The Exploration of Tibesti, Erdi, Borkou, and Ennedi in 1912-1917: A Mission Entrusted to the Author by the French Institute

Author(s): Jean Tilho

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THE EXPLORATION OF TIBESTI, ERDI, BORKOU, AND ENNEDI IN 1912-1917: A Mission entrusted to the Author by the French Institute

Lieut.-Colonel Jean Tilho, Gold Medallist of the R.G.S. 1919

*Read at the Meeting of the Society, 19 January 1920. Map
following p. 160.*

[*Note: The names in the text are spelled in accordance with the manuscript of Colonel Tilho, a few of the principal names—as Chad—in their English form, but the greater number in the French transliteration of Arabic. On the accompanying map the names are transliterated according to the G.S.G.S. rules for transposing from the French to the British system. The retention of the French spelling in the text has the double advantage of familiarizing the student with the two systems, and of preserving in some degree the character of the lecture, which was delivered in French.—ED. G.F.*]

1. Object of the Mission.

BEFORE I begin my lecture, allow me to express once more, in your presence, my heartfelt gratitude to the Council of the Royal Geographical Society for the high recompense accorded me on the occasion of my last journey in Central Africa.

It is of this journey, its chief incidents, and most important results, that I am about to have the honour of giving some account. Let me first of all explain to you, in a few words, what, from a geographical point of view, was the object of my expedition.

Explorations in Central Africa, made during the second half of the nineteenth century and in the beginning of the twentieth, had left unsolved a very interesting problem: it had been noticed that the level of vast stretches of desert, several hundred miles north-east of Lake Chad, were considerably lower than that of the lake—the difference amounting in some places to 260 feet; besides this, a wide continuous trench, offering the appearance of an old valley—the Bahr El Ghazal—led from the lake to this low-lying ground, and seemed to stretch far away to the north-east, between the mountain groups of Tibesti and Ennedi. On proceeding towards the north-east, an increasing analogy is to be noticed between

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the malacological fauna of the Chad basin and that of the Nile. Besides which there had been found recently, in the waters of the Chad, a shrimp till then only found in the Nile basin—the *Palæmon Niloticus*, Roux. In short, all these signs appeared to confirm the supposition that the basin of the Chad was not a closed basin, but belonged to that of the Nile, and was a former affluent of the old river on whose banks had sprung up and flourished one of the most brilliant and ancient civilizations of the world.

This was the hypothesis that the French Institute wished to have investigated, and in the early part of 1912 I had the honour to be chosen to undertake the necessary researches. May I tell you how the mission thus entrusted to me fulfilled my dearest wish? From my early youth I had felt myself irresistibly drawn towards Africa, and I was filled with a desire to take a modest share in the discoveries of great explorers, whose intrepid expeditions had revealed to the civilized world some part of the mysterious and immense dark continent.

You doubtless remember how vague, some thirty years ago, was our knowledge of that part of the world. At that time—which now seems so far away even for those then living—I had for chaplain at the grammar-school a holy man who was an ardent patriot; in his Sunday sermons he used to talk to us a little of our duty to God, and still more of our duty to our humiliated country, which was waiting and meditating, as it laboured, on the possible reparation of the iniquities of 1871. His voice, sad at first while he spoke of our disasters and the sufferings of our lost provinces, soon grew eager and thrilled as he showed us the new way to be taken by children, as we then were, to raise the prestige of our flag: he would speak to us of that mysterious Africa, half revealed by Livingstone, Stanley, and Savorgnan de Brazza; and I fancy, after these thirty years, I still hear the sound of the name of Savorgnan de Brazza re-echoing through our humble chapel and thrilling like a bugle-call. Then, of an evening in the class-room, I would ponder over the map of Africa, where amid great blank spaces appeared in the centre of the continent a few geographical features, one of which, coloured in blue, Lake Chad, possessed a singular fascination for me.

Some years later, on leaving Saint-Cyr, I began to look forward to the realizing of my dream: after a first campaign in Madagascar, I was sent out to serve on the banks of the Niger in 1899; and since that date each successive campaign in Africa allowed me to push a little further eastwards, and so get to work on a fresh item of the programme I had set myself to carry out: to establish an accurate geographical liaison between the basins of the Niger, the Chad, and the Nile, and unite by a great transversal line the extreme ends of the routes followed by Nachtigal to Tibesti, Borkou, Wadai and Dar Four.

In 1912 I was ordered to take command of the province of Kanem for the purpose of preparing a projected expedition against Borkou,

where the Senoussists had established their chief centre of agitation and anti-French propaganda, and whence they periodically sent out plundering expeditions, which spread ruin and desolation among the peaceful tribes placed under our protection. About the same time, the Académie des Inscriptions et Belles-Lettres entrusted me with the mission I mentioned above, concerning the supposed connection between the basins of the Chad and of the Nile. Of this latter expedition, which lasted five years—1912-1917—I now propose to give you a *résumé*.

2. From Congo to Borkou.

From Congo to Lake Chad.—I do not think there would be any real interest in a detailed account of my journey to Kanem; I followed a route pretty well known, the Congo-Ubangi-Shari route. We left the steamer at Matadi, at the foot of the cataracts, and took the Belgian railway which leads to Kinshassa on Stanley Pool, at the head of the cataracts; from there, after crossing the Congo to land at Brazzaville, we proceeded on a river-steamer, first up the Congo itself, and then up its tributary the Ubangi, as far as Bangui. Farther up, lighter steamers enabled us to surmount the rapids and reach Fort De Possel, a little post built on the right bank at the point where the Ubangi changes its course. From Fort De Possel we went by land to Fort Crampel, covering nearly 160 miles of the zone which divides the waters between the basins of the Congo and the Chad. A fine road for motor-cars was being completed when I passed, but the only means of transport was carriers on foot. At Fort Crampel we embarked in small boats and descended the Gribingui till it falls into the Bahr-Sara, taking farther down the name of Shari; from thence we proceeded on a river-steamer up the Shari till we reached the Chad, and crossed over to the post of Bol, on the northern shore of the lake; and finally, in four more stages, we reached by land the town of Mao, the military and political centre of Kanem.

This journey, which takes about twelve or fourteen weeks, according to the season, is very interesting for travellers, and especially for sportsmen, who find opportunity for exercising their skill on game of all sizes, from the elephant and the lion to the modest guinea-fowl. I may mention that when I passed by the banks of the Shari, the remembrance of the exciting hunts of the celebrated aviator Latham, killed by a buffalo, was still fresh in every one's mind; but does any one remember Latham now? We should notice that this line is still far from comfortable, and that the ever-present danger of catching the sleeping sickness through the myriads of glossina-flies that may sting the traveller, spoils all the pleasure one would feel in beholding the splendid landscapes of tropical rivers flowing beneath the shady arches of the quiet forests.

A Year in Kanem (1912-1913).—I will pass briefly over the twelve months' period of my command in Kanem and the neighbouring districts. My daily task—military, political, administrative, and judicial as well—

was such that the days seemed too short for the business to be done. It must be said indeed that the Kanembus, the Budumas, the Toubous, and the Arabs of this region may be reckoned among the most quarrelsome and litigious people one can imagine.

But the great matter was to be informed in time of the Senoussist raids, and when that could not be done, to discover and cut off their retreat towards their distant haunts; but we had to do with old stagers of the Sahara, who knew admirably well to wait for the right moment, and beat a rapid retreat with their booty once the thing was done.

Another important matter was the material preparation for the expedition planned against Borkou and Tibesti, where the Senoussists assembled their bands of brigands, and where they concealed their booty: camels, horses, cattle, and, above all, women and children, carried off into slavery.

The secrecy of this expedition was ensured through the simple fact that our enemies' spies had so often announced the formation and imminent setting out of a punitive column, as to render the Borkou gentlemen quite incredulous of its possibility; they were startled, however, when in July I led a reconnoitring party to the extreme limits of our frontier, but as I retraced my steps without going beyond this line, they were confirmed in their opinion that we should not dare to attack their fortress of Ain Galakka, and they recommenced more boldly than ever their incursions and plunderings among our villages and our tribes. For this reason, when, in the early November of 1912, Colonel Largeau came and assumed the command of an expeditionary column, our departure for the north-east was not considered by the Senoussists of Borkou as more threatening to them than any reconnoitring party of the preceding months had proved to be.

3. In Borkou.

The Conquest of Borkou.—Our expedition consisted of 400 black soldiers, with two mountain-guns; about 200 Arab and Toubou volunteers, forming a "goum" or party of scouts, accompanied the column. We carried with us provisions for forty days, and the total number of our camels was about 2000. By a rather extraordinary piece of good luck, our forward march was not disturbed by the enemy. The season was favourable, the days not being over-hot, and the nights fairly cool; the usual temperature at sunrise was about 60° Fahr., but a very strong wind, blowing from the north-east and raising blinding clouds of sand, made it seem a great deal colder. Our march was skilfully concealed as far as Kourouadi, a point from which we could threaten the fortress of Ain Galakka as easily as that of Faya. There, after allowing the troops a day for rest and final preparation, it was decided to strike a decisive blow at Ain Galakka, the principal centre of the Senoussist forces.

Our column, leaving its convoy a dozen kilometres in the rear, under a guard of fifty men, appeared before Ain Galakka on the morning of

THE COLUMN HALTED AT THE WELLS OF KOUROUADI, BORKOU

THE FORT OF BERRIER-FONTAINE, OASIS OF FAYA

ROCKY COUNTRY BETWEEN THE OASES OF YARDA AND BÉDO, BORKOU

DANCE OF THE NAKAZZAS, OASIS OF FAYA, BORKOU

27 November 1913; the enemy were completely surprised. The attack began by a bombardment of no more than about a hundred shells, which did great damage inside the *zawia*, and made in the outer wall many a breach for the infantry to pass through. The assault was opened at ten o'clock; the defenders, though not numerous, offered a vigorous resistance, preferring to die rather than surrender; by mid-day the entire fortress was in our hands. We had about forty casualties, of which a third were killed.

Leaving our wounded in Ain Galakka with a small garrison, we marched on the *zawia* of Faya, which we entered without striking a blow on December 1. Thence proceeding still farther into the desert, we reached in a week's time Gouro, a point 200 kilometres north, the religious and political centre of the Senoussists in Central Africa, which was seized after a short struggle. Then, continuing its successful march towards the east, the column took possession unopposed of the oasis of Ounianga, 60 miles from Gouro, and leaving a small garrison there we returned to Faya, the best place to be chosen for the military and political centre of the newly conquered territory.

Importance of the Conquest of Borkou.—This laborious campaign had the very important result of depriving the Senoussists of the valuable *tête de pont* on the south side of the Sahara which Borkou constituted for them, enabling them to distribute over Central Africa arms, ammunition, and propagandists of the holy war.

The great value of our conquest appeared plainly a few months later, when the German Emperor let loose on the world the most awful war that ever convulsed the Universe: a Germano-Turkish mission, headed by Nuri Bey, a brother of Enver Pasha, the Turkish Minister of War, landed in Cyrenaica for the purpose of organizing, with the help of the Senoussists, an outbreak in Central Africa against the protectates of France and Great Britain. This would have been an easy matter if our enemies had been able to establish their headquarters in Borkou, for they would then have been only a few hundred miles from German Bornou on one side, and on another from Dar Four and Dar Sula, which showed a certain hostility towards us. There is no doubt that, in this case, the Anglo-French campaign in the Cameroons would have been conducted in very different circumstances; when we take into consideration the large stock of arms and ammunition prepared by the Germans in their colony, and the care they had taken to fortify the mountain of Mora, we may suppose that the German staff had hoped to establish by main force a continental junction between the Cameroons and Turkey, through Kanem, Borkou, and Libya, in case of the communication by sea being cut off. And I do not think I shall betray any State secret by informing you that the Chad territory, with its modest resources in men and ammunition, would have been very difficult to defend with any chance of success against such an attack. I may also add that, had the Turco-Germans been able to

accomplish their design, the result would have been exceedingly perilous for Franco-British rule throughout the whole of Dark Africa.

By uniting, under my command, our frontier territories of the Libyan desert, the French Government's aim was to constitute a force able to resist any attempts that might be made to retake from us the excellent base of operations that Borkou afforded.

Four Years in Borkou (1913-1917).—I do not think it would be of any great interest to lengthen this geographical lecture by explaining to you the difficulties of every kind that I was obliged to overcome during about four consecutive years, in order to fulfil the military task allotted to me. As Borkou produces little else but dates, and Ennedi scarcely anything at all, I was compelled to procure from Kanem and from Wadaï the corn, meat, and other food-stuffs necessary for the maintenance of my civil and military subordinates. Now, the organizing of the commissariat transport became more and more difficult every six months; the want of pasture along the roads we had to take, the incessant raids of the nomads and the counter-raids of my troops, caused irreparable losses among our camels. From the end of 1913 to the first months of 1917, the activity of the rebels was so great, owing to the instigation of the Turco-Senoussists, that my troops could get no rest.

A Bird's-eye View of the Country.—When on leaving the shores of Lake Chad we proceeded towards the north-east, we first entered into a sandy region, with parallel valleys running between grassy downs that rose to a height of not more than 300 feet: this was Kanem, the country of corn and cattle, where subterranean water abounds and where it is easy to live.

After marching for about 100 miles, we left this fertile country and dropped quite suddenly into the desert itself, with its dull, empty, vague horizons, so monotonous that the slightest details interested us, such as a line of stones on the sand, the sight of a crescent of sand-dunes, or a poor, solitary, half-dead shrub; also our passing through a meagre pasturage of dusty *had* was quite an event, or the discovery in the distance of a few green bushes of *siwak*, till we reached the wells, where we were to rest all day long, to lead the camels to drink, and renew our own provision of water, which was often brackish and evil-smelling. This was the deceptive desert of the Lowlands of the Chad, the region I mentioned above as being lower in level than Lake Chad itself.

After a further march of about 250 miles we entered the country of rocks; at first scarcely visible above the sands, they soon rose in sharp peaks that looked like mediæval ruins, and then shot up into long steep cliffs bordering rugged plateaux, that formed ledges one above the other to the foot of the mountains: this was the region of Borkou, Tibesti, and Ennedi, the very heart of the desert, situated at almost the same distance from the shores of Lake Chad, the Nile, and the Mediterranean. This rocky belt forms, from the Tripolitain to Dar Four, a long broken wall,

encircling on the north-east the basin of the Chad, which it divides from the dismal and unexplored waste of the Lybian Desert. Tibesti and Ennedi form the highest and almost inaccessible parts of this region, while another part, Borkou, consists of a wide depression between the basins of the Chad and of the Nile.

4. The Oasis of Borkou.

Faya.—The *zawia* of Faya had been chosen as the military and administrative centre of French Borkou, in preference to those of the Senoussists (Ain Galakka and Gouro), because it offers the least unfavourable lines of communication with the garrisons of Gouro, Fada, and Ounianga, and the best position for joining Borkou by wireless telegraphy to the nearest post of the Chad territory, 350 miles to the south.

The huts of the Senoussist *zawia* sheltered us from the sun and the sand-storms, but they were in such a state of ruin and decay that we were obliged to begin at once and make bricks—unbaked, of course. Unluckily, for constructing our buildings we were obliged to depend on the work of the few black soldiers who were not employed in exterior operations; so that many months elapsed before we could build a sufficient number of habitable houses, and complete the detached works of our defensive arrangements, including three rows of rope network, supposed to be barbed, by means of the addition of long thorns from the date-trees.

The landscape from the summit of the square donjon which overtopped the fort, though wanting in charm and beauty, was not without a style of its own; the post was built in the middle of a broad valley, closed in on the east, but opening spaciouly towards the west; its rugged, steep, rocky sides plunging into shifting sands and wind-swept dunes, each dune curved into the form of a crescent.

At the foot of the fort the axis of the valley was delineated by fine rows of date-bearing palms, about 500 yards wide by 20,000 long, broken at intervals by heaps of moving dunes. On either side of the palm-grove there stretched green meadows, which looked as though they would afford fine pasturage for cattle, but which in reality were covered with sharp, hard grasses and herbs of no nutritive value: the most characteristic and the least bad was *akul*, a regular little bush of sharp thorns, which the camels would eat, but not without making a funny grimace at every mouthful.

All along the valley there lies a sheet of subterranean water, which rises in some places so near to the surface that the gazelles and jackals easily slake their thirst by scraping away with their feet a few inches of the soil; here and there, indeed, a little stream of water flows out of the sand, and runs a few yards towards a neighbouring depression, and little pools are formed in natural or artificial hollows made in the soil.

These jackals and gazelles are the only wild animals found in Borkou; the latter are quite unapproachable by hunters, while the former remain

hidden in the daytime, but come in bands at night, yelping round the villages, and penetrate boldly into inhabited enclosures to seek their prey. So cunning are they that they avoid the most ingenious traps the natives can set. The lion, the panther, the hyena, and the wild boar never pass beyond the desert boundaries of Kanem and Wadaï ; even the antelope and the ostrich, though bearing thirst so well, cannot venture so far into the Sahara.

The winged domestic tribe is seen among the villages in the shape of rare squads of lean fowls ; and flights of turtledoves and pigeons roost in the palm trees. A graceful species of sparrow, with black plumage and white tails, fly in and out of the rocks, and even come into our clay-houses ; they sing like nightingales when building their nests, and chirp like sparrows while they watch their young beginning to fly. All round the inhabited houses the black crows may be heard croaking : they are extremely audacious, whether attempting to snatch pieces of meat roasting before a kitchen fire, or settling on the back of a wounded camel and tearing off with their beaks morsels of bleeding flesh.

Snakes are fairly common, the largest being hardly more than a yard in length and one or two inches thick ; the most dangerous is the short bulky viper that lies hidden in clumps of grass, and whose bite is fatal even to camels. Scorpions abound, generally of a greenish hue, sometimes black ; their sting is very painful, and may be eventually mortal to women and children.

Amidst the rocks one may find a curious eatable lizard, the " dundou " ; it is inoffensive, but when it does bite, it bites so fiercely that the only way of making it let go is to pinch its tail sharply, either with pincers or with one's teeth.

There are very few domestic animals save the ass and the goat ; but small herds of oxen manage to cross the desert from November to February, when cool days, pools remaining from the rainy season, and the scanty pasturages of grasses produced here and there by the few summer showers allow them to pursue their march by short stages.

Where the animal kingdom exhibits its greatest vitality, however, is in the insect world : the common fly, dirty and worrying, rules despotically by day, together with gad-flies and big stinging flies of a pretty greenish hue. At nightfall, the very time when one might enjoy a little rest on the terrace of the houses, moths, coleopters, locusts, dragonflies, and bugs become very lively, and whirl madly round the table where a light is shining, so that it is far preferable to dine lighted only by the moon and the stars. When there is no wind at night there are swarms of mosquitoes, and also of a kind of little sand-fly that pass between the meshes of the best mosquito-nets.

Cultivation.—The soil indeed is not very fertile, which is the reverse of the account given of most oases in the north of the Sahara. It is especially favourable to the cultivation of the date-bearing palm, which

SANDSTONE ROCKS NEAR ORORI, BORKOU

ROCK DRAWINGS, OASIS OF YARDA, BORKOU

SANDSTONE ROCKS ATTACKED BY MOVING DUNES, OASIS OF YARDA, BORKOU

loves to have its foot in the water and its summit in the burning sun, but does not stand rain well. The first dates ripen in the month of May, while the latest are gathered in September; they vary in size, and are dark or light in colour according to their variety, but nearly all are of a very good quality, as sweet and fleshy as one could wish. The greater part of the crop is put to dry, while the most luscious are gathered into heaps and pressed into goatskins, to be carried to Wadai and Kanem and other places farther off.

After the date-gathering the natives prepare their gardens for the sowing of corn, which takes place in November and December. The ground is arranged in small squares, ingeniously adapted for irrigation; but the produce is meagre owing to the want of manure; this is remedied, to a certain extent, by an addition of virgin soil, containing more or less soda, which is fetched from some distance on donkey-back. The gardens are intersected with long parallel hedges, which shelter the ears from the withering violence of the north-east wind. The harvest is gathered in towards the end of March, and a short time later the ground is prepared for the sowing of millet, which yields a still smaller crop than the corn. When we add that in some gardens there grow a few onions and tomatoes, as well as a kind of spinach, scarcely appreciated anywhere but in Borkou, we shall have enumerated nearly all the available food-stuffs of the oases.

I must not forget to mention that the Senoussists had succeeded in importing to Gouro and Faya some fig-trees and a few vines; and on our side we managed to acclimatize the sweet potato, a precious resource which came from Kanem. We were less fortunate in our repeated attempts to acclimatize French vegetables, which succeed so well in the neighbourhood of Lake Chad during the cool season; the poverty of the soil, the want of manure, the extreme dryness of the north-east wind, the voracity of the grasshoppers and other destructive insects, were no doubt the causes of our lamentable failure as agriculturists.

Winds and Rain.—In the heart of the Sahara, where rain is so rare a meteorological phenomenon, the wind is the high arbiter of each day's weather. The weather is fine when the wind is light, and bad when it is strong; in the latter case nothing is to be seen but whirling columns of sand, raised by the north-east wind, blowing in stormy gusts and covering the whole landscape with a thick dry mist of brownish dust that penetrates everywhere and is very painful to the eyes, so that one does well on such occasions to wear motor-goggles to avoid ophthalmia. These north-east winds blow more or less violently for a great part of the year, sometimes for a few hours only each morning, sometimes for whole days and nights. I may say that we were able to note a fair correlation between the oscillations of the curves of the registering barometer and thermometer and the force and duration of these winds; they usually coincide with low temperatures and high atmospheric pressure, while the light winds or the dead calm accompany low pressure and high temperatures. Taking as a

basis the information furnished by the natives, borne out by our four years of regular observations, it may be said that, as a general rule, the north-east wind reigns supreme over Borkou and the neighbouring districts from October to May or June (that is to say, from about the autumnal equinox to the summer solstice); whereas in July, August, and September still weather prevails, alternating with gentle west-south-westerly winds.

It is these latter winds that bring with them from the Atlantic what little moisture nature measures out each year so parsimoniously to these dried-up lands. Then the sky clouds over almost every afternoon, but one's hope of refreshing showers is vain; the heat thrown up from the scorched ground, and the rapidly rising temperature through which the rain-drops fall towards the earth (a rise of about 3° Fahr. per 1000 feet), are enough to bring about their more or less complete evaporation before they reach the ground, and one sees long frayed streaks of grey cloud trailing almost along the ground, like unravelled skeins of wool, from which a few rare drops fall on the thirsty earth. When we took possession of Borkou the inhabitants assured us with one voice that it had not rained in their country for eleven years, thus putting back the date of the last rain to the year 1902; by a curious chance our entry into Faya (on 1 December 1913) was greeted by a little shower of utterly unlooked-for rain. The inhabitants saw in this downfall (unusual not only for that region, but for that season of the year) a happy omen for the rainy season of 1914, an omen which was realized, for in the month of August 1914 we had the satisfaction of registering about 90 mm. of rain at Faya. In 1915 the rainfall was hardly worth mentioning, and in 1916 about 35 mm.

Though Borkou is more than 300 miles south of the Tropic of Cancer, and very low-lying (650 feet above sea-level), the heat is really excessive only for six or seven months of the year, from mid-March to mid-October. During our observations, extending over three years, the maxima registered in the hot season never exceeded 117° Fahr., but temperatures of 110° to 115° were frequent. During the cool season, from December to February, the minima sometimes fall below 50° Fahr. without ever getting down to freezing-point. The dryness of the air is very noticeable from November to June, when a difference of more than two to one may regularly be observed between the simultaneous indications of the dry and wet thermometers: for instance, when the former stands at 44° C. the second often reads less than 20° . On the other hand, in August and September, under the influence of the winds blowing from the Atlantic Ocean, the air becomes very damp and the heat grows stifling.

In spite of its excessive heat, the climate of Borkou is comparatively healthy; very relaxing during the hot and damp season, it is extremely pleasant in the months corresponding to our autumn and winter. During my stay, lasting from 1913 to 1917, none of my European fellow-workers had any serious illness, and my black troops, though kept hard at work in

the shape of arduous reconnoitring and escort duty, and with barely enough to eat, showed a percentage of sickness and deaths below the average of the other garrisons throughout the Chad Territory.

Population and Commerce.—The population of Borkou consists of nomads, the Tedas and the Nakazzas—the great nobles of the desert—and of a sedentary tribe, the Dozzas, who are only half noble, for want of the few camels whose possession would enable them to take a share in the profitable plundering raids in the desert. There is also a third category of inhabitants, the Kamajas, half serfs, half slaves, whose duty it is to attend to the gardens and the plantations of palms, and who are profoundly despised by the other two categories. The total population of Borkou would not appear to exceed some ten thousand souls, distributed among a score of more or less flourishing palm plantations.

The commercial activity of the oases of Borkou is far from negligible; they export towards the south salt, soda, and dates, and receive in exchange cereals, butter, cattle, and smoke-dried meat. Caravans of two hundred camels may often be seen coming to load up with salt at the Arouelli salt-pits near Ounianga; and Arab caravans pass by on the way from Cyrenaica, by Koufra and Sarra wells, importing to Wadai stuffs, sugar, coffee, tea, mercery, and (in time past) arms and ammunition; and exporting principally millet, butter, smoked meat, hides raw or tanned, ostrich feathers, elephants' tusks, and so forth. The slave-trade, formerly carried on through Borkou between Wadai and Cyrenaica on a great scale, has almost entirely ceased since we took possession of the country.

5. Exploration of the Western Borders of the Libyan Desert: Ounianga-Erdi

After drawing up the map of the western part of Borkou, subsequent to my reconnaissance in March and April of the various oases that succeed one another between Faya and Ain Galakka on the south and Gouro on the north, I devoted the last quarter of 1914 to an exploration of the unknown regions situated further east. Over and above their geographical interest, the said regions were of great military importance. My object was, in fact, to ascertain whether a counter-attack by the Senoussists, starting from Koufra and crossing the Libyan desert, could easily hope to escape the vigilance of our camel-corps patrols and fall on the remoter borders of Borkou and Ennedi.

From Faya to Ounianga.—With this intention I left the oasis of Faya on 1 October 1914, at the head of a small escort, taking with me only some thirty lean camels tired and mangy, only capable of short stages and of carrying light loads. The result was that I spent nine days in covering the 117 miles between Faya and Ounianga, a journey that offers no difficulties and is usually completed in five or six stages. The points at which water may be found are frequent—at least one every 20 miles—and permanent; but grazing-grounds were almost non-existent at that time in consequence of the eleven years' drought the country had just

suffered from. The rain that had fallen in August had, it is true, made a few green blades spring here and there, and they were eagerly snapped up by our camels as they passed; but they were still so scattered among the broken rocks that they rather emphasized than diminished the desolate barrenness of these dreary solitudes. From place to place, round a water-hole, one found a few wretched acacias, bushes of *rtem* or tufts of *akrech*. By chance one would come across what had once been a field of dried-up *hâd* whose thorny branches were grey with dust; but in a general way the landscape was disappointingly bare, and I wondered anxiously how long my camels would hold out on this starvation diet.

The route passed alternately through hamadas of sandstone, the blackened rocks of which emerged from irregular dunes, and through sandy plains into which one sank, raising thick clouds of dust finer than ashes. We did not meet a living soul on the way, except a detachment going back to Faya, and a little caravan consisting of two delegates of the Grand Senoussi coming from Cyrenaica on their way to Fort Lamy as an embassy to the commander of the territory. I spent an afternoon with them near the wells of Eddeki, and so had the pleasure of offering them tea. The chief delegate, Si Mahmoud Sheikh, was a Khoan of fairly high rank in the Senoussist confraternity. His appearance was that of a good Mussulman "brother" by no means indifferent to the good things of this world; fifty years old, and of a fine corpulence, he had a fair but sunburnt complexion, grey hair, a black beard, a round face, thin lips, small eyes, and a sensual nose. He was dressed all in white, walked with gravity, and spoke little. His attitude, free from arrogance, was not without a touch of awkwardness, and his reserve concealed but ill his uneasiness about the fate that might await him during his long journey among the infidels.

His companion, Abdallah Ghariani, was younger and of a very modest rank among the Khoans. He had a jovial, bustling manner, and talked volubly, but his eyes were sly and shifty. While we drank tea flavoured with mint, he boasted of the pacific intentions of Ahmed Sherif, insisted on the desire of the Confraternity to maintain active commercial relations between Cyrenaica and the Wadai, and on the necessity for suppressing the Toubou brigandage that hindered the march of the caravans. In conclusion, he declared that he had eaten no meat for a long time and begged me to make him a present of a small quantity of smoke-dried meat—a precious commodity in the desert, where the resources of hunting do not exist.

Ounianga.—I reached the valley of Ounianga on October 9 in the morning, and was not a little astonished at failing to see the palm plantation till the moment of entering it; for, unlike those of Borkou, which can be seen from a distance, the oasis of Ounianga is hidden in a rocky excavation some 30 yards in depth and 4 or 5 miles long by 1 or 2 wide. The landscape thus formed is incomparably picturesque: a great

NATURAL CISTERN, ERDI

THE PEAK OF DIMI (600 m.), ERDI

THE PEAKS OF DOURDOURO (1000 m.), ERDI

sheet of calm water with blue shadows, edged with rosy-tinted beaches of sand, and fringed with green palm-trees stretched within a circle of bare wind-carved sandstone whose sombre hues cast here and there, under the blazing sun, warm shadows glowing with red or gold.

But it must be recognized that in spite of its beauty the palm plantation of Ounianga is but wretchedness, gloom, and disappointment. The inhabitants, known as Ounias, are few—some hundreds at most. On the other hand, millions of flies fiercely exercise their buzzing activity for fourteen hours a day on man and beast. The soil is unfruitful, and produces hardly anything but dates. The foodstuffs necessary to life—cereals, butter, smoke-dried meat—are brought at great cost by caravans coming from Abéché to seek the supplies of salt from Arouelli needed by the inhabitants of Wadai. Even the camels cannot live in the neighbourhood for want of enough pasture, and from this cause our little garrison had the utmost difficulty not only in getting supplies, but in fulfilling the mission of watching the approaches of the frontier, and especially the great road from Koufra that emerges from the Libyan desert in the region of Tekro Arouelli.

It occupied at the north end of the lake a little rectangular fort, solidly built, but surrounded at a short distance by rocks that blocked the view and overlooked it to the north and east. It had not been possible to find a more favourable site, offering at the same time extensive views and an easily accessible water-supply.

I devoted two days to different tasks (inspections of the garrison, interviews with the Ounia chiefs and with two Khoans, former governors of the country in the time of the Senoussist domination, and so forth), and set out again on October 11 to visit the last water-points before entering the Libyan desert.

The Libyan desert is still almost completely unknown, no European traveller having been able as yet to cross it from side to side, whether from north to south or from east to west. In 1870 Gerhardt Rohlfs visited the northern part, as far as the oases of Koufra; a quarter of a century later British officers penetrated the south-eastern region as far as Bir Natrun, about 200 miles west of the Nile. On our part, we have been able to explore the south-western district and to obtain in respect of the central part fresh information, which it will not be easy to verify and extend until the French, British, and Italian governments combine in organizing for that purpose a geographical expedition, which would be of considerable scientific and even political interest.

I first took the direction of the salt-pits of Arouelli; situated 28 miles to the northwards, where I met a caravan that had just loaded up with 30 tons of salt for the Wadai markets. The salt-bed lies at the bottom of an absolutely bare sandy depression, covering some 25 acres. The bed of salt, which is only about 6 or 8 inches thick, is on the surface, and more or less mixed with sand. The water-bearing stratum lies at a depth of 5 or 6 feet, and the water is naturally very salt. The water, rising to the

surface by capillarity, evaporates, forming the salt crust that the caravans carry away in pieces, and which the natives of the Wadai and the countries bordering on it consume without further preparation. If one may trust the information supplied by the Ounias, the salt crust forms again about three months after being taken away, so that the output of the Arouelli pits would amount to nearly 100,000 cubic metres of salt annually, an output sufficient to satisfy the culinary needs of more than ten million people, and worth on the spot, as prices were before the war, some fifteen million francs.

From Arouelli I went eastwards to fix the position of the well of Tekro, where there is also a deposit of salt which is not worked, the admixture of sand being too great. The well of Tekro is particularly important, because it is situated at the extremity of the great caravan route joining the Mediterranean to the Soudan by the oases of Koufra and the well of Sarra. The water is abundant and fairly fresh, but the vegetation is reduced to a hundred clumps of siwak and a few tufts of grass of no value for the feeding of camels.

The Route towards Koufra.—Between Tekro and Koufra the distance to be covered is about 350 miles, about half of which had just been reconnoitred by Lieutenant Fouché, commanding the garrison of Ounianga. Marching in a general direction north-north-east he had first crossed a rocky zone of slight elevation, spending four hours in doing so; then for two days he traversed an immense sandy plain, bare of all vegetation, with here and there stretches of rock surface level with the ground; broken lines of rocky heights were visible in the distance to east and west. These heights went to join the plateau of Jef-Jef, in the direction of which he marched for twelve hours during the third day. On the fourth, he found himself in a vast plain from which the Djebel Habid, 50 miles away to the east, can be seen during the first few hours. The fifth day ranges of moving sand-dunes that served as landmarks for the guides were observed to the north-west, and at last, at nightfall on the sixth day, he reached the well of Sarra, lying in a hollow running from south-west to north-east and 30 metres deep.

The site of the well was chosen by the revered Sidi el Mahdi about 1898, and the works began almost at once. The boring, all done with picks and crowbars, was effected in hard reddish sandstone, by gangs of six workmen, relieved every month, and supplied with food and water by an endless succession of camel-convoys. At the end of eighteen or twenty months of uninterrupted work the water was at length found, clear, fresh, and abundant, at a depth of 80 yards, and since then the crossing of the Libyan desert has become relatively easy, the longest stretch without water being reduced to about 180 miles, whereas it was formerly almost 300. From the well of Sarra to Koufra the distance to be covered is only about 160 miles and offers no further difficulties, thanks to the intermediate well of Bechra.

What makes the journey from Ounianga to Koufra particularly troublesome is the total absence of pasturage for 500 miles, a state of things that results in the loss of many camels on every journey. The only good pasturage in the whole region is said to be found 80 or 100 miles to the east of the Sarra well, in the Djebel El Aouinat, an unexplored mountain mass of an extent not exceeding 1500 to 2000 square miles, as I am informed, and whose altitude may be roughly put at from 4000 to 5000 feet. It goes without saying that I only give these figures as a mere indication, and as subject to caution in every respect.

The break in continuity between the surveys of Rohlf's from the Mediterranean to Koufra and ours from the Wadai to the well of Sarra is consequently reduced to about 180 miles; but this gap does not seem likely to be bridged before Italy proceeds to an effective occupation of the oasis of Koufra, which falls within her sphere of influence.

Having ascertained the site, depth, and value of the Sarra wells, Lieutenant Fouché, in accordance with his instructions, set himself to march back to Ounianga, but the return journey was particularly dramatic. For from the very first day his guide led him directly south, instead of marching south-south-west. One is justified in supposing that he meant to lead astray in the desert the detachment whose camels were so exhausted that everybody went on foot, and whose store of water was limited to a little less than a gallon a day per man. Astonished at this unaccustomed deviation, the lieutenant drew the guide's attention to it, but the latter answered: "Do not be uneasy, we are on the right road." But when he judged that the column was far enough from the tracks left by the outward journey, he replied to a fresh observation made by the lieutenant: "You are probably right, for I no longer see my usual landmarks; but if you would lend me a camel and a skin of water, I would go and find our tracks of the other day, and as soon as I had found them I would come back to look for you." The lieutenant thought it wiser to turn guide himself, and, compass in hand, he put himself at the head of the caravan, with what anxiety may be guessed! An error of direction of a few degrees—quite a usual thing in marching by the compass with no natural landmarks—might work out at a matter of 15 miles in a distance of 180, that being the distance to Tekro. And the well had to be found, in the immensity of the desert, before the detachment's scanty water-supply gave out! The black soldiers' thirst was aggravated by the crushing heat; reduced to a daily ration of a little less than 4 quarts of water, they no longer ate any solid food. The camels, grown weak, slackened their pace. The men, uneasy at not coming across their traces of the outward journey, thought themselves hopelessly lost. Their feet, swollen with weariness and made painful by the burning sands, seemed incapable of carrying them to the end of that interminable plain, torrid and unchanging, where the air vibrated as it vibrates above an overheated stove, creating all along the route deceptive mirages, ceaselessly dissolving and reappearing. After a while some

of them lost heart and wanted to stop, preferring to wait for death where they were rather than go on with an aimless march. The lieutenant tried to cheer them up by singing the praises of his compass, and promising them that on the morning of the seventh day the three familiar rocks near the well of Tekro should appear before them on the horizon. Incredulous, but respectful, they betook themselves again to their journey, advancing automatically behind the camels as exhausted as themselves, and by some miracle, on the promised day and at the promised hour, they saw faintly outlined against the far horizon the rocks of their salvation! A few hours later, bivouacked round the well of Tekro, the brave fellows who had just covered 350 miles on foot in fourteen days in conditions of the utmost hardship, had forgotten their weariness and were contemplating with respect, on the lieutenant's table, the "good little iron" that had saved them from the most horrible death.

As for the guide, he was left unmolested, his criminal intention not being susceptible of absolute proof. It was the wisest course to take, for by punishing him without proofs, all we should have gained would have been to terrify men whom we might need later on! In the desert, the best guides may have their weak moments!

From Tekro to Ounianga.—From Tekro I came back to Ounianga, and continuing eastwards by the lakes of Little Ounianga and N'Tegdey I reached the salt-pits of Dimi, after crossing a chain of little sand-dunes about 50 feet high, stretching from north-east to south-west, and extending from 5 to 6 miles in breadth. This salt-pit lies in a sort of huge circle of rock, in the middle of which rises an isolated conical peak 500 or 600 feet high. It seems to me more extensive than that of Arouelli, but the salt from it does not seem to be so much in demand, on account of the very large proportion of sand it contains. The result is that it is hardly used by any one except the natives of Ennedi, who have only three days' journey to go in order to get a supply of it. The grazing, though by no means abundant, was less scanty than in the regions I had just come through, and my skeleton-like camels could eat their fill, for the first time in a whole month.

From the top of the rocks of Dimi my Ounia guide, Sougou, pointed out to me in the east the almost horizontal lines of cliffs forming the most westerly point of the mysterious plateaux of Erdi. The word "Erdi" means in the language of the Toubous "expedition, razzia," and would appear to have been applied to that region from time immemorial because it served as a meeting-place for the bands of raiders who put the caravans to ransom and pushed their raids as far as northern Dar Four and Kordofan, and sometimes even to the valley of the Nile in its middle reaches. According to the guide, rocky tablelands were to be found there, of an altitude comparable with that of Ennedi; the rains were less rare than in Borkou, the grazing-grounds for camels abundant, and the points where water could be found were hidden away in gorges difficult of

access, little known, and hard to find the way to. For his own part, he hardly knew any except those of Erdi-Dji and Erdi-Ma, separated by a distance of 70 or 80 miles.

I hesitated some time before continuing my journey towards this region, whose very name was unknown till now; my water-barrels only gave me a reserve of some thirty gallons, and my men's skin bottles were so corroded by the salts of sodium they had transported that they were empty after twenty-four or thirty-six hours' march. My camels, thin, worn out, and more and more mangy, could not do more than 20 miles a day, and I only had at my disposal ten days' supplies for my detachment, so that any error on my guide's part might put me into a critical position.

Erdi.—In spite of everything I resolved to make the attempt, trusting in fortune to ensure its success. In two marches we succeeded in reaching the foot of the cliffs of Erdi-Dji, 750 feet high and about 2000 feet above the sea. We found there good grazing for the camels, and from that day onward we had abundant fodder at each successive stage, so that I was delivered from the dread of seeing my indispensable beasts of burden waste away from inanition. The water was no less abundant, and was found in natural cisterns hollowed out by waterfalls in the beds of dried-up torrents that came down from the plateau. Some of these cisterns contained nothing but sand; but it was enough to bore a hole 1 or 2 feet deep in the sand to obtain a sufficient store of water.

From the top of the cliffs all that could be seen was an immense plateau, slightly undulating, and rising gradually towards the north-east. Beyond the line of the horizon some dozen miles away, there rose, as our guide told me, other cliffs; but all I could do was to take note of that information without being able to verify it.

Continuing our route eastwards along the foot of the cliffs, we reached five days later the region of Erdi-Ma, decidedly higher than that of Erdi-Dji: the highest altitude I had the opportunity of measuring exceeded 3000 feet. Our bivouac was installed at the entrance of the gorges of Dourdouro, where very picturesque natural cisterns are to be found containing abundant quantities of water withdrawn by the positions of the enclosing rocks from the drying action of sun and wind. During the whole of the way thither we did not see a living soul, any more than in the neighbourhood of Dourdouro.

My guide never having gone beyond that point, it was impossible to push my investigations further. Besides, I had now only four days' supplies left, a fact which obliged me to change my direction and make for Wad Mourdi, on the northern border of Ennedi, where I was to receive fresh supplies. I had eventually to be satisfied with determining the position of this point and measuring a few heights while we were renewing our store of water before starting again after a day's rest.

This expedition, though limited to the south-western border of the massif of Erdi, revealed some interesting facts about the configuration

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of the country towards the 18th degree of latitude north and the 23rd degree of longitude east of Greenwich ; the altitudes increased from west to east, and it seemed likely that the massif of Erdi was connected in one direction with the mountains of Tibesti by the plateau of Jef-Jef, and in another with the still unknown massif of El Aouinat, situated approximately between the 22nd and 23rd degrees of latitude north and the 24th and 25th degrees of longitude east.

Later information gave me a few further indications about western Erdi, where two water-points were found ; one Bini-Erdi, about 80 miles north-east of Dourdouro, and the other, Erdi-Fouchini, some 60 miles north of Dourdouro, at the foot of a line of tall cliffs. The deduction may be allowed, for the time being, that the central tableland of Erdi offers altitudes presumably superior to 4000 feet, and that it slopes gently down on the east to the great sandy plain, without vegetation or water, across which passes the route from El Aouinat to Merga, a route that establishes direct but very difficult communication between Koufra and Dar Four, to the east of the 24th degree of longitude.

Between Erdi and Ennedi.—In leaving Dourdouro to march southwards I was going into the unknown. I could, no doubt, see in front of me, 40 miles away, the crests of northern Ennedi, at the foot of which I was to find the water-points of Aga and Diona ; but to seek the said points without guide in the chaos of rocks was a risky undertaking, and might have been held unreasonable if the way our supplies were running short had not obliged me to go forward.

A vast depression, stretching from south-south-west to north-north-east and of an average breadth of some 30 miles, separated Erdi from Ennedi ; it was the depression I heard spoken of earlier as a prolongation of that of the Bahr El Ghazal, through which Lake Chad once poured its waters into the lakes of Toro and Djourab, and consequently that by which the basins of the Chad and the Nile might in ancient times have entered into communication. That being so, I took the utmost care in examining the region and determining the altitudes. The lowest point was found about 30 kilometres from Dourdouro. Its altitude was 1750 feet, or 1000 feet higher than that of Bokalia at the north-eastern extremity of the Djourab. The slope was therefore from north-east to south-west, as was confirmed by the shape of the ground and the general direction of the valleys running into that depression, and I was able to conclude that if an ancient river once flowed in the bottom of that broad valley, which is hardly likely, it ran, not towards the Nile, but towards the lowlands of the Chad. By this evidence, one of the most important items of my geographical programme was fully elucidated : the basin of Lake Chad constitutes in the centre of Africa a closed basin which has never been connected with the basin of the Nile. The lake zone, now dried up, consisting of Kanem, the lowlands of Lake Chad, and Borkou, was once the outlet for the affluents of Lake Chad and for many great rivers coming

down from the mountain mass of Ennedi, Erdi, and Tibesti. Its outline at successive periods—an outline in all probability very irregular—might be indicated by the hypsometric curves 270—260—250 metres, adopting for the Lake Chad of to-day the altitude of 240 metres. Its extent at that period must have been comparable with that of the Caspian Sea at the present day, and its greatest depth some hundred metres.

In the evening of the second day's march, when we were drawing near the foothills of Ennedi, we had not yet found any well, and our tiny store of water was used up. But spying in the west a notable gap in the line of hills, I thought we should be likely to find a water-point there, and profited by the coolness of the night to try to reach it. At dawn we came out on a fine river, dried up, where we got a little water by digging holes in the sand. By good luck our guide, Sougou, recognized that we had reached Oued Mourdi, where he had come by another route some six months earlier; thanks to which discovery, after a little search we were able to bivouac beside the well of Diona.

If I had had time and means, it would have been extremely interesting to explore up to its starting-point the great depression I had just crossed, a depression which perhaps comes down from the region of Merga in the heart of the Libyan Desert, where the natives agree in declaring that there exists a little lake surrounded by a palm plantation. The probable position of Merga is between the 25th and 26th degrees of longitude east and 18th and 19th degrees of latitude north. This oasis is situated on the direct route from Ennedi to Dongola, about 200 miles from the last water-point of Ennedi (Gourgouro).

(To be continued.)

CLASSIFICATION OF THE GROUND FROM THE AIR

Captain H. A. Lloyd, M.B.E. (late Intelligence Corps)

Read at the Afternoon Meeting of the Society, 8 February 1920.

AS a preliminary it should be stated that this paper is based on the experience I gained, as Intelligence Officer to the 9th (G.H.Q.) Wing of the R.A.F., of the difficulties of navigation over enemy territory on the Western Front during the last two years of the war.

The closer co-operation between the army and the air force, brought about early in 1917, by the establishment of special Intelligence Sections on all aerodromes accommodating reconnaissance or bombing squadrons, led naturally to a more careful study of the reports brought back by pilots and observers. It soon became apparent that a large percentage of the reconnaissance and photographic flights undertaken yielded no intelligence.

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FRENCH SUDAN.

Map to illustrate the
WORK OF THE MISSION TILHO
in
TIBESTI, BORKU, ERDI AND ENNEDI

Scale, $1/2,000,000$ or $1/2$ M.

MILES 20 0 20 40 60 80 MILES

1 Inch = 31.56 Stat. Miles & 1 Millimetre = 2 Kilometres

KILOMETRES 20 0 20 40 60 80 100 120 KILOMETRES

Reference.

Principal Routes of the Mission

Other Routes

Permanent Wells, Springs & Pools ●W ●S ●P

Temporary " " " ○W ○S ○P

Heights in Metres.

Redrawn from a map prepared for Lt. Col. Tilho
by the Service Géographique de l'Armée.
For astronomical positions and description of
surveys see note to be published in the
Geographical Journal, Oct. 1920.

Map by the Royal Geographical Society.

17 18 19 20

TIBESTI
Tilho