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Author(s): T. Alexander Barns
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THE HIGHLANDS OF THE GREAT CRATERS, TANGANYIKA TERRITORY

T. Alexander Barns

THE *Hochland der Riesenkrater*, in what was formerly German East Africa, west of Kilimanjaro, has been described and roughly mapped by various German travellers, from Dr. Oscar Baumann—the first white man to strike out a route across this part of the *Abflusslosgebiet*—to Dr. Fritz Jaeger, whose more detailed researches were described in the elaborate monograph bearing the title since generally bestowed on the remarkable region therein dealt with. But I do not know any account of it in English, and therefore at the suggestion of Sir Harry Johnston I took advantage of an opportunity to pay it a brief visit in the early months of this year, and send the following account of my visit.

This district, a part of which was also known to the Germans as the *Winter Hochland*, is called Engotiek by the natives inhabiting the Arusha district and is now called on British maps the Highlands of the Great Craters, or the Engotiek Plateau.

The region is not easy of access to the ordinary traveller, for it lies away from all the main caravan routes, being surrounded by waterless tracts to the north and west, and enclosed to the south, east, and north-east by extensive lakes and active craters. Within the Ngorongoro crater itself two farms had been granted to a family named Siedentopf, all the male members of which were very active participants in the late war, and it was Herr Siedentopf senior that kept the German soldiers supplied with meat rations at a critical time by shooting wildebeeste in Ngorongoro. As the crater itself is said to contain 50,000 of these animals, which never leave it, the task was fairly easy, and he could, if necessary, have supplied the army with meat for a very long time; in fact, the Germans contemplated erecting a canning factory within the crater for this purpose.

In the second week of February 1921 our party met at Voi and took the one train to Moshi, the junction of the Voi military railway with the late German Tanga–Moshi line. There is very good shooting close at hand, but especially round lake Jipe, where that shy gazelle, the long-necked Gerenuk, may be met with, and in the Pare Mountains the giant Abbot's Duiker.

Three cars just managed to land us and a few personal belongings in Arusha without any serious breakdown; the rest of our gear followed with porters. *En route* a young Abbot's Duiker was brought us, but, perhaps owing to the joggling of the car or being hurt in some way, it unfortunately died before we reached Arusha. The road is being put in order, and substantial bridges built: it gradually ascends to the rich highlands of the Meru mountain. All visitors to Arusha fall in love with the place, and judging by the extremely fertile volcanic soil and the luxuriant growth of tropical and sub-tropical trees and plants, from peaches, bananas, and coffee down to wheat and potatoes, this part of the district at any rate will go ahead, and is also likely to become, so I am told, the Government hill-station at some future date. Unfortunately the Arusha district is very limited in extent. As I passed through, it struck me that tea should do well here; the rich red soil and the copious rainfall well distributed throughout the year should suit this plant admirably. However, most of the plantations and farms are at present held by Dutchmen and Greeks, who I judge are lacking in enterprise, so if tea is to be tried, and it is well worth while, the Government will have to do it.

One hundred and fifty porters were waiting for us at Arusha, recruited from the village of the agricultural Masai, who now inhabit the slopes of Meru. They proved to be a pleasant lot of savages and never grumbled, although they must have been hard put to it at times not to do so, especially when nights were cold and rainy, and they had to sleep out in it as best they could.

The Highlands of the Great Craters are some 75 miles west of Arusha, and the region is administered by the Political Officer at this place. Reports of the great concourse of animals within the Ngorongoro crater and its wonderful scenery greatly pleased us, as did the news that lions were abundant and commonly seen in the daytime; also that the rhino carried exceptionally fine horns, and, as Major Brown the D.P.O. put it, "might well be classed as vermin."

We now learned that the district is inhabited only by the nomadic pastoral Masai, who never cultivate a grain of anything, so we had to arrange for a supply of food for our large safari to reach us from time to time. Major Brown kindly sent instructions to Mbulu, a Government post 60 odd miles to the south of the craters, that we were to receive a good quantity of native meal by special porters at a main camp we proposed to make within the central crater of Ngorongoro.

With the able help of our Somali headman Ahamet, all the loads were presently adjusted, and one forenoon saw our caravan file out of the shady roads of Arusha into the torrid acacia-strewn plains below. For three days we trekked across an arid steppe, finding water fairly plentiful at this time of the year, although muddy with the heavy rains we encountered. Game was abundant, and we saw a few Schilling's giraffe, also many of those splendid game birds the giant bustard or pau, a nest

of which our table boy discovered, with two light blue and brown splotched eggs in it.

The fourth day brought us to the Mbújuni river, which, rising in the Essimingor mountains, runs due south across the Mbugwe road and not northerly, as shown on the Kilimanjaro sheet B5 of the 1/300,000 map. Hence we skirted Essimingor, and marching parallel with the shore of lake Manyara, although still some distance from it, we reached a Masai encampment and pitched our tents near the only available water, which lay in a muddy depression on the Manyara flats, and which had been churned up with the hoofs of zebra and many cattle. The zebra seemed to like the company of human beings, for they would not leave our vicinity. The Masai never kill or eat the game about them, and in consequence the latter show no fear of man—in fact, I think the game near our camp looked upon us as a kind of protection from the lions, which are very numerous on this side of the lake.

As we rounded the spurs of Essimingor and dropped down the low escarpment of the eastern Rift Valley to this camp on the grass flats of Manyara, we obtained our first uninterrupted view of the great wall on the far side, running north and south across the landscape, upon which, to our right, towered the massive summit of Loolmalasin, the highest peak of the plateau. The natives with me immediately pointed to the escarpment before us and exclaimed, "Engotiek," which is the name commonly used amongst them for the Highlands of the Great Craters. Looking to the north along the western wall of the Rift Valley, which so much resembles the Western Rift along which I had journeyed not so many months ago, the sharply cut outlines of the Oldonyo-Lengai volcano stood out darkly against the sky-line some 50 miles away. Again looking to the south, across the thin silver streak of lake Manyara, were to be seen the steep buttresses that round off the Irok or Iraku (as the map has it) portion of the plateau, known as the Wambulu country.

We were glad enough to move off next morning away from the filthy water and intolerable cloud of flies of this camping-place, round the north end of Manyara to the Dathyieni river,* a fairly big stream of clear water running between cool and forest-clad banks, and having several sources above and on the face of the escarpment. The way took us first across a long stretch of open plain covered with sage bush, interspersed with belts of thorn scrub, and then, as we neared the ancient shore-line of the lake, over the most curious petrified volcanic mud formation I ever remember to have seen, resembling gigantic flattened cobble-stones, across which it was difficult to walk. These cobbles decreased in size until the old shore itself was reached, where they were loosely piled one on top of another,

* This river is wrongly named on sheet Eyassi B4 as Olgedju-Rongai. Neither the local Masai nor our porters knew it by this name. The river is also wrongly placed, as it flows into Lake Manyara at its north-west corner, and not through the centre of the grey saline flats that lie across the north end of the lake.

resembling great balls of hardened grey mud, from the size of a large ostrich's egg down to pieces a few inches in diameter, all symmetrically corrugated in a wavy pattern. When one of these stones was hammered, the outer crust broke off in rounded layers of ever-increasing hardness, until a milky opaque core of flint was exposed.

As we passed the lake its shallowness, even far out, was easily discerned by the great quantity of flamingoes feeding across it, making a great splash of rosy reflection around them as they fed. There are two big lagoons north and south, and some water channels, but the rest of the lake-bed was in February dried saline mud and sand, grey and brown in colour.

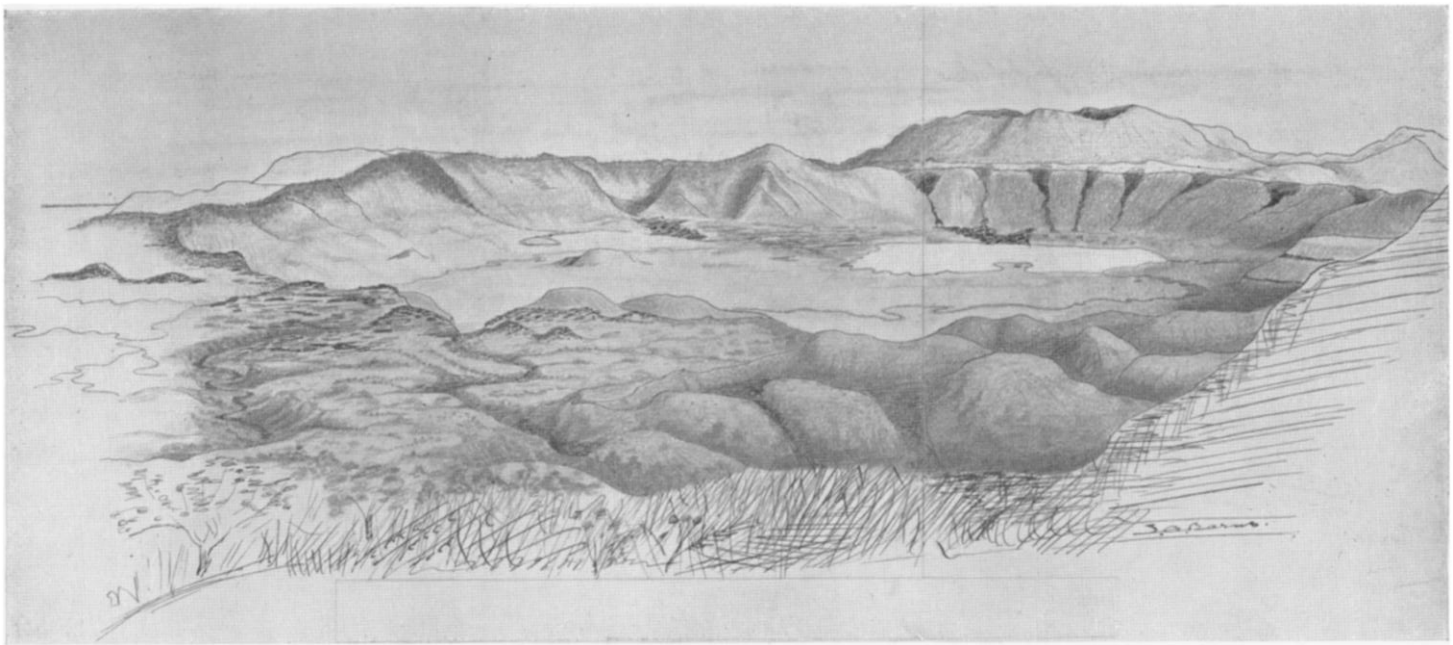
After a hot march of several hours we were glad to find a pleasant camping-place on the banks of the Dathyieni river, which runs almost at the foot of the sheer wall of cliffs now rising nearly 2000 feet above us, and in the shadow of which our tents lay. This camp was 3150 feet above sea-level. The following day we climbed the escarpment to reconnoitre. The view below us was superb, and we gained an idea of the formation of the floor of this part of the Rift Valley and recognized that it was divided up into a chain of basins of varying sizes, formed of such porous volcanic débris, and beaten upon by such a fierce sun, that some of them would scarcely hold water, and each divided from the next by what may be termed a low, and in some cases a narrow, dam. Lake Natron was one; the next southward was a small basin formed by the eruption of Oldonyo-Lengai in 1917; following this came the Engaruka Flats; then the big Manyara basin, and so farther to the narrow Babati lake beneath the Ufiome volcano. As we clambered down again to our camp we passed above a cleft in the face of the escarpment, where with a continuous roar a subterranean river leaps out into the Rift Valley—possibly the Munge river by which we camped the following day—its lower course is unknown, and its waters apparently become lost in some lake-bed or crater amid the primæval forest surrounding it.

Starting at dawn the following morning we all climbed the escarpment, having breakfast on its edge, where my aneroid showed an elevation of 4950 feet. We made a seven-hour trek that day, which took us first across open park lands, reminding me in all essentials of the Tanganyika–Nyasa plateau, and then, gradually ascending, on to undulating grass country with scattered thorn trees, until we reached the sharply defined belt of primæval forest clothing the eastern slopes of the Ngorongoro volcano and the Loolmalasin summit. It would appear that this dense and dank forest belt harbours neither many mammals nor any abundance of insects. Monkeys were absent, elephant tracks there were none. Rhinoceros, which are exceedingly numerous all over the great craters, only pass through it, and the giant forest hogs which roam this side of these highlands in great numbers, as also the bushbuck, prefer the forest glades which begin when the edge of the high central plateau is approached, at an elevation of about 7000 feet.

THE CRATER OF NGOROGORO FROM ITS EASTERN WALL: OLDEANI VOLCANO BEYOND

FLOOR OF THE CRATER OF NGORONGORO: WILDEBEESTE IN MIDDLE DISTANCE

THE CRATER OF NGORONGORO AND MAGAD LAKE FROM THE WESTERN WALL



THE CRATER OF NGORONGORO LOOKING SOUTH FROM OLOLMOTI: SKETCH BY MR. T. A. BARNS

We camped that night on a green circular lawn of grass surrounding a tiny pool, in the centre of a miniature crater, the most perfect spot that can well be imagined for a camp. The natives know it as Olbalbal Losaiyaie, and it lies close to the eastern bank of the Munge river, which could be heard rushing past in its bed of lava. The elevation being 5800 feet, we passed a cold night, and in the morning, everything being drenched with dew, we were glad to pass beyond the forest belt and reach the open glades above. These were the most beautiful I have ever seen. We had arrived between the two seasons of the little and big rains, when the flowers of both plants and trees were in blossom to perfection. The forest bordering these narrow glades had formed itself into high hedges and banks, which were brilliant with a species of yellow-flowered arborescent bean, that, although common on the heights of Kilimanjaro, Meru, Kenya, and the Great Craters, is seldom seen farther west either on Ruwenzori or the Mufumbiro mountains. Below this background of yellow flowers hung great bunches of purple Vernonia, and then came a wonderful carpet of white lilies, scabious, forget-me-nots, and everlasting flowers, between the greens of fennels and wild turnip; then lower still, midst the fine grasses and clovers, little erect-growing violets on long stalks, as if they too would aspire to arborescence.

Presently we stood on a ridge with the forest and its glades behind us, confronted by a splendid and what looked to be a circular treeless moor many miles across, and we knew that we had now reached the topmost plateau of this fascinating country, the far side of which bordered the vast chasm of the great Ngorongoro crater. This moor, which stands at an elevation of 7800 feet, presents many interesting problems to the vulcanologist, for it would appear to be the ancient floor of a giant crater, second only to Ngorongoro itself. From where we stood its northern and western circumference was bounded by the steep slopes of the Loolmalasin summit and the Ololmoti crater and their connecting ridge, and on the southern and eastern side by the ring of connected ridges and hills, bearing every resemblance to the ruins of a crater wall. In support of this supposition there were to be found in odd corners of this saucer-like plateau, the small craters or rather depressions so frequently met with on the floor of volcanoes of large size. On such a one, containing a pool of water, we camped for that night, after traversing a portion of the moor. We found its hummocky grass-covered surface very fatiguing to walk over, the hummocks being formed by uncountable generations of moles. This is the large grey mole (I forget its specific name) with the pair of long teeth that come out to meet the upper incisors from an aperture below the bottom lip; it is common all over Africa. In this friable volcanic soil there were millions of these moles; they are in fact to be found pushing up their chocolate-coloured hills all over the great craters. Their fur is of an exquisite quality and colour, so here there should be a unique opportunity for an enterprising trader willing to

foster such an industry as mole-catching amongst the younger generation of Masai.

Frequenting the large patches of fragrant lad's love bushes which cover many acres of the moor are numerous rhinoceros. We saw eland, hartebeeste, and other game, and many spoors of lions. Altogether we had a splendid and interesting day, and in spite of the long march we hardly felt tired in the rarefied air, a companion especially feeling the benefit of the high altitude as he had been gassed in the war.

The camp on the moor was astir at an early hour the following morning, for, owing to the proximity of Ngorongoro, which we were to reach that day, the spirit of expectancy had invaded it, causing us to tumble out of our flapping tents with but scant attention to the cold Scotch mist driving past outside.

Across our right front, as we followed our Masai guides over the tussocky turf and over the one sizeable stream that wanders through the centre of this Alpine moor, lies the imposing pile of the Ololmoti crater, its frowning brows forming what seems to be more a mountain range than a single volcano. On looking halfway along its face, a narrow breach in its ramparts is discernible, through which, after collecting its waters from the springs and pools of the inner crater, leaps the Lemunge river on its short but turbulent way to the lake lying in the mighty abyss of Ngorongoro, 4000 feet below.

We reached this running stream at a point not quite halfway down its length, where it leaves the edge of the moor and starts on its headlong course over the wall of cliffs. Here we crossed it, and, leaving the moorland behind, we entered a broken country, made on the one hand gloomy and weird with old, blackened, and matted primæval acacia forests, and on the other beautiful with an extraordinary wealth of flowers and flowering shrubs. Passing through this unique scenery and out beyond the last belt of dark forest, the enchanted traveller finds himself standing on a great eminence—an edge of the world—from which he gazes down into a chasm so vast and presenting such novel features, that his breath is taken away at the sight.

An unbroken ring of precipitous cliffs circled away on either hand, to meet in the blue haze 12 miles across from where we stood, now forest clad and grass grown, but at one time holding within bounds a steaming sea of lava. On the far side of the wide-spreading crater floor, beneath the shadow of yet another great crater, the Oldeani, lay the Magad lake, blue and gleaming in its marshes and its mud flats. Light and shade, wonderful cloud effects, and pygmy thunder- and rain-storms chased one another round the circular wall of cliffs, or hung low above the lake as if to suck up its shallow moisture; or again, at other times stood above the two towering sentinels of Oldeani and Ololmoti, as if the sun-struck banking clouds had once more drawn fire and smoke from their long-dead throats.

This was not all, however, that could be seen from our coign of vantage, for, even without the aid of our glasses, we could see that such a concourse of wild animals was collected within this giant ring-fence as Africa's best big-game days could scarcely surpass. The enclosure of the crater must have reached a circumference of well over 35 miles, giving plenty of room, one would imagine, for all the animals it contained, and yet in many places their numbers were so great that there seemed to be a crush of game.

Before the war the German Government had allowed a family called Siedentopf to occupy land within Ngorongoro. The elder Siedentopf, it appears, took some interest in archæology, and it was due to his research that two barrows were unearthed in the crater, bringing to light two skeletons, so the tale goes, and some interesting ornaments which were found upon them. These may have been merely the graves of former Tatoga chiefs, or they may even have been of considerable antiquity. In any case the find seems to have caught the interest of the then Kaiser, for in 1914 he caused the German archæologist and geologist, Dr. Reck, to proceed to the neighbourhood and undertake a systematic survey of the Great Craters and their surroundings. What the professor found is still a matter of surmise out here, as war broke out shortly after his return to Berlin on the completion of his expedition, but the report goes that it included fossil remains of Dinosaurs, and the discovery of the remains of an ancient civilization, as well as diamonds and gold. Those who met this Dr. Reck report his having said that "his discoveries would one day astonish the world."

The Ngorongoro crater itself and the surrounding country has been plastered at varying intervals of geological time by layers of grey volcanic mud, ash, and sand from the Oldeani and Ololmoti volcanoes when they were active, both these craters being considerably younger. These superimposed strata of volcanic grey mud and sand are seen wherever cuttings have been formed.

Sixty miles to the north-east, between the volcanoes of Oldonyo-Lengai and Gelei, lies a steaming, desolate, grey, mud-plastered country, presenting the same features as once existed right across the volcanic mass of the Engotiek plateau.

To return to the Great Crater and to the cliff from which we were regarding its stupendous features. Presently, after clambering down the last thousand feet, we found ourselves again crossing the Lemunge river and resting beside it on the short clover-sprinkled turf of the crater-bottom. Farther down the stream stood Siedentopf's deserted homestead, and all around us in dense array, with tails swishing and manes bristling, stood, pranced, danced, galloped, and snorted thousands of blue wildebeeste and thousands of zebra. Kongoni hartebeeste and Thomson's gazelle were many, but not filling the landscape to the extent that the gnu and zebra did.

As this side of the crater, the north-east, was practically treeless, and wood and shade therefore became a question of importance for the main camp that we proposed to make, we decided, it being still early afternoon, to continue our march to its south-east curve, with the idea of making our camp on the edge of a belt of acacia forest that we could discern in the distance. This place, which is known to the Masai as Leitokitok, proved to be eminently suitable for our purpose, for we found there good spring water, wood, and shade; it was a long way, however, and took us close on two and a half hours to reach it.

This first march across the floor of this colossal amphitheatre was a wonderful experience, made more so, if that were possible, by the kind of triumphal procession to which we were treated by a never-ending mixed herd of wildebeeste, hartebeeste, zebra, and gazelle. As I say, it took us over two hours, and we were walking through herds of game all the time. Wherever one looked over the far crater-plain there were animals, and looking at them along an absolutely flat surface, they might well be described as a sea of backs with an undercurrent of legs, as they moved hither and thither about us.

We reached the acacia forest at dusk to find that it stood beside an extensive marsh, and debouching directly from the cliffs of the crater-wall into it was a deeply eroded trough (whether made by the action of water or by flowing lava it was difficult to tell) some 30 to 40 feet deep and 200 yards broad. Our camp therefore, when we had it pitched, stood on the same level as and looked out across the flat crater plain, but behind us ran this deep cutting, with the spring at the bottom, extending out towards the lake and its marshy surroundings: an interesting place, as I soon found out, and the only place in the whole crater from which the stratification of its actual floor could be critically examined. On the face of this cutting it was possible to trace with ease the successive inundations of volcanic mud and sand which had been poured into the great crater by the ancient eruptions of Ololmoti, or which had been deposited there at a time when a much larger lake than the present one covered a considerable area of the crater bottom.

The very first day in our new camp produced a novelty, for a rhinoceros who marches up to within 250 yards of a large camp and lies down to sleep in view of everybody, may be considered as such.

We each began to stroll in any direction fancy took us. I went exploring and collecting. No one could get lost, for the grass was like a lawn, and the tents could be seen from at least 10 miles away almost without the aid of glasses. My first ramble was along the marsh to the wild shores of the shallow Magad lake, which, although fed by the Lemunge and other streams, would seem, like Lake Manyara, to have very little rise and fall, with a tendency to diminish rather than increase in size and depth. Its water was potashy and distasteful, except where streams flowed into it. The slimy flats surrounding it were strewn with

petrified mud. There were many cranes, storks, and waterfowl; ducks and geese were in great variety, but they preferred the marsh and the streams to the bitter mud of the lake-shore.

The wealth of game was extraordinary. It has been calculated that before the war the crater contained 50,000 head of wildebeeste and 25,000 head of other game. This number must have been decreased somewhat during Siedentopf's occupation, as he was engaged in slaughtering wildebeeste and drying the meat for the German troops during the war, and also for their long bushy tails, which he and his sons were in the habit of exchanging with the Masai for sheep—the Masai setting great store by these tails for fly-switches. However, judging by the great numbers of calves which accompanied every herd of females, the herds will soon regain their original numbers.

Apart from the blue wildebeeste, the list of animals living in the crater comprised hippo (living in the pools of the marsh), rhino, ostrich, zebra, Kongoni hartebeeste, Thompson's and Grant's gazelle (the latter differing slightly from the usual *Grantii* in the shape of their horns and the bar on the flank), Chandler's reedbuck, oribi, lions, cheetah, hyæna (the large brown spotted species, seen in great numbers in the daytime) and jackal, also in large numbers. Baboons were to be seen in troupes of a hundred or more; there were also numberless guinea-fowl, quail, and the giant bustard or pau.

How such a vast quantity of game manages to subsist and keep its condition, year in and year out (for they never leave the crater), on this one area is rather perplexing, until one realizes after a walk that the pasture is one close mat of succulent white and red clover, in places growing to such luxuriance on the rich volcanic mud and *débris* that acres and acres of it stand knee-deep in one solid mass of green, as if it had been heavily sown and fertilized. Such wild clover pasture I have never before seen, and it is probably unique in the whole breadth of Africa.

The two extinct volcanoes of Ololmoti and Oldeani (one to the north and one to the south) both overshadow the giant central crater of Ngorongoro between them. They stand poised on the edge of its circular crater wall, but their summits reach many thousands of feet above it. As seen from our camp, these two volcanoes, in reality immense, for the crater of one of them is over $3\frac{1}{2}$ miles across, are dwarfed into insignificance by the colossal proportions of the great abyss on the edge of which they stand. Ololmoti, the northern crater, attracted me the most, for not only was it the second largest of the group, but it contained the source of the Lemunge river, which rises within it and gushes out through a curious cleft in its side, as if Vulcan himself had split the great wall with one blow of his hammer.

Having decided to leave the main camp on a trip of exploration to the recent volcano of Oldonyo-Lengai, I resolved, therefore, to first climb

this crater, as I had a great hankering to see into it. I also had it in mind that a sketch made from such a commanding position would be well worth any trouble. To gain the foot of Ololmoti it was first necessary to climb out of Ngorongoro itself, so, selecting a fine morning, I left our main camp with fifteen porters, and taking the same way by which we had come into it, I made the stiff climb up the Lemunge ravine to the edge of the moor upon which we had previously camped. Here I pitched my tent for the night, and on the following morning, which fortunately remained fine, I took four natives and started up the mountain. The ascent from my camp took me a good four hours of climbing before I reached the highest point. Naturally, my followers and I arrived at the top very much out of breath and pretty well fagged, so it was a very mean advantage that two rhino took of us on the very summit, by charging us in the rough scrub, shaking us up very badly after the arduous climb. The whole crater, inside and out, is closely overgrown with arborescent "lad's love" bushes, very hard to push through, but of a fascinating fragrance. No wonder the rhino make their home here, for the crater sides are a mass of fragrant herbs and mints and alpine flowers, and there are some sheltered alpine meadows in the deep folds round this crater that are marvels of beauty, carpeted with a lush green thick-leaved flora, and surrounded by an aborescent kind of broom, and massive moss- and fern-hung Hagenia trees of the utmost grace and beauty. The map gives the impression that the Ololmoti crater is closely covered with primæval forest, but this is wrong, for there are only the very smallest patches of Hagenia forest that could be described as such: fragrant scrub interspersed with patches of coarse grass covers the crater within and without.

My aneroid showed 10,000 feet as the highest point we reached on the lip of the crater. It is a perfect ring some $3\frac{1}{2}$ miles across, and contains quite a respectable mountain in its centre, which is in reality a gigantic core of ash and lava. The catchment of this crater-basin forms small pools and runnels of water on each side of this core, which then drain out through the narrow cleft of which I have spoken, as the Lemunge river. The effect of the Ngorongoro abyss below and the extensive view beyond it to lake Manyara is unsurpassable. The sketch I made gives some idea of it, but only a vivid imagination or an actual visit to the summit of Ololmoti can fill in the colours and the beauty of such a scene.

The following day I struck camp, and, crossing the pass between Ololmoti and the great pile of Loolmalasin, I took a north-easterly direction over the curiously formed bed of an ancient lava lake called by the Masai Embulbul. From here there is a long upward rise along a beautiful moorland valley of splendid close pasture, to a narrow ridge that connects the Elanairobi crater with the Loolmalasin massif. The previous day a great mob of six thousand Masai cattle had used this same track. They were being shifted by the district cattle inspector down into the Rift Valley on account of an outbreak of rinderpest on the highlands. I caught them

up in the late evening and camped beside the lowing herds on the eastern slope of Elanairobi.

By reason of its eastern aspect, facing the rising sun, and also no doubt on account of the ideal conditions of moisture prevailing, this eastern slope of Elanairobi has become a veritable alpine "herbaceous border" of flowers. Amongst those that I could place were a large flowering sweet-scented larkspur, white with black stamens, purple thistles in great bunches, verbena-scented thymes, mints, docks, fennels, borage, sorrel, forget-me-nots, mallows, campions, crow's foot, petunias, poker-plants, ground orchids, at least a dozen kinds of clover and trefoils of a wonderful range of colours from white to salmon-pink, violets, nettles, marguerites with scented leaves (all plants seemed to have scented leaves), wild turnips, Star of Parnassus, purple and white lupins, scabious of many kinds, chamomiles, daisies, and great beds of crinum lilies.

In the morning the Masai grazed their cattle to the edge of the Elanairobi crater, and there I followed them. This extinct volcano is made both interesting and beautiful by reason of the lake it contains. This body of water is over 2 miles across, green-blue in colour, and covered with a heavy metallic film. It is said to be of great depth. The northern interior slope of the crater is covered to the water's edge with primæval forest. Judging by the inundations along the shore-line, there has been a considerable rise recently in the level of this crater lake. The elevation of my camp on the slope of the volcano I made 8850 feet above sea-level, and the low eastern portion of the crater-ring 9360 feet. The highest point of the ring reaches in my opinion an elevation of well over 10,500 feet.

From the north-eastern lip of the Elanairobi crater I obtained my first view of Oldonyo-Lengai, or the Mountain of God, as the Masai call it, who look upon this extraordinarily beautiful volcano with the utmost awe and veneration, which it is hard not to share. This volcano erupted during the war, in January and again in March 1917. The Masai look upon the volcano as sacred and the source of all blessings and benefits for their race. The internal rumblings that preceded the eruptions of 1917 were put down to the bellowings of cattle that were to come out to enrich them. After the last eruption, and when it was safe to approach, the Masai picketed the neighbourhood, allowing no one but a Masai to go near the volcano on pain of death. They afterwards took goats and cattle there, and conducted thither many of their women with blood and milk which was poured out at the foot of the mountain.

There is no previous record of this volcano having been active; it was covered with mountain scrub right to its peak, where there were two small extinct craters. Its height was placed by the Germans at 9350 feet; it must now be considerably higher, and culminates in a single crater on its tapering and graceful summit. The sides are now so steep that it is impossible to climb them.

I reached the "Mountain of God" by way of the barren watercourses that run below it, through the difficult and fatiguing country to the west of the Kerimasi volcano. Even after four years the grey mud from the former is still to be seen covering the ground in many places that are 10 miles or more away from it.

A close view of this entrancingly beautiful mountain is "a sight for the gods." It thrusts its massive yet slender and tapering form upwards from the bed of the rift valley in one glorious pink, grey, and white pyramid, arabesqued with folds and furrows of beautiful shape. A saddle of ash and mud, white and shining, out of which emerge two curiously formed parasitic craters, join Oldonyo-Lengai to the green cliffs of the escarpment. A thin film of vapour rises over the sharply cut edge of the narrow vent, but no glow is perceptible at night.

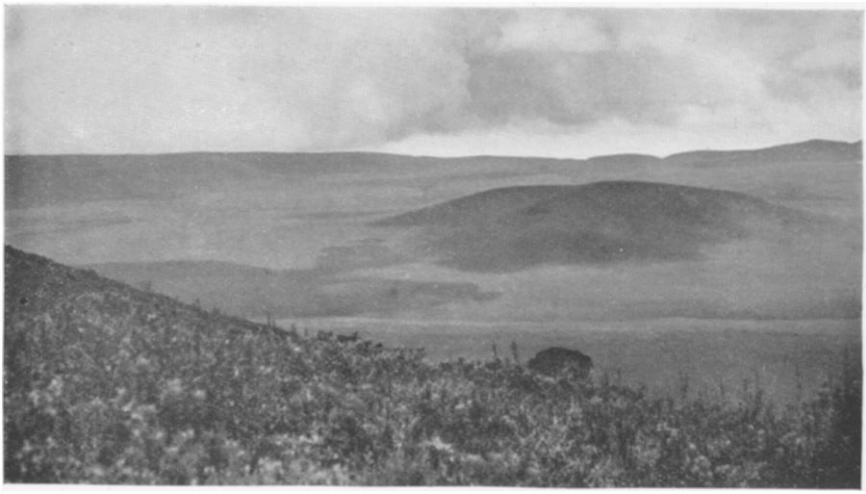
The grey mud-plastered valley that runs along its southern foot, merging into the steaming lava lake under the volcano of Gelei, might have been transplanted from some other world, so weird and desolate does it appear. The lower part of this valley abounds with steaming parasitic craters, ash-cones, and fumaroles of all sizes and shapes, some of them raised in tiny truncated cones, whilst others have formed themselves into great cracks and round caverns, flush with the surrounding surface of volcanic mud. Eastward, across the lake of lava, and through the swirling yellow and grey fumes, rises the huge pile of the Gelei volcano, a mass of parasitic craters, terraced, and piled one above the other to its high summit.

The saline mud shot out by the eruption of Oldonyo-Lengai has erected a low dam connecting it with the foot of the Gelei volcano, forming yet another basin in the chain of basins on the floor of the East African rift valley.

I would have given a good deal to have been able to penetrate into this steaming wilderness and over to the Natron lake, which I could just see beyond, but time was against me, and I was unprepared for a longer excursion than I had already made, so having obtained some interesting photographs I retraced my weary steps to camp, where by day the flies were an abomination and at night a large species of mosquito swarmed over everything. As these mosquitoes are only found in the vicinity of the Elanairobi volcano, I presume they are bred in its crater lake, where they hatch out and descend in vast buzzing clouds on the surrounding slopes.

The lions of Ngorongoro were what we called "daylight" lions, for owing to their being unmolested they were more often than not to be seen abroad in the daytime. They were located on the opposite side of the water, which decided us to shift camp to the north-west corner of the Magad lake. The crater-wall on this side is cut into at frequent intervals by deeply wooded ravines or kloofs, which had become the

OLOLMOTI FROM THE CRATER OF NGORONGORO



INTERIOR OF OLOLMOTI CRATER LOOKING WEST: LEMUNGE RIVER IN FOREGROUND

LAKE MANYARA LOOKING SOUTH ALONG ESCARPMENT OF ENGOTIEK PLATEAU

OLDONYO-LENGAI

LAKE MAGAD UNDER THE WESTERN WALL OF NGORONGORO

permanent home of these beasts. Like all other animals within the great crater of Ngorongoro, they were especially tame and especially large and fat, and with fine manes. Preying on the abundant game around them, they had become numerous and bold, offering such sport as is seldom obtained in these days.

Everything in this wonderful crater of Ngorongoro seemed in some subtle way to take to itself an air of enchantment, and to differ from anything ever experienced before. Our new camp, for instance, was a most wonderful place. To be able to overlook the floor of the crater we selected a site well up under the cliffs, on a spur of the great wall that was thickly overgrown with the most enormous candelabra euphorbias I have ever seen; they must have been of great age, for they reached to 40 feet in height, with trunks that were a good 30 inches in diameter. The view of the lake, which was now close, and of the great crater-plain with its crowding game, was a picture to marvel at, set in a frame of branching blue-green euphorbias. Even the magnificent chorus of lions that lulled us to sleep o' nights seemed to be just that much more effective than one had heard elsewhere, from the echoes of the circling cliffs around us.

This western side of the crater differed in many ways from the east which we had just left. The crater-floor was in shallow terraces, as if formed by the receding waters of a lake that possibly at one time extended right across the crater. The foothills of the crater-wall showed masses of fine scoria, which could be picked up in handfuls. Flakes of obsidian were strewn about. Rather curiously, too, there were numerous large anthills on this side, and spread amongst them clumps of fine trees, forming a pleasing park-land near the lake.

In the course of my rambles near the estuary of the Lemunge river I found myself in front of a high ridge of lava, which can in fact be seen for many miles across the crater plain. When examining this I discovered, chipped out of the iron-like lava, two rows of shallow holes, each about $3\frac{1}{2}$ inches wide, forming the "board" of the African native game known in Swahili as *bao*. As this game is unknown to the Masai and never played by them, this is doubtless a relic of the days when the Kisemjangs owned the crater.

We had decided to leave Ngorongoro by mounting the cliffs that form its south-western curve. One fine morning, therefore, found us struggling up one of the many steep Masai cattle-tracks that make their way down into the crater, from the high pasture between the volcanoes of Oldeani and Lemagrut. Having reached the high plateau (8100 feet) that lies beneath Oldeani, we made camp in yet another wonderful spot, this time on the edge of a ravine clothed in primæval forest and beneath gnarled and knotted trees laden with every imaginable parasitic growth, from tiny liver-worts to festoons of orchids and lichens. From our tents we looked out across undulating downs long with feathery grass, to the towering

mass of Oldeani on the far side, whose mantle of green bamboo forest made a streak across the landscape where it met the open pasture in a sharply defined wall of stems. This was a great place for rhino, and their tracks were everywhere in evidence. At sundown a fat old bull came out from the bamboos and took a mud bath, which we watched with interest through our glasses.

Our route presently took us over the shoulder of the Oldeani volcano into the deep basin of lake Eyasi. As we slowly made our way down the steep sides of this volcano a magnificent view unfolded itself—a most splendid picture of wild lake scenery, enhanced by the dark clouds of a thunderstorm that drove across it from the west. The foot of Oldeani abuts right on to the shore of the lake, giving this volcano a towering effect of great grandeur, for it rises sheer from the lake-level. The south-western face of the crater has been riven asunder by an eruption of shattering force that strewed the country below with such a devastation of lava and volcanic *débris* that it has hardly yet recovered. The crater now contains the sources of two streams which flow out from each side of a central core or neck, joining up afterwards into a swiftly flowing stream with an unpronounceable Masai name.

The crater of Oldeani is overgrown within by primæval forest, mostly of ancient white cedars; the northern slopes without by a thick mass of bamboo. The name Oldeani means "The Bamboo Mountain." The higher south-western slope of the volcano has a beautiful alpine flora, among which we found Canterbury bells, yellow cosmos, pink and white geraniums, creamy-white anemones with flowers 4 inches across, and scabious and other beautiful flowers in great variety. The well-known South African sugar bush covered a considerable portion of this side of the mountain with its handsome foliage at an elevation of about 9000 feet.

After painfully descending the steep lava-strewn slopes of Oldeani and crossing many deep cuttings, we were more than glad to find ourselves camped within reach of the lake. The vegetation about us was now of that thorny, rough, and tough description, with many baobab trees, that one associates with the African low veldt. Here, perhaps, it was just a little more tough and thorny, and absolutely broken to pieces by the quantities of rhino that inhabited it. We found the north-eastern lake region to all intents and purposes a desert, which gave us a very trying and hot day's work to cross. In its character it resembled a Mexican steppe, with thick-leaved plants, aloes, cacti, and euphorbias. After crossing this barren land we camped on the Katete river, a muddy stream of fresh water that flows into Eyasi on its eastern side. The palm-fringed mouth of this river is the haunt of thousands of hippo; their numbers are prodigious, and I am told formed the staple fat-supply for the German army during the war. There are some giraffe in this region and a few gerenuk, as well as other small game.

My wife and I, accompanied by thirty porters, now made the best of

our way over the Ngabora mountains towards a native track that leads into the Government station of Mbulu. A local Wambulu native, who had been sent out to us by the Assistant Political Officer at this place, lost us in these unknown hills and there shamefully deserted us in a waterless country, making his own way back to his home. After an excessively trying journey through dense thorn scrub overrun with rhino and elephant, we eventually reached the first habitations of the Wambulu with our clothes torn to shreds and our food-supply at an end. Two days afterwards we reached the old German boma of Mbulu.

The Wambulu natives occupy the high and fertile plateau of Iraku. They are an interesting, industrious, and intelligent people of Nilotic origin, tall, with fine features and in many ways similar to the Watuzi of Ruanda. Owing, however, to the continuous raids of the Masai in former times they are not numerous. They are very clever pastoralists and agriculturists, both the men and women working hard tending their large stocks of cattle, sheep, and goats, and growing large and well-matured crops of maize, rice, sorghum, millet, eleusine, beans, yams, many kinds of native vegetables, and European potatoes; they also raise quantities of fowls.

The Mbulu country has an exceedingly pleasing aspect with its well-ordered, often terraced, patches of cultivation, its quaint houses, its herds of cattle and sheep, its curious combination of clumps of thin-stemmed, tall phœnix-like palms (with orange-coloured fruits), with large stretches of heather and bracken and clumps of graceful tree-ferns along the many beautiful streams.

The country in many respects resembles Ruanda, but there are no bananas, and it is cultivated to an extent that is never seen there. It is extremely well watered, with a rich pasty soil of pink mica-schist through which run large seams of mica and pink quartz. The contour of the highlands of the great craters to the north has been altered by the hoofs of milliards of cattle passing across the centuries; here the run of the land has been altered by the hand of man, for with the flight of time and a continual scooping out of the sides and heads of the watercourses for cultivation, the face of the country has been much changed.

Near the White Fathers' mission of Mbulu is a small lake in and around which live many pythons, which are held in veneration by the Wambulu. The natives in the vicinity have the curious custom of carrying back to this lake any python that is found any distance away from it.

To take us on our southward journey down to the Ufiome country, the Assistant Political Officer supplied us with a fine lot of Wambulu carriers, who took us along the well-graded German road (with deep cuttings) that runs through their fine country. The second day took us off the "berg" (7000 feet) down into the forest of the Rift Valley (4750 feet), passing through some fine scenery *en route*. After crossing the Eer river, the fourth day brought us to Dodo's village, which lies beneath the massive ruins of a volcano named Ufiome in the district known as Bonga,

a small basin or drainage system, complete in itself, on the floor of the Rift Valley, on the lowest portion of which is the picturesque Klaui lake. On the northern side of the basin are several extinct craters.

From Ufiome we gradually made our way to the Tanganyika railway. We changed porters at Kondoa Irangi, finding the Political Officer in charge a most entertaining and hospitable man. He gave me, among much interesting information, the following story of the "Kondoa Fire King," with which I must close these notes:

"I have had an opportunity of watching closely a native conjurer of my acquaintance who possesses a secret which would be invaluable to a fire-brigade. He smears himself with what is apparently a vegetable oil which renders his skin impervious to flame. I have taken a photograph of him holding a blazing bottle-straw within an inch of his naked armpit. He scorches his skin for as long as you like, and the closest inspection reveals no damage. On one occasion, in the presence of the Bishop of Kilimanjaro, Mr. Bampfylde, and the whole of my family, this native brought a bundle of sticks into my back yard, and under the scrutiny of the afore-mentioned audience, he pounded up leaves taken from two trees, mixed the resulting juice with water from my kitchen, and scorched himself as usual. I smeared some of his juice under my own arm and applied the flame myself closely for half a minute. I could feel only a pleasant warmth, and felt no pain either then or afterwards. No mark was left on my skin, and even the hair of my arm was uninjured. Both the trees whose leaves he used are common."

Note added by Mr. Heawood.

EARLY INFORMATION ON THE HIGHLANDS OF THE GREAT CRATERS

It may be of interest to note that, many years before this region was first traversed by a white man, some rough inkling of certain of its features had been gained through the careful inquiries of the early missionaries. In particular the great mountain Oldonyo Lengai (or Donyo Ngai), the "Mount of God," had already appeared in the famous "Mombas Mission Map," which did so much to turn attention to the East African interior about the middle of the nineteenth century. Somewhat later the data collected by the missionaries Wakefield and Farler, interpreted and mapped by geographers like Keith Johnston and Ravenstein, had supplied descriptions which made a forcible appeal to the imagination of would-be explorers. The mountain was said to be even higher than Kilimanjaro, though not so massive; to be a volcano with a *menara* (tower or peak) on the top, from which smoke constantly ascended, causing a perpetual black cloud above it; and to exhibit "radiating and coruscant appearances." Ngorongoro also figures in the early itineraries, not far from its true position, and would seem in those days to have not lain so aloof from caravan routes as Mr. Barns says it does to-day. It was described as a thickly populated Masai district with many villages, in a country full of big game, where the caravans remained about twenty days to trade and hunt. Maps constructed from such native information were published by this Society (*Journ. R.G.S.*, vol. 40, 1870, p. 303; *Proc. R.G.S.*, N.S., vol. 4, 1882, pp. 776), accompanied by the text of the itineraries.