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Journey to Lake Chand and Neighbouring Regions

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to us. It was mainly owing to this Chief's friendly assistance that we succeeded in our exploration. He was a very old man, and we found him, as I have mentioned, in a feeble state of health. It was a matter of great satisfaction to us that the letter and presents reached him before his death, which took place early this year. The letter and presents were safely delivered by a trustworthy native officer, who proceeded with them from Peshawur, and replies were received from the old Chief and his son, Ali Murdān Shah, expressing much happiness at being remembered by their English friends. Ali Murdān Shah is now ruler of Wakhān.

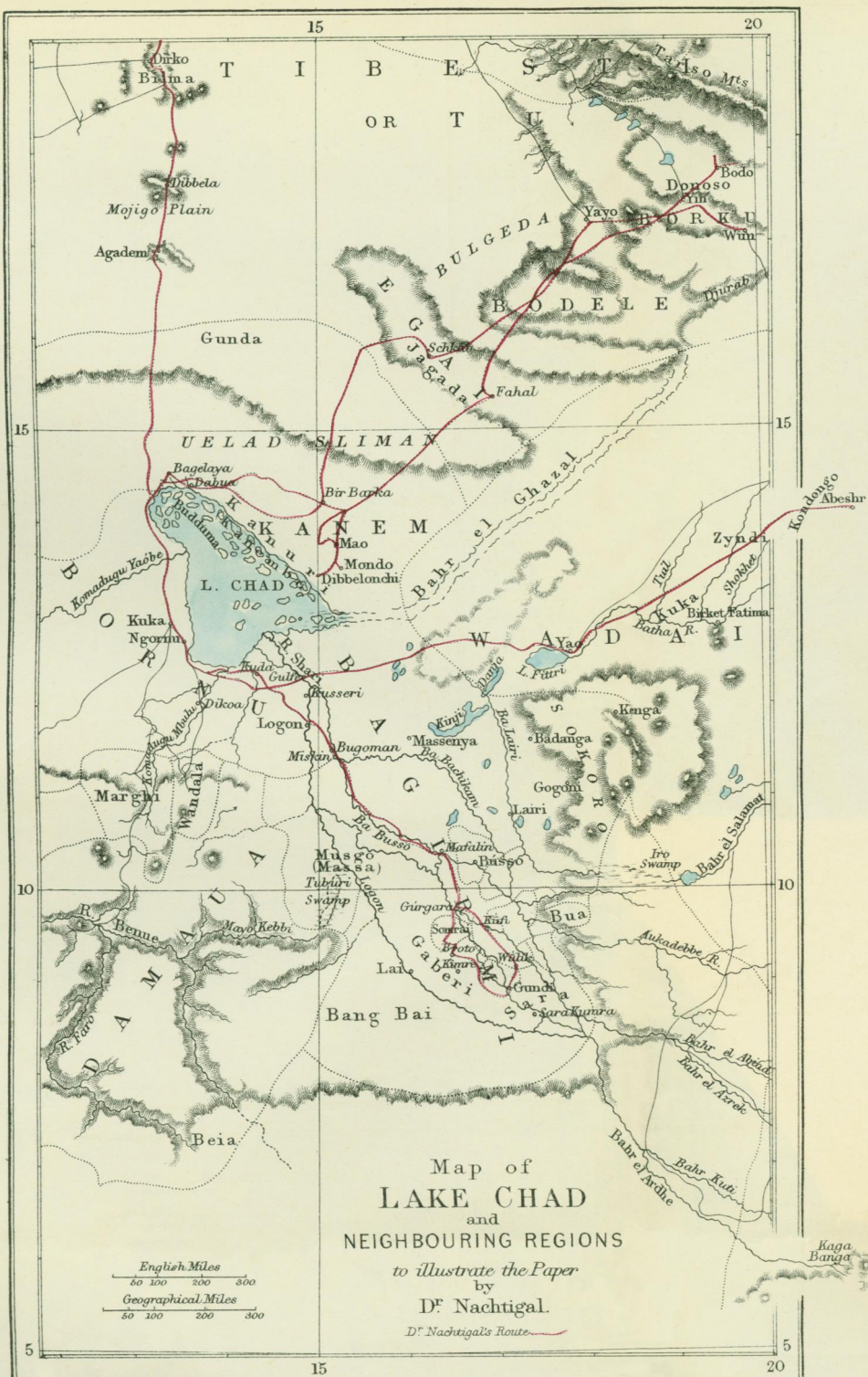
What I have now said gives merely the observations of an ordinary traveller, as to what was seen and the information gathered by careful inquiry from many individuals of the different races and clans we met in our journey regarding the countries in the immediate vicinity of our routes. The geography of the scene of our travels has been ably and scientifically dealt with by Captain Trotter, of the Royal Engineers, and the result of the lamented Dr. Stoliczka's valuable researches in geology, botany, and natural history is now being prepared for publication under the orders of the Government of India.

XV.—*Journey to Lake Chad and Neighbouring Regions.*

By DR. NACHTIGAL.*

IF I had not taken advantage of the opportunity afforded by a mission from the King of Prussia—the sending of presents to the Sheik Omar, Sultan of Bornu, science would not have received any benefit from this Expedition, since, if I had not decided to go, the Government would have entrusted a native with the conveyance of the presents. I held it to be my duty, therefore, as far as my feeble powers would allow, to serve the interests of geography and of knowledge. Our home Government, at that time, had no intention of adding any work of exploration to my mission; and as I was myself residing then in Africa, and had resolved on the journey only four weeks before starting, I travelled with the most modest resources, with the most incomplete outfit, and quite alone. Although I do not consider that this light equipment would be a disadvantage in journeys of discovery, properly so called—that is in travelling through or opening up perfectly unknown lands—

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Edw^d Weller

yet in this way the scientific results are limited to a correspondingly moderate scale.

I could thus make no astronomical observations; but I travelled with compass in one hand, and watch in the other, measured and counted paces, and thus reckoned the distances traversed, like my successful countrymen, Barth, Rohlfs, and Schweinfurth.

I could not make zoological, botanical, or mineralogical collections; and even when I was in a position to gather together some objects of interest, I was as frequently obliged, for the want of means of transport, to leave these behind me. I was, however, provided with thermometer, aneroid barometer, and hypsometer, to determine approximately the meteorological conditions and relative elevations of the countries passed through. The data obtained from these instruments are, for the most part, still in Africa, and have not yet been finally calculated. If, then, in spite of the preliminary character and incompleteness of my results, I venture to place some of these before you, I do so only to fulfil my duty in communicating as soon as possible something of what I saw and experienced to English geographers, who, from time immemorial, have rendered such great services to African geography. The qualifications which tended to lighten my undertaking were my knowledge of colloquial Arabic, and of Mohammedan customs—the indispensable requirements for communicating easily with men of such different modes of thought and feeling from ours; my knowledge of medicine, and, besides, a tough physical endurance, and a fair share of patience. It is no small thing to endure five years of life in the midst of a world of strange customs, and often without resources; to suffer a complete isolation; not infrequently under the numerous crosses and hindrances, and the yearly and unavoidable illnesses. Not only every spark of enthusiasm is extinguished, but all courage, hope, and energy, break down, apparently never to recover. It is not my intention here to give you any detailed account of my five years of travel; but I will confine myself to a compressed sketch of its chief features, and I will only examine more minutely some special districts and phenomena which may prove of greater interest. The incomplete results of my journeys, which comprise many separate expeditions, consist—

1st. In an opening up of the eastern half of the great desert which embraces the Tibbu countries.

2nd. In contributions towards the more perfect knowledge of Lake Chad and its tributary rivers; and of the Bahr el Ghazal, and the districts which surround it in the north-east from Kanem to Borku.

3rd. In the reported character of the heathen country south of Baghirmi.

4th. In the preliminary exploration of Wadai, and in information about the savage countries which border it on the south.

5th. In the similar exploration of Dar Fur.

In the spring of 1869, when, on my way from Tripoli to Bornu, I had reached the farthest Turkish province, the Fessan, I learned that there was no caravan about to proceed to Tropical Africa, since the direct trade between Bornu and the coast of the Mediterranean had for many years been greatly reduced. I was therefore compelled to make a dangerous and difficult journey to Tibesti, in the south-east of Fessan, where, however, I gained a closer knowledge of the Tibbu race and their country. Many of the geographers present may remember the accounts published by me at that time of *Tibesti*, the naked rock-land of "*Tu*," as it is called in the native language. Its chief characteristic is the summit of its knot of mountains, the broad-backed *Tarso*, which, according to an approximate determination, is 8000 to 9000 feet above the sea-level. It has on its summit a wide crater; its sloping sides are broken through by many granite-ranges and peaks, and on its eastern declivity there is a hot spring of high temperature. From it there radiates to north-west and south-east many irregular rocky chains and hill-groups of granite and sandstone, giving its configuration and direction to the whole country. On the south-west and north-east sides the river-valleys descend, and their deeply and sharply-cut channels testify to the violence of the rare showers of rain. These are the lines of vegetation and the centres of population, both of which, owing to the waste character of the country, are very scanty. The inhabitants, who hardly reach 10,000 in number, belong to the Tibbu family, and call themselves *Tedā*. They occupy a transition stage between the Berber and the Negro, and are of one race with the Southern Tibbu, the people of Borku, of Bahr el Ghazal, and partly of Kanem. They are distinguished from the last named by a difference of dialect, since they speak the "*Mōdi Teda*" of the Tibbu language, while the others use the "*Midi Dāza*." The Southern Tibbu may therefore be grouped under the name of "*Dāza*," although they are called "*Gorāan*" by the Arabs. Barth believed, from the reports given to him, that the *Wanya*, who live on the caravan-route between Baghazi and Wadai, belonged to the Tibbu race, as well as the *Bidēyat*, in the north-east of Wadai, and the "*Zogháva*," who are chiefly settled north of Dar Fur; but he was in error. Even though I have not been able to reach the seat of this race, yet individuals

of the family came so frequently under my notice, as to convince me that they form a race by themselves, a different one from that of the Tibbu. They are united by a common language, and stand rather more closely in alliance with the peoples of Tropical Africa than the Tibbu. It was only in the spring of 1870, after I had succeeded in escaping by night from the inhospitable land of Tibesti, where I had almost met my death, and after an inconceivably painful journey through the desert without a guide, almost without provisions, and with only a small supply of water carried on the shoulder, and after having reached Fessan half-dead, that I was able to continue my journey thence towards Bornu.

Arriving there at last, I discharged my mission, studied the country and people, learned the Bornu language, and was preparing for a journey to the Chad Lake, when a war between the King of Wadai and the ruler of Bagirmi overturned this project, and for the time closed to me the routes to the east and south-east. I therefore took advantage of the opportunity which offered to accompany an Arab horde belonging to the tribe of Aulad Soliman (which at this time were on a trade-visit to the market of Kuka, the capital of Bornu). These Arabs had settled in Kanem thirty-five years before, and were now on their journey back to their adopted country, the steppes of Egai and Bodele lying north-east of that, and to Borku, another chief district of the Tibbu region.

For nine months I travelled with these bandits—the fear of whom spreads far and wide—leading a monotonous and horrible nomad and robber-life, but one which afforded me opportunities of exploring the topography of these districts, and of extending our knowledge of the Tibbu family and its home; and especially enabling me to determine the character of the Bahr el Ghazal, and of the depressed plain of Bodele, to which last I will afterwards call your closer attention. I could not, indeed, reach the terminal point of my Tibesti journey; but from the northernmost hills of Borku I saw the mountain-chain which I had traversed in Tibesti, extending south-east as far as the country of the Wanya.

Having returned to Bornu in January 1872, I found that the war between Wadai and Bagirmi had come to an end; the king of the latter country, Mohammedu, had been vanquished, and was taking refuge in the savage lands of the south. King Ali of Wadai had returned to his country. I was now, therefore, in a position to carry out my original intention of exploring Wadai, the grave of Dr. Vogel. Yet it seemed to me to be more desirable, first, to trace upwards the course of the Shari River, and to study the chief tributaries of the Chad, for which

purpose the presence of the retreating King of Bagirmi seemed to afford a favourable opportunity.

I set out, therefore, at the end of the next month, February 1872, on this dangerous excursion through the war-torn country of Bagirmi, in which, the King of Wadai having imposed a new sovereign while the country generally remained true in its allegiance to the original king, a new civil war was being waged. I crossed the River Logon close to the capital of the district, reached the Shari near Bugoman, followed its course upwards for about 100 miles to Mafalin, turned then due south, and found the retreating king southward of the territory of Somrai, in the district of the Gaberi. I expected to find the ex-king in friendly relations with his former tributary subjects, but I was again, contrary to my will, compelled to make experiences of the slave-hunting which the king was prosecuting with the remnant of his former army, and in which I was perforce engaged for four months. Here I became acquainted with all the horrors of this scourge let loose over Africa, which has raised up those barriers to commerce and exploration which are so difficult to overcome in the unknown interior; and which in this case also prevented me from penetrating farther on my way. Along with these sad experiences I learned much of the Shari and its tributaries from the east, and about the union of its eastern branch—the so-called Ba Busso—with the western river of Logon; and here I arrive at the point which I wish to make the chief subject of my communication to-day: namely, the remarkable water-system of the Chad Lake.

This great central African depression is well worthy of our particular attention, since it has again and again been a centre of interest to geographers.

Denham, in his time, made it the object of his travels to explore its tributaries and outlets; it was also the goal of the English expedition of Richardson, Barth, and Overweg. Denham reached it from Kuka, and, travelling south and east, attained the very region in which the Bahr el Ghazal unites with the Chad. Barth and Overweg went round the northern apex of the lake, and Overweg navigated its interior waters and discovered its numerous islands. I, lastly, going in a northerly circle as far as the south-west of Mondo, and then in almost the same direction as Denham to south and east, came upon the Bahr el Ghazal at about two days' march from its connecting point with the Chad, and the same distance s.s.e. of Mondo, yet, under the circumstances in which I was placed on this journey, there could be no attempt at a regular survey of its shores. Lake Chad covers an area of about 500 German geo-

graphical square miles (10,500 English square miles), and is thus of about the same extent as the island of Sicily. Its form is that of an irregular triangle, the base of which extends from w.s.w. to e.n.e., but not in a straight line, since the delta-land of the Shari River invades the triangle at this point; another side lies more or less from it to south, forming the western shore of the lake; while the third, which runs not quite directly from north to south-east, forms the north-eastern bank. The interior does not consist of open water, or only in a relatively small proportion, two-thirds at least being occupied by land, which, from the net-like distribution of the waters of the Shari, falls into innumerable islands, which for the most part are inhabited. The open water stretches from the mouth of the river to west and north-west. It is much to be regretted that the lamented Overweg, the only one who has traversed the interior of the Chad, should have left such scanty information, that it is impossible from his report to estimate the true relation of land and water within it. Still it is a fact, that travellers going to Kanem in favourable seasons of the year, that is, in spring and summer, coasted the south-western course of the Chad, fearing the insecure state of the northern route, and as soon as they had passed the Shari, turned to the north, and reached Mondo through the territory of the Kanuri, without being aware that they had passed through a lake, because the branches which separate the islands are then at lowest water, and are quite passable for beasts of burden. On the central islands of the lake live the Budduma, who call themselves "Yedina"; on the eastern, live the Kanuri; and from the north-east shore several Kanembu families have migrated into the interior, since the occupation and ravages of the mainland of Kanem by Aulad Soliman have made it uninhabitable. Between the islands and in the open water the Budduma navigate about in their light boats, proving very dangerous to the shore-peoples, on account of their rapid movements and robbing propensities; but, nevertheless, they carry on some trade with these people, especially with those of the Kanembu tribes, in ivory and natron. This latter substance, although the waters of the lake are fresh throughout, is obtained in many places on the banks and islands, and is carried by the Bornu people across their country and the Hausa States as far as the Niger, and thence onwards to Illori.

The true banks of the Shari consist of sand-soil, and this is not uncommon in the lake-islands and on its shores. A deep black mud-soil, which is very difficult to pass in some seasons, is only met with on the low grounds close to the lake, which are flooded every year. From the shores of the Chad a view over

open water is rarely obtained ; either the prospect is over a vast expanse of marshland, or the water is covered with a network of reeds and papyrus, and bounded on the horizon by a line of green islands. In the eastern portion one sees only land, with a network of waters when any higher ground affords a view. On the north-east shore, in obtaining reports of villages in the interior, the distance is given, with the additional information of the number of water-channels to be crossed.

The Chad is thus a vast lagoon, which has the most of its water in the western portion of it. There it is also rich in fishes and hippopotami ; while, according to Overweg, animal life is scarce in the interior. The lagoon is fed from south and south-east by the Shari, from the west by the Komadugu Yaóbe, and from the south-west by the Komadugu Mbulu. Here I would note that the words Chad, Shari, Komadugu, and Ba, have each the meaning of river or collection of water ; the two former belong to the different dialects of the Massa family, the third is Kanurish (or of Bornu), and the fourth is Bagirmi.

The Komadugu Mbulu, which falls into the Chad some days' journey south of Kuka, has for three-parts of the year only separated pools of water. It may be crossed in dry seasons dry-foot ; but towards the end of the rainy season, and immediately afterwards, it requires to be passed by boat. Barth saw it in its upper course, on his journey to Adamawa, and calls it the river of Alaõ, which passes close by Dikoa, and generally contains water, but is only navigable for boats in the rainy season or immediately after it. The Chad Lake changes its outline continually ; the lowest stage of its water occurs in the beginning of the rainy season, which in these latitudes occurs towards the end of June ; it rises gradually during the second half of the rainy season ; the last rainfall occurs in the beginning of October, and it reaches its highest stage in the end of November. These phenomena naturally follow along the south-western shores of the lake which are first exposed to the inundation, and which, in my journey to Bagirmi, I found more difficult to pass in the beginning of March than on my return in the beginning of September, at the height of the rainy season. I do not speak here, of course, of the waters which result directly from the rainfall, and which formed considerable hindrances in the way of our journey, but only of those parts which were flooded by the waters of the lake. When, in winter of 1872-3, I was travelling from Bornu to Wadai, the tracks along the shore of the Chad were impassable, and they remained so until February ; we found difficulties enough indeed, even in the beginning of March. The first decrease of the waters was announced at Kuka, that winter, on the last days of December.

It is therefore a fact that the rain-water falling directly into the lake during July and August, and that brought to it by the Komadugu-Yaobe, and the Komadugu-Mbulu, from the immediate vicinity, does not suffice to swell the water of the lake, but that its actual increase is due to waters which come from a greater distance. *The Shari* is the chief affluent, and consists of a western and an eastern branch, which join at a distance of about 50 miles from their mouth in the lake. Of these, the eastern arm—the true Shari—(which is named Ba Busso, from the Bagirmi town of Busso on its banks) is the more important. Its volume and current are very variable, according to the season of the year. Below the confluence of its two branches, Denham found the river half-a-mile wide, and with a stream of two to three miles an hour, in the month of June; above the junction Barth found the true Shari, in March, to be 1800 feet broad, with a current also of two to three miles an hour; and near Bugoman, some distance farther up the stream, 1200 to 1500 feet wide.

From the last-named town I followed it upwards for about 80 miles, also in the month of March, and I found its width varying from 1000 to 1600 feet; half-way across it was fordable, and for a third part beyond, it was from 10 to 15 feet deep. Its bed is full of shallows and islands, and the people who had been driven out of the villages during the war, at the time of my journey in Bagirmi, had taken up their abode on these.

The western arm, the so-called river of Logon, is in ordinary circumstances a third smaller, with proportionately less current; and in March it could be waded across at the town of Logon. In the month of August, when I went down the corresponding portion of the eastern branch, I found it generally much increased, yet by no means in the same proportion as the western arm, which, when I crossed it, much exceeded the eastern in volume as well as in force of current. Barth saw both streams again in the month of August, and was also struck with this remarkable disparity in current. Now the reports I received from the natives of Bagirmi, as well as from the Southern people who live nearest it, and therefore should know best, go to prove that the eastern and western rivers are formed only by a separation of the main stream coming from the south-east; in the same way as the smaller arm, called Ba-Bachikam, divides from the Ba-Busso above that town, and rejoins its originating stream again at Miskin, near Bugoman.

Although I was not able to reach nearer than within four days' journey from the point of separation, yet I have laid down these branches of the river chartographically in a preliminary

way, and it thus appears that the whole of Bagirmi is included in the islands formed by the Shari. However, the native indications of hydrography, in which they introduce many fantastic ideas, must be received with great caution. I doubt much the accuracy of these reports, and the phenomena of the disproportionate rise and fall of the Ba-Busso and the Ba Logon cause me to think them somewhat improbable. If both streams were part of one river, they must swell at the same times, or else the branch which rises in so much greater proportion than the other, must receive tributaries after the bifurcation has taken place, which might cause the greater volume of water and the stronger current. The districts of the Musgo lying west and south-west of the river of Logon are, however, so flat that they are covered with swamp in many parts during the rainy season, so that at times a union seems to take place between the basins of the River Benue and that of the Shari by means of the lake, or rather swamp of Tuburi discovered by Vogel. Thus it is not probable that, after the reported separation, any tributary can come to the river of Logon from the westward, in such size as to increase in volume and current, and the existence of any bifurcation becomes consequently very doubtful. The only hypothesis which remains to be assumed is that of a separate source for each of the branches of the Shari which join at Kusseri. We come thus to the question of the origin of these. Whilst I was travelling from north-west, and passing up the Shari, seeking to discover its origin, and later, also, when I came from Wadai southward again to collect reports which might elucidate its water-system, the illustrious Dr. Schweinfurth was journeying south-westward from the Nile, and had reached the river of the Monbattu, the so-called Uelle, becoming at once convinced that in it he had found the upper course of the Shari. He (Schweinfurth) says, "If the Uelle is not the Shari, whence can the volume of the latter river arise?" and to this he adds, "no noteworthy tributaries can possibly reach the Shari from the dry steppe-lands of Wadai and Dar Fur. While I was seeking information about the eastern tributaries of the Shari, in the south of Bagirmi, I obtained reports of four tributaries, of which the two more northerly flow in the territory of the Bua to the Ba Busso, or to its branch the Ba-Bachikam; the third was said to unite with the Ba-Busso, at a little south of the 9th degree of latitude; and the fourth was reported to enter about the 8th parallel into known country. The three former were said to be unimportant; but, as far as I could learn, the fourth, which is everywhere known as the Bahr el Ardhe, is a much more considerable river, and is always identified with the Shari.

Later, when in Wadai, I sought information about the hydrography of the country in the south, and I found the existence of these four tributaries of the Shari-system fully confirmed, both by the native merchants who carry on a little trade from Dar Kuti, in the south of the kingdom, with the Banda tribes, and by the officers of the king, who every year make slave-hunting raids in the south. The most northerly tributary gathers its waters from the slopes of the Marra Mountains in Dar Fur, where the numerous water-channels running south-west form the river known variously as the Bahr Sula, Om el Timan, Bahr el Tine, and *Bahr el Salamat*, which constitutes the southern limit of Wadai Proper, and afterwards loses itself, in great part, in the swamp of Iro; only a small portion of its waters going beyond this reach the Ba Bachikam, the above-noticed branch of the Shari. The second, which is larger in volume, is called Aukadebbe, and comes from the spurs of the mountainous country in the south-west of Dar Fur; it flows in a south-west and westerly direction through Dar Runga, in which it receives several tributaries from the lands of the Gulla and the northern Banda, and reaches the Shari between $9^{\circ} 30'$, and 10° s. latitude. It is reported to have water in its channel during the whole year, to be about 80 paces wide, and at low water to reach to the waist. The third, which is stated to be still larger, rises by two head-streams, the Bahr el Abiad and the Bahr el Azrek, from the mountainous districts of Dar Banda, flows w.n.w., and joins the eastern branch of the Shari in the territory of the Sara, not far from Sara Kumra. Both the Abiad and the Azrek have water always, and, according to the report of my servant who had accompanied a slave-hunting expedition as far as the Bahr el Ardhe, and who was trustworthy and intelligent, the passage of the river is generally not without difficulty. The River Azrek, according to this man, is 150 paces broad, and could not be forded even in the season of low water; and the Abiad is from 250 to 300 paces wide, with water reaching to the chest.

The fourth, which is known as the Bahr el Ardhe, was reported by my servant to be more than 300 paces broad, and to have a strong current, which makes it difficult to cross; it is studded with islands, and although it was not very deep at that season, yet the number of boats used by the inhabitants showed its usual large size. One of my informants, an intelligent Bornu man, who had lived at Kuti for ten years, and who had travelled a great deal, had seen the sources of the river at Kaga (mountain) Banga, between 6° and 7° n. lat., and about the 21st meridian east of Greenwich, and was acquainted with its farther course. In volume he com-

pared it with the Shari, and was much inclined to identify it with that river.

North of the River Uelle, seen by Dr. Schweinfurth, there is still a considerable quantity of water flowing to the west and north-west. Does this suffice to form the two branches—the Ba Busso and Ba Logon—which, uniting, constitute the Shari? This appears to me also to be improbable; so much the more since we have just seen that the latter branch cannot receive any sufficient tributaries from west or south-west to explain its periodical increase of current and volume; I am, therefore, disposed to argue for the river of Logon a more distant source than that of the Eastern Shari, which, in my opinion, is to be found in the Bahr el Ardhe. I do not agree with Dr. Schweinfurth in speculating on a very distant tributary (from the Southern hemisphere), or rather, I do not believe that such a tributary exists, just as the reported rise of the Shari in March seems to me to be also an error.

If the reasons above given make it probable that the river of Logon has a distinct and independent source, this must lie near the River Uelle seen by Dr. Schweinfurth, the Kubanda River of Dr. Barth, or the Kuta, of which I obtained information, all which three appear to me to be identical. From information given me, this river flows to the west (near the 21st meridian east of Greenwich, and between the 5th and 6th parallels), and it has been described to me by men who have seen it as larger than the united Shari; it must therefore be much larger than the Ba Lagon. Still, apparently unaccountable increase and diminution of river-beds in Africa are not very rare phenomena, and I do not think that *this* disproportion is sufficient to preclude all possibility of an identification of the two rivers.

More interesting, perhaps, than the question of the origin of the Shari is this: what becomes finally of the water which it conveys into Lake Chad? Without doubt, the waters of the Chad lose much by evaporation, which is greatly aided by their shallowness and net-like distribution; yet it is easy to understand why an outlet has been sought for the Chad, as long as men of science in Europe have interested themselves in the lake. Such an outlet certainly does not now exist, and we are confined to the theory of *evaporation*. But there appears to have been one at no very ancient date.

From the south-east corner of the Chad, a broad, flat, wooded valley stretches for 30 English miles to the east; then it is turned to the north-east by the group of rocks and undulations which rise between the Chad and Fittri lagoon, and runs thence narrower and less wooded in the same direction, almost to where the sixteenth parallel crosses the nineteenth meridian.

east of Greenwich, and there it loses itself in the district which slopes down into the fertile and pastoral plain of Bodele. Without considering its many bends and frequent tributary valleys, it has a length of 250 English miles. This valley or river channel, called the *Bahr el Ghazal*, has long been an object of attention to European geographers. Since it stretches north-east to the country of the Tibbu, as far as Borku, in which rocks are characteristic, one is at first sight inclined to think that the Bahr el Ghazal must slope from north-east to south-west, towards the Chad. The natives, on the contrary, maintain that this puzzling valley has the opposite slope; that formerly it always had water in it; and that the vast depression of Bodele, which also was formerly water-covered, was connected by it with the Chad. There are still some persons of the Kuri race living who have heard their grandfathers relate how they sailed to north-east with boats, in expeditions of rapine or war, and the Bahr el Ghazal itself, as well as the plains of Bodele and Egai, are covered with the dorsal bones of fish. In my journey with the Arabs of Kanem, through Kanem, Egai, and Bodele to Borku, I was able to prove the truth of some of these reports, and the results obtained must be regarded as the light which counterbalances the shadow side of ten months of nomad and robber-life. Ascending very gradually from the shores of the Chad in Kanem northward, the last well-station which is generally reckoned the limit of Kanem is reached a little south of the sixteenth parallel. Turning thence E. to E.N.E. and then N.E., the aneroid and boiling-point thermometer show a descent undoubtedly to below the level of the Chad. The wide rich pastoral plains of Egai and Bodele are then crossed, and again the land rises towards Borku in the E.N.E.

Egai is a long-stretching hollow, full of springs and pasture, which slopes from north-west to south-east, without, however, reaching down to the Bahr el Ghazal; and Bodele is a system of shallow valleys, rich in little water-holes and isolated moving dunes. Bodele also slopes from north-west to south-east, and its deepest district appears to be where the Bahr el Ghazal loses the last trace of its "wady" characters. From north-east the river valley (called "Eunevi," *καθ' ἑξοχήν*, by the natives) named Djurab by the Arabs, slopes down into the south of Borku, and is also conspicuous in its desert neighbourhood by its pastures and wells. The whole of the land of this country thus presents a vast plain of basin-like hollows, embracing Egai on the south-west, and the southern districts of Borku in the north-east, and the lowest part of which fall in with the termination of the Bahr el Ghazal, in about 16° latitude and 19° east of Greenwich. This whole basin is scattered with fish-

bones, and seems to have been under water in the most recent times; then it must have been connected with the Chad, and appears to have been a sort of reservoir for the lake. How this drying up of the country has taken place, and how the communication between Chad and Bodele has been broken, I do not venture to decide. Formerly it was said that sand-hills prevented the passage of the water from the Chad into the Bahr el Ghazal; but this is scarcely possible, since in the rainy year of 1870 the waters of the Chad were driven for a distance of about 60 miles into the valley of the Bahr el Ghazal, so that a report was spread in the vicinity that it would again be covered with water as far as Bodele. Whether the Chad could suffer this loss of its outlet without modification of its form is another not less interesting question. Here I would remark that the Chad not only changes its limits in each season of the year, but that it also seems to have lasting changes of configuration. This is specially the case in the northern corner of the lake which has been traversed almost annually for thirty-five years by the Arabs of Kanem, who have found themselves compelled on every journey to make a wider circuit round the lake. The lake stretches out in this direction by advancing "Redzül" (or legs), which form wide bays, some of which are of such recent date that they have not yet received names. On the western shore, also, a general advance of the water seems to have taken place, and it appears to be invading the great layers of limestone in some districts as Barth formerly supposed. That the inhabitants of Kuka are persuaded firmly of the truth of a general advance of the waters appears most clearly from the following facts. During the year 1871-72, at the time of highest water of the Chad, the inhabitants of Kuka, and especially the Court circle, were in great fear lest their capital should be covered with the rising flood; and this anxiety had reached such a pitch in the end of 1872, that early in 1873 a new residence was decided upon by Sheik Omar and his courtiers. The beginnings of this new capital progressed rapidly; it was baptised "Cherwa," or the "blessed," and lies about two hours north of Kuka on a range of sand-hills. A similar advance of the water of the Chad has taken place near the town of Ngornu.

I hasten to a close, but I beg for a few moments still to glance at the remaining portions of my journey. In spring, 1873, I started, in spite of all warnings and prophecies of my friends in Bornu, for Wadai. This country had been from the beginning the chief object of my travels, and from Arabian merchants I had heard much good of King Ali.

I travelled along the west and south-west shores of the Chad

to the Shari, which I crossed at Gulfe, passed through the districts south of the lake which are only visited by nomads, as far as the rocky heights between the lake and Fittri, and traversing the territory of the Fittri once seen by Leo Africanus in its powerful state as the Bulala empire, reached Wadai Proper, through the countries of the Kuka, the Zyudi, and the Kondongo, and after a month's journey came as far as Abeshr, the capital of the country and the residence of the king, with whom I found every protection and support. King Ali, of the race of the Abassides, is a young, energetic, and intelligent man, who during his government since 1858 has won for his country a position of unusual power.

He has brought foreigners into his country, protected and encouraged traffic, and has extended his power and influence far beyond the limits of his kingdom. To the northward he rules over Wanyanga, a small part of Borku, and a large area of the Bideyat; he calls Fittri, Bagirmi, a part of Kanem and of the Bahr el Ghazal, his property; and southward he extends his sway over Dar Runga and Dar Kuti to the south of the Bahr el Salamat. In natural resources, in richness of land, in cattle, in population, and industry, Wadai is still behind Bornu, yet it excels in strong government, traffic with the Mediterranean coast, and in the warlike spirit of its inhabitants. The people of Wadai even surpass the people of Bornu in their hatred of strangers, in their rudeness, and general lack of civilisation.

The death of King Hassin of Dar Fur closed my route to the east for some time; so I turned once again to the south, in order to study the details of the hydrographic conditions of the extensive country of Dar Banda, and I returned only when I heard that the change of government in Dar Fur had passed over peaceably, leaving the track to the east free. Now only, in order to accomplish my return journey to Europe, in January, 1874, I was able to leave my royal protector of Wadai, and his residence. In four days I passed through the eastern limit of his kingdom, and entered upon the territory of another State, feared alike for its fanaticism and its hatred of foreigners, namely, Dar Fur, which previously had only been visited by two Europeans, the English traveller Browne, in the end of last century, and the French Dr. Cuny, more than thirty years ago. Browne, who had only seen Kobe and Fasher, the chief places of trade and foreign intercourse, brought back but scanty information with him; but Dr. Cuny died of illness in Fasher, and scarcely any of his reports reached Europe.

Coming from the far west, one ascends from the eastern shore of the Chad to the Marra Mountains. If we assume that the Chad lies about 800 feet above the sea-level, the capital of Wadai,

Abeshr, may be about 1500 feet in elevation, and calculating from that point, one may have attained on the western foot of the Djebel Marra the height of 2500 feet. From thence one ascends for a good day's march over the northern extremity of the mountains of Dar Fur, the pass-heights of which may be estimated at 3500 feet. On the second day one descends again to the plain; and the royal residence and capital of the kingdom, El Fasher, on the pool of Tendelty, may be still about 2000 feet above the sea-level. The Marra mountain is four days' journey long, or about a degree of latitude, and two and a half to three days' journey wide. It gives its character to the whole country, sending off numerous water-channels to w.s.w., and south especially, from which circumstance this part of the country is richest, most fertile, and most populated.

The river valleys which come from the northern extremity, and from the western slope of the mountain, collect the hill-waters of the rainy season to the above noted Bahr el Salamat. The rivers collecting the rain-waters of the eastern slopes, are prevented from finding an outlet to the Nile, in consequence of the absence of sufficient fall; Obeidh, the capital of Kordofan, still having an elevation of about 1700 feet. Only the rivers rising in the southern extremity of the Djebel Marra seem to reach the Nile through the Bahar d'Arab, the source of the River Homr. From the southern end of the mountain the watershed of the Nile and the Shari runs to s.s.w. through the territory of the Gulla and the Banda. Dar Fur is about half as large as Germany, and may have four millions of inhabitants. The riches of the country consist chiefly in cereals and in cattle; of the former, the Ducha (penicillaria) Durra (sorghum), the maize, and a small quantity of wheat, ground nuts (arachis and voandzeia), cotton, indigo, beans, and tobacco, are cultivated. The domestic animals are camels, cattle, horses, sheep, and goats. With the exception of wheat, Bornu might afford the greatest amount of cereals, and might also have the greatest number of cattle; its breed of horses is especially fine.

Dar Fur excels in agriculture, in its riches in wheat in the mountainous districts, as well as in its cultivation of tobacco. It surpasses its neighbouring countries, besides, in the quality and quantity of its honey.

Dar Fur has since ceased to be an independent State; the complications of the past year were brought to a catastrophe shortly after my departure. The brave King Brahír lost land and life in the battle of Menowatsi; his uncle, the old Prince Hasseballa, retreated with the remnant of his fighting men into the mountains, but was soon compelled to throw himself at the feet of the victorious Khedive. Thus Dar Fur, the evil-reported

seat of fanaticism, has been opened up, by incorporation with Egypt, to strangers and to civilisation. The land is fruitful, and in the north and east has a healthy climate for foreigners, so that when the well-known energy of the Khedive shall have prepared the way for commerce, its future has favourable prospects in connection with Egypt. For us, in Europe, the influence of the Egyptian Government, and through it of European civilisation, on the States and condition of the Sudan, is the best result of the conquest of Dar Fur. This is indeed the most important step that has ever been taken towards the suppression of the slave-trade, because Dar Fur does not alone come into consideration; its neighbour countries, Wadai and Bagirmi, are the two chief strongholds for the supply and export of slaves, and both are now more convenient to the direct influence of Egypt. Only when real results have been attained in this direction can we hope to see a peaceable commerce arising with the tribes of unknown Africa, and only then will the barriers fall which shut off the heathen lands of inner Africa from those of surrounding Islam, and then only will merchants and explorers and missionaries be in a position to fill out the great white patches in the map of Africa.

XVI.—*Notes accompanying a Chart of a Portion of the Niger Delta.* By RICHARD DOUBLEDAY BOLER and ROBERT KNIGHT.

AFTER much experience in surveying the rivers and creeks, as shown by accompanying Chart, we are of opinion that these channels of the Delta of the Niger will greatly facilitate, at some not distant period, a very much more extended trade than there is at the present time, by giving easy access to steamers of light draught to the interior markets. At present business is carried on by tribes settling on the shore, who have neither the means nor the inclination to carry out measures to develop the enormous trade which the country can supply. These tribes act as brokers for the produce, and are very jealous of any interference with their markets, but, no doubt, before long the whole of the magnificent rivers, creeks, and lagoons, extending from Benin to Opobo, and forming the Delta of the Niger, will be opened and navigated by suitable steamers, developing the trade of the far interior.

The country from New Calabar to Brass we found, with rare exceptions, to consist of the usual mangrove-swamps, with their