

up the steep ascent, and by nine o'clock scaled the summit, following the fresh track of an *Ovis Argali*, which showed that our approach had been watched by sharper eyes than ours. Mist had gathered again, obscuring the view. Immediately below us was the northern rampart cliff, and it stretched away eastward, until in the distance its continuity was broken by the Darband-i-Nafta gap. From the foot of the cliff the ground slopes steeply to a maze of foothills and ridges which fall away to the Trans-Caspian plain. The grassy slopes afford pasture to the flocks of nomad tribesmen, some of whose black tents were visible far below. Over the west shoulder of the Kamar leads the difficult path to Deh Chah. Through the Darband-i-Nafta the road leads north-east to Dushakh on the Trans-Caspian railway 16 miles distant, and crosses the frontier at the Darband-i-Khoja half-way.

Temporary partings of the mist clouds revealed extensive views over the Trans-Caspian plain and the Kara Kum desert beyond, stretching like a sea to the horizon. Dark patches on the buff plain marked the wooded enclosures around the stations on the Trans-Caspian railway. To the north lay Kakhka, where in the preceding summer a little British force had joined the retreating Trans-Caspian army and enabled them to make head against the Bolshevik onslaught, and eventually to turn the tables and drive the Red invaders back to the Oxus. Further north-east, but obscured by cloud was Dushakh, the scene of the desperate fight on October 15, 1918, when the 19th Punjabis covered themselves with glory, and struck the enemy the final blow that compelled the abandonment of their enterprise.

Looking backwards over the interior of Kalat-i-Nadiri, the view was of rolling downlike hills with here and there a sharp peak, all draining to the deep valley of the Issik Su which lay below, and all bounded by the wonderful encircling cliffs.

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## NOTES ON THE OKOVANGO AND KUNENE RIVERS

Maudslay Baynes

I HAVE been interested in articles appearing in the *Geographical Journal*, "The Control of Climate by Lakes," by Prof. E. H. L. Schwarz, vol. 57, No. 3, of March 1921; and "Notes on the Kunene River, Southern Angola," by F. E. Kanthack, vol. 57, No. 5, of May. Being acquainted with the Okovango and Kunene rivers over that part of their courses most in question, that is the easterly course of the former and westerly of the latter, I offer the following remarks.

The first question that presents itself regarding the Okovango is: What proportion of its volume flowing past Libebe, say, may be supposed actually to reach the Zambesi *viâ* the Chobe? If I am right in supposing

that it would be so small a proportion as relatively to be negligible, we then get these further considerations: Since, when the river is flooding and subsequently, say for six months out of twelve, one can push along for mile after mile in a native canoe through what looks like a huge acreage of lush meadows, now and again crossing open water in marshes or even rivers, it would seem that under nature's conditions of to-day the waters of the Okovango are largely functioning as Prof. Schwarz would have them do further south: only that under present conditions the process of evaporation is retarded owing to the cover afforded by standing grass and vegetation [which may, however, in some conditions evaporate more than open water.—ED. G.F.]. The question follows: Does the present marsh and flood distribution in this northern area influence rainfall? The Kalahari is well wooded and only a desert in the sense that its sandy surface does not hold water; although the bushman by inserting a hollow reed is able to suck up enough moisture to satisfy his meagre requirements. On digging the moisture recedes. I do not know whether it is considered that the present rainfall in the Kalahari would be inadequate even if the surface were water-supporting. South-west of lake N'gami the sand gives place to limestone over a wide area in what is known as the Ghanzi veld, where I think wells do not need to be sunk to any great depth.

Most maps show a considerable sheet of water south again of this limestone formation and well in the desert in "Anderson's vlei." I believe that this pan was persistently and vainly looked for in recent years, and if more or less correctly placed has presumably disappeared since Anderson saw it (*circ.* 1865). This leads me to suggest that perhaps in drawing conclusions as to general desiccation insufficient allowance is often made for the effect of inundations which have been due only to temporary conditions, such as successive years of excessive rains. In Portuguese East Africa at all events there is evidence that the extensive lake system which runs parallel with the coast has retained more water since the floods of four years ago than it had had for a very long time previously, as massive trees of great age have died from standing in water near the present—1921—margins of these lakes.

I venture the opinion that the Kwito carries a volume of water at least equal to that of the Okovango, and doubles the resources of the latter river below the junction. It is not as wide, but appeared in 1911 to be deeper and much swifter. On the Kwito the Portuguese had stationed an iron vessel, which had been transported from the coast in sections and assembled on the spot. I think they told me it had never had steam up. It was sufficient to ferry my waggon and belongings, though I nearly lost several of the oxen, which had to swim from bank to bank, and which, owing to the current, were washed several hundred yards down-stream during the passage.

The Okovango at Mohongo, where I crossed it on several occasions,

presents a much more formidable appearance than the combined waters of the Limpopo and Olifants below the confluence at normal flow ; indeed, it is comparable with the last 20 miles of the Limpopo where the latter is navigable by ocean-going but diminutive steamers. Mohongo is well below Lisho (Libebe), and on the Protectorate side of what was the Caprivi Zipfel, and is the point below which the river begins flooding into the marsh on the south bank.

Before reaching Kwangarri (I was proceeding along the southern border of Angola from east to west) I was held up more than once for days at a time—the months were January to March—and yet I forded the Okovango there in a small boat with ease (absence of current), and my cattle even walked the river-bed for a further distance than they needed to swim. Compare this with my experience in crossing the Kwito before all this rain.

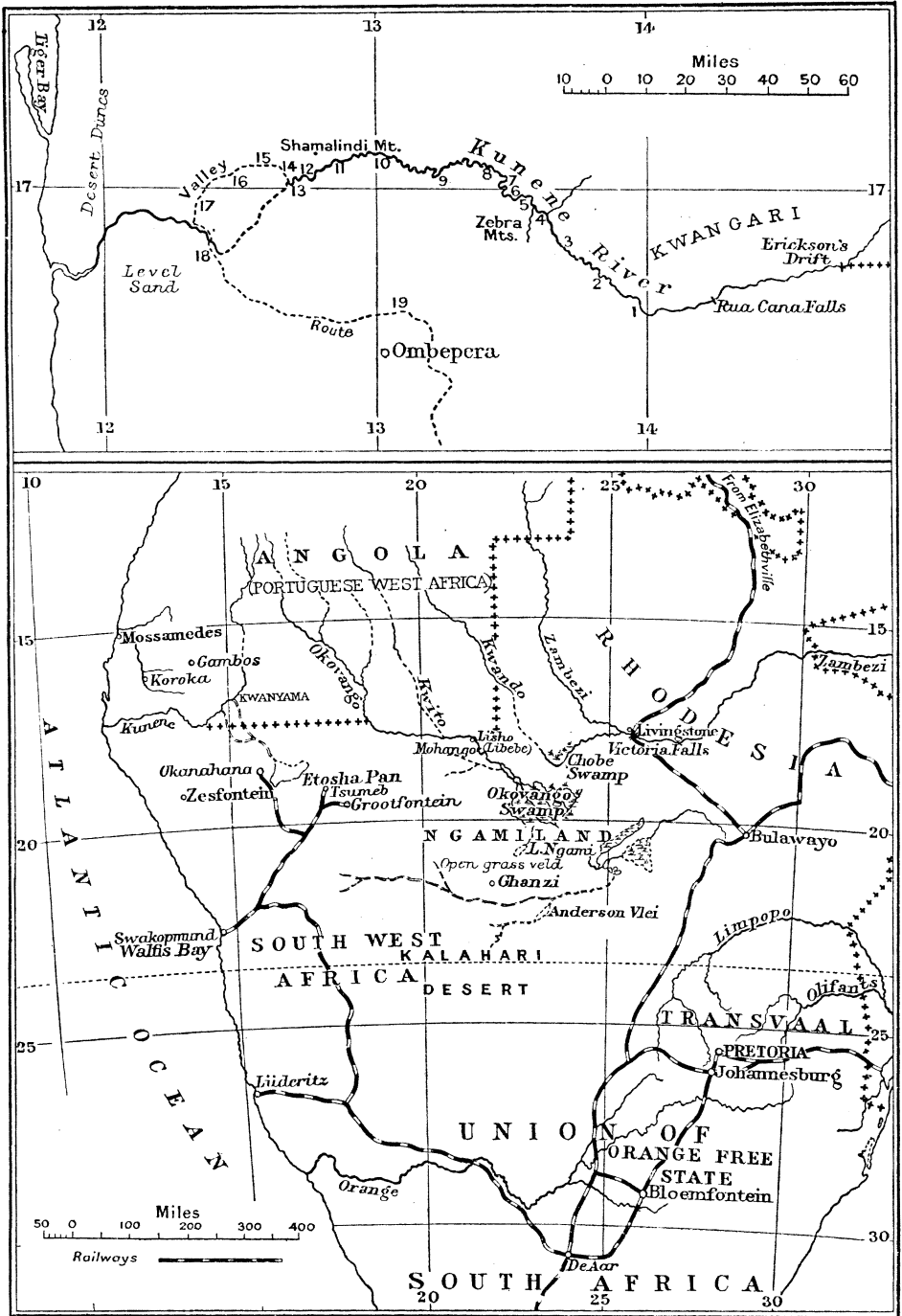
I have a pocket-book which records in pencil my diary from above Erickson's drift to where the Kunene debouches through the last of the mountains on to the desert sand that belts the coast. I will not attempt to give in detail the history of a journey which began in a spirit of picnic and developed into a struggle for bare existence ; but extracts from the diary with the accompanying sketch-map may help to bring out the salient features.

I cannot hope to add materially to Mr. Kanthack's information on the section between Erickson's drift and the Rua Cana cataract ; but I note the following points : I rode across this drift on a good-sized ox which did not have to swim. This was in the latter part of June, but a dry year (1911). I have noticed, however (particularly with the Olifants and Limpopo), that sandy rivers subject to floods constantly shift their bed sand, so that for the same height of water a drift that one has to swim one year may become less than knee-deep the next. Although the Okovango and country eastward had had copious rains, the country from about halfway between Kwangarri and Kwanyama through to the west coast was suffering from a culmination of drought extending back through several years of scarcity.

I photographed the western fall on July 11—about the same day of the year that Mr. Kanthack saw it—and close inspection shows considerably less water in 1911. In extracts from the diary, given below, on August 20, I noted " clear water-mark along rocks about 5 feet above present level " ; and on the 31st of the same month " river falling daily."

Certain Bashimba hunters had attached themselves to my party just before reaching the big cataract, and their name for it was " Pupa." This is remarkable, because the rapids on the Okovango are also called " Pupa " by a quite different people, speaking a totally different tongue.

Mr. Kanthack says : " Of the Kunene below the falls very little is known, . . . At the Monte Negro Falls the Kunene is said to make a drop even greater



Sketch-map of the Kunene River below the Rua Cana Falls, with numbers referring to notes in text : and General Sketch-map to illustrate the paper.

than at Rua Cana, but the information about these falls is very vague. . . . The length of the Kunene described is very wild and unapproachable, and access is only possible along the south bank."

We followed the river along the north bank from Erickson's drift to some miles below the Rua Cana falls before recrossing, and I may remark here that on the only two occasions that natives were encountered from here to the coastal desert they were Bashimba from the north. We swung from bank to bank in the effort to get forward (rapids are continual and generally fordable), and the balance of passable going must certainly be given to the north bank; also, as far as I could judge, should accessibility from the hinterland; and when, under the guidance of local knowledge, we were obliged to abandon the river for a few days, it was a *détour* to the north. When we were finally forced south the earliest signs of native habitation were something like 50 miles in a direct line south from the river. As to the going, the best comment is that from Erickson's drift to the coastal desert took ninety-three days, and thence to Zesfontein (also without roads and through mountains) only twenty-one days. The straight-line distances are nearly equal.

It is difficult to know where to place the Monte Negro falls; but they must either be at point 9 or between 13 and 18 of the sketch: if at the former, then judged by sound the fall must be something less than half that of Rua Cana; if at the latter, the sound which the guide insisted was roaring wind behind the adjacent heights (diary extracts below, 16/9/11) on a calm day in the valley might be this cataract, and if so it is only just behind the mountain gate at point 18. Not to have investigated such matters while in the vicinity would seem to argue lack of enterprise, and I may therefore be allowed to say that I had originally expected to reach the coast and return to Kwanyama in under two months; that in spite of rigid economies the last of the supplies had run out on August 16, since which date game meat and river water were our portion; and when the final turn away from the river was made less than a dozen rounds of rifle ammunition remained. Also I was much bothered with malarial rheumatism, etc., a legacy from N'gamiland.

Mr. Kanthack's sketch-map marks a considerable tributary as the last feature westwards entering from the south. It is worthy of mention therefore that all watercourses encountered after leaving Kasupe's (point 19)—and there were several large-sized river-beds—were headed south, that is, away from the Kunene, and presumably when in spate find their own way west to the coast south of the Kunene mouth. The diary records "all this country (Kasupe's) very high, with an almost cold climate by day" October 2, about lat. 17° S. I did not anywhere find tributary water entering the Kunene; but during rains no doubt it would be impossible to follow it owing to swollen torrents from the surrounding highlands. From near the summit of the "Zebra" mountain (point 4) I could make out a huge basin in a horseshoe of mountain tops to the

north-east, across which basin the winding course of a tributary bed was marked by green vegetation in contrast to the prevailing grey-brown of the landscape. I do not think it was flowing, but very possibly lying in pools; and it came from the direction in which the Bashimba pointed a Portuguese post which they called "Gambos," only two or three days away for a native on foot.

The following selections from the diary are numbered for reference to the sketch-map:—

1. River fordable, rapid, waist-deep, and say 15 yards wide only. Big hills on south bank white. White, cement-like slabs of stone.

2. Cataract facing north, about 20 feet drop, whence river north-west in succession of rapids, and going very difficult. Smooth black rock.

3. Broad, sandy, reed-fringed river-bed from south. "Zebra" mountains approach from south and show west.

4. Zebra-like appearance of this range due to streams of ironstone boulders from knife-back summits, intersected with astonishing regularity by declivities containing grey grass and trees. Small pellets of iron lying on white *débris* in torrent beds. Lower formation a smooth, dull white rock, not friable. Enormous basin in horseshoe of distant peaks north-east brings winding tributary thence to river opposite.

5. Elephants all the way lately. Small tributary river-bed from south. Bashimba from north squatting with cattle, about fifty head of grown beasts. They asked me to give them a paper to the effect that the cattle belonged to me. They say that there is a Portuguese post named Gambos some days to the north-east.

6. Country opens again south side after river has been shut in by ironstone heights to, say, 2000 feet: also temporarily free from rapids.

7. River east-north-east.

8. River north-west with many rocky channels from mountains a few miles to eastward. Appearance in front of hillocks of white (sand?) covered with small, sparse bush along river, backed by zebra mountains with an occasional white one.

9. Noise of one or two cataracts, but unable to approach (from north bank) owing to many reed-fringed channels. River later in gloomy serpentine westerly course through inhospitable country.

10. For many days past river continually in rapids and often in rocky channel far below and inaccessible. Clear water-mark all along rocks about 5 feet above present level.

11. River far below running placidly between reeds and palms, with large half-moon valley of trees, sand, and grass; and descent fairly easy over plates of slaty stone by zebra tracks. River flowing west-north-west divides mountain range heading from south-east from another range from the north-east. This valley about a mile by a half is the first place since No. 8 where the river has been accessible for more than 100 yards at a stretch. On the north bank towers the bald-faced giant "Shamalindi," and on the south stretches a mountain of smooth contour shaped like a sperm whale.

12. Morning trek about 3 miles in as many hours crossing and recrossing the river. Afternoon climbed high to see the river flowing west between 1000-foot walls of rock. At night within 200 yards of river it took the "boys" three-quarters of an hour to climb up and down for water. Next day through and

over mountains, following zebra paths ; going all loose stones and unsuitable for game. The country on this north bank still bad, but mountains receding, and signs of relenting on the other.

13. This morning three Bashimba from the north, hunting. They say it is impossible to follow the river for some distance ahead, but they will take us a few days' *détour* to the north. They say that there are Bashimba living a long way behind the mountains south-east and Hereros south, but a long way back (south). Also Bashimba living to the north in this range, and permanent water ; but river unsuitable for occupation. River falling daily. Next day magnificent mountainous views and fairly good going. Sheer mountains lining opposite (north) bank.

14. (Northern *détour*.) Formation changed—tall hills all table-topped, slate and lime. Big mountains west and south. Afternoon again climbed north for three hours, and must be 3000 feet above river.

15. Morning trek through huge basin in mountain-tops ; midday halt in limestone cave. Afternoon through plain and up into nek where water lying in blue stone basins, the top one very strong of sulphur. *En route* collected salt. (Next day) morning through enormous basin in mountains. At evening drop of some 2000 feet in front and on both sides.

16. Half morning trek on spur, whence view west-north-west of vast plain, and sand-dunes some 50 miles away. North and south shut off. Hence descent of 2000 to 3000 feet. To sleep without water, a recurring difficulty lately.

17. Into valley with view at last of open country south. Also two huge mountains south-south-west with their feet in level sand. Came on big patch of green ; proved to be reeds growing out of salt-encrusted mound, with apparently sweet water streaming from it. Reached river flowing west-north-west, to find it tumbling through deep bed of rock, in one place falling some 50 feet in 5 yards, the ironstone bed being worn into arches, basins, etc. The river flows underneath these natural bridges. Came on footpath running north and south ; guide says of natives from south going to Koroka to trade. (Koroka probably native name for Portuguese settlement near Tiger Bay.) Heavy mountains west-south-west some 40 or 50 miles away. At one point heard continuous roaring behind mountain wall to eastward, which guide insisted was wind—a calm day—but which I should have supposed to be a cataract. Afternoon followed path south *up* river and crossed at level, shallow sandy drift.

18. Few miles south down valley to mountain gate where river turns abruptly from east through jagged heights.

The track turned south-east into mountains with long steep ascents and very difficult going. The first water was in limestone basins, fully 20 miles from the river camp. We finally came on Hereros under chief Kasupe, some 50 miles south from river having climbed very high into mountains during three days' journey. This chief's usual headquarters, Ombepera, was a good deal further south, and he had moved with a quantity of stock owing to scarcity of water. They knew the river, but not the country south, and their ornaments were from the Portuguese.

Kasupe lent me a fast riding ox and guides, and ten days later we reached Zesfontein.

My experiences lead me to suggest that the best way to tackle the exploration of these regions would be to make a base camp at Kasupe's

headquarters, with a smaller one where the river finally breaks through to the valley level, at which point (No. 18) water and meat are always within easy reach. The route from Zesfontein to Kasupe's presents no very arduous difficulties (given a guide), the worst obstacle being the first trek of nearly 40 miles without water. Beyond that water is always available at easy distances, and the obstacle is merely the nature of the going. Horses might reach Kasupe's; but even if they did they would be useless beyond that point, and I believe the most suitable transport animal, both for riding and packing, would be oxen borrowed from Kasupe's people. They live in the mountains and have feet like iron and are fast. Kasupe was a very old man ten years ago; but these Hereros all appeared to be amicably disposed, and no doubt his successor would furnish assistance. It may not be amiss to utter a word of warning not to count on obtaining water from the river in the region north and north-east from Kasupe's, as it is not unlikely to be found twisting mile on mile many hundred feet below between sheer ironstone walls.

Any such exploration party would need to be armed with the freedom of both banks and permission to shoot anything necessary for provender. At the same time I have no doubt that the easier point of attack would be from the north; either from Gambos along the tributary stream above referred to, or from between the desert and foothills from Koroka. This last route is probably much the easiest and practically a level approach to the river; and whatever the water difficulties may be they are not insuperable to taking a few head of loose cattle for trade *ex* Kasupe. The bald-faced mountain at point No. 11—"Shamalindi," as the Bashimba guide called him—is worthy of special notice. To the east and south he shows a rectangular face as sheer as a cut cheese for perhaps 1000 feet from the summit, of which one gets the suggestion that it must be as plane as the sides.

There was at least one other Herero chief living in the mountains to the east of Kasupe, and I think another south. For the rest in this area I encountered only "Berg-Damatas"; a very black (hence unlike the genuine bushman) and primitive people, usually with small-stock, whose speech consists entirely of clicks and grunts. Bashimba were said to be squatting south of the river but a good deal further east, behind the Zebra mountain section, I imagine; and I should think most of this nation are, or at least originally were, situated in the plateaux behind the north bank. Some of the tribe might have crossed and taken residence south of the river from the same motives as prompted those I met at point 5 to ask for a paper to show that their cattle belonged to me. The Bashimba extend, I think, up to but not east of the Kunene elbow; and I should like to testify to the willingness and intelligence of such of them as I met.

*Note.* The outline of the Kunene River sketched by the author has been published in Paul Sprigade's "Karte des Deutsch-Portugiesischen Grenzgebiets in Südwestafrika" (*Mitt. aus den deutschen Schutzgebieten*, xxv. 1912).