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THE KAFUE RIVER AND ITS HEADWATERS.

By GEORGE GREY.

DURING the year 1899, the "Tanganyika Concessions Co." sent a prospecting expedition, under my command, into Northern Rhodesia. The sole object of this expedition was to search for valuable minerals, and with this end in view its course was directed to those regions which I believed to be as yet unprospected, and it traversed portions of some districts in North-Western Rhodesia which had been previously unexplored. Among other geographical discoveries was that of the source of the Kafue river and many of its northern tributaries.

The expedition was organized in Bulawayo during the months of February and March. The white members of the expedition were five in number : Mr. F. H. Crewe, second in command ; Mr. J. N. Justice, geologist ; Mr. Paul Macdonald, a prospector of many years' experience in South Africa ; Mr. M. G. Farquhar, who accompanied the expedition for the sake of sport, and the interest of travelling through new country ; I myself being the fifth.

Mr. Crewe was killed in March last, while fighting with Colonel Plumer at Ramathlabama. I cannot too much deplore the loss of one to whom to a great extent the success of this expedition was due. He was an accomplished native linguist, and thoroughly understood the native mind. By his unfailing tact and patience, he did much to enable the expedition to gain the confidence of the many native tribes through whom it passed, and to avoid in any single instance serious misunderstandings or hostilities.

The natives who left Bulawayo with the expedition numbered thirty-eight, and consisted of Zulus, Fingoes, and Matabeles. Twenty-five of them carried rifles. Transport was almost entirely done by animals, and for this purpose 67 donkeys, 6 oxen, 7 horses, and 2 mules were taken. The donkeys and oxen drew three waggons as far as the Native Commissioner's camp at the Lubu, which is about 25 miles south of the Zambezi river. From that point all the animals were packed or ridden. I consider that transport by donkeys is, where possible, preferable to the use of carriers, mainly because of the great difficulty of feeding a large number of carriers in sparsely inhabited districts.

The expedition left Bulawayo on April 5, and proceeded along the Lubu waggon road to Lubu, from there to Binga's kraal on the Zambezi river, lat. 17° 38' S. Binga's kraal was reached on May 8, and the river crossed on that and the two succeeding days. From the Zambezi river the course lay nearly due north to the Kafue river, passing the British South Africa Police camp at Monze's, and following the Magoyi river to Minenga's kraal, in the eastern part of the Mashikolumwe country ; then from Minenga's to Ntumiga's, on the Kafue. The Kafue was

crossed on May 30, in lat. $15^{\circ} 39'$ S. From the Kafue a north-easterly course was taken to the headwaters of the Chongwe river, and the course and valley of the Mwembezi river, a tributary of the Kafue, was explored. A temporary camp was formed near the source of the Chongwe, and a small party proceeded to follow that river to the point where it runs into the rough hills that form the edge of the plateau and the northern boundary of the Zambezi valley. From that point they went in an easterly direction to Unde-unde's kraal, and from there north, descending from the plateau to the valley of the Lunsefwa. The Lunsefwa, which is a tributary of the Loangwa, was touched near its junction with the Mulungushe, lat. $14^{\circ} 54'$ S., and from this point the party returned to the expedition's camp on the headwaters of the Chongwe. On July 19 the whole expedition again started northwards. They passed Chepepo's kraal, and crossed the Lukanga river near its source in lat. $13^{\circ} 52'$ S.; then crossed the Kafue, for the second time in lat. $13^{\circ} 19'$ S., between its junction with the Konfulafuta to the north and the Pongwe to the south; then a course rather west of north was taken; the Kafubu, a large tributary of the Kafue, was followed to its source, the headwaters of the Lufunsusa were crossed, and the Kafue again reached and crossed in lat. $12^{\circ} 14'$ S., at Lambula's kraal, some 40 miles from its source.

From Lambula's, the expedition, in order to avoid swamps, proceeded to and followed for a short distance the watershed between the tributaries of the Kafue and those of the Luapula. The Kafue was crossed for the last time on August 25 in lat. $11^{\circ} 53'$ S., and from this point I followed the river to its course, about 28 miles further north. The expedition then proceeded, with a course rather south of west, to cross all the northern tributaries of the Kafue, and a temporary camp was formed at Kwa-Nyunda, on the Mutanda, while this district was explored. The courses of the upper parts of the Mutanda, Kifubua, Lunga, Munyoshi, and Shilumba were all mapped.

On October 1 the expedition started south, and for about 100 miles kept at some distance from, but parallel to, the Lunga; then followed the Lunga to its junction with the Kafue, and the Kafue to the point where it bends sharply to the east near the Nkala mission station. The junction of the Kafue and Lunga was found to be in about lat. $14^{\circ} 40'$ S. The Matoka plateau was then crossed with a south-easterly course, and the main part of the expedition crossed the Zambezi at Binga's kraal on November 9. The majority of the expedition reached Bulawayo on November 24, the last waggon arriving on December 1. Thus, in less than eight months the whole expedition had travelled approximately 1750 miles, and at least another 1250 miles had been travelled by small parties making tours from temporary camps at which the expedition halted.

As much care as possible was given to survey of the route travelled.

and of the country adjoining the route. Observations for latitude were taken every day when possible; the average direction of every march and its distance were carefully estimated.

To a South African, travelling north from Southern Rhodesia, the first great point of interest is the Zambezi river. The Zambezi river has been so often described that I shall only say here that I found it 480 yards wide at Binga's kraal where the expedition crossed it, and about 200 yards wide at Walker's drift, some 30 miles higher up, where I crossed on my return journey. From May 8 to 10, I found it still rising slightly; probably it was at about its highest for that season. No one could fail to be impressed by the magnificence of the mighty river, much less a Rhodesian, used to a country in which, during the greater portion of the year, running water is the exception.

The Zambezi valley is bounded on the north by very rough, steep mountains, which form the southern edge of the Matoka plateau. This plateau is now fairly well known; I found it to be between 3100 and 4250 feet above sea-level. Much of it appears to be an exceedingly fine, well-watered, stock-raising, and agricultural country. The soil is remarkably deep, and, judging by the splendid crops of Kafir corn and the thick luxuriant grass we passed through, must be very rich. The plateau has the appearance of a country healthy for man and beast. The Kafue river is the northern boundary of the Matoka plateau.

It may be of interest to give a general description of the Kafue river as known to me from actual observation in the dry season. In and immediately after the rainy season, which ends in March or April, all or most of the streams mentioned must carry much more water than they did at the time that I had the opportunity of observing them. Therefore my descriptions of fords, etc., must be taken as applying only to the winter or season of low water.

The Kafue is a river of many native names. From its source for a considerable distance it is known as the Lufubu. At and for some distance below its junction with the Lunga it is known as the Loenge. Below its western bend it is called the Kavuvu, Kafukwe, or Kavuvwe. I have never heard it called the Kafue by any natives, but am told that the natives who live on the Zambezi, near the junction of the rivers, speak of it as the "Kafue." Kafue is, however, the general name by which it is known to Europeans, and I therefore refer to it by that name. The Kafue rises in about lat. $11^{\circ} 30' S.$, at an elevation of 4400 feet above sea-level. Its source is similar to the source of all the streams I visited on the Congo-Kafue watershed. It heads in a dense clump of trees and bush which grow in a swamp. A rocky ridge about 200 feet high lies immediately to the north of this swamp, and is part of the watershed. The streams on the other side of this ridge run either into the Lufira or Luapula rivers, both of which eventually help to form the Congo.

All the country in the neighbourhood of the source of the Kafue is very swampy, and the river is fed by numerous small runners which drain extensive areas of swampy ground. As it is followed south-westward, it rapidly increases in size. Twenty-eight miles from its source a ford was found where the river was 10 yards wide, knee-deep, and carried a strong stream. To this point the Kafue had fallen 400 feet, and had run through narrow open flats bounded by low timbered ridges. The course is very winding, and is marked by a thin line of bush which grows on each bank and overhangs the water. Below this point the river enters and flows through a very extensive papyrus swamp, which is often some miles in width, and is probably 20 miles long. At Lambula's the river is again found to be enclosed between firm banks. Two large tributaries, the Shilumba and the Munyoshi, have entered it from the west, and I found the river at the crossing to be 20 yards wide, averaging about 2 feet in depth, very swift with a gravelly bottom. The general character of the stream, however, is sluggish and deep, and the bottom is muddy. Good fords are rare. The general course of the river from its source for 150 miles is south-east. It then bends to the south-west, and flows in this direction for about 200 miles, until it is joined by the Lunga in about lat. $14^{\circ} 40' S$.

In this section I crossed it in lat. $13^{\circ} 19' S.$, and found a ford 70 yards wide, and not more than 3 feet deep; but, as higher up, the river is generally sluggish and winding, and I saw still reaches of water many miles in length. At its junction with the Lunga, the Kafue is between 150 and 200 yards wide. It has received many large tributaries—the Konfulafuta, Pongwe, and Lukanga from the east, the Kafubu, Lufunsusa, and probably many others from the west. In every place that I touched or followed it, between Lambula's kraal in lat. $12^{\circ} 14'$ to its junction with the Lunga, the Kafue runs between low well-defined banks, and flows in a winding course through a narrow open valley. Its course is marked, as higher up, by a fringe of trees and bush.

The Lunga is the Kafue's largest tributary, and is at its mouth about 100 yards wide. It heads, as does the Kafue, on the Congo watershed, the actual source of the Lunga being not more than 35 miles from that of the Kafue. The Lunga increases in size more rapidly than the Kafue, as it is followed from its source. It receives from the west the large tributary the Mutanda, about 60 miles from its source, and lower down the Muluma, Mfwash, and Pungu. The Lunga in character resembles the Kafue; it has, however, greater fall. In 200 miles the Lunga falls 1300 feet, while the Kafue has only fallen 900 feet in a distance of 350 miles. In consequence of a steeper slope to the ground, the headwaters of the Lunga are less swampy than those of the Kafue. Below its junction with the Lunga, the Kafue develops into a most magnificent river. Its elevation is 3500 feet at the junction, and it

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only falls 400 feet in the next 250 miles. It retains its winding character, following between firm low banks, and for 50 miles varies from 200 to 600 yards in width, is very deep, and has no perceptible current. Unfortunately, as it is followed down, it is found that extensive rocky ridges cross the river, splitting it up into swift narrow channels, and destroying all possibility of continuous navigation by large boats. Such granite bars I noticed both at Mbulembule's kraal and at Muyanga's.

From the Lunga, lat. $14^{\circ} 40'$ S., to Nkala mission station, lat. $15^{\circ} 55'$ S. (approx.), the general course of the river is slightly west of south. It receives in this distance very few tributaries, and those of no importance or size. Near the Nkala mission station, after receiving the small tributary, the Musa, the Kafue bends sharply to the east, and flows for about 150 miles through a wide level valley or plain, which has the appearance of being the bottom of an ancient lake, and is bounded on the east by a prominent ridge of mountains. The Kafue has cut through this ridge, and so drained the lake. The expedition crossed this valley on its northward journey, and I found the valley at the point of crossing to be from 20 to 30 miles wide, and about 3100 feet above sea-level. At highest water much of the valley is covered by the overflow from the river. This valley is quite treeless, and, until the grass is dry enough to burn in July or August, is covered with dense grass 6 feet high.

Such tributaries as run towards the Kafue from the north and south seem to lose any regular defined channels after they enter the valley, and either disappear entirely or lose themselves in extensive swamps. Owing to these swamps, the river is in this section, I imagine, often very difficult to approach. The expedition was fortunate in being supplied with good guides by the Shukolumwe chief Minenga, who brought it over solid ground to a place where there were firm banks on both sides of the river. The Kafue there (Ntumiga's kraal) is only about 100 yards wide, and has a current of 2 to 3 miles an hour. This is probably one of its narrowest points; in some places in this valley, I believe it attains to a much greater width. From a little hill on the northern edge of the valley, north-east of Ntumiga's, I overlooked the valley, and saw to the south-south-east the river 15 or 20 miles distant. The course of the river was marked by a long stretch of blue open water, and the river must at that point be very wide. We crossed this huge valley in winter, and found the cold very severe. The thermometer frequently fell below freezing-point at night. Owing to its treeless character, we suffered from want of fuel. Small quantities of wood could generally be bought from the native kraals, but when it was necessary to camp at any distance from a kraal, the entire absence of firewood and severe cold caused real suffering among the native members of the expedition.

The Kafue, when it leaves this valley or plain, passes through a prominent range of mountains, and in less than 100 miles joins the Zambezi river. The elevation of the plain is slightly over 3000 feet, the elevation of the Zambezi 1500 feet or less. There is, therefore, a fall

of at least 1500 feet between the plain and the Zambezi. Mr. Phillips, a railway engineer who visited the mouth of the Kafue last year, tells me that for about 40 miles above the junction the Kafue is very wide

and not rapid. Most of the fall, then, must take place in a distance of from 40 to 60 miles. Such a fall must make any kind of navigation absolutely impossible.

The area drained by the Kafue may be described as of oval shape, 350 miles north to south being its major axis, and 250 miles east to west its minor axis. The extreme north of this area supplies a much greater proportion of water than the southern and central portion; the rainfall in that portion north of lat. 13° must be much heavier than further south. The extreme southern portion of this area is the north half of what is known as the Matoka plateau. This plateau really extends north without a break to the Congo watershed, the slight descent to the lower Kafue from the south and the ascent on the northern side being so gradual as to be barely noticeable.

The expedition did not explore the Mashukolumwe country, which is reputed to be open, high, well watered, and hilly. The course chosen lay to the east of that country on the northern journey, and to the west of it on the return.

I found the country immediately north of the lower Kafue to be very similar to the Matoka plateau; the bush perhaps rather thicker, and the proportion of open country less. Much of it is well watered and fertile. A particularly fine open valley is that of the Luimba, a tributary to the Chongwe. North of lat. 15° the country was mostly covered with thick bush; it may be described as a rolling or level plain gradually ascending as it is followed north, generally covered with deep alluvial soil. Streams are numerous, though we found the country in the neighbourhood of Chepepo's to be badly watered. That portion between lat. $14^{\circ} 40'$ and $15^{\circ} 40'$ which lies to the west of the Kafue is, I believe, very dry and badly watered.

The Lukanga river intersects this plain. This river is remarkable for the immense papyrus swamp through which it runs. The swamp is often more than a mile wide. The expedition followed it for more than 20 miles, and nearly reached its source before a ford could be found over which the donkeys could walk. A man can cross in many places by walking on the dense reeds, which grow so close and thick that when bent down they will support his weight. In crossing over one of these places, I sounded with a long stick, and found that I was walking over the main channel of the river with 7 feet of water below me. The Lukanga is also remarkable for the immense flocks of geese and ducks which make their home in its swamps.

North of the Lukanga the country becomes gradually wetter and more swampy, and the bush and timber thicker and larger. From lat. 13° to the Congo watershed, I found the whole of the country which is drained by the Kafue and its tributaries to be of a very swampy character. We had great difficulty in traversing this country with our donkeys. Every little valley contained a swamp, into which the

animals sunk up to their bellies; every stream—and streams are very numerous—runs through deep alluvial soil, and its banks and bottom are mud of the softest character. The donkey is an excellent animal on hard or rocky ground, but does not show to advantage in mud. For several weeks travel was a most wearying business. Every march meant dragging the donkeys one by one through several swamps or streams, off-loading on one side and carrying the loads through to load up again on the other.

This extreme northern part of the Kafue basin is of much the same character as the country further south—that is, featureless forest. There are, however, a few prominent mountains, such as Chafuguma and Suka, which rise from 600 to 1000 feet above the surrounding country. Here and there are found patches of fine timber, but as a rule the trees are not large. Still, the further north the expedition travelled the thicker the bush was found to be, the taller and straighter the trees, and the more numerous were trees of a size which would make them suitable for the sawmill. Machabel, mahobohobe, and acacia, well known in South Africa, are found as far north as the headwaters of the Congo, and many other trees which I do not know further south. All kinds of thorn trees are conspicuous by their absence.

The monotony of this huge forest is relieved by numerous fine streams of water. As will be seen from my map, rivers at the extreme north of the basin are very numerous. All the tributaries shown are fine running streams of beautifully clear water. These rivers increase in size very rapidly as one follows them down from their sources. I saw the country in August, September, and October, the driest time of year, and was impressed by the great flow of water in the streams, and by the fact that there is evidence that the rivers never rise very much higher. The natives cross the streams on roughly made pole bridges, often only 3 or 4 feet above the water; over these bridges they told us that the water never rises. Nevertheless, it seems probable that the Congo-Kafue watershed has a very heavy annual rainfall, to keep up the enormous quantity of water which flows into the Kafue through these numerous tributaries.

The elevation of this northern portion may be said to be between 4000 and 5000 feet above sea-level. The lowest point that I visited on the watershed was 4400 feet, the highest 5000 feet.

All the mountains which bound the southern edge of the plateau north of the Zambezi appear to be composed of schists and quartzite. The plateau itself is generally found to be sandstone, generally horizontal. Some large areas are covered with crystalline limestone, notably east of the Mwembezi river and near the sources of the Shoa. Granite outcrop is scarce, and we never found it extensive. Iron is found to exist in large quantities nearly everywhere, and in the northern portion visited the mountains and hills, such as Chafuguma and Suka, are

composed of ferruginous sandstone; ferruginous conglomerate covers large portions of the country.

As the expedition stayed for such a short time in any one place, and as all its members, both white and black, were strangers to Central Africa, we did not attain to any great degree of intimacy with any natives, and only brought back a very general impression of their customs. Owing mainly to one Matabele, Mkoman by name, an old servant of Mr. Crewe, I never had any difficulty in freely communicating with any of the native tribes through whose country we passed. This Matabele boy started with a very good knowledge of the language talked by the natives on the Zambezi, and, being a born linguist, seemed naturally to pick up the different dialects of the northern tribes, which are all akin to the dialect spoken on the Zambezi. Mr. Crewe spoke a little of the Batonga language, and was able to talk to the northern natives, to a limited extent, without the help of an interpreter. Various native members of the expedition could talk the language of the Barotse and other similar dialects.

The Batongas of the Zambezi are, of all tribes we passed through, the most miserable and lowest type. They are lazy and unreliable; their habitations are the roughest form of grass huts; they appear to have barely any arts or industries, and are most cowardly. The Zambezi river has probably been their salvation, as, living on the banks of the river, they are always able to cross on to islands or to the opposite bank, and so have avoided extermination by raids of Matabele or other powerful tribes. The Zambezi native has a strong hereditary love for the river, which has for generations afforded him protection and supplied him with food in the shape of fish. But in spite of the long sojourn of himself and his ancestors on the river-bank, his canoes are the crudest productions that can be imagined. Any large tree is used, regardless of the irregularities of its shape, and is roughly hewn out; the result is a heavy hollow block of wood, often far from straight. Four hundred pounds is a good load for the best Zambezi canoe. No art is displayed by the Zambezi in making his paddle; it has no width of blade, and is generally little better than a stick; in fact, he will often work his tedious way across the river with any stout stick when a paddle is not at hand. Still, the Zambezi knows his river well, and we found the natives most willing to help us in the work of getting the animals and goods of the expedition across.

Mr. Gielgud, the native commissioner, came down from the Lubu and camped with the expedition while we were crossing the Zambezi. He kindly used his influence with the natives, and made all arrangements for our passage, getting nine native canoes to work, and lending us his boat. The price arranged was 5s. per day for each canoe. Our seventy-eight animals and 8000 lbs. weight of goods were all safely landed on the north bank by the evening of the second day after our

arrival on the river. The natives thoroughly understand this work, and the white man has only got to keep them at work, and no hitch occurs in crossing any number of animals.

When crossing oxen or donkeys, three men work a canoe; two are paddlers, one at each end, the third sits in the middle and holds the head of the animal close to or resting on the gunwale of the canoe. Once the animal loses its footing the work is easy enough, but it is often difficult to launch an obstreperous ox, who will resist being dragged and pushed into the water, and often makes a rush back for the bank, climbing over the canoe, filling the boat and knocking the boatmen into the water. The natives take all such accidents good naturedly, and those who get ducked join in the laugh raised by the others. Donkeys are far more passive; they are easily pushed into the water and towed across. They seldom make any effort to swim.

The Zambezi natives grow mealies, corn, ground-nuts, and sweet potatoes; they own considerable numbers of sheep and goats, but are most unwilling to sell any of their live stock. Along the low banks of the river mealies are planted and ripen at various seasons, drawing their moisture from the river, and being independent of rain.

The Batoka, who inhabit the plateau to the south of the Mashikolumwe, are very much akin to the Zambezis in nature and habits; like the Zambezis and the Mashikolumwe, both sexes knock out the four upper front teeth. On our journey north we found the Batoka natives very timid; kraals were entirely deserted on news of the approach of the expedition, the inhabitants flying into the bush and hills. This is, I think, due in a great measure to certain irresponsible white men who went up into this country in the winter of 1898, and, in pretence of trading, raided, robbed, and disgracefully treated the helpless Batoka. This raiding has now entirely ceased, owing to the establishment of two police stations on the plateau, and the promulgation of certain regulations by the B. S. A. Co., regarding traders in Northern Rhodesia.

The Mashikolumwe inhabit the valley of the Kafue river from its western bend until it leaves the plateau. They extend to some distance north and south of the river. The Mashikolumwe are as savage a tribe and as far removed from any form of civilization as can be found in Central Africa. Probably justly they have a reputation for treachery. Though the women wear as much, if not more, clothing than is customary in Central Africa, the men in nearly all cases go absolutely naked. Every man carries a bundle of long-handled barbed assegais. Nearly every man has dressed, or, to describe it more accurately, forced, his hair and scalp into the knob or spike which is peculiar to this tribe. Many wear the full head-dress, which looks like a long, straight, and flexible wand starting from the back of the head. One of these head-dresses I measured and found to be 45 inches long, measuring

from the skin of the head upwards. The head-dress is made of hair and grease, with a finely shaved piece of sable antelope's horn inside to stiffen it. In making it, the skin of the head is drawn back until a mass of flesh and skin protrudes 2 or 3 inches from the back of the head. This causes great pain at first; one whom we asked replied, "We bear the pain because of the beautiful result." On this artificially made base of soft flesh is built an upright cone, gradually tapering to less than 1 inch in diameter, and prolonged to at least 3 feet in height. The straight upright piece is quite flexible, and waves in the wind. The completed head-dress takes about three years to make, and the happy possessor of a 45-inch spike attached to his scalp takes great care of it. When he sleeps in a hut, the flexible end is tied by a string to the roof; when sleeping in the open, a long-handled assegai is stuck firmly in the ground at the man's feet, and the end of the head-dress is tied by a long string to the shaft of the assegai, so keeping it off the ground. In spite of the time and trouble taken to make these head-dresses, some of the men offered to cut them off and sell them for a few yards of calico. I had hoped to buy some on our return journey, but unfortunately passed south just west of the Mashikolumwe country, and saw no more of this peculiar head-dress. Though not tall, the Mashikolumwe are well made and active, and, judging by some who followed me when hunting on horseback, good runners.

We camped one night at a Mashikolumwe kraal between Minenga's and the Kafue river, and found that we were the first white people who had travelled on that path. Mbwire, the chief, had never seen a white man, and came to visit us wrapped in the skin of a lion, which had been killed in his cattle-kraal. I gave him a cup of very sweet tea, and was much amused at the way in which, after suspiciously tasting it, the old man clutched it tight and drank every drop, while his people looked enviously on. I found the natives at Ntumiga's kraal on the Kafue river to be very expert boatmen. Their canoes show much greater signs of skill in their manufacture than do those we saw on the Zambezi. They are very much thinner and lighter. It is, however, evidently very difficult for them to find trees large enough to make canoes of any size, and those can only be found at some distance from the river. Some canoes we saw were made out of two trees, one forming the bow, the other the stern, the two halves being neatly laced together with bark. Most of the canoes were more or less patched, and numerous leaks had to be constantly plugged with clay. The Mashikolumwe have much better paddles than the Zambezis; some were seen ornamented with carving. The natives, when paddling on the Kafue, stand upright in the canoes, and force them through the water at a considerable speed.

The Mashikolumwe own more cattle than any other tribe we visited. I saw several herds of cattle in the small part of their district

that the expedition passed through. The cattle are all of the very small type peculiar to this part of Africa. They are very unwilling to sell their cattle. We had no difficulty in obtaining at moderate prices an ample supply of grain from the Mashikolumwe in the neighbourhood of Minenga's, but on our return journey found the western Mashikolumwe had no food to sell, owing to the destruction of their crops by locusts.

The natives living to the east of the Mashikolumwe and the north of Kafue call themselves Basala, or Basola; they inhabit the country as far east as the eastern edge of the plateau. Important chiefs among them are—Shamaponda, who lives on the headwaters of the Mwembesi river, an old man who remembers the Swazi raid, and was taken prisoner by the Swazis when very young; and Ma-unde-unde, whose kraal is some 15 miles west of the Chongwe river.

In the valley of the Lunsefwa the natives are called the Baluana, Luana being the name of that district. The Baluana, who have had dealings with the Portuguese, I found particularly civil and well-mannered. Their women wear the pelele, a metal disc inserted in a hole made in the upper lip, which is common to many tribes living east of the Loangwa river. The Luana district is famous for the fine tobacco grown there. We bought for calico a considerable quantity for the use of our Matabele.

Among these tribes I saw very few guns of any description; all the natives carry bows and poisoned arrows. The poison is in the form of a black waxy-looking material, and is put on the shaft of the arrow just above the point.

In the neighbourhood of the Lukanga a similar tribe, called the Balenje, live. North of the Balenje I quite failed to find any tribal name for the natives. The people of every kraal go by a different name; we found such names as Balamba, Baseba, Manyendwa, Bakaunda, and others. I came to the conclusion that, though these people are of one tribe or race, they know no name to denote their tribe, the names they gave us being family names.

Throughout the country drained by the headwaters of the Kafue and its tributaries, I found no big native chief. Small chiefs rule over small districts. Chepepo is a man of some importance, and further north Kapile Mpanga, Mlongo, and Mlegelwa appeared to have some influence. Several kraals are ruled by women, such as Luena and Lambula.

An Arab called Chiwallah lives on a tributary of the Konfulafuta, an eastern tributary of the Kafue, between lats. 13° and 14°. Chiwallah is much feared by the natives in the neighbourhood, and has established a reign of terror over a considerable area.

In the districts of Lambula, Mlongo, and Kapile Mpanga, the people build square huts with a round roof. They seldom wear skins, the

natural clothing being made of the bark of the machabel, which, when new, makes a neat and tidy blanket or loin-cloth, but soon gets ragged and torn. Those who have calico wear it in preference to the bark.

Though we were never without a sufficient supply of grain while staying among these northern natives, it did not appear that the natives possessed very large supplies of food. A common article of food is the root called cassava. Very little maize is grown, but a fair quantity of Kafir corn and sweet potatoes. From the number of fish-traps seen in all the smaller streams, I conclude that at certain seasons the natives live to a great extent on fish.

The method of cultivation in this part of Central Africa is as follows: The lands chosen are always in thick bush or timber. Over a large area the timber is chopped down, the stumps being left about 30 inches high. The smaller branches are then chopped off the trees, and are collected and piled thickly in strips of a few yards in width through the area cleared, care being taken to include all the larger ant-heaps, which are very fertile, within these strips. When thoroughly dry, these strips of branches and twigs are burnt, and the ashes serve to manure the soil beneath them. The fire also probably destroys the weeds and grass and makes the soil easier to cultivate. Thus a large quantity of forest is cut down every year to fertilize a proportion of its area. The stumps left sprout out again, and soon grow up into dense thickets of bush.

The custom of knocking out the four upper front teeth was not noticed north of the Mashikolumwe. The tribes in the northern part of the Kafue basin file each of the upper front teeth to a point. Individuals dress their hair in various eccentric ways, one of the commonest being to form it into round knobs, 2 or 3 inches in diameter; another to train it into cones or horns, one on each side of the head. Luena, a female chief, had grown a long plait of hair from her forehead, which was decorated with beads, and hung down over her nose to the level of her chin. Chiefs of kraals generally wear quantities of beads in their hair.

The custom of saluting a chief or important stranger is peculiar. The men kneel down, clap their hands, and then, bending forward, rub one shoulder and arm on the ground. Before a very important chief, they lie on their backs and wriggle on the ground. These antics remind one of the cringing submission of a timid dog, which they possibly imitate. The women, when saluting an important stranger, do so by lullilooing, a word coined by Livingstone to express a peculiar shrill scream, the sound being made to vibrate by hitting the mouth with the hand. At one kraal, passed in the Basola country, the women expressed submission by lying on their backs on the ground and clapping their thighs—not a very elegant proceeding.

We found that the members of the expedition were the first white

people who had ever travelled through a large portion of the country drained by the headwaters of the Lunga and the Kafue, and that the natives in these districts had never seen a white man before. The horses and donkeys created great interest, and when camping near kraals, numbers of natives used to occupy large ant-heaps or other commanding positions with the object of watching our animals. With a very few exceptions, these natives, after the first natural suspicion aroused by the approach of a comparatively large armed force had been allayed, appeared very pleased with our presence. It was pleasant, when visiting a kraal for the second time, to find a genial welcome.

Obtaining food is a much simpler business north of the Zambezi than among the Matabele or Mashonas. It is the custom, when a caravan camps near a kraal, for the chief to visit the leader of the caravan, bringing with him a present of food, generally large baskets containing meal, sweet potatoes, and ground-nuts, as well as some fowls and Kafir beer. When a rich kraal was visited, the chief's present was often more than sufficient to feed the whole party for one or two days. The size of the present depends, of course, to a great extent on the supply of food owned by the kraal. At Mlegelwa's, the chief's present amounted to 140 lbs. of meal, a large quantity of potatoes, some fowls, and Kafir beer. The chief refuses to visit the stranger without a present, to do so being apparently considered very bad manners. Considerable delay is sometimes caused by the preparing of the present.

Muyanga, who lives on an island in the Kafue, came to visit the expedition without the customary present. He was followed by a boy carrying a stool, which was put down opposite my tent. Without a word of warning, Muyanga told his stool-bearer to pick up the stools and, in spite of the expostulations of our interpreter, walked quickly away and crossed over to his island. I could only suppose that we had unwittingly offended him, and that he had gone away in a huff; a messenger was sent to ask the reason of his extraordinary behaviour. The answer was, that when Muyanga saw the white men, he realized what great chiefs they were, and was ashamed to have come to see them without a present, and would not return until he could come bringing an ox with him. That evening he came, bringing a young heifer and some meal.

Insect pests appear to be particularly numerous in the northern part of the Kafue basin. White ants are more plentiful and more active than I have seen anywhere else. Owing to the numerous swamps, flies of various kinds are abundant, and as early as September the large biting fly called the "hippo" fly was a great annoyance. Our stock suffered severely from the thousands of these flies which attacked them every evening. Many of the donkeys used to come in with their legs running with blood from the bites of these pests, and made raw sores on their hocks by biting at the flies. Midges are also particularly

virulent. North of lat. 13° I found the natives suffer considerably from the jigger, the small burrowing flea so well known on the West Coast of Africa and in Nyasaland. The natives called it maunda. When we first found the jigger, and saw many of the natives so lame that they could hardly walk in consequence of its attacks, I anticipated that we should have great difficulty with our Matabele, who, never having seen or heard of the jigger before, would, I thought, suffer worse owing to inexperience than the local native. Most of my boys had at one time or another jiggers in their feet, as had I myself and other members of the expedition. I was relieved to find that, if care was taken, the jigger extracted as soon as he was noticed, and the hole he had made treated with carbolic oil, the inconvenience caused by the insect is very slight. We had no cases among ourselves or our natives serious enough to prevent marching.

Patches of tsetse fly were found to be numerous in most of the country explored by the expedition north of lat. 14° , and also on the western bank of the Lunga and Kafue rivers as far south as the mission station at Nkala. There is also "fly" directly south of Nkala, between Nanzela and the Zambezi. I had hoped that, by making careful inquiries from the natives, the expedition might avoid "fly," but after crossing the Kafue for the second time, I found that native information on this subject was so unreliable, and that the "fly" belts were so large, that it was impossible to avoid the "fly." Therefore I pushed on in any direction that I wanted to explore, determining to get as much use as possible out of the stock before the "fly" killed them. The mortality of the expedition's stock was very much less than my previous experience of tsetse fly had led me to expect. This fact, and native reports and opinion on the present power of the "fly," have convinced me that the "fly" in this particular part of Africa is not such a fatal pest as it used to be before the rinderpest killed the buffalo. The natives repeatedly told us that since the rinderpest the fly no longer kills, and that they now take their dogs with them on hunting-trips with impunity. This story was repeated with variations. Muyanga was said to have made medicine and killed the "fly." Another story told us in that neighbourhood was that, since the "fly" had taken to biting women, it did not kill cattle. One way and another, we found a universal belief among the natives that the tsetse fly had lost its power.

The domestic animals which the expedition took across the Zambezi were 5 horses, 2 mules, 5 oxen, 67 donkeys, and 9 dogs. Of these three horses died, all probably, two certainly, from the results of fly-bite. Fourteen of the donkeys died from accident or other causes, but none, in my opinion, from the results of the tsetse fly. The mules, oxen, and dogs were unaffected by the "fly."

The explanation of the decrease of the fly disease in spite of the existence of the "fly" is possibly in the fact that the rinderpest was

in 1895 so severe in that part of Africa north of the Zambezi, that the buffalo, which existed before in great numbers, is now nearly extinct. Other kinds of game still exist in fair quantity, but the buffalo, which is generally found in connection with the tsetse fly, has disappeared. Surgeon-Major Bruce, by his investigations in Pondo Land, has proved that the tsetse fly is not the author of the disease which destroys domestic animals bitten by it, but only transmits the germ of a disease always existing in, but rarely, if ever, fatal to the wild animal. Possibly this disease is mainly confined to the buffalo, and does not exist to any great extent among the various species of antelope which are left. Hence the partial disappearance of the disease.

Most of North-Western Rhodesia is a good game country. Practically no shooting was done by the expedition, except for purposes of food, but there was seldom any difficulty in keeping up a good supply of meat. Eighteen varieties of antelope were killed, besides zebra, pigs, hippopotamus, buffalo (one only), and six lions. Elephants exist in the northern part of the Kafue basin. I nowhere saw evidence of large numbers. In one instance I saw the spoor of a herd of about a hundred to the west of the Lunga river, but, with this exception, the tracks I saw indicated troops of not more than ten. The natives near the Congo Free State are very well provided with muskets, and continually hunt the elephants. I saw in several places remains of freshly killed elephants. Unless regulations for their protection are strictly enforced—a matter of considerable difficulty—the elephant will in a few years disappear in this district, as it has elsewhere, only in this case it will be exterminated by the native without the help of the white man.

INTERNATIONAL OCEANIC RESEARCH.

THE Conference at Stockholm in June, 1899, the report of which was summarized in the *Journal* for December, 1899 (vol. xiv. p. 646), was to have been followed by a second Conference in the autumn of 1900, but this did not actually come together until May of the present year. Representatives of eight nations—all of those bordering the North Sea and Baltic with the exception of France—met at Christiania, on the invitation of the Norwegian Government, on May 6, the meetings continuing daily until May 11. The Conference was officially announced as “for the exploration of the sea,” but the proceedings were conducted on the understanding that the exploration in question was to be carried out strictly with a view to practical results, especially as regards fisheries. Sweden sent six delegates, including Profs. Pettersson and Cleve, Dr. Wijkander, and Mr. Ekman; Germany sent five, including Dr. Herwig and Prof. Krümmel; Great Britain sent four, Sir Colin Scott Moncrieff, Permanent Under-Secretary for Scotland, Prof. D’Arcy