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## NOTES ON THE NORTHERN FRONTIER PROVINCE, KENYA

J. PARKINSON

THE geographical changes in the Northern Frontier Province of Kenya from mid-Tertiary times onwards have scarcely received the attention they deserve. For present purposes this great area is taken to include the Chalbi or Koronli desert, the country east of the Mathews range to the Italian Somaliland frontier, southwards to Isiolo, thence south-east to Bura on the Tana river, and thence eastwards along lat.  $1^{\circ} 10' S.$  to Italian territory. The Ethiopian frontier on the north completes the outline.

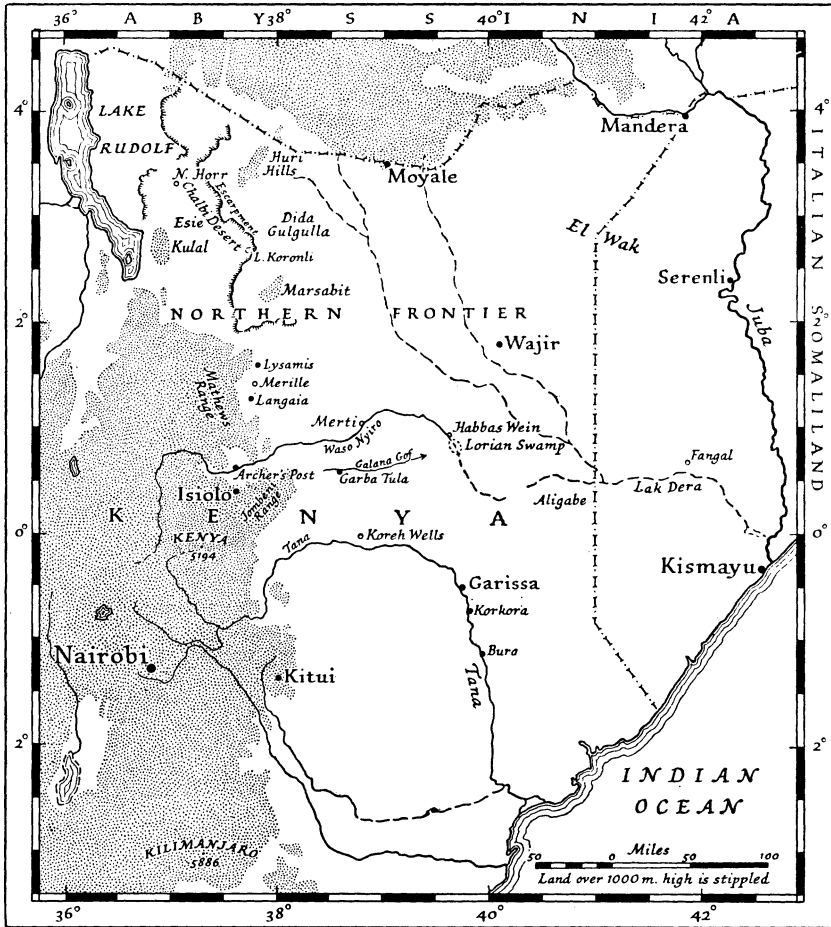
Kenya may be divided into Kenya proper, familiar to the tourist and settler, and the Northern Frontier Province, hot, parched, and dusty, to which access is barred unless by special permission. From the standpoint of practical utility, agriculture in the Northern Frontier Province is non-existent. The country, though geologically for the greater part very different, is singularly like British Somaliland in general appearance: its inhabitants, its water difficulties, and the sense of desolation it too often produces are points in common. Once a fertile land of lakes and great rivers it will, one fears, in the near future become a desert; it is already semi-desert and desiccation is to all appearances rapidly proceeding. With the exception of the Marsabit and Huri volcanoes and the Willeh hills in the north-east, the country is flat to slightly undulating, scantily furnished with trees, amongst which flat-topped conifers predominate, and tenanted by nomadic tribes, principally Somali and Boran, who possess huge herds of camels, sheep, and goats. Keeping them alive is a heavy drain on both grazing and water resources. The value to their owners is a matter of prestige and sentiment rather than of cash, since there is no market for these animals. In 1915, one small Indian shop or *duka* was established at Archer's Post on the Waso Nyiro and another at Moyale on the Abyssinian frontier; in 1938 they were common even in the most unlikely localities, and carry on a small trade in cloths, beads, cigarettes, matches, tinned salmon, and oil for lamps. Communications are maintained by a system of very bad dry-weather roads and wireless stations.

In 1914-15 the writer had the advantage of travelling through this country, except for the north-east corner, the Chalbi desert, and the district south of the Lorian. This first journey was accomplished by camel safari, which allowed leisure for observation, and was followed by a journey up the Juba river as far as navigation limits permitted, and by another from Kismayu towards the Lorian swamp as far as Fangal, in those days little-known country. These journeys occupied eleven months. East of long.  $41^{\circ}$  is now Italian Somaliland. In 1938 more extensive journeys were made by motor car, and in all about 7000 miles were covered.

In this enormous area the scenery falls naturally into three well-marked types: (1) hills of inselberg structure, formed from the Archaean rocks of the "Lower Basement Complex"; (2) the flat-topped sandstones of the Marehan Series<sup>1</sup> developed south-south-west from Mandera and Ramu and extending

<sup>1</sup> Glenday, V. G., *J.E. Afr. Ug. nat. Hist. Soc.*, March 1933.

eastwards to the Juba river near Serenli and northwards into Ethiopian territory; and (3) the featureless plain of grey silt and red granitic sand extending from the Merti plateau north-eastwards to Wajir and southwards across the Lorian swamp to the latitude of Bura on the Tana river and beyond. It is with the third part of the Province that this paper deals. The



Northern Frontier Province, Kenya

interest lies in the evidence of the striking geological changes that have taken place, as is proved by the sediments and terraces situated some distance from the banks of existing *laks*<sup>1</sup> and by limestone deposited in freshwater lakes where now no obvious drainage channels exist.

The main features of the country east of Marsabit have been referred to in the Report dealing with the results of journeys in 1914-15,<sup>2</sup> but recent

<sup>1</sup> *Lak* or *lugga*, a drainage channel containing water only in the wet season.

<sup>2</sup> Col. Rep. Miscell. No. 91. 1920. Cmd. 729.

traverses along the Chalbi desert and between the Lorian and Isiolo enabled the extent of the lava flows to be better appreciated than heretofore, as also the ancient lakes and former extension of the rivers. In the west doubtless the early Lake Rudolf included the Chalbi desert.<sup>1</sup> The interest of the volcanic episode lies largely in the differentiation into rocks of varying composition of the magma which produced the successive flows and the remarkable puy stage. The early extravasation of the plateau lavas (the western and natural end of which is the escarpment defining the Chalbi desert on the east) was succeeded by a volcanic phase of a Hawaiian type responsible for the elongated flat cones of Marsabit, Huri, and perhaps Esie, and to the south for the more Vesuvian type of Kenya and Kilimanjaro. These four principal volcanoes lie upon a zone roughly parallel with the Rift Valley to the west.

Very shortly after leaving Garba Tula in a westerly direction an extensive lake deposit is crossed, followed by a lava plain which extends almost to Isiolo, about 30 miles by road. From this lava field the range of puys forming the Jombeni range rises and probably marks a subsidiary line of weakness. In the streams (*laks*) cutting through the lavas well-marked sections of sediments in the banks form additional evidence of higher rainfall and more extensive erosion. Extinct hot springs, shown by limestone, partially silicified, forming terraces and mounds built up by the overflowing waters of the springs, are seen east-south-east of Garba Tula on the road to the Koreh Wells.

As perhaps the most interesting evidence of the changed conditions in the Province, the Merti plateau shows the reduced rainfall, the consequent desiccation of the country, and the shrivelling of the river system. A glance at the sketch-map will show the relation of the plateau to the Waso Nyiro. After leaving the neighbourhood of the Merti plateau, the river, not yet dry, bends to the south and enters the Lorian, now greatly shrunken. Compare the account of the Lorian given by Dracopoli in 'Through Jubaland to the Lorian swamp.' How far desiccation has proceeded since the book was written (1913) may be gathered from the remark (p. 303) that from Madoleh, where the river finally sinks into the ground, to Merti the "whole plain could easily be irrigated from the river." The "great agricultural possibilities" Dracopoli saw are now hopeless of realization. The present writer waded into the stream in 1914 until his passage was blocked by a mass of high reeds; in 1938 he was informed by members of the expedition that they had jumped across it. Now the land is an arid waste, swept by constant dust storms and dotted only with a few gnarled and struggling trees.

Emerging from the Lorian, the drainage channel is known as the Lak Dera and contains water only after heavy rains. The middle and upper courses of the river have been briefly mentioned in the Report referred to above. Dr. L. R. Cox has named a gasteropod found in a fragment of freshwater limestone, a few miles from the edge of the swamp as it now is. The snail is *Bithynia (Paranerita) humerosus*, v. Martens, a living East African species. Formerly the swamp must have extended some miles to the north, for a pit on rather higher ground put down 5<sup>1</sup>/<sub>2</sub> miles from Habbas Wein bridge on the

<sup>1</sup> See Fuchs, V. E., "The geological history of the Lake Rudolf Basin, Kenya Colony," *Philos. Trans.* Ser. 3, vol. 229, 1939, p. 219. He considers that the water covering the desert was distinct from Lake Rudolf unless by overflow.



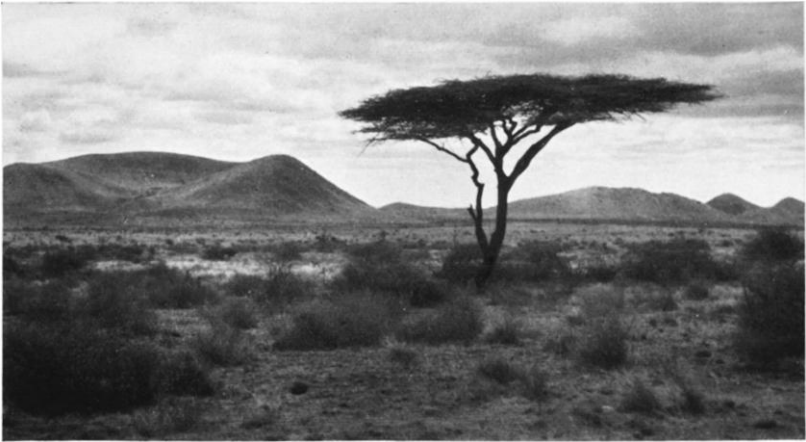
*The Merti plateau*



*Sands composing the Merti plateau; the highest point is crowned by the lava cap*



*The Korkora Sands on the left bank of the Tana river*



*Puys of the Jombeni range, from the Garba Tula-Isiolo road*



*Chalbi Desert, with the lava scarp bounding it on the east*



*The Dida Gulgulla*

Wajir road found massive gypsum at 4 feet. A careful survey accompanied by bores or pits would enable the size of the former lake to be ascertained; obviously it must once have been a very important sheet of water. It may be mentioned that the Galana Gof east of Garba Tula was probably a tributary of the Waso Nyiro or ran direct into the lake. Once it must have been a large river.

The Merti plateau rises sharply from the alluvial plain three-quarters of a mile north of the river, and is doubtless part of an old terrace formed at a time when the Waso Nyiro was a very important feature. It is about 600 feet above the plain, and the sands of which it is composed were probably accumulated during a period of elevation coinciding with one of excessive rain. The plateau is formed of compacted sand sufficiently solid to stand in a vertical face, very quartzose, and containing strings and occasional thin layers of quartz pebbles, which thickly strew the ground at the base of the cliff. Amongst them are a few well-foliated gneisses and pegmatites, accompanied not uncommonly by undecomposed cleavage fragments of orthoclase or an allied felspar indicating an earlier period of dryness. These are derived from the west or north-west. Locally the rock is almost an arkose, and below, forming the lower part of the cliff, is a mauve-coloured rather argillaceous sandstone. Traces of a lower terrace can be seen here and there. The plateau is covered by a thin lava flow that has doubtless preserved the sands from the denudation which removed the surrounding and presumably continuous deposits. Proceeding eastwards in the direction of Wajir there are extensive patches of pebbles on the flat ground, which are probably the remnants of the disintegration of a terrace similar to that of Merti, but unprotected.

The presence of lumps of lava on the slopes of the cliff is due to the undermining of the cap by the erosion of the softer sands below. The existence over a large area of so thin a layer of lava, about 8–10 feet thick, is remarkable; its extent as far as the writer is aware is doubtful, but a similar capping is conspicuous covering the crystalline rocks on the east side of the old safari route between Lysamis and Langaia, and though the intervening country, 70 miles in a direct line, has not been traversed by me, it seems probable that the lava is continuous. Distinctly later than these flows are the puys<sup>1</sup> west of Lysamis showing only the slightest of erosion features and greatly resembling those forming part of the Jombeni range, east of Isiolo.

Similar proofs of a former great extension of the river system preceding a period of elevation are found near the Tana river, 10–12 miles south of Garissa. The locality is known as Korkora, and the alluvial deposits may conveniently be known as the Korkora Sands. An excellent section of these beds is to be seen along a branch road leading east from Korkora about 15½ miles south of Garissa and half a mile approximately from the left bank of the Tana. It consists of red and grey sands topped by a thin layer of quartz pebbles. Locally the sands when slightly clayey are very gypsiferous. The quartz pebbles are well rounded, of ivory, pink, or purple quartz, and seldom larger than a hen's egg. Lava pebbles are unusual, but small pieces of fresh-looking pumice were found by searching. In general terms the sands resemble closely those of the Merti plateau, the likeness being heightened by the frequent

<sup>1</sup> See Report Cmd. 729. 1920. App. C. Fig. c.

occurrence of angular fresh cleavage plates of felspar, amongst which micro-perthite is fairly common. These beds are also exposed 22 miles north of Bura and stretch back 4-6 miles at least from the present bank, and similarly on the right or western bank, as seen along the Kitui road.

Taken as a whole the plain east of the Tana river as far as the international frontier is featureless and covered by thorn scrub, often very dense. Eighty-two miles north-east from Garissa at Aligabe and about 10 miles from the Italian territory, a clearly defined terrace consisting of brown, well-bedded soft sandstones is passed about 600 yards south of the *lak*. These sediments become red and laterized on the lower ground and frequently show an appearance of brecciation; angular grey fragments of hard clay are closely scattered in a chocolate-brown rock with bluish-black iron segregations. The shells of freshwater snails, the epidermis still present in some cases, occur locally in profusion near the *lak*. In regard to the western part of the area, there is little to add to V. E. Fuchs's recent Memoir on the Lake Rudolf basin. The Chalbi desert is bounded on the east by the edge of the lava flows, which the writer believes are of the same age as the lava flows of the Dida Gulgulla, and form a base for the flat conical masses of Huri and Marsabit.

Motoring westwards across the desert for a dozen miles or so the featureless expanse of sand gives place to low hills and dunes with scattered thorn bushes half buried by the slowly invading enemy. This struggling vegetation becomes more profuse and less stunted to the west in the direction of Esie.

Clearly the onset of desolation comes from the east in this locality. Going northward to Northern Horr the same encroachment is seen, with all stages of obliteration from dead sand-scarred stems to dwarfed shrubs whose slow burial has only just commenced. Lake Koronli, on the southern edge of the desert, which figures on many maps, was a shallow dried depression when seen, but no doubt had recently contained water. In August of last year vast herds of camels, sheep, and oxen belonging to the Sakuye were moving down from the north towards Lake Rudolf owing to failing supplies in their own country. The problem is the old one of overgrazing and the possibilities of solving it are extremely poor. On the whole there is no great depth of soil over the Province except for coarse sandy alluvium along the dry river banks, while near El Wak and the Lorian the water is gypsiferous, and pits in the sands of the Koronli desert showed at a depth of a few feet an extremely brackish fluid permeating sandy clays. Lord Hailey's remarks on the "widespread erosion due to overstocking . . . in parts of the arid Northern Frontier District"<sup>1</sup> are well worthy of attention.

<sup>1</sup> 'An African survey,' pp. 1110-11.