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The Pibor River

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Source: *The Geographical Journal*, Vol. 60, No. 3 (Sep., 1922), pp. 210-217

Published by: geographicalj

Stable URL: <http://www.jstor.org/stable/1781056>

Accessed: 27-06-2016 03:53 UTC

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It is a pleasure to report that the results obtained with this receiver far exceeded expectations. Time signals were received at every locality where they were desired, and a daily newspaper, published from news received from radio-stations in the United States, Panama, and Europe, kept the members of the expedition fully informed of current events.

Owing to the better static ratio, the loop was used throughout the trip. With the proper balancing of circuits the static was practically weeded out, and gave little or no trouble. The signals received were at all times clear and loud regardless of time, place, and conditions. The reliability with which this instrument worked is marvellous; the receiver took precisely four minutes to place in operation, and no matter where it was erected good signals were received. Many times the receiver was erected indoors behind walls 2 and 3 feet thick, other times the very loop itself was buried in the massive foliage of the primæval forest, the grass enfolding the receiver; then again it was erected behind a sand embankment, which was directly in the plane of the station from which signals were to be received; and at Esmeraldo, Venez., excellent results were achieved practically at the base of the Duida Mountain, which has an estimated height of 10,000 feet, and which is directly in the plane of the stations from which signals were received.

Time signals transmitted in the usual manner were received practically daily from:

<i>Location.</i>	<i>Call.</i>	<i>Wave-length.</i>	<i>System.</i>	<i>75th Meridian,</i>
Annapolis, Md.	NSS	16,900	C.W.	11.55 to 12 noon.
Arlington (Washington, D.C.)	NAA	2,500	Spark	9.55 to 10 p.m.
Darien, Panama	NBA	7,000	C.W.	12.55 to 1 p.m. and 4.55 to 5 a.m.

THE PIBOR RIVER

**Major D. Hay Thorburn [The Cameronians (Scottish Rifles)],
Commanding Xth Sudanese, Egyptian Army**

IN the plain that lies to the south-east of the Anglo-Egyptian Sudan, between the Bahr el Gebel branch of the White Nile and the Abyssinian mountains, the river Pibor is formed by the junction of the rivers Veveno-Lotilla and Kengen and flows northward for 140 miles until it meets the Baro; there the Pibor and Baro become the Sobat, and as such join the Nile below lake No at Taufikia. In 1920 I noticed that for some days the Pibor flowed southwards instead of northwards, and in 1921 I made up my mind to watch the movements of the river as closely as I could; hence these notes.

The Pibor throughout its whole course is a river of the plain, and, as is usual with such rivers, winds considerably. Not a rock or a stone is to be found in its bed or near its banks. The country through which it flows

is a grass-covered plain stretching to the eastern and western horizon, with nothing to break its monotony except the narrow belt of trees that borders the river, or an occasional heglík tree, the resting-place of marabout storks, standing alone in the plain. The fringe of trees by the river varies in breadth from a few yards to half a mile, but rarely exceeds 200 yards, and in some places, in the lower (northern) reaches, it is non-existent.

The plain itself consists of black cotton soil—in the wet season, thick sticky mud; in the dry season, hard and rough, with cracks from 2 to 6 inches wide and from 1 to 3 feet deep. Woe betide the unlucky pack-donkey that gets his legs into one of these cracks; he has to be lifted out by a couple of men.

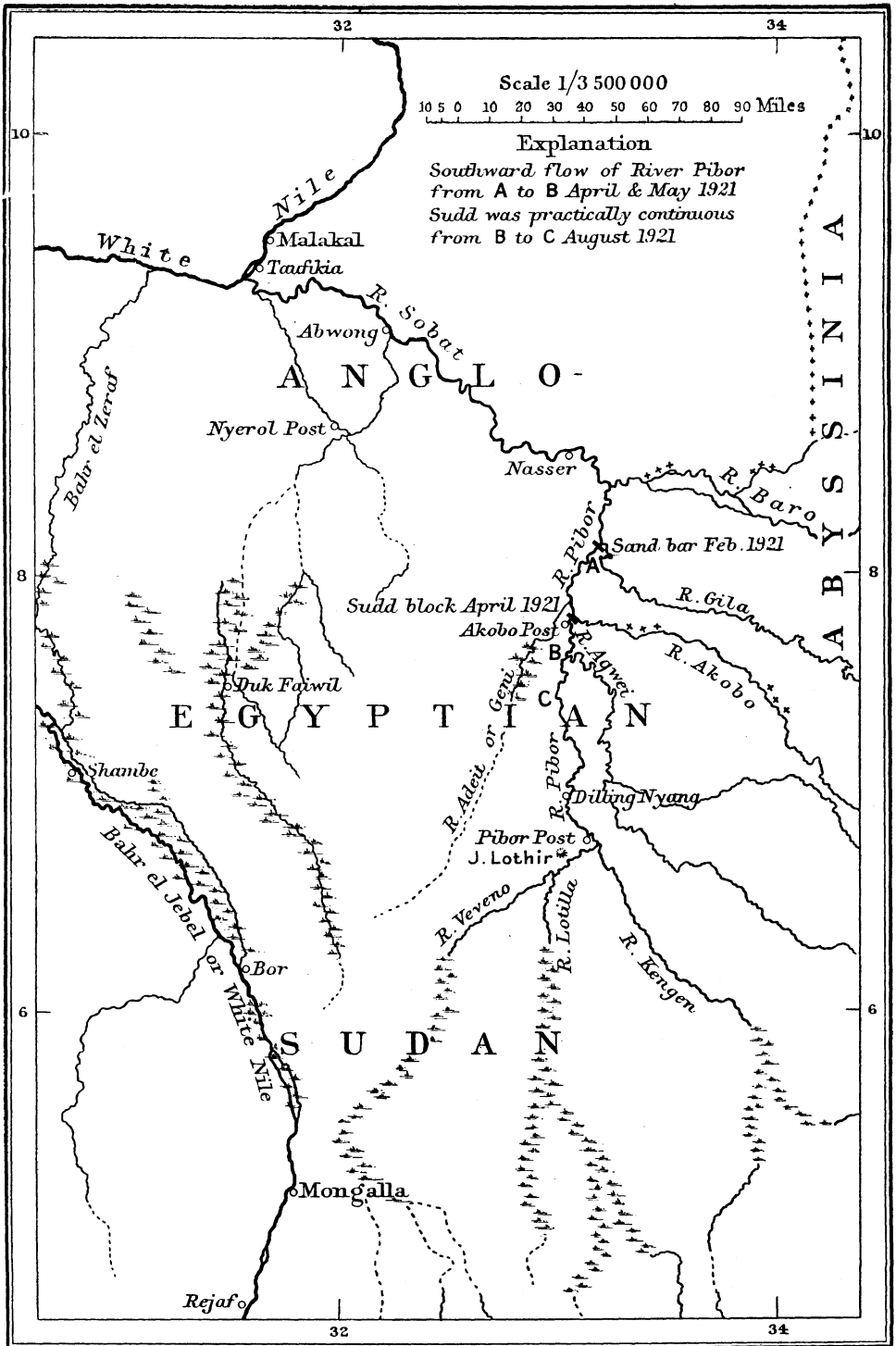
The rainy season lasts from May to October, and the dry season for the rest of the year, but it is not unusual for rain to fall in November, March, or April.

The greater part of the plain near the Pibor or its tributaries is covered with coarse elephant grass, 10 to 15 feet high at the close of the rainy season, and as there are no roads, travelling is almost impossible until it is sufficiently dry to burn the grass in December or January. If this is done judiciously when the wind is in the right direction, it is much easier to go about; but the surface is rough, as the roots of the elephant grass form knobs of unburnt stubble 6 to 9 inches high and from 1 to 3 feet apart. As the sun dries the ground between the roots it cracks, and these fissures gradually increase in size until at the end of the dry season in April they greatly hinder rapid movement.

Another kind of grass, much finer in texture and only 3 to 4 feet high, also grows, but it is usually found much further from the river; it is possible to march through this grass, but naturally quicker progress is made if it is also burnt. When burnt, fresh green shoots at once sprout from the roots, and even if no rain falls these grow to a height of from 6 to 9 inches and are eagerly nibbled by the hartebeeste, cob, and smaller gazelle.

The Pibor has well-defined banks; from the mouth of the Khor Agwei northwards they vary from 20 to 30 feet in height, but south of that point they are lower. In the dry season the river dwindles to a few feet deep, while in the rains it fills up and in places overflows its banks. The ground near the top of the bank is often a few inches higher than that further away from the river, and invariably is rather redder than the black cotton soil of the plain. This is possibly caused by the alluvial deposits of mud brought by its tributaries from the Abyssinian hills. On this better soil, rarely more than a few yards in width, the Nuers, Annuaks, and Beirs cultivate *dura* (millet), Indian corn, and tobacco.

Where the ground slopes away from the top of the banks of the river large lagoons form in the rains between these banks and the belt of trees. They are known as *tojh*, and in some years, if the river rises rapidly, they form open sheets of water, but if the rise is gradual the grass grows as



Sketch-map of the Pibor River to illustrate the paper by Major Hay Thorburn.

fast as the water rises, and while to all appearances it is grass-covered meadows there may be 20 feet of water. Where there is no *tojh* the tree belt is close to the channel of the Pibor, and in many places the trees overhang the water, especially south of the mouth of the Akobo river. The most common trees are heglik (*Balanites ægyptiaca*), which has a fruit about the thickness and twice the length of a hard green gooseberry, known as lalup and much liked by the elephants. Heglik is a hard white wood and has good calorific value. Kuk (*Acacia veruga*), habil (*Combretum sp.*), and dabkar (*Cratæva religiosa*) are soft white woods of little or no calorific value, but give welcome shade for a midday camp.

There are two kinds of tullah (*Acacia seyal*), the one with red and the other with a white bark. Natives say that the former is the male and the latter the female tree, but they are really distinct species, both of little calorific value.

The nabbak (*Zizyphus sp.*) has a long straight thorn about 2 inches long, and the kitka (*Acacia sp.*), with its hooked thorns, makes dense thickets. The ardeib (*Tamarindus Indica*) grows to a considerable girth and height and it is, without a rival, the most majestic tree that grows on the Pibor. A decoction made from its fruit is much used by natives as a cure for fever and as a cooling drink during Ramadan.

The "yoey" (I do not know its scientific name) is a red hard wood that always overhangs the water; it has the very best steam-producing qualities, and is very popular with native engineers and firemen of the river stern-wheelers on that account. Owing to the cutting of steamer fuel on the banks of the Nile the forests are gradually disappearing, and it is possible that the yoey trees on the Pibor may be drawn upon when the supply further north is exhausted. From Khor Agwei mouth to Pibor Post both banks of the river are thickly lined with yoey, and I have no doubt that an average of 2000 cubic metres of steamer fuel wood per mile could be obtained on each bank without ever having to go more than 50 yards from the river.

Game is plentiful on both banks of the Pibor. Waterbuck (*Cobus defassa typicus*) are as tame as cattle; Jackson's Hartebeeste are more timid, and to see a herd of over five hundred of these beautiful animals stampeding is a sight to be remembered.

The rare Mrs. Grey's cob (*Cobus maria*) is found near the spot where the Pibor meets the Baro, while the Beir country is full of white-eared cob (*Cobus leucotis*). Buffalo and elephant tracks are plentiful in Khor Lau, but I never saw any by daylight. Lions' roar may be heard most nights. A herd of sixteen giraffe, with a bored expression, stood on the bank and watched the steamer pass.

Of birds, crested crane, ibis, guinea-fowl, geese, and duck may be mentioned, while the brilliant kingfishers and such-like make the river a delight.

In the dry season, when the banks are uncovered, scores of crocodiles may be seen sunning themselves or slowly cruising along, showing their

eyes and nostrils only. They live chiefly on fish, but occasionally a native, and more often a goat or gazelle, is swept into the water by a stroke of a crocodile's tail, and then seized by their jaws and dragged to the bottom. When marching near the bank at a spot close to Gila mouth I heard snarling and growling, just as if a dog-fight was in progress. I approached the edge of the bank, and beneath were two crocodiles fighting. They were half in and half out of the water on a spit of sand, and one had the other by the throat; they were lashing their tails furiously in the water, and the foam was tinged with red. They paid no attention to me, but continued growling and fighting.

A few days after this—further south—I shot a waterbuck quite close to the water's edge. A few seconds later a medium-sized crocodile (about 15 feet long) scuttled out of the water and tried to seize the dead waterbuck. I shot and wounded the crocodile, who retired to the water. Half an hour later I saw a considerable commotion a few hundred yards up the river, and I found that several large fish had attacked the crocodile and were eating the flesh in the wound left exposed by the exit of the bullet. The crocodile, to escape the fish, had to leave the water, where he finished his career. These fish are from 2 to 3 feet long, as thick as a strong man's forearm, have a large head like a dog-fish, and are called in Arabic *Garmut*. They are easily caught on a ground-line baited with a lump of meat, and are eatable, though muddy in taste. Curiously enough a wounded crocodile almost invariably leaves the water to die, and turns over on his back to do so.

The native villages are generally built on low mounds called "dabbas"; at first sight these appear to be of sand, and one wonders how these islands appear in the black cotton soil of the plain. In my opinion these dabbas are the accumulated débris of old villages, in fact ancient rubbish heaps, and this was confirmed by excavation, as broken pottery and bones (sometimes human) were found. Owing to their origin these dabbas cannot be very healthy sites for villages, and the natives sometime desert a dabba, leaving it unoccupied for years, and then return to it again. The dabbas nearly all rise above flood-level, and are then habitable in the rains at the time when the plain is simply mud and water.

The northern reaches of the river are lined with Nuer villages and fishing camps. They are large cattle owners and great fishermen; they also grow a fair amount of dura and some tobacco. They fish from canoes, and use a spear with a detachable barbed head which is fastened to the base of the spear by a leather thong, which gives the spear the appearance of a bow. The fisherman kneels at the bow of the canoe and jabs the bottom of the river every few yards. If a fish is struck the spear-head detaches itself, and the spear reversed becomes a fishing-rod. Quite large fish are landed in this way. I have seen as many as sixty canoes, in the dry season when the river is low, paddling slowly up the river five or six abreast, driving the fish into the shallows and spearing them there, while



CATTLE SWIMMING PIBOR RIVER NEAR WEIKODNI
Voey trees on high bank left; single Kuk tree in centre



BEIR WOMEN, with bundle of white-eared cob skins on ground



Heglik trees and Kitta thorns : waterbuck in long grass



BEIR MEN

on the bank the women and children were busy gutting the fish and drying them over smoky fires.

The Nuers are very ugly, and add to their ugliness by plastering themselves with wood ash to protect themselves from the millions of mosquitoes which render life a burden after sunset.

The Annuaks, who live between the points where the Akobo river joins the river Pibor and where the Agwei flows in 20 miles south, are better looking than the Nuers, but are very lazy: they cultivate only the minimum of *dura* that will keep them alive, and own only a few cattle and goats. They fish in a different way from the Nuers: they spear the fish and pin it to the bottom, and then land it with their hands. They hunt waterbuck, etc., with dogs, and occasionally organize a drive on a large scale, in which a man or two generally get hurt by the horns of desperate buck trying to break through the diminishing cordon. They are on the whole a cowardly race, and if it had not been for the protection given them by the presence of Egyptian army troops, they would soon have been enslaved or annihilated by the more virile Nuers.

The Beirs, who live on the southern stretch of the Pibor and in the country to the south of Pibor Post, are rich in cattle and cultivate large areas of *dura* and Indian corn. They live in most primitive huts, and are too lazy to bury their own dead; they simply drag the corpse outside the village and leave it for the vultures and hyenas. When asked why they did not dig a hole, they reply, "If we dig we would be tired." The men are very well made and fine looking; they spend much time doing their hair, which is made up into a permanent sort of hat ornamented with beads and brass wire. They invariably carry a small stool on which they rest their neck when sleeping, so as not to disarrange their head-dress. They are great hunters, and in December and January organize drives of white-eared cob, which they slaughter indiscriminately, old and young.

The rains in this part are usually heavy, and in normal years two crops of *dura* are cultivated.

Pibor Post, a small Government fort, is near the southern end of the Pibor, a few miles north of the junction of the rivers. This fort was formerly known as Fort Bruce, and is so marked on some maps; it is still locally known to the natives, who are unable to pronounce the letter "B," as "Pruce."

Akobo Fort is on the Pibor river 5 miles south of where the Akobo flows into the Pibor. In February 1920 there appeared to be every probability that the Pibor would run dry before the rainy season began, and a dam was constructed to hold up sufficient water for the garrison at a point about 600 yards north of the fort. The dam was 20 yards long, and the depth of the water 2 feet. The water north of the dam continued to flow away, and finally there was, at the beginning of April, a difference in level of 18 inches. Soon, however, the water downstream of the dam began to rise until it became 9 inches higher than the water above, when

the dam broke, and the Pibor flowed the wrong way, *i.e.* from north to south, for some days. Heavy rains in May caused the flow to resume its normal direction, which lasted until the end of the year.

In December 1920 a large sudd block formed at the junction of the Akobo and Pibor rivers, and on 3 January 1921 the stern-wheel gunboat *Metemma* was unable, even with the assistance of 150 lusty soldiers with ropes, to force its way through the sudd against the current, which was flowing strongly north. The *Metemma* draws about 3 feet 6 inches of water, and will be remembered as one of the gunboats used by Lord Kitchener in the Nile campaign in 1898.

On 3 January 1921 the river gauge at Akobo Fort registered 1·7 metres. On January 23 the gauge showed only 62 centimetres, and on that date the *Eland*, a much smaller stern-wheeler, 50 feet long, 8 feet beam, and 2½ feet draft, was with difficulty pulled through the sudd with the current by 150 soldiers. The Pibor continued to fall rapidly, and soon ceased to flow at all south of Akobo mouth. As the river fell the floating sudd there gradually settled down, and the water that had been finding its way under, through, and over the sudd could do so no longer. This sudd completely blocked the river-bed for 400 yards, and acted as a dam which held up all the water to the south. The Akobo river continued to trickle into the Pibor north of this obstruction, and the Pibor north of this point continued to flow, at times almost imperceptibly, northwards.

Navigation by stern-wheelers ceased for several months, although the *Eland* on the return (*i.e.* southward) journey managed to come as far as the mouth of the Gila on February 5. She could not cross the sand bar that had formed there, and the mails had to be sent on overland. Attempts were made in March and April, *i.e.* the driest time of the dry season, to burn the sudd at the Akobo mouth, but with only partial success, as much earth and sand were mixed with the grass.

At the end of April the Baro and Gila rivers, both of which rise in the Abyssinian hills, were running strongly, and as the water in the Baro dammed back the Pibor, the water coming down the Gila began to flow south until on April 30 this water broke through the sudd block, and between that date and May 7 at Akobo Fort (5 miles south of the sudd block) the river rose 1 metre, and pieces of sudd floated southwards past the fort at the rate of 1 mile per hour.

About the middle of May this southward flow ceased, and during June, July, and August the Pibor remained practically stagnant at this point. Occasionally after a day of rain there was a slight northward movement, but this did not last long as a rule. The river continued to rise slowly, but this would appear to be due to local rains.

The south wind blew the floating sudd northward again, and this, augmented by more sudd from the Gila and Akobo rivers, blocked the Pibor from 600 yards south of Akobo mouth and for 400 yards at a bend 1 mile north of Khor Geni (or Adeit or Lau). Meanwhile the Gila

continued to discharge into the Pibor, and caused a moderate stream to flow northwards from Gila mouth to Sobat.

The waters of the Akobo river had been trickling into the Pibor north of the sudd block all through the dry season, and during the first half of May helped to swell the south-going flood of the Pibor; but from June onwards the waters of the Akobo caused the Pibor between Akobo mouth and Gila mouth to flow slowly, almost imperceptibly, northwards.

In August the water from Gila mouth to Sheikh Bartalan's village (Dilling Nyang on Map Africa 1: 250,000, Sheet 78G) was brown in colour, exactly like a peat burn on a Scottish moor. Tea made from this water had a much better taste than tea made from Sobat water.

The gunboat *Metemma* left Akobo on August 7 (river gauge recording 3'69 metres at Akobo), and steaming only by daylight reached Pibor Post on August 13, and on the return journey reached Akobo on August 16 (river gauge reading 3'58 metres), after being 35½ hours under way. On arrival at Akobo many of those on board were suffering from violent irritation of the skin, accompanied in some cases with vomiting; possibly the stagnant water was the cause. Very little floating sudd was met, but for at least one-third of the distance the steamer had to plough her way through long growing grass and reeds which completely obscured the channel. This grass was frequently found growing in 10 feet of water, with 2 or 3 feet above water. Occasionally patches of clear water from 50 to 500 yards in length were met with in the sudd and grass.

Khor Agwei was blocked with sudd and showed no signs of flowing when visited on June 20, July 9, August 7 and 15, and on September 5 and 11. The sudd block at Akobo was blown northward by the wind about the second week in September, and both the sudd blocks were between the Gila mouth and Nasser on September 14. On September 9 the river Kengen was flowing muddy-white into the Lotilla, which was of brownish hue as before described.

Tradition says that General Gordon visited Gebel Lothir, a rocky hill near the banks of the Lotilla some 15 miles south of Pibor Post. I tried to get there, but I found it impracticable to reach the neighbourhood in the time at my disposal. Progress through the sudd was very slow, and frequent stops had to be made to clear the grass and the weeds from the stern wheel of the steamer. Often these were so tightly packed round the axles of the wheels that axes and choppers had to be used.

EXTRACT FROM RIVER RECORD AT AKOBO, 1921.

				Metres.					Metres.
				Zero *					
April 30	...	...	...		June 30	...	...	...	2'50
May 9	...	...	...	1'01	July 13	...	...	...	3'00
May 11	...	...	...	0'91	July 28	...	...	...	3'50
May 18	...	...	...	0'87	August 5	...	...	...	3'60
May 21	...	...	...	1'00	August 22	...	...	...	4'00
May 31	...	...	...	1'50	September 11	...	...	...	4'58
June 21	...	...	...	2'00					

* This does not mean that there was no water at Akobo Fort, where the water remained in pools 5 feet deep during the dry season.