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Between the Nile and the Congo: Dr. Junker and the (Welle) Makua

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shown that in Alaska there were glaciers and mountains of the highest interest to every one connected, not only with geography, but also with the sister science, which he hoped geography would adopt, orography.

Lieut. SETON-KARR said the Indians had a pass from Chilcat to the north of St. Elias to Mount Wrangel down the Chichitka river. The Copper river had been ascended by Lieutenant Allen in 1884. The Indians, however, only crossed the pass in winter when the streams were frozen, but it might perhaps be done in summer. The snow-level depended on the snow-fall, and the conditions of St. Elias were such that the snow-fall was very heavy. Damp winds came up from the Pacific, and were condensed on the snow mountains which were immediately at the ocean's brink ; the result was a very heavy snow-fall, greater than in any other part of Alaska. There was, therefore, more snow to melt, and consequently the snow-line descended lower. He judged it to be 400 feet, but other travellers might make it even lower. No doubt some of the glaciers were decreasing, but others at Mount St. Elias were advancing and getting larger. All the forest land which he saw was being destroyed by their advance. With regard to the weather, as a rule, June and July were fine. There was not a single drop of rain during the whole fortnight he remained on the slopes of Mount St. Elias, although it was cloudy. After that bad weather set in, and it rained the whole time he was in Alaska.

The CHAIRMAN (Mr. Francis Galton) congratulated Lieut. Seton-Karr on the opportunity he had had of exploring a country where the forces of nature were to be seen acting on a very large scale. The journey had evidently been performed under circumstances of great difficulty. We might expect a more detailed account in the narrative of his journey which he is about to publish. He experienced many difficulties which he has not mentioned in his paper, and on more than one occasion he was in peril of his life. It was to be hoped that Alaska would be further explored, and that fuller knowledge would be obtained of its most interesting characteristics.

Between the Nile and the Congo : Dr. Junker and the (Welle) Makua.

By J. T. WILLS.

(Read at the Evening Meeting, March 28th, 1887.)

Map, p. 330.

I NEED hardly remind you that in the fertile part of Central Africa, in the belt of tropical rains and rich vegetation which stretches from the Zambesi to Senaar and Lake Tsad, river navigation is the only means of cheap transport : and boats almost the only alternative to slave portage. Rivers are here the trade routes and the lines upon which European influence must advance ; and the big navigable rivers, with the exception of the Niger Benue and Zambesi, almost all flow to one of three points, Berber, Lake Tsad, and Stanley Pool, of which the last is alone at present accessible to us.

Let us first look for a moment to the history of river exploration round the region in question. The first central African river to be explored and used was the Nile. Eighteen centuries ago, in the reign of the Emperor Nero, two Roman centurions explored and navigated the Nile 500 miles beyond Khartum as far as the *sudd*, where they found

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the river closed in by reeds and morasses, full of tall grass into which there was no means of penetrating either by boat or on foot. This sudd region is a swamp of vast extent, where matted weeds and floating grasses choked with fine mud, and knit together by the tangled roots of aquatic plants, form rafts or islands of floating *sod*, on which other tall grasses grow, and which jamb and block the deep channels, like floating ice in polar seas, while all around papyrus and other reeds grow thick on the shallow swamps and inundated flats. The block so formed is variable and intermittent, and when exploring expeditions in 1839, 1840 and 1841, penetrated for the first time beyond the point reached by Nero's centuries, little hindrance was experienced, then or for the next twenty-five years; but in 1870 Baker's expedition had the greatest difficulty to get through, and the block of sudd that formed in 1878 continued on and off for three years, and after nearly frustrating Gessi's campaign in the Bahr Gazal, eventually caused his death in 1881. Emin Bey very possibly * owes his safety now to the re-formation of this sudd in 1884.

When European ivory traders in and after 1845 followed the tracks of the Egyptian expeditions beyond the sudd, two navigable branches of the Nile were found; one navigable at all seasons as far as Gondokoro (Lado), and the other as far as Meshera el Rek. The custom was to *sail* up from Khartum to either of these points, in the dry season or winter, and to sail down again in June upon the flood. The winds are strong and steady from the north and N.N.E. for three or four months as far as Meshera, and for one or two as far as Lado; and they are nearly equally strong and steady from the south during an equal period, lessening in strength and duration up north towards Berber, as the winter north winds do towards Lado. Consequently the clumsy Khartum nuggers of 40 or 50 tons, with a 20 foot beam, low masts, and rotten, spliced, and cranky yards, often average up to the sudd some four or five miles an hour against a stream that generally runs two miles an hour. They thus do 48 to 60 miles a day, and in nine or ten days get to the sudd. Schweinfurth describes his nigger often staggering under bare poles, when the wind was best, for fear of breaking the yard.† This is the cheapest river navigation in Africa, and according to Gessi, freights from above Meshera to Khartum were only 2*l.* a ton. It costs at present between 30*l.* and 40*l.* a ton to get porters' loads carried up from the sea to Stanley Pool, and it used to cost 10*l.* a ton by camel from Suakin to Berber.

We all know how these trade-winds soon became slave-trade winds; how soon after the discovery of the great lakes and sources of the Nile

* I beg leave to alter my opinion. News from the Soudan shows that the Khalif at Khartum has neither leisure nor power to attack him. Nor has any one else. I do not believe there are any rebels or Arabs now in the Bahr Gazal except a few score of petty slave-hunters, and those without political support. The reopening of trade with the Soudan, however, will quickly increase their numbers.—J. T. W.

† The yards, if made of fir, have to be imported from Trieste.

Sir S. Baker was sent up in 1870 to stop slaving on the Lado branch where it was least vigorous, and how he was followed by Gordon in 1874-75-76, while Zebehr and many other smaller slave-hunters continued their devastations practically unmolested in the Bahr Gazal. And we know how Nile explorations led to other explorations; how Livingstone traced the Zambesi to its source, and Barth visited the countries round Lake Tsad. In 1870 Schweinfurth went through the Bahr Gazal with an ivory trader and reached the big Welle Makua in Monbuttu, beyond the Nile watershed, just at the same time that Livingstone explored Lake Bangweolo, Lake Moero, and the Lualaba down to Nyangwe. Schweinfurth reported that his river was supposed to run to the Shari, Livingstone supposed his to be the Nile. Three years later, Cameron disclosed by his overland march the south watershed of the Congo, and Nachtigal got important but hearsay information of the south watershed of the Shari. The mouth of the Congo was known, but no one had got past the rapids between the sea and Stanley Pool. In 1875 Gordon was on the Upper Nile launching steamers* (which are still in working order) on the upper Dufié and Lake Albert reach, which is separated from Lado by over 100 miles of land transit. He established the government which Emin Bey now maintains. Long, his lieutenant, navigated a considerable unknown reach on a still higher level in our enemy's country; and Stanley sailed round Victoria Nyanza, which pours its waters in Long's reach over more cataracts. Stanley then went to the slave-hunters at Nyangwe, and prepared to embark on the unknown river there in October 1876, just when Gordon went down to Egypt to say that he would not go back to the Nile unless he had full powers over the whole Soudan slave trade.

When Stanley emerged on the west coast and made known the Congo, Gordon, as Governor-General, was preparing to put down at last the roaring slave trade of the Bahr Gazal; and Zebehr was writing to his son there to rebel. That rebellion barred further exploration of the Welle Makua. Bohndorf, once Gordon's and afterwards Junker's servant, went by himself to explore in Zebehr's country, but was made to swear on the Koran, and was finally robbed and left naked. Dr. Junker, who was already in the Bahr Gazal in 1877, had to keep well to the east, where great hardships broke his health, and forced him to retire for a year to Khartum and Egypt.

Stanley, as we know, returned to the Congo, made firm his way, and took up his steamer to Stanley Pool, and in 1883 revisited for the first time the great arc of the Congo (above Kwa mouth), which he had paddled down six years before. He went along the south bank of the Congo, which is here generally so wide (and also full of islands) that the other bank is actually below the horizon and out of sight; when at

* One 100 feet long.

length he crossed over and reached the mouth of a big tributary on the north side, and found from the friendly natives that they were in possession of certain peculiar and unmistakable Italian beads (which had come down this river through the Watumba from traders who came from the north), he was surprised more than interested, and passed on to view with dismay the presence of Tippu Tib's Nyangwe slave-hunters at Stanley Falls, and at the mouth of the Aruwimi.

These beads were Rafai's beads: the big river which Stanley was told came far from the north or north-east, and was so wide above that one could not see the other shore, was the Loika (or Itimbiri), and was found last year to be navigable for at least 100 miles at all seasons from its mouth. It is identical with the big water or lake reached by Rafai, six days' journey south from the Makua across the country of the Ababua, where Rafai had a secure trading post. Petermann's Mittheilungen had published Rafai's news (which Lupton had sent) a full year before, and I am rather surprised to find that such items of news were not forwarded with the usual letters through Belgium to Stanley on the Congo.

Hicks, with his army of 10,000 men, had been slain four or five days before Stanley appeared on the Loika (on November 10th, 1883), Lupton, at Dem Suleiman was receiving, as a precious gift, 300 percussion caps from Bohndorf, Dr. Junker's servant, who had hurried off with news of his master to catch the expected steamer—the last steamer that ever visited the Bahr Gazal. Rafai, Lupton's best captain, had fallen fighting bravely against the slave-hunters or Mahdiists. Rumbek was taken by storm by the rebels, and Emin's garrison there put to the sword the same month, and the news of that disaster recalled Emin Bey from Tangasi in Monbuttou, on the Makua, five days after his long and anxiously expected arrival in that neglected district, and forced Dr. Junker also to retire from his half-explored rivers to Lado. Thus connection between the Soudan and the Congo was just *not* made in 1883, and no further exploration of northern tributaries of the Congo took place till fifteen months ago.

Let us now trace Dr. Junker's explorations, all made before November 1883 and on foot. After having recruited his health in Egypt, he arrived in the spring of 1880 in the Bahr Gazal, where Gessi was celebrating the first anniversary of his great victories over the slave-hunters. Gessi had 40,000 liberated slaves on his hands, and was planting them in the colonies, hoping they would settle down as cultivators. He was building nuggers on the Wau, and was collecting a good quantity of ivory, and 50 tons of first rate indiarubber. Ndoruma, a great Zandeh chief, whose country lies on the watershed of the Nile basin, and who had for years successfully repulsed the slave-hunters, and on one occasion had destroyed a force of 800 muskets, had recently "come in," first sending envoys with a present of 100 tusks of ivory to ascertain if the good news

about the new governor was true, and then coming himself to do homage or make submission. He gave Gëssi all his ivory, 1000 loads, i.e. 150 tons, and also offered to give up the 800 captured muskets. To Ndoruma's, therefore, Dr. Junker went, but as his armed escort of ten negro riflemen or basingers caused great alarm, he sent them back at once from the chief's border, trusted then and thenceforward to the goodwill of Zandeh chieftains, and never had cause to regret this course.

From Ndoruma he went to the Makua, and acted in fact, though not in name as a government ambassador. "I am looked on," he writes, "as a mediator. Gëssi is only too anxious to punish the deeds of violence which the natives suffer at the hands of the Nubians whom he sends out to collect ivory. As long as I remain here, robberies and murders are not likely to be committed, for fear of my reporting them. Ndoruma's belief in my protective power is shared by many other chiefs near here, all of whom have either visited me or sent messengers: they are afraid, not only of the Arabs (Nubians), but also of their own kith and kin. Blood feuds are frequent, and each prince fears to go in peace to his own cousins and brothers." Semio, for instance, to the west of Ndoruma, who had felt the weight of Zebehr's and Suleiman's attacks ever since the destruction of Mofio, his liege lord and northern neighbour in 1874, had become a mere vassal of Suleiman, intrusted by him with the use of besinger riflemen for the purpose and on condition of getting slaves and ivory from his neighbours. Semio, now that times had changed, dared not go outside his own marches, and sent many urgent requests to Junker to come to him. Kifa also sent to ask him to try his persuasion upon a rebellious relative.

Junker, however, sending Bohndorf to pay calls on these chiefs, went south and struck the Makua, where there were alarms of war, which made the natives (here Monbuttus) distrust him and show hostility. He was very glad when Ndoruma, who had heard he was in difficulties, arrived in hot haste with all his forces and set him free. He then surveyed this country in the bend of the Makua, and reconciled two brother-chieftains who had been egged on to fight each other by detachment of so-called troops, who were here doing pretty much as they liked. He also effected a reconciliation in the family of Wando, another Zandeh chief. Wando's son, Hoqua alone of all the family, had submitted to the Egyptian Government, which means, I must explain, that he had agreed to help Yussuf Bey, Mudir of the Rohl, to get slaves and ivory from the territories of his brothers and father.

When Dr. Junker arrived on the Makua there was a body of his troops, under a Colonel Hawash, fitly described by Casati as brigands, here well out of Gëssi's reach and control, who were bullying the Monbuttus on the south of the Makua, to the great alarm of Kanna and even of Bakangai, great Zandeh chieftains, lower down the Makua on its south side.

Dr. Junker probably knew that Gessi had then quitted the Bahr Gazal, finding his position under the new Governor-General intolerable, but he did not know that he was then dead, having been rescued too late, and at the point of starvation, with fifty other survivors only out of 400, from the middle of the sudd in which his worn-out steamer had been helplessly blocked for three months (September 1880 to January 1881). He therefore avoided the Monbuttu region for a time, and having waited for one of Gessi's more respectable ivory-trading agents, Osman Badui, and for the escort of his caravan, went to Bakangai's, where (July 1881) he found much confidence reposed in him, and much alarm felt at the doings of Hawash. He kept promising the people a better future when Emin Bey should come to set things in order, and "often," he says, "did I hear them speak thus in reply: 'Tell us again such sweet tidings; this year of your coming is a fortunate one for us. Through your words we hope for a better future.'" He wrote to Emin Bey of this, and to say that he had promised that he would presently come to set things right. There was no governor in the Bahr Gazal all that year. Lupton arrived only in December 1881.

From Bakangai he went back through Kanna's country to where Colonel Hawash had been fighting Manbanga, Munza's cousin, for over a year, and was lying by till he could avenge the defeat of some detachments by annihilating the Monbuttu chief. He was well received and listened to both by Hawash and Manbanga, and succeeded in making a truce and in getting Hawash to observe it while he reported his conduct to Emin by letter. Emin's reply came back by letter over a distance of 400 miles, and was (as I gather from Casati) obeyed by Hawash.

Dr. Junker's own account of his action in this matter is very modest, but Casati shows that it was much more considerable in weight and effect. Casati met Junker here, and describes him as follows:—A man of great culture and intelligence, modest and unaffected, full of open-hearted kindness to me, who won my highest esteem—a man of firm character too, quiet and self-possessed. "I left him," he adds, "full of content and happiness." Dr. Junker has been described very unfairly and incorrectly by Mr. Stanley in the *Times* as an honest little man, altogether absorbed in recording geographical minutiae on an elaborate large-scale map, and as a Russian. Dr. Junker is a German, of German parents, born and bred in Germany, educated entirely at German schools and colleges, and German to the backbone. In justice to him I must ask your attention to the good political work which he did here and elsewhere.

Dr. Junker returned to Bakangai, explored the southern watershed of the Makua, and waited for Emin's arrival and for the reply to his report upon Hawash, in which, when it came, Emin made a promise to follow soon, which promise events did not allow him to fulfil. He then

went south through Monbuttu to the banks of a river Nepoko, 70 yards wide, which almost certainly runs into the Biyerre,* and which he struck in about $1^{\circ} 48' N$. Here he was detained by Sanga, a Monbuttu chief, who was trying to reorganise on the Nepoko part of the shattered remains of Munza's people, who had been driven by the slavers from the banks of the Makua. The numbers of the nation have greatly decreased, Junker says, and in their present seats, whither they have thus been driven, they form an aristocracy of a few thousands, ruling numerous backward and comparatively uncivilised indigenous tribes. Sanga detained him as he did not know whether he was friend or foe, and Junker had to send secretly to Gambari, a Monbuttu whom he had visited further east, to give him a good character. Gambari was a slave, brought up in Yussuf's household, who had been sent by Yussuf to Monbuttu to rule it as a conquered country, but having failed† and having been dismissed, he had been himself captured lately by the miscreant Arabs on the Rohl, and was just saved by Emin's arrival from being sent down to Khartum to be sold as a slave. Gambari's representations set Junker free, and in September 1882 he rejoined his servant Bohndorf at Semio's, after a year and a half's absence, and reposed awhile, being ill from bad food and want of necessaries, out at elbows, out at heel, and consequently lame.

Dr. Junker found that between the south water-shed of the Makua and the Nepoko, and rather to the west of his route to the Nepoko, lay the head-springs of the Nawa which flows west and becomes a big river; it runs five or six days south of Bakangai's and must, as he says, be Rafai's big water, and Stanley's Itimbiri, which we ought to call Loika.

Dr. Junker left Bohndorf (whom he did not see again) at Semio's in the end of 1882. He explored the Werre or Opi, which falls into the Makua about long. $24\frac{1}{2}^{\circ}$, and found rapids on the Makua, near the junction; these being the only *known* rapids on it below the Kibali rapids in long. 28° . Travelling as usual overland, from one Zandeh chief to another, he struck the Makua at several other points of which Ali Kobo's seriba in about $22\frac{1}{2}^{\circ} E. 3\frac{3}{4}^{\circ} N.$ was the furthest. The Makua was here colossal, and full of islands (as it is elsewhere above) some of which are thickly populated while others are full of elephants. From bank to bank the river was perhaps six miles across. It ran north-west, and six days beyond was joined by the Kuta; of this junction he is quite positive, the point being well known to the Zandehs; in fact all the Zandeh chiefs seem to know it, for Casati up at Kanna's was told how these rivers joined in the land of Ambanenghe, and Potagos learnt the same at Ingimma's years before, with this addition, that canoes there had sails.

* Miscalled the Aruwimi.

† In supplying eunuchs; but not for want of trying. He was one himself. The matter is fully dealt with by Gessi in an unpublished letter to General Gordon.

Dr. Junker had no means of navigating the river. The Zandehs, whose chiefs were everywhere friendly to him and glad to see him, do not own boats. The tribes inhabiting the banks and islands are quite distinct in race and language, and knew nothing of Gessi or Lupton, or of their anti-slavery policy. Ali Kobo and other government ivory traders were new comers and were only just beginning to get acquainted with them; a voyage would have meant fighting. Dr. Junker therefore went back to the north-west to connect his surveys with Lupton's. Between Ali Kobo and Singio's he passed no river of any size running to the Kuta. Singio's is a little above the junction of the Shinko and Mbomo and just below the junction of the Warre (of which one fork is called Ualle) and the Mbomo. He then went to Semio's and sent news of his return (and of the Makua having been last seen to the south-west) to Lupton and Bohndorf. Lupton replied that he had explored as far west as Foro, along lat. 7° N., and had taken latitudes. Junker connected his survey at Mbanga, where Lupton had taken sixteen stellar observations for latitude, and at Dem Bekir closed his own circuit. Junker only surveyed with compass, and by reckoning distances travelled, yet he took such care and had made so many cross routes and subsidiary triangles, that at Mbanga he was not much out in his reckoning (according to Lupton's latitude). Still he was out of course. Correcting the map so as to fit Lupton's latitude we get the Makua into the position shown on my sketch map. Dr. Junker's uncorrected mapping makes it cross Grenfell's Loika.

Lupton's letter reported that all the streams he had crossed going to Foro ran south or south-west to the Mbomo, and two of them the Shinko and Enji were as big as the Mbomo itself. The Shinko or Paperwer (Bohndorf's Ghenko) is formed by the junction at Marra of several streams, some of which rise three or four days S.S.W. of Hofrat el Nahas. Marra is 1980 feet above the sea, or 1000 feet above Stanley Pool, and the Shinko there was 20 to 25 feet deep and 90 yards wide with steep banks. It is not fordable in the dry season anywhere lower down. From Foro, which is beyond the Enji but in its basin, Lupton had sent a man south or S.S.W. rather to the Kuta (as the joint Mbomo Shinko is called there) to report upon it. The man took 44 hours and odd minutes on the way, halts excluded, to Barusso on the Kuta, which places it about $5^{\circ} 20'$ N., and found the river two or three miles wide, running west. A river which Lupton calls the Welle joined it 13 hours above, and a big river joined it also from the south four days below Barusso. This last must be the Makua, for Junker found no other intermediate river of any size, except one that ran west to the Makua.

It will be well for the future, to avoid confusion, to call the Welle Makua, "Makua," and the Werre or Opi, "Opi." Makua is the Monbuttun name; the Zandehs call it Warshal. Welle, I believe, only means river.

Lupton's letter is dated October. Hicks and his army perished,

and Stanley arrived at the mouth of the Loika in November; the last steamer came up and took down Bohndorf with Lupton's news in December; Gordon met Bohndorf in the Korosko desert in January, learnt his news in full at Khartum, and must have been encouraged by it in his long considered plan* for going south to Lupton with all steamers and stores, and holding the Bahr Gazal till he could open up a route to the Congo, and find a water-way up the Makua or to the Makua by which the negro Soudan could be permanently held against the Mahdi, and against all slave traders. I call attention to this plan of Gordon's because we are now perhaps able to carry it out.

I must leave Dr. Junker himself to describe these countries and their people in full. As you see from the map a great quadrangle of country between the Bahr-el-Arab on the north, the Lado-Nile or White Nile on the east, the Makua on the south, and Foro, the Enji, and Ali Kobo on the west, has been explored from the side of the Soudan. The water-shed runs from corner to corner diagonally from Wadelai to 60 or 70 miles south-west or W.S.W. of Hofrat el Nahas (the copper mines), the extreme known point here being a mountain with a wide view, ascended by Potagos in 1877, in company with Arabs who told him what he was looking at. The watershed is highest in the south-east, and beyond Wadelai it flanks Albert Nyanza in mountains 7000 feet high. There are passes of 4000 to 5000 feet leading to the sources of the Makua from Wadelai. Mount Baginze, due south of Meshera, is 4000 feet; there are several mountains probably higher than this in Makaraka about the sources of the Rodi, and a large tract of country above 3000 feet high. To the north-west the watershed seems to be pretty flat in many places.

The rivers on the Nile slope run north in long parallel courses. The eastern or longer rivers, Rodi, Rohl, Roah, and Tonj, in and after the rainy season inundate large parts of the great triangle of low flat plain that fills the whole space between the Bahr-el-Gazal and Nile as far as Rumbek, and nearly as far as a north-west and south-east line drawn through Lado and Djur Ghattas. Their lower courses are therefore lost in swamps and reeds, and are not navigable. The five shorter rivers on the west are all navigable from Meshera for at least five months in the year to boats drawing five feet of water, up to points ascertained by Lupton. Dem Suleiman is close to one of these points. There is at least 10 feet of water up to Wau and Kurshukali for seven or eight months.†

The low flats sweep round up the Bahr Arab, and Hofrat is on a great open which is lower (at 40 miles east of Hofrat) than the Nile at

* See Lieut.-Gen. Sir G. Graham's article in the 'Fortnightly Review,' Jan. 1887, and Gordon's 'Last Journals,' pp. 47, 48, 49, 87, 112, 145, 200, 225.

† Gessi (unpublished letter).

Wado. Hofrat is the copper mine, for the sake of which Zebehr made war on Darfur. The ore stands up in a long wide reef, protruding two or three feet above the ground. It is very pure. Zebehr and Gessi worked it and bartered copper for ivory. Copper is the only precious metal known to the Monbuttus and other Congo negroes, and was much valued. The Bahr-el-Arab is fordable in the dry season at $25\frac{1}{3}^{\circ}$ east, but not, it is said,* lower down. For five months or more it floods the swamps on its banks so as to form an almost impassable barrier between the negro and Arab, the fertile and the desert regions of the Soudan, everywhere east of Hofrat, or of long. 25° . It is no doubt obstructed by sudd and reeds below, but except for this ought to be navigable for eight months; its course is only too flat. This triangular flat would be suitable for growing rice, but at present is worthless, and is thinly inhabited by Dinka negroes with their thin, but highly venerated cows. It must always be very unhealthy. The valuable and healthy part of the Nile slope is the upland plateau 2000 to 3000 feet high, which begins just north of the line Djur Ghattas-Lado and continues beyond the watershed. Schweinfurth fully describes its characteristics—the rich red ferrugineous and rather spongy soil, the park-like and moderately timbered uplands (where the tall grass is fired every year, as it is on the low triangular flat and throughout Senaar), the real tropical forests which clothe the banks of the narrow river cuttings† which are generally 200 or 300 feet deep, in which the air is close and heavy in contrast to the fresh and open air above.

In the Makua basin, the vegetation is more luxuriant, and the trees bigger. Indiarubber (for instance) which Gessi and Lupton exported in quantity, and of first rate quality (much better than the Brazilian) is more abundant. The banana grows in Monbuttu, but in the Nile basin not north of Wadelai. There is more forest, though the Zandebs regularly burn the tall grass annually. I do not know if this firing of the prairies is a long-established practice or not; its effect in creating prairies is of course great. Going from Rumbek to Tangasi in the hottest six months of the year, Casati found 66° and 97° were the extremes of temperature (19° – 36° C.) which is very moderate. Monbuttu country proper is distinctly healthy, very fertile and well watered, but rolling, well drained, and 2500 to 2800 feet high. The Nubians were bringing their wives and children to settle there in 1871, and, as we know, they are not so tolerant of moist heat as Englishmen. Ten or twenty thousand of them, must have emigrated for good, or rather for evil, to the Bahr Gazal, before Gessi turned them out. By all accounts the Makua slope is healthier than the Nile slope. Bohndorf notices the difference at Mbanga, which is at nearly the same altitude as Dem Suleiman. Lupton, in the Bahr Gazal, thanks to constant activity, had not a day's sickness.

* Schweinfurth.

† Schweinfurth's *galerie* forests.

The two chief races in the Makua basin are the Zandehs and the Monbuttus (the latter is a name given by the Arabs). The south bank of the Makua generally is Monbuttus, and the north Zandeh as far east as long. 28°. The Zandehs stretch along the watershed to near Lado; the Makarakas who supply Emin with his best, and with most, of his soldiers, being Zandehs. To the north-west they reach the Shinko, and the south bank of the Kuta. The Bandas,* who occupy all the country west of the Shinko and north of the Kuta, as far (according to Nachtigal) as latitude 9° north, are the same as the Zandehs in language and customs, but there are political differences, and they refuse to be called Zandehs. The Zandehs also have conquered and occupied, not long ago, the Bomokandi basin, thus cutting off the Monbuttus proper of Schweinfurth (in Munza's and Degberra's kingdoms) and from the A-Babūa, who are of the same race and language, and who extend from about the Mbelima as far as Ali Kobo, and apparently south to the Nawa-Loika. The original inhabitants of the Zandeh countries in the Bomokandi basin, are called Mēge and A-Barambo. The tribes east and south of the Monbuttus, are by them called Momvu,† and those south of Nepoko, Mabōde. The Mēge are Monbuttus in language if not in race. The tribes south and east of the Monbuttus's proper, as far as the Albert Nyanza watershed, are looked down on by them as poor savages, and as above stated, the Monbuttus, though much broken up by slave-hunters, exist now chiefly as an aristocracy ruling inferior subject races.

Of the tribes through which Stanley means to go east and north-east from Stanley Falls, little is known. According to Dr. Junker they are disorganised and disunited, and probably sparsely scattered in a rough, hilly, forest country: they have goats, and those nearest Lake Albert have cattle. The rivers there beyond the Nepoko have probably a rapid fall. The river that joins the Congo just below the Falls is twice broken by rapids a short way up.

The Akkas or dwarfs, exist only in scattered colonies. In the country west of the Shinko, and north of the Kuta, which the Nubians call Dar Abu Dinga, are a peculiar people, the Nsakkara. The A-Bassango, who inhabit the banks and islands of the Makua, and who practically *monopolise its navigation throughout*, are distinct from the Monbuttus, Zandehs and others. They have canoes sixty-feet long.

The attention of travellers and linguists will be directed mainly to the Zandehs, Monbuttus (i. e. A-Babūa, &c.) and A-Bassango.

The Monbuttus are a superior and intelligent people, superior to any of the Bahr Gazal tribes, from whom, as Schweinfurth says, you may expect an intelligent answer and a sound judgment, and whose word you can rely on in matters of business. In Munza's time they emphatically formed a nation, and knew it. They stood by each other faithfully as fellow-countrymen, and they are faithful to friends. Many of them

* Or Bandja.

† A term of contempt.

fought under Gessi. He saved them for a time, and deposed Gambari. Emin came to Tangasi in 1883, and administered the country, which is part of his province; the nation was then much broken and decayed, and looked to him for protection.

The Monbuttus are agriculturists and smiths. Their population in 1870 was very dense; according to Schweinfurth, about a million in a space of a square degree, or 250 to the mile. Though they have neither pincers or file, or the art of tempering by immersion, they supplied the Zandebs with many of their weapons. They felled trees, and made canoes 40 feet long and 5 wide, with a tedious little iron hatchet. Munza's great hall, 100 feet long, 50 wide, and 40 high, was the architectural triumph of Central Africa. They did not know how to weave cloth in 1870, though the A-Babūa did. The men dressed in fig-bark, while the women went naked. They are light-coloured, have rather long curved noses (for negroes), and are all circumcised. They are great cannibals, and naturally so, as they have no domestic animals to eat, and are not great hunters. Bananas, cassava, yams, sweet potatoes, and sesame, are their chief food.

The Monbuttu women are, according to Schweinfurth, a striking and most unpleasing contrast to the Zandeh women, who are modest and retiring, faithful as wives, and devotedly attached to their husbands.

King Munza was a powerful monarch who levied taxes, and kept good order. He had a great retinue of courtiers and officials, and affected much state and pomp whenever he emerged from his usual privacy. All that he touched was sacred. He protected his people from the abominable malpractices of the slave-dealers, and steadily refused to let any of his numerous daughters marry an Arab or Nubian. For these reasons they murdered him in 1876.

The Zandebs are a less civilised but more promising race. Their domestic virtues seem to be considerable, and their fighting qualities are superior to those of any other negroes in the Soudan. The testimony as to this last is clear and unanimous. Emin has written most emphatically of the gallant defence of Amadi by his Makarakas, who ate their boots and then at last cut their way out. The negro battalions in Hicks's army stood out a whole day without water after he and his Egyptians perished, refusing to capitulate, and saying they had eaten the Effendina's* bread, and therefore meant to do their duty. Continually during the rebellion the basingers died like the Old Guard, selling their lives very dearly. The best of them, without any doubt, were Zandebs. Lupton's intention to take to the jungle with a spear, along with his trusty Zandebs, when his ammunition should be spent, and to so continue resistance, argues in favour of the troops as well as of the leader. Sudden betrayal only prevented him doing so.

* i. e. the Government's.

The Zandebs are a nation of hunters. Hunting is their chief occupation. Meat is their word for food, and they hunt for meat. They have no cattle, and a third of their grain (eleusine) goes in brewing a drink that deserves the name of beer. They can carve well, and make pottery and iron weapons. Their huts are tasteful, and they are very fond of music, even of their own. They take auguries regularly before going to war, and seem to have a faint sort of hero worship. Schweinfurth thinks their religious ideas are poor, but the Banda tribes* have a male and female deity, each of whom has a shrine in each homestead, where they lay their offerings, take oaths, "baptise" their children, and take auguries. In person, they are remarkable for their round broad heads, short legs, and big full eyes set wide apart, and above all for their graceful agility and ease of motion, high training, and evident mastery over every accomplishment that befits a hunter.

Politically they are disunited, through the number and turbulence of an aristocracy of petty chiefs, each of whom is implicitly obeyed by his retainers. Succession goes by primogeniture, but the insubordination of brothers greatly tempers the rule. It is the custom for a Zandeh to ask his chief to find him a wife, or to intercede for him, rather, with the father of the maid he has courted. In most savage countries a man buys his wife direct from the father. The Zandeh custom suggests that not long ago their nation was organised for war like the Zulus, who being all soldiers, might only marry by permission of their leader.

Each chief or clan has round it a waste or forest mark, where it hunts, and which separates it from the next. Sometimes independent brothers are found living and ruling side by side within the same belt of waste. The word clan is perhaps wrong; for change of allegiance, and taking service under another more popular chief seem to be not uncommon.

The chiefs affect no state, but may be known by their pride of mien. Schweinfurth says that they do not lead their retainers in battle; but they alone declare war and peace and direct the campaign. They have power of life and death, and now and then "indulge in fits of Cæsarism," lest the fact that they can kill without giving a reason should be forgotten. All the ivory belongs to them, and half the carcass of elephants. They recognised Gessi's and Lupton's authority over them, by asking for protection, by making large gifts of ivory, by referring disputes to Dr. Junker, whom they treated as a government commissioner, by agreeing to trade ivory only with government agents, and in various other ways. In 1883 most of the country north of the Makua from Ali Kobo and Barusso eastwards was in fact an Egyptian protectorate.

I have mentioned examples of the intestine discords of the Zandebs, and of the struggles of brothers for independence, or leadership, which were so cruelly fomented by the slave-hunters. Dr. Junker's narrative

* According to Nachtigal's Bornu man, see *post*.

seems to show that they had had their surfeit of civil wars, and wished for internal peace and for protection under a strong leader, a wish which would require another European arbitrator and protector like Gessi or Lupton to carry out. Khartum traders will infallibly foment dissensions in order to get ivory and slaves, for this is their invariable policy. Whoever can prevent this and organise the nation ought to be able to stop the whole Bahr-el-Gazal slave trade. At least that was Gordon's plan in 1884.

So much for the people: let us return to the rivers. Where does the Makua flow to? It must flow either to Lake Tsad or to the Congo; that is quite clear. I dismiss as utterly absurd the idea maintained by Stanley in his book on the Congo that it is the Bierre; and I cannot understand how such an authority could have written in 1885 two pages of argument to maintain that it does, for upon the face of the facts which were known on Bohndorf's arrival in Europe, and which were in print in the middle of 1884, the hypothesis is untenable. Explorers look only to their own discovery.

We now know, thanks to explorations made in December 1885 or February 1886 by the missionary Mr. Grenfell, that the Loika is navigable to about $23^{\circ} 25' E.$, $2^{\circ} 50' N.$, that the rapids he stopped at are possibly passable at high water, and that the river about Christmas has a volume of some 30,000 cubic feet a second. We also know of the Mobangi, up which he went 100 miles before he found he was not in the main Congo (such is its size and the sharp angle at which the two streams meet), and found it navigable to $4^{\circ} 27' N.$ at lowest water; and we know also that the only other northern tributary of the Congo between the Mobangi and Aruwimi is the Ngala, near Bangala, which in December had a volume of about 25,000 cubic feet a second. The Ngala has since been navigated in time of flood by a tiny steam-launch to about $3\frac{1}{2}^{\circ} N.$ and perhaps $21^{\circ} E.$ It and its branches are there very small streams, barred by rapids and waterfalls, in a hilly and rocky country. Its sources in these hills defines the watershed of the Makua. Grenfell searched carefully for other northern tributaries and found none.

The French, in January 1886, navigated the Sekoli-Bonga, another large Congo tributary, parallel to the Mobangi, and only 60 miles further west, which in October had a volume of about 40,000 cubic feet a second. All these estimates of volume are by Mr. Grenfell. The Mobangi is by far the biggest of these northern tributaries, not excepting the Bierre; * the Makua must be the Mobangi, or else must go to Lake Tsad: that is quite clear.

[NOTE.—The following argumentative paragraphs were not read at the meeting. They meet Mr. Ravenstein's arguments.]

Now the Lake Tsad streams were explored by Barth and Nachtigal. They are two, the Shari and the river of Logon. The latter is

* Stanley's "Aruwimi."

fordable in March (at Logon), and is there about two-thirds the size of the Shari. The Shari in March has been described by Barth as 600 yards wide, quite shallow for two-thirds that width, and 15 feet at deepest. The current in the deep-water channel ran two to three miles an hour, and over the shallows of course much less. Say current $2\frac{1}{2}$ miles an hour throughout, and average depth for 200 yards 13 feet and for the rest three feet (a very liberal interpretation), and you have 42,000 cubic feet a second. Barth says the year was a very rainy one. Nachtigal travelled along the Shari for many days above Barth's point in March, and says it is 330 to 450 yards wide, fordable half-way across, and for a third part beyond (i. e. for a third of its width), 10 to 15 feet deep; current two miles an hour. If the remaining sixth part is the slope down from the edge to the 10 foot depth, and if the fordable half averages three feet, this gives 20,000 to 28,000 cubic feet a second.

But then the Shari splits into four streams, which flow from east to west. Both in Bagirmi and Wadai, Nachtigal found they were well known and that there was no other. He took into his service an intelligent and reliable man, who had crossed them all in the dry season, though apparently not at the driest. The Aukadebbe, which joins in lat. 10° (Nachtigal went beyond its mouth to lat. $9\frac{1}{2}^\circ$ on the west side of the Shari), and the White and Blue rivers, which join below lat. 9° , have together about as much water, or more, than the fourth or main stream, the Ardhe. One was 80 yards by three feet, the second 200 or 300 yards by 4 feet, the third 100 or 150 yards, but not fordable, and the currents of all three were nothing particular. The Ardhe was 300 * yards wide and fordable, but it had a current which made fording rather difficult. Now a four mile an hour current three feet deep, or a three mile an hour current four feet deep, is pretty bad to cross, and the former at four or the latter at five feet would lift one off one's legs. These depths and currents if maintained right across the river give (which could hardly be) from 17,000 to 30,000 cubic feet a second. This crossing was not said to be at the lowest season.

Evidently this fordable Ardhe is not the Makua. Roughly speaking, it is about half the Shari, which is *perhaps* at very most 40,000 (in a wet year), but more likely some 25,000 cubic feet a second in a usual dry season. The Makua in long. 28° near Munza's has 10,000 cubic feet of water a second, and at Ali Kobo is six miles wide in the dry season.

But suppose the Ardhe was the Kuta-Makua. The Kuta-Makua certainly at long. 22° drains at least 120,000 square miles of country, for its watersheds are known. Where would the other half of the Shari

* This is native information. The man did not measure widths, but compared it to a river bed before their eyes which Nachtigal promptly measured. Had he been a Londoner his estimate would be nearly worthless, but a slave-hunter, whose business is to cross many rivers, looks twice at them and with a practised eye. An archer knows a bowshot; a mountaineer the height of a snow-slope, and the time it will take: a Chinese tailor will eye his customer and then fit him perfectly without using the tape.

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(the three northern streams) find a proportionate drainage area? Indeed they would require a far bigger one, for they run in latitudes where the dry season is very dry indeed. Where would the Logon find its proportionate area? And where would the Mobangi find a basin three or four times as big as that of the Kuta-Makua-Ardhe? Grenfell was at $4^{\circ} 27' N.$ on the Mobangi in its very lowest season, at the end of February: at the season when the Kuta and Makua too are at their lowest. The river was 640 yards across, of 25 feet average depth, and had a current of one to two miles an hour: say a current of $1\frac{1}{2}$ miles an hour, and its volume is 75,000 cubic feet a second, which is three-quarters of what all the other northern tributaries of the Congo below the Aruwimi put together contribute in November and December, and two-thirds of what the united Kasai-Sankuru gives (120,000 cubic feet a second)* in June (a month perhaps from its lowest). An area of 180,000 square miles is drained by the Kasai-Sankuru. The Kuta-Makua drains two-thirds as much, and presumably has two-thirds of its volume, which is just the volume apparently discharged by the Mobangi.

Again, Nachtigal had another informant, a trader from Bornu, who had gone south across the Aukadebbe and White rivers, which rise, he says, much further east (in the hilly Nile watershed toward Hofrat el Nahas), and no doubt are the streams which Potagos had pointed out to him from his mountain point of view near the junction of the Shari, Nile, and Kuta basins. Beyond these rivers, and fifty miles beyond the springs of the Blue river (which lie in a hilly country), the Bornu man passed through Foro (Lupton's Foro), close to which also, in a hilly country, were the springs of the Ardhe, a river which he knew all about; and 100 miles beyond Foro, he reached the Kuta, which he said was a river bigger than the Shari itself, which certainly did not run into it, flowing west, and full of inhabited islands, some of them rocky. He gives other names besides Foro, which Lupton identifies. He spoke the Banda language, and said it was spoken from lat. $9^{\circ} N.$ to the Kuta, and he gave examples to show Nachtigal that all its dialects are mere dialects and nothing else. This uniformity of language of course facilitates the spread of good information. His distances as mapped by Nachtigal are so correct that the Kuta so mapped (though Nachtigal himself was nearly 400 miles from it in Wadai) is only forty or fifty miles further south than Lupton found it to be.

Nachtigal consequently did not pretend that this Kuta could flow into the Ardhe, but threw out a suggestion that it may flow into the Logon (the Congo then was unknown). But this cannot be, for the Ardhe, according to the other informant's distances, lies only 120 miles from Grenfell's furthest on the Mobangi. The Kuta-Makua would have to make a tremendous sweep to get round it to the Logon (which, as stated, is a fordable stream two-thirds the size of the Shari in the dry

* By an estimate more careful than any of the others given above.

season, not capable of receiving a fifth part of their waters) and would almost run into the Mobangi on the way.

The fact of the Logon swelling, so as to equal or even exceed the Shari in the rains, is easily accounted for by its position: its basin lies where the summer rainfall must be drawn from the Atlantic, and may reach further south than the Ardhe.

The reported connection between the Shari (Ardhe) and Logon, which, if true, makes Bagirmi an island, is immaterial. *Primâ facie* it is not likely, and Nachtigal himself says he is inclined to disbelieve it; its existence is negatived by the unequal rise and fall of the two rivers. As in the dry season it is said hardly to flow at all, it hardly affects my argument.

The origin of the idea that the Makua flows to the Shari is found in the tale told to Schweinfurth in Monbuttu, that it flowed to a big water where the people prayed like the Arabs, and had white clothes like theirs. I explain this tale by another whose truth is immaterial as long as we suppose it to have been repeated for true. Rafai, in 1877, on the banks of the Mbomo, told Potagos that beyond the Shinko was a river Sebang, running south to the Mbomo (the Enji we may suppose), and beyond it another which bifurcated, one part going to the Shari, and the other to the Mbomo (Kuta). Rafai also told him that Zebehr had a few years before descended the Tsigo (Shinko?) in a canoe to the Mbomo, and from the Mbomo had ascended the Sebang * and had learnt of this other peculiar river. Potagos adds that he asked Zebehr about this afterwards, who assured him that this was so. If Zebehr and Rafai believed such a tale it would also reach Munza's through the Arabs.

In face of the known positions of the Makua and Mobangi it is scarcely necessary to weigh the Shari hypothesis any more. Before the discovery of the Mobangi was made it was scarcely tenable.

The matter is now one of practical importance. The Mobangi is known to be a waterway hardly inferior to the main Congo for practical purposes: deep; never less than 600 yards wide, even in February, when the Kuta-Makua certainly (and it too apparently) is at its lowest level; and navigable at all times from Stanley Pool 650 miles thence straight N.N.E. to lat. 4° 20' N. beyond the limit which the Congo State, by private treaty with Germany, has placed to its future "sphere of operations," and beyond the limits which the French will probably occupy if they win in their dispute with the Congo State as to which of the two shall not operate in the Mobangi basin. It is then found to turn sharply to the east, flowing from the east through a gap it has cut in a line of quartz and red clay hills 1000 feet high, hills which may be a

* The sources of this Sebang were pointed out to Potagos on the mountain in the Shari basin, where he had such an extensive view. It is probably the Enji. All that we know of the chances of such a bifurcation is that the lower Ardhe runs in a wide flat country, where there were no mountains to be seen to the south.

continuation of the hilly watershed between the Makua at Ali Kobo and the sources of the Ngala. The gap is narrow, and big rocks rise in mid-stream: at high water it is difficult to pass; but at low water, after reconnoitring, Mr. Grenfell got the *Peace* through easily, in February. Where we know the Kuta-Makua next, they are placid and colossal; the Shinko at Marra is still 90 yards wide, 20 to 35 feet deep in October, and only 1980 feet above the sea. Stanley Pool is now said to be 916 feet above the sea;* but Mr. Grenfell, who is more likely to be right, makes it only 800 feet. Equator Station at Mobangi mouth is 130 feet, and Grenfell's furthest just 500 feet higher—say 1300 feet. Therefore more rapids on the Mobangi-Kuta may be expected.

The river strikes at the very roots of the slave trade, and renders its suppression easy by commercial and peaceful means. Take away the ivory, turn a lucrative trade from Khartum to the Congo, and the great incentive to slave-hunting and slave wars is gone; philanthropy is cheap, for the profits will be enormous. Ivory is now worth in London twenty to twenty-five times the cost of its transport from Stanley Pool to here, the remaining 900*l.* or so a ton will pay for river steamers, trading stations, and the rest. Lupton carried his ivory from south and south-west of the Makua, and almost all of it from the Congo side of the watershed overland to Meshra. He claimed to show a net profit through this trade of 60,000*l.*, reckoning the whole cost of his province as part of the expenses.

What Gordon proposed to do when writing as Governor of the Congo to Stanley, in January 1884, can be done now. "If we act in the countries where the slave-traders hunt and make treaties with the chiefs, we can prevent their raids and truly stop the slave trade."†

We have not heard the last of the negro Sudan or of the way thither. A way lies through the country of the Zandebs the loyal subjects of Gessi Pasha and Lupton Bey, up the two rivers Dr. Junker has traced to their confluence.

After the paper,

Sir FRANCIS DE WINTON considered that the Society was much indebted to Mr. Wills for his paper, which was really a history of the exploration of Central

* 280 metres. Mr. Wauters has just accepted this figure.

† These blacks are becoming the Janissaries or Mamelukes of the Sudan, just as Gordon prophesied they would. "My belief is," he wrote, "that this Mahdi business will be the end of slavery in the Sudan. The Arabs have invariably put their slaves in the front and armed them (with rifles); the slaves have seen that they were plucky while their masters shirked. Is it likely that they will ever yield obedience to their masters as heretofore?" The last Blue Book is an instructive commentary upon this. Upon a promise of 10 dollars a head to each black who should come down to Egypt desertions have begun freely, and the would-be-conqueror of Assouan, Walad-el-Njoumi, had to stop and try to disarm the only drilled troops or decent riflemen that he had in his army. [Since this was written Njoumi has been beaten by the loyalists and the Khartum Khalif has been transferring his arsenal to the swampy island at Khartum for fear of a loyalist coalition.]

Africa, and will prove very useful to students of that region, giving, as it did, a succinct account of what had taken place there during the past ten years. The question which most interested him was whether the Congo would in future be the route to the district, and whether the Mobangi would prove navigable up to Kibali. Mr. Wills had omitted to mention that Grenfell in coming down ran on rocks, and very nearly sank his vessel, the *Peace*, which only drew 18 inches of water. It was a general characteristic of all those rivers to have rapids where the navigation became very dangerous. Therefore until it was known whether its course was navigable it would not be safe to prophesy whether the Mobangi (or Welle) would or would not become the great highway in the future. He had been connected with the Emin expedition, because of his friendship with Mr. Stanley. The expedition arrived at the Cape on the 10th March, and reached the mouth of the Congo on the 18th, one day ahead of the calculated time, without any hitch or misadventure. He had just received a telegram from Sir Frederic Goldsmid, the President of the West African Telegraph Company, stating that the *Madura* arrived all well with a party of 796 all told. Mr. Stanley's party numbered 638. All the Europeans were well and in excellent spirits. Tippoo Tib was with them, in order that they might get as much information as possible out of him with regard to the country which it was proposed to cross. The expedition were about to enter into the territory of the Congo Free State, and the Committee were sure that the King of the Belgians and his officers serving there, would do all in their power to forward the party on at the most rapid rate possible. Of course, calculations made about travel in Central Africa were subject to variations, but it was hoped and believed that Mr. Stanley would arrive at Stanley Falls and cross the 350 miles to Wadelai by the middle or end of July. The messengers despatched from Zanzibar would no doubt, carry to Emin Pasha the tidings of the relief that was being sent, and that would keep his soldiers in good heart. It might be thought that the route from Zanzibar was very much shorter than the Congo route, but from Wadelai to Zanzibar would necessitate a land journey of over 100 days. That was the opinion of Mr. Stanley and Colonel Grant, both of whom had had great experience in African travel; but by the Congo route the land journey could be accomplished in about fifty days. Among Emin's party there were many women and children, with whom an overland journey of 100 days would be a very difficult task. It was also known that when once a road was opened in Africa by a white man it became known as a white man's road, and if the territory described by Mr. Wills were once traversed by Europeans a great blow would be struck at the heart of the slave trade.

Mr. RAVENSTEIN said that Dr. Junker's work was among the very best that had been done in Africa. To him and Schweinfurth we owed nearly all we know about the countries lying to the west of the Upper Nile. He had found no difficulty in adjusting the work of these explorers to the latitudes observed by Mr. Lupton. Still, the map of that part of the country rested upon very unsatisfactory data. Neither the Meshra er Rek, and a point on the Upper Yeyi, had been determined with accuracy. As to the latitude of the former, Lupton and Petherick differed to the extent of ten miles, whilst Marno's and Petherick's observations in the south were quite irreconcilable with each other. For the longitudes of these places we still had to trust to very unsatisfactory itineraries. We ought not too readily to accept the positions inserted upon Dr. Junker's most recent map, for a survey of a winding river, unchecked by observations for latitude, or facilitated by prominent landmarks, was a task not very easy of accomplishment. He trusted that Mr. Stanley's relief expedition would bring home a few points fixed with great care. He supposed that after Dr. Junker's most recent statements they must accept it as a

fact that the Welle-Makua found its way into the Mobangi. Still, he could not help thinking that with the facts until quite recently before them, as good a case might have been made out in favour of the Shari as of that tributary of the Congo. Dr. Schweinfurth told them that the Welle begins to rise about the middle of April, whilst the lower Shari first rose sensibly in June, and was highest in September and the beginning of October. The discharge of the Welle was estimated by Schweinfurth at 40,000 cubic feet a second when in flood, whilst the Shari, according to Nachtigal, discharges 64,000 feet in spring, when it is low. Assume a rise of twelve feet, and the discharge would be nearly 200,000 cubic feet. We knew little about the way in which the Shari conducted itself on its way to Lake Tsad. There might be a sort of half-way house, he meant a lake, from which it issued with reduced volume. It was known, however, that the river turned spendthrift on approaching the lake, and instead of going along decently, it sent one branch to the right, another to the left, and even parted with some of its water to the Benue. This, at all events, was asserted by Dr. Vogel to be the case. As to the Mobangi, it appeared to differ considerably according to the seasons. Where Grenfell passed with ease, Captain Rouvier failed to make any progress. The Shari, notwithstanding its vagaries, was a considerable river all the year through, and kept Lake Tsad, whose water-level might fairly be estimated at 10,000 square miles, pretty well up to its level, even causing it occasionally to overflow through the Bahr el Gazal. If we assumed the annual rainfall over the Tsad to amount to 36 inches a year, and the evaporation to 120 inches, then that lake would require an annual supply of two million millions of cubic feet to maintain its level, and this the Shari alone contributed at the rate of 63,570 cubic feet a second. Unfortunately, in all these speculations we dealt with assumptions and not with facts, for the volume of none of the rivers in question had ever been accurately ascertained even for a single day. The basin of the Tsad, which covered an area of 550,000 square miles, of which 246,000 were unproductive, yielding no rain, was deserving of being explored, and he hoped that the Royal Niger Company would make it their business to settle the various problems still awaiting solution.

GEOGRAPHICAL NOTES.

Dr. Junker.—The distinguished African explorer, Dr. Wm. Junker, will arrive in London in a few days, and it is expected that he will read a paper at the Society's meeting on the 9th inst. The preliminary sketch-map given in the present number, in illustration of Mr. Wills's paper, shows the substance and the extent of Dr. Junker's discoveries. Since the end of 1883, Dr. Junker has been with Emin Bey, shut up in the Equatorial Province on the Upper Nile, and only last year succeeded in negotiating a passage through Uganda, and so reached Zanzibar about Christmas. Dr. Junker's travels in the Sudan and Central Africa have lasted from the spring of 1876 to the end of 1886, with the exception of about a year and a half in 1878–80. In his first journey he found the sources of the Welle Makua near Lake Albert Nyanza, but Suleiman's rebellion and his own ill-health prevented further exploration to the west. In 1880–83 he explored the basin of the Makua and Kuta (Upper Mobangi), travelling without any armed escort, and known as

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