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NGAMILAND

Captain A. G. Stigand

Map following p. 476.

Note: The spelling of names in this paper is especially difficult, since Sechwana may now, owing to the efforts of the missionaries, be considered a written language, but the system on which it is written does not agree with that of the P.C.G.N. (R.G.S. II. system). The principal differences are these: The consonant written *g* in Sechwana is usually the *kh* of R.G.S. II. (Taoge = Taokhe). The consonant written *ñ* in Sechwana is more like the *ng* of "singing" than the *ny* or *n'* which is the normal equivalent of the Spanish *ñ*. The consonant written *c* in Sechwana is our *ch* (Cwarelañwane = Chwarelangwane). In addition to these difficulties there are the four clicks in the Bushman and one (the first) in the Makuba language, for which on the map Captain Stigand has used four superscript numerals. The only one which appears in the text is the first, the linguo-dental, written *x* conventionally (Xgadikwe = 'Gadikwe). Now since the Sechwana spelling is well established, and is used officially in correspondence between the Government and the chiefs, as well as in official reports, it does not seem possible for geographers to supersede it by the P.C.G.N. system: yet as it stands it is misleading; and moreover no system either of consonants or numerals can teach us how to pronounce Bushman clicks. We have therefore, provisionally, used the conventional system in the text, and the P.C.G.N. system (with the addition of numerals for clicks) upon the map; leaving a solution of the problem for the P.C.G.N.—ED. G. J.

THIS paper has been written as an adjunct to the writer's sketch-map—the result of numerous journeys by land and water in Ngamiland during the last thirteen years—rather than the map being supplementary to the paper.

Ngamiland* is little known owing to its situation, which is remote from the routes of communication between South and South Central Africa, and owing to the fact that it lies within the Batawana Native Reserve, one of the large native reserves of the Bechwanaland Protectorate, wherein the only Europeans are five belonging to the Administration and eight licensed traders with their assistants. Mauñi, the chief village or "town" of the Batawana tribe—numbering some five hundred huts—

* Ngami is the conventional spelling. It is from the Sekuba name, phonetically = Ng'āmā (the ' is a linguo-dental click), given by the Makuba to the lake, meaning a very large expanse of open water.

is the seat of the local administration and of six traders' stores. The climate is malarial for six months in the year, but much less so than was the case at Tsau up till 1915, when the Chief Mathiba and his people, as well as the local administration and traders moved from Tsau to Mauñ. Mauñ is pronounced as a dissyllable: Ma-ung.

Some notes on Ngamiland by the writer appeared in the April 1912 number of the *Journal*, wherein a brief rough general description was given of the physical features of the country. But for a better and fuller description I must refer to the following: Dr. S. Passarge's book 'Die Kalahari'; Kew Gardens Bulletin No. 3 of 1909, XIV.; 'The Flora of N'gamiland,' Introduction by Major E. J. Lugard, D.S.O.; or to Hauptmann Streitwolf's book 'Der Caprivizipfel' in Susserott's 'Kolonialbibliothek,' Band 21, pages 12 to 32, published in 1911.

From the latter, however, I will here quote and translate some relevant extracts since they give an excellent description of the Okovango river system.

Streitwolf:
 "Ngamiland belongs to the Middle Kalahari. Its rainfall is from 300-500 mm. Rain can only be depended upon from December till March." [Some years April gives a little.]

"The only river in Ngamiland which carries water is the Okovango, which is quite a mighty stream. It comes from high up out of Angola, bringing its beautiful crystal-clear water, and for 350 km. forms the boundary between German South-West Africa and Portuguese Angola. At Libebe's (present Lisho's village, on Tahoe island, Andara) it breaks over countless rapids which end in the 4-metre high Popa falls. After that it spreads out into many arms which further on split up again into numerous branches, and loses its water in vast swamps. One arm, the Tauche (Taoge) flows southwards to Tsau and formerly discharged its water into lake Ngami. Ngami was last filled with water in 1895. Since then the Okovango flood water has been ever retreating, and to-day (1909) it dries up in the sand close below Tsau.

"Another arm, after the Okovango's entry into its swamp region (Okovango basin), runs with further ramifications to the eastward, then southward, part of it flowing into the Botletle under the name of Tamalakan, and part of it in a north-easterly direction into the Mababe flat under the name of Mababe river." [The latter has not flowed since 1910.]

"The Tamalakan flows into the Botletle, and at this junction also it divides and flows in two opposite directions. The bulk of the water goes to the Makarikari Salt Pan, and a smaller portion flows west to lake Ngami, which it can just manage to reach at high flood. Whereas formerly lake Ngami was filled from the north by the Taoge arm and then ran off to the east into the Botletle, now the Okovango water reaches Ngami from the east." [See map 4s regards amount of flood water that reached the eastern end of the "Lake" in August 1910, and again the minute amount that just reached the mouth of the "Lake" in 1921, which latter year had a bigger flood than any since 1918; 1922 has been the worst of any.]

"The drying up of lake Ngami is in the first place attributable to the fact that the water of the Taoge no longer reaches it. This is certainly due on the one hand to the diminution in the volume of the water of the Okovango, and on the other to the silting up of the bed itself. The famous Kalahari explorer Passarge

says that one of the causes is that natives are in the habit of abandoning their papyrus 'rafts,' after they have carried their produce down river on them, and these block up the channel mouths." [There is a good deal in this last as a contributing cause. The writer has seen flotsam of papyrus rafts—which are little floating islands some 15 to 17 feet diameter by some 5½ feet deep in thickness, constructed and used by Makuba and River Masarwa (River Bushmen) north of lat. 19° on the Okovango main stream—blocking the entrance of effluent channels in the papyrus beds bordering the Okovango.]

"After the Taoge was cut off from lake Ngami it spread out, particularly to the eastward, and filled a huge swamp area, and at the same time formed a new Ngami north of the old one. Formerly this swamp was not nearly so full of water; of this old Bechuana have repeatedly assured me. Of course this does not conflict with the certain fact of the increasing diminution of the water brought down by the Okovango.

"The Swamp region, which Passarge calls the Okovango Basin, is of enormous extent, quite 150 km. by 40–60 km. wide." [At lat. 19° 43' about it is approximately 155 km. wide, or nearly four times Hauptmann Streitwolf's figure."] "It is practically unexplored, and its mapping would be a work deserving of gratitude. The courses of the Taoge and of the other arms, such as the Boro, Kuruman (Kudumane, or Kurumane), etc., are still unknown."

His following account of one of the short local excursions he made into the swamps close to Tsau, whilst he was the guest of my predecessor there, gives a more graphic description of the scenery than I can write:

On the occasions of my three visits to Tsau, each time I made a rather longer excursion into these swamps. After I had ridden up stream 30 km. from Tsau, I borrowed a canoe at a native village and travelled in an easterly direction into this interesting region. After we had first canoed through some flooded open grass flats, then through a 200 m. broad belt of reeds and papyrus by a narrow channel, we reached the Taoge itself, which was about 10 m. broad and 3–4 m. deep" [the writer during the big flood season of 1910 only found it from 8 to 9 feet deep] "which flowed briskly with its crystal-clear water. Next we went again through reeds and papyrus, and reached numberless islands, rush beds, channels, and little lagoons. High leafy trees wooded the island banks and mirrored their hanging greenery in the water. Lotus lilies and water-plants of all sorts covered the unruffled water surface. Countless waterfowl sat motionless on the pools and trees, amongst the deep green of which often showed forth the dazzling white of the heron. Duck, geese, 'snake-neck' birds (cormorant), did not dare to disturb the silence of this secluded region. It is a beautiful world, this Swamp region! Practically uninhabited, except for a few Makuba engaged in catching fish, shut off from the outer world and difficult of access, it has retained its virgin charm. Here dead silence reigns, only now and then broken by the distant snorting of a hippo ploughing its way through a reed bed, or by the hoarse cry of a fish eagle circling majestically in the air above."

"Such is the swamp region of the Okovango. So far no white man has succeeded in crossing it.

"The Okovango rises in July–August, that is to say, in the middle of the dry season. This peculiar time—which one would naturally expect to immediately follow the rains—is due to the fact that the Okovango above the Libebe rapids flows through a wide valley with very little fall, which it has first to fill when it rises. The water can only flow slowly over the depressions overgrown

with high grass, and down."

[End of July is a Tamalakane river. way to Andara (Libebe) its delta at about 18° fill up many dry channels way further south.]

"The Ngamiland is a vast marshy inland lake. For the landscape I must leave it to the future. If one accepts the fact that the Victoria Falls can easily understand the water on towards the Makubas, the water from this resulted."

For the following Ngamiland during the eighteenth, I am inclined to think that Mokwati, descendant of the chief of the Bayei line, occupied Ngamiland. I have had many talks with him. He has a very clear memory for he says when the lake was close on a hundred years ago (indicating about the arrival of the "white man" a grown-up young man then been about the age of the "Naka," he says he saw a lion cub as a pet which he used to lick Livingstone's hand. There was also a hippo in the lake.

From old Mokwati I learned that "lake" Ngamiland was a lake by the Zambesi at the Victoria Falls (in the sixteenth century) time since anything has been published in 1856, when he saw it on 28th July 1856.

Old Mokwati, who was old when Oswell and I were on the shore of the lake with him, was constantly fishing and

with high grass, and it takes some months till the flood water makes its way down."

[End of July is about the time it usually reaches lat. 20° in the Tange and Tamalakane rivers. Besides the time taken by the flood water in making its way to Andara (Libebe), further down, after the Okovango has spread out into its delta at about 18° 50' S. lat., the flood water has naturally to saturate and fill up many dry channels and much dry swamp area before it can make its way further south.]

"The Ngamiland depression must in those former days have been an enormous inland lake. From what cause such a great change has occurred in the landscape I must leave undecided. Chiefly it is the result of diminished rainfall. If one accepts the theory that also the Zambesi before it broke through at the Victoria Falls discharged its water into this Kalahari Basin, then one can easily understand that enormous river lakes existed at Ngami and further on towards the Makarikari Pan. When subsequently the Zambesi drained off the water from this region to the sea, a general change of climate quickly resulted."

St. George's For the following information as to the hydrography and history of Ngamiland during the nineteenth century and the latter half of the eighteenth, I am indebted to the oldest inhabitant, an ancient Mokuba, Mokwati, descendant and heir of the Mokuba chief Zankotse, who was chief of the Bayei living at Lake Ngami when the Bechwana Batawana occupied Ngamiland about the year 1800. Old Mokwati, with whom I have had many talks since I first came to Ngamiland in January 1910, has a very clear memory. He must be well over a hundred years of age, for he says when the Chief Khama was born (Khama to-day is said to be close on a hundred years old) he, Mokwati, was a little boy "so high" (indicating about four or five years of age). Mokwati clearly remembers the arrival of the "Naka" (Doctor Livingstone). He says that he was a grown-up young man at the time. I think that Mokwati must have then been about thirty years of age. Amongst other recollections of the "Naka," he says that Livingstone brought with him a large grown lion cub as a pet which was led on a chain, and that this young lion used to lick Livingstone's hand, but growl at any other person who came near it. There was also a small baby elephant.

From old Mokwati's information there seems to be very little doubt that "lake" Ngami, after the draining off of the vast Okovango Basin lake by the Zambesi following its breaking through at the Victoria Falls (in the sixteenth or seventeenth century (?)), has never been at any time since anything more than a shallow flooded depression or large open patch of swamp water. Andersson, in his book 'Lake N'gami' published in 1856, dwells upon its shallowness and on his disappointment when he saw it on 28 July 1853.

Old Mokwati, who, as stated, was a young man about thirty years old when Oswell and Livingstone discovered Ngami, and dwelt on the shore of the lake with his father and Makuba, and was with them constantly fishing and hunting hippo on the lake, has told me that the

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depth of the lake in the middle and deepest part was "equal to two 'mokoro' (canoe) poles lashed together and that you could just touch bottom with these." I have measured a large number of Mokuba canoe punt poles and 12 feet 6 inches is the very longest I have found among them; 11 feet is the average. Taking two 12½-foot poles lashed together and deducting 2½ feet from each for the joint gives us 20 feet. This was before Livingstone came.

Further, Mokwati—who must have been born somewhere about the year 1820, or perhaps even a year or two earlier—has often declared to me that when he was a boy he often heard the very old men of his family relating how, when they were boys, there was no lake, but that the Mokolane river (Taoge) ran through a plain wooded with Mochwere (*Combretum primigenium*), camelthorn, and other trees, and that they used to play along its banks. That later this river overflowed its banks and flooded this Ngami wooded plain. Mokwati further says that when the lake started to dry up and the water receded, the receding water disclosed old stumps of Mochwere, Mogotlo (camelthorn), and Matshiarra trees on the lake floor, "thus proving the truth of what our fathers had told us."

This is corroborated by Andersson, who visited the lake in 1853; see his book referred to above, p. 443, where he says of the lake, "Again, there are unmistakable proofs of its having been at one time of smaller dimensions than at present, for submerged stumps are constantly met with."

Therefore, at a very rough calculation of the ages of the old men of Mokwati's boyhood, whom he mentions, the Mokolane river which ran through the Ngami wooded plain must have overflowed its banks and flooded the Ngami depression some ninety years before Livingstone's time, perhaps somewhere about 1760, which would be just about forty years before the advent and occupation of Ngamiland by the Batawana.

The forecast by Livingstone and Chapman to the effect that "The change of climate is rapidly reducing the water which flows into the lake, and in all probability the country round will, within a few generations, assume the character of the Kalahari desert" has proved very true.

As regards the appearance of the lake flat in 1922: Prior to my four and a half years' absence in Europe during the War, I last passed along the north margin of the eastern end of the lake in 1915, when dried-up reed beds were still there. These are burnt yearly by the local natives with a view to reclaiming land for ploughing. The old swamp beds are valued owing to the fertilizing qualities of the ash from the burnt reed roots. After the rains most of the reed roots shoot afresh, being extraordinarily hardy and tenacious of life, to be burnt again after they have grown and dried up in the dry season. The matted mossy growth of the reed roots reaches 3 to 3½ feet below the swamp bottom, and this stuff goes on smouldering continuously for many months every year;

in fact, ordinary. Eventually, after the ash is blown on the sand and with a short quiet for as far as one lake bed had been flat covered with that of the Maba swamp bed with burnt-out reed effected in about on at the site of I had always covered least twenty years state of hard turf

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in 1922: Prior to my time of the War, I last passed the lake in 1915, when burnt yearly by the local lightning. The old swamp of the ash from the burnt roots shoot afresh, being burnt again after they have matted mossy growth on the swamp bottom, and this every months every year;

in fact, ordinary rains sometimes fail to put it out below the surface. Eventually, after drought years, the roots are entirely destroyed by fire, the ash is blown about by wind, and under the action of wind and rain on the sand and dust blown on by the former, hard soil is formed covered with a short quick-grass. I next viewed the lake flat in April 1922, and for as far as one could see with glasses from the eastern end, the whole lake bed had been transformed into a level and smooth golf-course-like flat covered with short quick-grass. Its appearance was identical with that of the Mababe flat, this proving that the transformation of an old swamp bed with dead and dying reeds and treacherous bottom of partly burnt-out reed roots into a level flat of hard grass-covered soil can be effected in about five years. The same transformation has been going on at the site of the swamp bed at Tsau since I was last there in 1915. I had always conjectured that it must have taken the Mababe flat at least twenty years to evolve from a dried-up reed swamp to its present state of hard turf flat, but I had greatly overestimated.

The Taoge (the *g* is the Sechwana *g*, pronounced as the R.G.S. *kh*) branch of the Okovango has, from Livingstone's time, been looked upon by Europeans as the main continuation of the Okovango river. This is not the case to-day, neither has it been for some time past. At the present time, and for perhaps at least some eighty years past or more, the Ngoga river (pronounced in R.G.S. system=Ngokha) is and has been its main channel and true continuation (see map) and to-day carries at least three-quarters to four-fifths of the Okovango water to the eastward and then southwards, eventually reaching and supplying the Thamalakane with its perennial flow, thence flowing into the Botletle, or Dauga, river.

Mokwati states that when he was a youth the Ngoga river had not such a strong current as it has to-day and did not carry so much water; that he and other Makuba used to fish in it and hunt hippo, where to-day and for some time past no Makuba or other river people will venture near it on account of the aggressiveness of the hippo and the force of the current and depth of the water. But he also has told me that in his youth the Thamalakane was a bigger river than the Taoge. Also that the Thamalakane was then a bigger river than it is to-day. He has twice on different occasions told me this.

In Andersson's time (he reached Ngami on 28 July 1853, and therefore, as he states, the Taoge was at the height of its flood water) from his data the Taoge does not seem at that time to have been such a deep river as I found the Ngoga to be last year in July and August. He says "the lake is fed by the Teoge. This river never perhaps exceeds 40 yards in width. The main course of the Teoge is north-west, but it is so serpentine that in thirteen days when I ascended it, travelling on an average 5 miles per day, and reckoning 2¼ miles to the hour, I made about one degree of latitude due north of the lake. As far as I pro-

This is quite possible. In many places in the deep papyrus-choked swamps I have found hippo paths, or submerged hippo alleyways, which the concentrating flow of flood water has enlarged into fairly respectable channels through which a canoe can conveniently pass.

The said Mampukushu also agrees that the changing of the Okovango's main course from the Taoge to the Ngoga is further due to the choking up of the mouths of the effluent channels in question by the silting up, combined with the growth of papyrus, being further aided by the flotsam of abandoned papyrus rafts.

As regards the Thamalakane—its correct Sechwana spelling, not Tamalakane (the *T* is not pronounced as in English, but is *l* sound followed by *h* aspirate)—which Livingstone calls the "Tamunakle," was evidently once smaller than to-day. There are some submerged stumps of Moch-were trees still visible in its bed 6 miles below Mauñ. As I have said above, the Thamalakane appears to have been in Mokwati's youth bigger than it is to-day. With regard to the evidence of the submerged stumps in it, it was probably a very much smaller stream, or totally non-existent, prior to about 1760, and its valley may have been flooded at the same time that the Mokolane river overflowed its banks on the Ngami plain.

My journey in July-August 1921 was up the Gomoti and Mogogelo rivers to Xgadikwe "Jediba," or lagoon, thence eastwards down what becomes the Kudumane, towards Mababe, thence back *via* Xgadikwe, up the Moanachira river into the Ngoga river, up this to Xesabe island, then returning down the Ngoga to the beginning of the Moanachira, then across the swamps, striking the lower course of the Ngoga, where it is called the Boroga, touching at Kuui on the long island, thence down the Santantadibe river to the Thamalakane. It was most interesting, since besides the Ngoga river, I found large and deep "madiba" such as Xgadikwe (the *X* representing here the linguo-dental click in these River Bushman names), Xkakaxnikwe, Xgobega, dobe, etc., the existence of which I had never previously heard of from natives, as well as ascertaining the great length of the island named Chubaora at its north-western extremity and Xgabadam at its south-east end. Navigable channels for boat and canoe were found throughout, except at a spot near Shindi lagoon and between there and the Moanachira lagoon, where the Moanachira river loses itself in dense papyrus through which it filters, to reunite into a decent channel further on. Here, after a whole morning's reconnaissance a channel had to be cut and smashed through the papyrus bed for some 400 yards, the rate of progress being feet per hour, enlivened from time to time by striking a little pool of some 10 yards diameter which would give a false hope of a proper channel again.

The Xgadikwe lagoon is the largest of all the Ngamiland "madiba." It is supplied by the Moanachira river, which also supplies the neighbour-

ceeded however it was navigable with smaller craft, for only in three places that I can remember did I find less than 5 feet of water, and generally speaking the depth was considerable. It must be recollected however that it was at its greatest height."

The Taoge therefore, even in those days when the Okovango must have carried down a greater volume of water than it does now, seems to have been a smaller stream than the Ngoga is to-day. (See data on attached map as regards width, depth, and current as I found it in July and August last year—at the height of the flood water. 1921 was a bigger flood year than any previous year since 1910 (but not equal to 1910)—barring 1918 I am told, when I was absent.) At no place did I find the Ngoga less than 10 feet deep; in some places 17 feet and even 31 feet; average was 12 feet; current (surface velocity) 1·7 miles per hour. Against the current with a 25½-foot aluminium boat with eight Makuba paddlers, on an average, only 1·1 to 1·4 miles per hour could be made. This was timed by stop-watch timing a boat-length passing a selected papyrus stem, etc., when navigating close to the papyrus beds flanking the channel. The two dug-out canoes I had with me could make a little more against stream, say up to 1·5 miles per hour, but could be outpaced by the boat when returning with the current, the boat then easily doing 4 miles per hour and a little over.

Andersson says "he reckoned" he made 2½ miles per hour against the current of the Taoge, which "he thought" flowed 2 to 3 miles an hour. I think that he must have much overestimated. I know how deceptive one's speed is in a boat or canoe. What appears to be 3 miles per hour, when tested by timing boat-lengths passing a fixed object in the water (a papyrus stem or water-lily, etc.), is found to be only about half that speed. The same with current velocity. Most of the Ngoga traversed last year I should, at sight, have put down as having a 4 miles per hour current, whereas upon testing it with floats between marks with a stopwatch I made it a little less than half that, on an average 1·7 miles per hour.

Mampukushu natives living north of lat. 19° tell me that their old men have told them that the Ngoga river was only formed during the early part of the chieftainship of Letsholathebe, (the Batawana chief visited by Livingstone, and who must have succeeded to the chieftainship some considerable time before Livingstone's arrival, since he was a boy when he was made chief), and that the Taoge used to be the main Okovango channel, the Ngoga being merely a "molapo" or shallow swamp channel, or collection of channels. They say that the Ngoga was formed by hippo in great numbers breaking through and trampling a big hippo path through the papyrus beds eastwards, that most of the big "madiba" or pools were originally formed by crowds of hippo

channels, or systems of channels, which become the Kudumane and Mogogelo rivers to the east-north-east and south-south-east respectively.

The Ngoga—the Okovango main channel—of which the Moanachira is an affluent, assumes the name of Boroga near Kuui. Further on its ramifications carry a further supply to the Mogogelo, but the greater bulk runs into the Thamalakane under the name of the Gomoti river, a lesser supply reaching the Thamalakane by the Santantadibe.

The bad name given to the Ngoga proved to be thoroughly justified, since this river, together with the Xgadikwe, Gamoga (Gamokha), and Xkakaxnikwe lagoons, must be the habitat of four-fifths of the hippo of Ngamiland—in fact, Hippoland—and these object to any human intrusion into their domain.

My flotilla consisted of a 25½-foot aluminium boat and two well-made native dug-out canoes. Travelling up the Ngoga and down it, not one of the craft escaped the attentions of the hippo; first one canoe was capsized; later, returning down stream, the other was entirely sunk in 18 feet of water—in each case the Makuba crew, of two, diving like otters, as they always do on such occasions, and reaching the papyrus bordering the channel in record time; all non-floating cargo was lost, but luckily this was not irreplaceable in Ngamiland. Finally the boat was torpedoed, a couple of holes being punched through the thin soft aluminium below the waterline aft, but fortunately these were pluggable with rags and an island chanced to be within a quarter of a mile, where the boat was run ashore. In each case the offending hippo attacked and retired submerged without exposing itself to a shot. As my kit and equipment, mostly acquired originally at pre-war prices, was all stowed in the boat, its loss would have been a first-class disaster.

Elsewhere in Ngamiland, in spite of native opinion, I have always found hippo quite friendly and good-natured fellows, except on one single occasion when exploring the Cwarelañwana river in 1912, when an old bull hippo badly holed and twisted up the same boat, which would have sunk in 12 feet of water had there not been a small bank alongside the channel on to which the waterlogged boat was rushed.

The Ngoga river is a strong-running channel varying from 35 to 45 yards wide, 12 to 21 feet deep (during July–August 1921 which was at the height of the flood water), surface current velocity = 1·7 miles per hour, twisting its course with frequent sharp bends round which the water swirls strongly through an interminable corridor formed by two tall unbroken walls of thick-stemmed dense papyrus 12 to 14 feet high, presenting no opening or break except where the small and effluent channels are marked on the accompanying map.

To travel up this river is to come into a most inhospitable region, for the stream is flanked by the deepest swamps in Ngamiland, and its course is devoid of any island or even dry mound from Ngoga island

wooded island I have seen in Ngamiland—up to the latter (also beautiful) the only break and unsubmerged spot was a little bare rush-grown mound or small bank, where the first night was passed. The second night we actually had to “sleep on the water” in the boat held alongside the papyrus bed, as that dismal prophet Motseoakhumo (the sort of foreman and courier supplied to me by the chief Mathiba) had been gloomily predicting since we left Ngoga island. It is the first time in all my swamp journeys in Ngamiland that a comfortable island for a night camp was not reached by sunset every day. One has been rather spoiled that way.

The return journey with the current was good. Leaving Xesabe island at 7.50 a.m. we arrived, hippo permitting, at Ngoga island shortly before 4 p.m. that afternoon. It was after leaving Ngoga island next day that the canoe was sunk and then the boat damaged. A hippo-proof boat or a papyrus raft (which is invulnerable) is a necessity for this river. The Batawana call a perennially flowing river a “noka,” and the spillways or shallow flood channels that only flow when the flood water fills them “melapo” (singular = molapo). But in Sechwana the word “noka” is strictly applicable to any river or channel-bed, deep or shallow, that actually has water flowing in it, and “molapo” to any dry river-bed or channel. The Batawana, not being a river people, have not the clear-cut differentiation of the Mampukushu, who dwell on the Okovango in the north of Ngamiland, with whom a spill-way or shallow flood channel is always “Moronga” and a river with a deep bed “Ruare.” Also the Makuba always call a spillway or shallow flood channel a “Modum,” and a river with a deep bed a “Moruanga” (the reverse to the Mampukushu).

The name Okovango, or Kovango, is not used by any natives of Ngamiland. The German Missionary Oblate Fathers at Andara, who know the Mampukushu language well, tell me that they do not know whence the name Okovango originated. The Portuguese are probably responsible for it (Cubango on their maps), and it may have been gathered by them from some tribe in Angola living on this river above its confluence with the Kwito. The Maxgeriko (Niangana's village) at that confluence do not use the name.

The Mampukushu merely refer to it as the “Ruare.” All other natives of Ngamiland likewise refer to it as the “river” in their own language. No river in Ngamiland has a continuous name of its own. It is merely “the river” of such and such a place. The whole country, swamps included, is divided up into “veldts” or districts, some large, some small. The rivers are referred to accordingly, as if, for instance, the Thames were successively alluded to as the “river of Windsor,” the “river of Putney,” the “river of Westminster,” etc. Native information about rivers, therefore, can be very misleading when a native tells you

a Ngamiland native if the Thamalakane runs past Mauñ, he will—unless he is an intelligent Motawana, who are superior in intelligence to the subject tribes, and will generally understand what you mean—deny it and tell you that “the Thamalakane is far from Mauñ. At Mauñ there is the Mauñ river.” It will be seen from the map that the same principle holds good also with large islands, these too being divided up into “veldts.” It is only a small island that is favoured with one name all to itself. This is, of course, consistent with the essentially parochial existence and habits of the inhabitants of Ngamiland. The fishing is needless to say, parochial, no Mokuba or River Mosarwa (River Bushman) is allowed by his neighbours to poach outside his own district. Therefore, as guides and spoorers on hunting trips they are useless outside their little radius, as a rule. In the swamps you have continually, through the Motawana, “chief’s man” who acts as courier, to hunt out generally reluctant fresh pilots every 10 to 15 miles. For the Ngoga no pilots are obtainable.

The Sandbelt region, that is, the country above the level of the Okovango basin, high-water level, from the latitude of the “lake” northwards, is covered with scrub forest. To the west of the swamp region, roughly south of about lat. 18° 50', it is almost entirely Magonono (*Terminalia sericea*) scrub forest. North of that it is chiefly Mosheshe tree (generally called “wild seringa” (*Albizia anthelminthica* (?)). The immediate neighbourhood of the old “lake” margin and banks of the Nghabe river is mostly Mogotlo (Camelethorn (*Acacia giraffæ*)) forest, which is usually only found within and bordering old flood areas. Between Tsau and the Kuyeyé melapo and there and the Thamalakane most of the scrub forest is Moshu (*Acacia horrida*), with Mogotlo bordering the melapo, and other thorny acacia. From lat. 20°, from the east as far west as roughly long. 22° 45' E., Mopane scrub forest practically entirely predominates up to the Chobe on the sandbelt and on the large islands in the swamps.

The margins of the swamps, the margins of the large islands, and the whole of all small islands are wooded with tropical trees, the largest and most stately of which is the Mokuchoñ, for which no botanical name is given in Passarge's list. He states that it does not extend east of the Thamalakane, and that it dies in dried-up flood areas. With regard to the latter, when I revisited Tsau in February 1921 after an absence of over five years, I found a startling change had taken place in the scenery. The swamps at Tsau, which up till 1915 had been perennially under water, had dried up and large tracts had already undergone the same transformation that has taken place on the floor of Ngami, described above. The numerous fine Mokuchoñ trees had withered and died, as had the formerly luxuriant Phoenix palms and dense *Acacia* (Macke) bush. Tsau and its neighbourhood presented

a bare and dismal-looking landscape. The only redeeming feature is that with the drying up of the water malaria has locally almost disappeared during the rainless months.

Other chief trees of the Swamp region are Mochaba (*Ficus Gnaphanocarpa*), Moporota (*Kigelia pinnata*), Moisaodi (*Copaifera coleosperma*)—the shadiest of all trees, Mokoba (*Acacia Passargei*), Maoka (*Acacia Arabica*), Mopororo (*Ficus bongensis* (?)), Moana (Baobab, *Adansonia digitata*), Mokolane (*Hyphena palm*), Tsaro (*Phoenix reclinata palm*).

The islands between Tsau and Tubu are chiefly wooded with dense Maoka and Tsaro palm. The tall Hyphena, or Borassus palm, predominates to the east, north of Mauñ. North of Tubu (which is not a real island since it used to be flooded at high floods in Chief Sekgoma's time) the *Acacia Arabica* is not seen, but the Mokuchoñ becomes much more common. At Xganyana and near Morotsenyane's there are beautiful clusters and small forests of Mokuchoñ.

North of Mohango on the sandbelt near the river, the Shii, or native teak, is prevalent. From this the Mampukushu carve out their well-cut and finished dug-out canoes. The Missionary Fathers at Andara have made all their furniture out of this wood, which takes a fine polish. The Mampukushu make 9 to 10 feet long paddles from the Mooa tree, which is a light wood and buoyant.

Our census of 1921 gave the total native population of the Batawana Reserve as 17,449 with 103,989 head of cattle. The Caprivi Strip has this year (1922) been placed under the Bechwanaland Protectorate for administration. The Mampukushu and their chief Lisho living on the Okovango in the western portion of the Strip, number in all some 2000. A further 1500 to 2000 Mampukushu live at and near Mubembo and on the Bonga side of the river down to Kabamokoni in Batawana country, under the chief Mathiba.

Of the population of the Batawana Reserve the bulk are Makuba (who formerly called themselves Bayei). These number some 11,000 or more out of the total 17,449 (which must be taken as approximate only, since with native enumerators supplied by the chief, and the impossibility of catching and numbering most of the wild River Bushmen and many Makuba fishing, etc., in the Swamps, a fair number must necessarily be left out). The chief also thinks that one must add another 50,000 to the cattle number. The Batawana, the ruling race, to-day only number some 1500. In-breeding, disease, and degeneration have greatly reduced their numbers. Natives generally in Ngamiland, Batawana in particular, suffer from weak chests. The balance of the population is made up of Damara (refugees from German South-West Africa), some Manayé, Massubia (both river tribes from the Chobe), some Barotse, and a good number of River Bushmen.

The Bayei or Mayei—to-day called Makuba in Ngamiland—are of

and his son and successor Moremi I. brought the Makhalahari and the Bushmen into subjection, but with the Bayei they did not interfere. The Batawana lived and hunted on the sandbelt and the Bayei lived and fished on the lake and rivers. The Makuba, or Bayei, were as numerous as they are to-day. During the chieftainship of Moremi I., Sebitwane, chief of the Makololo, came from Basutoland and raided the Batawana. Moremi and his people, who at that time lived at Namanyane (some 4 to 5 miles south of Dautsa flat) fled to the Kavimba-veldt (on the Chobe), whereas the Makuba escaped into the swamps. Sebitwane followed up Moremi I. and found that he had died of disease and that his son Sedumedi was ruling the Batawana. Sebitwane seized the Batawana town and chieftainship and settled at Linyanti. He then killed Sedumedi. Mogalakwe, brother of Moremi I., split up the Batawana and took a portion of them to Matshara (Toteñ), lake Ngami, and built there. The remainder of the Batawana stayed under headman Meno and under Sebitwane. Mogalakwe brought with him Letsholathebe, Sedumedi's younger brother, who was a small boy. Mogalakwe then placed Letsholathebe in the chief's chair while he was still young. Letsholathebe then began to bring the Makuba into subjection. Zankotse was then already dead, and Mosadi, his son (the present Mokwati's father), ruled the Makuba at lake Ngami. Mogalakwe wished the Batawana and Makuba to form one tribe against the incursions of Sebitwane. It was Letsholathebe who began to oppress the Makuba. When Letsholathebe was grown up Sikeletu, Sebitwane's son (Sebitwane was dead) raided Matshara (Toteñ). (Toteñ is a contraction of the Sechuana word "letlotlō", the locative case of letlotla=abandoned site of a village.) The Batawana fled with their cattle to Kgwebe, Sikeletu following them. A battle took place at Kgwebe, Letsholathebe beating the enemy. Letsholathebe possessed many flintlock guns which he had bought from traders, but Sikeletu had no firearms. The latter with his people fled back to Linyanti. The other Batawana still lived at Kavimba. When Sikeletu returned intertribal war started among the Makololo and the Batawana. Sikeletu died of disease. Then the Batawana of the Linyanti trekked and joined Letsholathebe.

To cut the further history short, Moremi II. succeeded his father Letsholathebe as chief of the Batawana. In or about 1883 Lobengula, having heard from a Makololo captive, escaped from Moremi, of the Batawana cattle wealth, sent one of his Matabele impi to raid them at Toteñ. Most of the Batawana, with such cattle as they could save, escaped on to islands in the swamps north of Tsau, while Moremi and his "general" and cousin Dithapso, with some of the Batawana, stayed behind at Toteñ, holding the Matabele in check with firearms—the Batawana having some M.H. rifles, muzzle-loading guns, and flintlocks. Some of the Matabele had M.H. rifles but did not know how to shoot, whereas the Batawana were very much better shots. The Matabele

Bantu race. Andersson said, "In person, features and complexion the Bayei appear closely allied to the Ovambo and the Hill Damaras." Both Andersson in 1853 and Streitwolf in 1909 found a similarity in many words in their language to Otjherero. During the early part of the eighteenth century they lived on the Linyanti river. The Mayei who live there to-day at Diei, west of Mamili's, are the same people as the Makuba of Ngamiland. They never seem to have had any tribal unity, but have always lived in small communities under different Mayei chiefs.

The following notes on the history of Ngamiland and the Bayei in the eighteenth century, prior to the advent and occupation by the Batawana under their chief Tawana about the year 1800, I have from old Mokwati:

Mokwati's great-great-grandfather Xega (pron. Ekha) was a chief of the Mayei and lived on the Linyanti. He never came to Ngamiland. Zankotse, his son (Mokwati's grandfather), came to lake Ngami when he was a young man with a following of Mayei and settled there. Since Zankotse was about seventy years old when Tawana with his Bamangwato followers (the Batawana) seceded from his brother Sekgome (the Bamangwato chief, father of the present Chief Khama, whom Livingstone knew) and trekked to lake Ngami (about the year 1800), he, Zankotse, must have settled there about 1750. I have it from some old Makuba living on Tubu island that at the same time another lot of Mayei under their chief Tearxkgwe came from Diei on the Linyanti and settled near Tubu, their northern boundary being at Namasser, the Mampukushu living north of that. When Zankotse came to Ngamiland the only inhabitants were the Bushmen on the sandbelt and the River Bushmen* on the rivers. There were Makhalahari living at the Kgwebe Hills. The Masarwa (or Bushmen) bartered game meat, horns, and ivory for tobacco grown by the Bayei. Although the Bayei cultivated grain, mealies or maize, "Kaffir corn" (*Sorghum vulgare*), and lebelele corn, they chiefly lived by fishing, as most of them do to-day at the proper seasons, on the rivers and in the swamps, with nets, fish-traps, and with vegetable poison. They also hunted hippo with their heavy harpoons, of which some are still to be seen to-day preserved by the old men. The contrivance is similar to those depicted in ancient Egyptian pictures. The barbed iron harpoon itself has a long length of line attached, and fits into a socket in the end of a heavy shaft-pole which also has a thick rope attached to it. The heavy shaft gives the harpoon driving power when it is driven into the hippo at close quarters by Makuba from canoes; the barbed harpoon remains in the animal, and the heavy shaft detaches itself and is retained by the hunters. The hippo is then played like a whale.

When Tawana and his people arrived they drove the Makhalahari from the Kgwebe Hills and built their town there. Both Chief Tawana

were unable to fight much, but rounded up and took off most of the cattle which the Batawana had left behind. In 1886 another Matabele raid, sent by Lobengula, took place; the Batawana retreated hurriedly with their cattle on to an island in the swamps and here with rifles resisted the attack of the Matabele, a very large number of whom were shot swimming in the water advancing to the island to attack, and crocodiles disposed of the wounded. The Matabele remnant returned with only such stray cattle as they found on the mainland. About this year Moremi II. moved his "town" to Nokanef, north of Tsau. This year, or next, Ngami started to dry up as the Mokolane river was beginning to stop running. It was just after this that the receding lake water disclosed the old submerged stumps of trees in the lake-bed, dating from before Tawana's time. It was also at this time (1887) that the Savuti river, running into the Mababe, began to dry up.

Moremi II. died in 1888, leaving his son, the present chief Mathiba, a small boy. Sekgoma, Moremi's younger brother by a different mother, then usurped the chieftainship and young Mathiba was got out of the country and protected and brought up by the neighbouring chief Khama. Subsequently the Batawana split up into two factions, the pro-Sekgoma and the pro-Mathiba. Sekgoma was deposed by the Government in 1906 and kept out of the country, and after a "plebiscite" Mathiba was installed.

The Batawana leading headmen, who are the "nobility," have each an area of country allotted to them, and this is hereditary. Within that area they are lords of the manor, and the Makuba, etc. residing therein, are their retainers.

Anderson's description of the Bayei, or Makuba, as he found them in 1853 holds good to-day: "The Bayei are of a merry and cheerful disposition and are the happiest of creatures provided they have a pot full of flesh and a pipe. They are much given to lying and pilfering, and are suspicious as they are deceitful."

Under Moremi II., and under Sekgoma in pre-administration days, they were under strict control and treated as domestic slaves. To-day, under Mathiba, the emancipation and freedom enjoyed under his chieftainship has in most cases led to their taking full advantage of it. Many of those who herd cattle for Batawana masters are to-day constantly killing by stealth and eating, and stealing and selling, their masters' cattle. Theft has greatly increased among them, whereas in Moremi's time the drastic punishment kept it down.

The Mokuba is by nature thoroughly lazy, and it is only exceptionally few individuals who will attempt to earn their living, even for a few months, by accepting a paid "job of work" offered them, and even so they must be supervised the whole time. As they have a good muscular development—due to their being used to poling their canoes from boyhood—they make useful rough labourers, if kept at it.

As carriers they are much inferior to those of East Africa, as they are lazy and dawdle—unless on the homing trail—and they only carry a load of 35 to 40 lbs. This is never carried on the head, but is divided in two portions and slung on to opposite ends of a stout stick which is held balanced on the shoulder. The only time they hurry is when they carry in loads of game meat to camp from where it has been cut up in the veldt; then they invariably carry their load at a half-run. Motseoa-khumo, a Motawana and one of the "chief's men" (a sort of constable, chief's messenger, gamekeeper, etc.), who has a sense of humour as well as a stutler in his speech, says "meat makes them run."

But their great redeeming feature is that they are mighty punters of canoes. A Mokuba will with a steady rhythmic swing pole a canoe practically from sunrise to sunset, and then over a pot of game meat at the night camp loudly talk and laugh throughout the night, if he is allowed to.

They are of course only shallow-water men and are much afraid of deep water, as a rule, where they will carefully hug the bank. The sight of the 12-foot high Popa falls, to the foot of which I took a Makuba crew in 1910, terrified them, and it was with great difficulty that the Motawana foreman and "courier" with me restrained them from deserting. Their intelligence is of a lower standard than that of other natives in Ngamiland.

The Mampukushu, on the other hand, are deep-water men, and adepts with the long 9-foot paddle, which they use in a standing position, at shooting their rapids as well as ascending them. They have a contempt for Makuba as river men. In his own rapids the Mampukushu canoe man should more than hold his own with any other human being.

The Mampukushu chiefs succeed through the female line, the chief's eldest sister's son being the heir. This was also Bayei custom till the Batawana (Bechwana) inheritance through the male line was imitated by them.

The chief of the Mampukushu (present Lisho, who succeeded Libebe who died in 1915) is the hereditary Great Rain Maker of the Okovango, and his eldest sister's eldest daughter is the Rain Woman. Mysterious rites are performed yearly inside the chief's hut—upon which the people are forbidden to pry—when a secret concoction is said to be mixed in the "Rain bowl." Up till the time of Moremi II. the Batawana used to pay yearly a professional fee in cattle to the Rain Maker, since no flood can come down the Okovango unless he arranges it.

The Missionary Fathers tell me that the present Lisho has made a mess of things. Just before the 1917-18 rainy season he told his people that they need not sow any crops because he was angry with them and he would make no rain. It rained deluges that rain-year. Another year there was a drought when he had been "making rain." So this year he has given out that he is not going to try because he wishes to see whether

one Baramangandu, who has just succeeded as chief to a seceded portion of Mampukushu, who left the late chief Libebe when he became chief, knows how to make rain. This rival, who claims to possess the original and genuine Mampukushu rain-making apparatus, has just trekked from the Luyana river on to an island above Andara.

In dress they wear a kind of kilt, dyed black. The women grow their hair long and spice dyed and greased string pigtail continuations to the ends of their locks. They appear to be akin to the Ovambo and their language is somewhat similar to Otjiherero.

As regards the River Bushmen and their classification, two years ago Dr. Péringuey, the Director of the South African Museum, Cape Town, informed me that he had just managed to obtain a model of a River Bushman from Ovamboland, and stated that in all likelihood he was a cross between the San and the Herero called Berg Damara (dubbed now Klip Kaffir); and that the Bushmen he had from the borders of Damara and Ovambo lands, and roaming thence to Bechwana and Ngamiland, have a strong infusion of Bantu blood.

As regards the word "Mokuba," although it subsequently was also used as a word of contempt by the Batawana, like the Anglo-Saxon word "churl," it is not a Sechwana word. It has been suggested to me by the ordained native missionary teacher representing the L.M. Society in Ngamiland, Andrew Kgasa, that the Batawana got hold of the Mampukushu word meaning "people." The Mampukushu in their language never refer to themselves as such, but as "Hakuva" (people), sing = "Moguva" (person). The Makuba, however, they refer to as "Hajo" (those people).

The Mampukushu trekked from the Mashu (upper Chobe) to the Okovango under their chief Libebe I. at the beginning of the nineteenth century. As stated above, they made Namasserri and its upper course the Kgadam their south boundary.

Under Tawana and Letsholathebe the boundaries of the Batawana were Namasserri in the north, Ghanzi in the south, Nyae-Nyae (away in the sandbelt to the west of Tsau) in the west, and Mopipi (in Khama's Reserve to-day—to the east).

The Batawana and Makuba grow "Kaffir corn"; the former grow the red-grained variety and the latter the white, "lebelebele" ("bullrush corn"), Indian corn or "mealies," beans, pumpkins, and some tobacco. The Mampukushu in addition grow large quantities of ground nuts and more tobacco than the Makuba.

Owing to the often insufficient local rainfall the Batawana and Makuba plough lands both on the sandbelt above the flood-level—these are entirely dependent on rain—and also to a greater extent on "bokgola" ground, *i.e.* molapo and swamp flat ground that is flooded a couple of months in the year. The bokgola ground is ploughed after the flood water has dried up on them. These yield crops, usually, when drought

destroys the "rain land" crops, although if unusually heavy rains occur a local flooding may destroy them.

The Makuba and River Bushmen, besides eating fish, live also on water-lily roots, chitila (flag) roots, the base of papyrus stems, tortoises, both land and water varieties, water pythons, the fruit of the Mokuchon, Motsaodi, Mochaba, Mokolane, and Tsaro palms, etc.; they hunt lechwe in the swamp, getting up drives and killing them with the spear; also they hunt hippo when they possess muzzle-loading guns and ammunition. The present-day Mokuba has not the pluck to hunt hippo as his fathers did, with the harpoon.

As to fishing, besides nets (which they make from string from a fibre aloe and also a variety of sansevieria), fish-traps both fixed and portable, spearing, they poison fish in small shallow pools by throwing in the dried and ground bark of the Motsebe tree.

The large game is elephant, giraffe, rhinoceros, Cape buffalo, sable and roan antelope, kudu, blue wildebeest, tsessebe, pala, zebra, reedbuck, bushbuck, waterbuck, lechwe (in great numbers; the black lechwe not found), situtunga, stembok, and duiker. Eland and gemsbok live on the sandbelt, where also Cape hartebeest and springbok south of Tsau are found; in the Swamp area hippo and crocodiles. Carnivora are lion, leopard, cheetah, spotted hyæna, hunting dog. Brown hyæna are found in Ghanzi district. Most of the game is to-day within the fly belt, including the large islands.

When hunting in the Swamp region in August 1912 I came across a lion who had developed aquatic habits. This enterprising gentleman had taken up his hunting quarters for the lechwe hunting-season for two months on some islets in pretty deep swamps a couple of miles off the mainland at Charnachama on the 60-mile-long island. At night he swam from islet to islet through 7 or 8 feet deep water, stalking lechwe on one islet after another in turn, roaring at intervals, each time on a different island. Although leopards thus hunting lechwe in the swamps are common, I had never heard of a lion being so adaptable.

Fish include many varieties of the Cichlidae family, species of Tilapia and Paratilapia. Of these a collection was made for the British Museum, Natural History, by the late R. B. Woosnam in 1909; also the splendid Tiger fish (*Hydrocyon lineatus*), which gives good sport trolling and casting with rod and spoon-bait in the deep lagoons and rivers.

The Batawana seldom hunt in the fly belt since the Motawana likes to hunt on horseback, and a well-to-do Motawana intensely dislikes walking. But a few individual poor Batawana, who earn their livelihood as "chief's men" and have a large area of the swamps allotted to some of them, are frequently good hunters and spoorers, and indefatigable walkers.

Of the districts, the Kabamokoni district is the most thickly inhabited with a large number of little Mampukushu and Makuba villages.

This district begins at the south-west end of the Makwexgana spillway between the Chobe and the Okovango, which has not been flooded since 1910. It must be about dead level, since when it does flood, the Chobe and Okovango flood waters respectively meet halfway. The only Europeans who have traversed it, to my knowledge, are Major St. Hill Gibbons in 1898, when on his way from the Chobe he turned back halfway, meeting there the rising flood water from the Okovango; Franz Seiner in September 1905; and a colleague of mine, Capt. G. B. Moseley, who traversed it on foot with carriers in November 1913, from Diei, on the Chobe, to Kabamokoni and back.

No native in Ngamiland appears to be quite immune from malaria. The Batawana, although less affected than the European, suffer more from it than the Makuba. But even the Makuba during the fever season frequently get malarial headaches and a rise of temperature.

If, however, the process of desiccation of this country continues in the ever steadily progressing manner that it has done during the last hundred years, then at no very distant time it will be as free from malaria as the Kalahari is to-day, but then it will also be a thirstland.

THE MAGNETIC VARIATION IN THE NEIGHBOURHOOD OF THE NORTH POLE

H. Spencer Jones, M.A., Royal Observatory, Greenwich

Chart following p. 476.

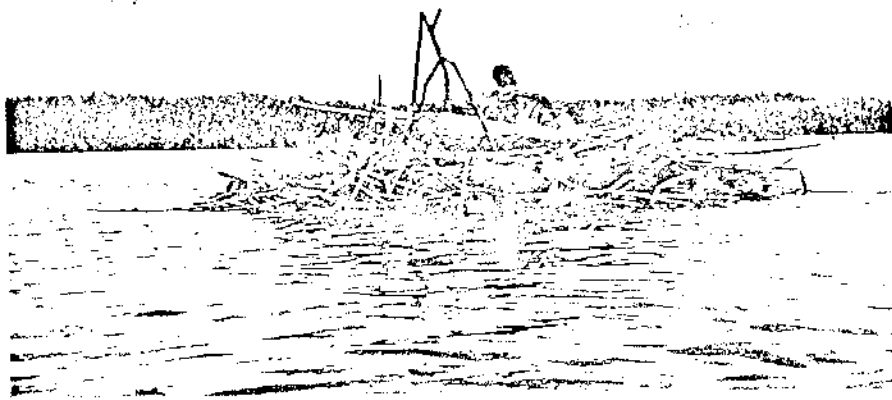
1. THE observations of magnetic variation obtained by the Canadian Arctic Expedition and published in the *Geographical Journal*, p. 301, Oct. 1923, indicated, as was pointed out in the note added by the Editor, that the curves of equal magnetic variation given on the small North Polar Chart of the Magnetic Variation Chart, 1922, published by the Admiralty, require correction in the region concerned.

As these observations were made in the region between the geographical and magnetic north poles, in which the variation changes very rapidly from point to point and in which very few earlier observations were available, they have been utilized to revise the curves of equal variation in the polar region. Opportunity has been taken in making this revision to incorporate other observations published since the compilation of the 1922 charts, in particular those obtained by Amundsen's *Maud Expedition, 1918-1921* (*Terrestrial Magnetism*, 27, 35, 1922) and some obtained by the observers of the Carnegie Institution of Washington ('Land Magnetic Observations,' 1914-1920; Vol. IV., 'Researches of the Department of Terrestrial Magnetism,' 1922).

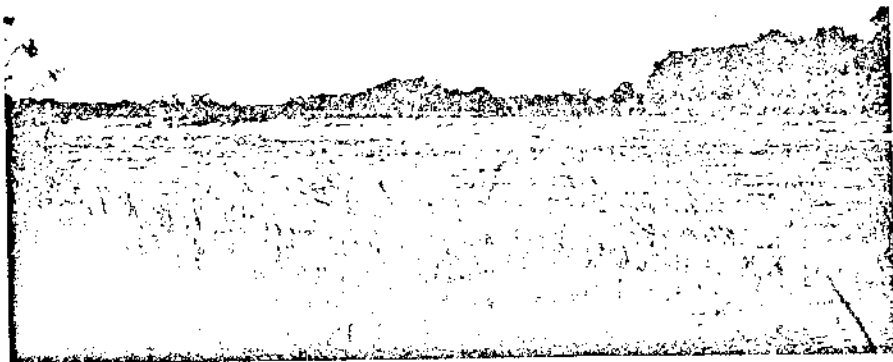
Although of recent years there have been frequent expeditions to north polar regions, there has been in several instances a considerable



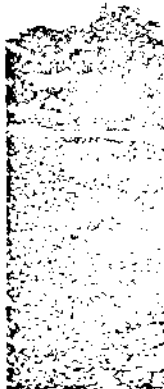
THE OKOVANGO AT MOHANGO DRIFT, APRIL 1910



PAPYRUS RAFT ON THE OKOVANGO



THE POPA FALLS

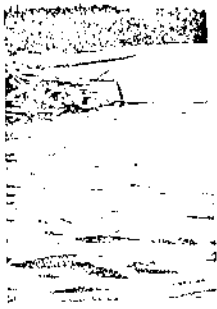




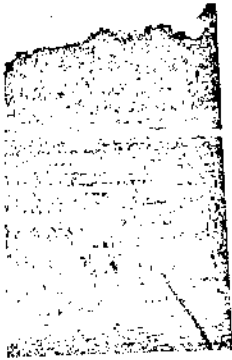
IL 1910



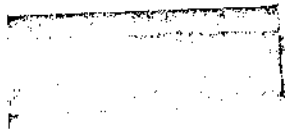
PAPYRUS BANKS ON GOMA LEDIBA



THE OKOVANGO ABOUT LAT. 18° 06' S.

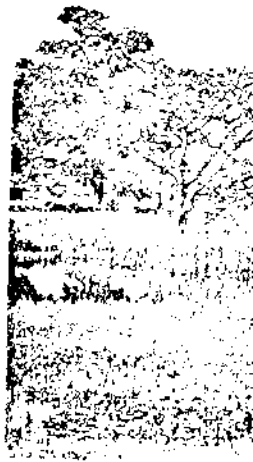


THE OKOVANGO AT NGAUDAU, ABOUT LAT. 18° 30' S.





GIRAFFE ON THE LARGE ISLAND AT PIAJO



MA



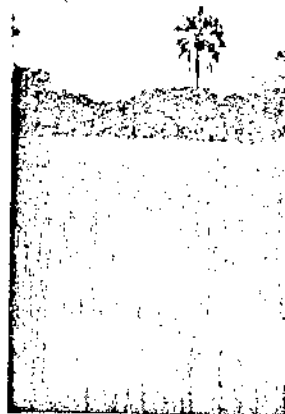
A TYPICAL MOLAPO WITH NATIVE CANOES



CV



NGOGA RIVER BELOW NGOGA ISLAND



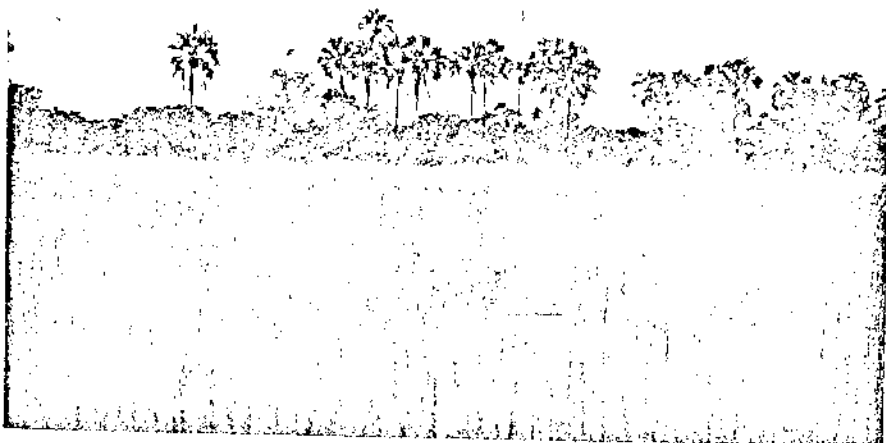
MOKOLA



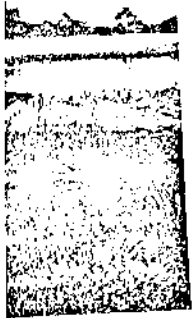
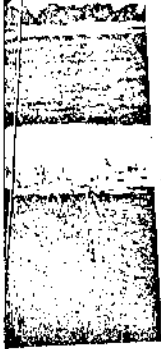
MAGISTRATE'S QUARTERS AT TSAU, 1911



CWARELANWANA RIVER, JULY 1912



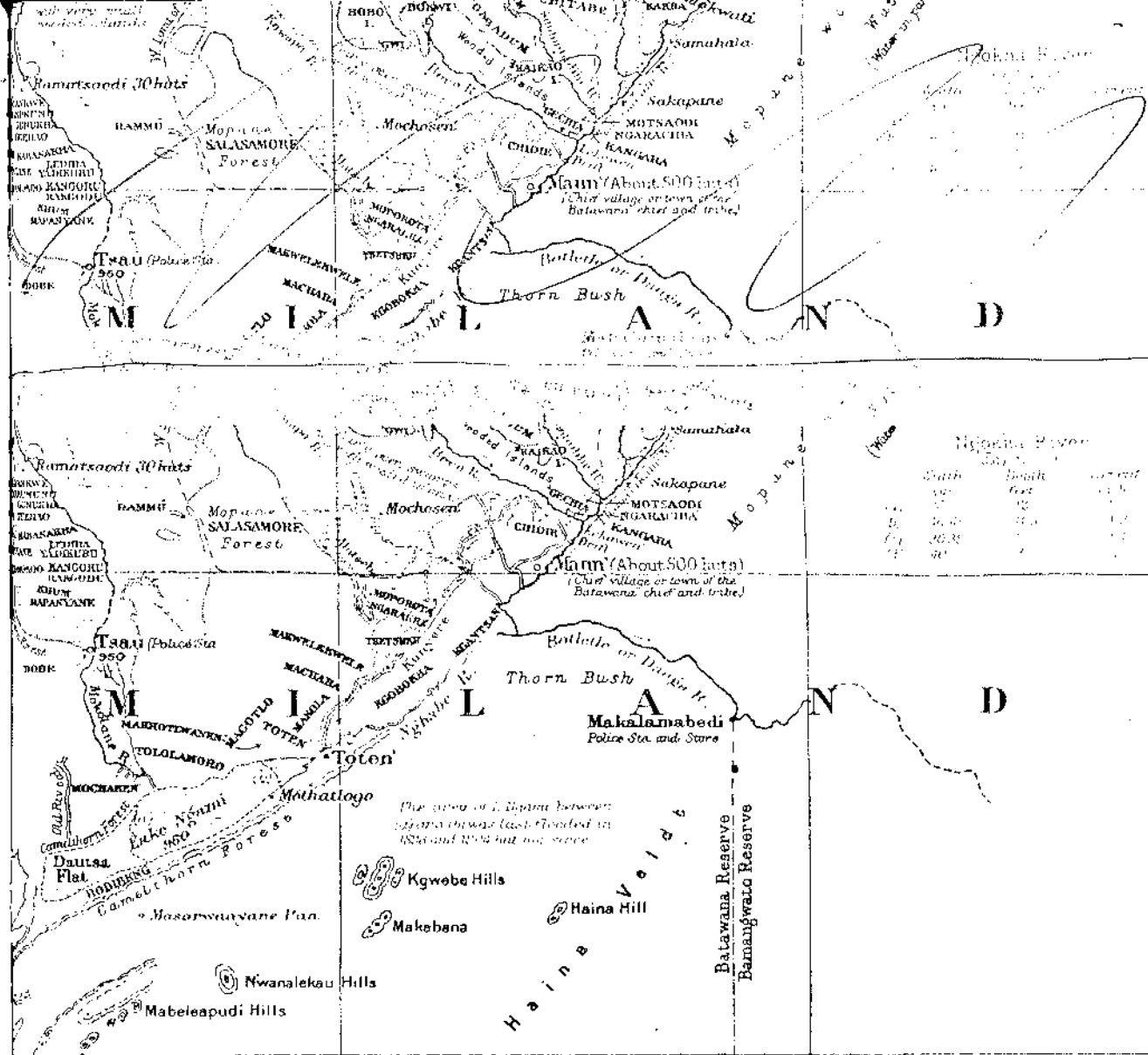
MOKOLANE PALMS, THAMALAKANE RIVER



ES



D



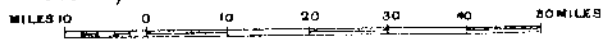
	Depth	Length	Area
1	100	10	1000
2	200	20	4000
3	300	30	9000
4	400	40	16000
5	500	50	25000

SOUTH AFRICA.

Map of
NGAMILAND AND GHANZI.

From Compass Traverses by
CAPT A. G. STIGAND.
1910 - 22.

Scale 1/1,500,000 or 1 inch = 23.7 Stat. Miles.



Reference

- Rivers with perennial flow of water, course observed
- " " " " " " course not observed
- " and "Molapo" (spillways or shallow flood channels) only flowing during normal flood seasons.
- Old beds of rivers and "Molapo," dry.
- Areas perennially flooded
- Areas flooded in normal flood season, e.g., 1921
- Areas flooded in heavy flood seasons, e.g., 1910.
- Areas previously flooded, but not since 1888
- Margin of flood areas, defined by rising ground.
- DORE** Native names of districts or "veldts." Heights in metres.

