be quite sufficient to pass off the water from the lateral streams. If metalling were required, an abundant supply could be obtained from the rocky granite hills bordering the valley of the Kagera throughout its length. Connections with this road could be made under conditions equally favourable for road-making through the rift near Nsongezi, east of the Koki hills, past Kana-Bulem and Simba, or along the coast of Buddu.

Further west the valleys of the streams draining the Ankole mountains offer lines by which roads might penetrate the mountains, though more art and expenditure would be here required to construct roads fit for wheeled traffic.

The communications westwards, along the valley of the Kagera, as far as the Congo frontier, would afford a means of keeping in touch with the part furthest south of the territories belonging to the Uganda Administration, and would open intercourse and trade with the Congo Free State and the regions lying towards Lake Tanganyika.

The Kagera valley, of course, offers equal facilities for the construction of a railway. From the Lake shore, 3726 feet above the sea, to Lake Karenga, 4500 feet, the rise is a perfectly gradual one of 775 feet approximately. Water is available throughout the whole length, and the line could be constructed under the easiest imaginable conditions. Labour could, no doubt, be supplied from Buddu and Ankole. There should be little difficulty in getting the natives to work in sufficient numbers throughout this district at a wage of 3 rupees per mensem.

The open plains stretch away south of Mpororo, and the valley of the Kagera southward appears to offer an opening for the extension of

the railway towards Lake Kivu to join with the trunk line coming from the south. It appears that the easiest line for the trunk railway to follow would be the opening of the Kagera valley, down the whole length of which the railway could be carried and continued across Buddu, either through the rift near Nsongezi, round by Lake Mizinga, or by the easier line past Simba, or through Sango to the Buddu coast, and so on towards Entebbe, where the line from Mombasa must eventually end.

If the latter route were adopted, the line could be carried from the western boundary to the neighbourhood of Entebbe with hardly a cubic yard of cutting all the way. The Katonga and Bukora rivers would require to be bridged somewhat elaborately, but besides these rivers, throughout the whole district under discussion, there is no stream which would require a bridge of any size. Ninety per cent. of the streams could be accommodated with small culverts, which would allow ample margin for the greatest rise of water.

The Kagera river itself could be utilized for steam communication certainly as far west as the Mihingame rapids, 70 miles from the lake. The bar at the mouth of the river, unless a channel were dredged, would limit the size of vessels to such as draw not more than 2 feet of water.

The Bukora river could also easily have a channel cleared, which would enable communication by water to be maintained with the lakes in the interior of Buddu and Ankole. The importance of the line of the Kagera for the purposes of a railway must be specially emphasized. Alternative lines might be suggested to the east and west of Lake Albert Edward, but the Mfumbiro group and the Ruchigga mountains offer serious obstacles.

Again, the country bordering Lake Albert Edward on both sides is very much broken and extremely difficult. The precipitous mountains on the west side continue northwards close to the shores of Lake Albert a long way to the north. On the east side of Lake Albert Edward the hills drop suddenly from the Ankole plateaux with elevations of about 6000 feet above the sea to the level of Lake Albert Edward, say 3000 feet above the sea.

At the north-east corner of Lake Albert Edward is a series of swampy lakes. To the north of it lies the great mass of Ruwenzori, and on the east side of Lake Albert lies Western Unyoro. Here also is an extremely difficult country. Steep hills, alternating with deep ravines and watercourses, run from east to west, the whole dropping very rapidly from a general elevation of about 4000 feet above the sea to 2200 at the level of Lake Albert Edward.

Furthermore, a line of railway which followed the basins of Lake Albert Edward and Albert on either hand would not traverse the most important parts of the Uganda protectorate.

In Uganda itself, the swamps, which are so striking a feature of the country, would not be a serious obstacle to a railway. The water is only a few feet deep, the bottom firm below a foot or two of mud, and the current slow, so that generally a low embankment with culverts or small bridges would be sufficient in most cases to cross them.

These points have thus been referred to, as it appears that the valley of the Kagera is destined to play an important part in the future development of the great lake region of Central Africa, and in the building of the great African Trunk Railway from the Cape to Cairo. Next to good government, the urgent requisite for the development of all this magnificent country is perfection of the means of communication.

Before the paper, the PRESIDENT said: I have great pleasure in introducing Colonel C. Delmé-Radcliffe to the meeting. He has been engaged on very important service in the delimitation of the frontier by the Anglo-German Commission from the Victoria Nyanza to the Congo Free State, and has also traversed the Nile province of Uganda. In the course of this service he has collected a great deal of important geographical information. I now call on Colonel C. Delmé-Radcliffe to read his paper on Western Uganda.

After the paper, the PRESIDENT said: We have to thank Colonel Delmé-Radcliffe for his very interesting paper, which has been most beautifully illustrated. We must all have been struck this evening and on previous evenings with the great addition to our knowledge of African geography that has been contributed by these delimitation commissions. We have had quite recently Colonel Elliott's account of his work on the French boundary, and Colonel Jackson on the German boundary, in Northern Nigeria; we have had Colonel Leveson's Portuguese work; and now we have an immense quantity of valuable knowledge conveyed to us by Colonel Delmé-Radcliffe, collected in the intervals of his more important duty connected with the frontier work. He has described most graphically a very interesting country and its people and animals, and more especially its botany. He has also given us an interesting account of the Nile province. I would, therefore, ask you to join with me in offering our best thanks to Colonel Delmé-Radcliffe, and in passing a vote of thanks to him.

THE VISIT OF THE BRITISH ASSOCIATION TO SOUTH AFRICA.

By A. J. HERBERTSON.

THE most remarkable fact about the visit of the British Association to South Africa is that nearly four hundred members should have been transported 6000 miles by sea to South Africa, carried over some 4000 to 5000 miles there, and be brought home again in the short time of ten weeks. Never has there been a more impressive demonstration of the advance of the material sciences! To its success workers in every section have contributed, from the astronomers and magneticians of A to the schoolmasters of L. If the engineers have combined the results of many investigations in constructing the ways and the means of transportation,