CANE SUGAR IN EAST AFRICA

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Introduction.

The expression "East Africa" for the purpose of this presentation connotes the Kenya Colony and Protectorate, Tanganyika Territory, and the Uganda Protectorate, comprising a total land area of 642,878 square miles, slightly more than four-fifths that of the Union of South Africa. The territories include Lake Victoria and the whole or portions of other lakes amounting in all to 38,901 square miles, of which Lake Victoria situated at an elevation of 3,720 feet above sea level accounts for 26,828 square miles. The gross area is thus 681,629 square miles. Kenya and Tanganyika are bounded on the east by the Indian Ocean. Uganda lies in the interior with access to the sea through the other two. The climate ranges from tropical heat and humidity in the coastal and lake areas to cool and temperate conditions in the highlands, with extensive arid belts in the interior of Kenya and Tanganyika. The population of the three territories is estimated at 18,400,000 of all races. There are 59,000 Europeans and 259,000 Asians. The annual net rate of increase is estimated to be one and a half per cent. for the African population, two per cent. for the Asian, and one to one and a half per cent. for the European.

East Africa generally is in an active state of development, both agricultural and industrial. Within the memory of many persons, some of whom are still actively engaged in varied pursuits in Eastern Equatorial Africa, the region has emerged from a state of primitive savagery and slavery to become the source of considerable quantities of varied and greatly needed commodities, including cotton and copper, sisal and sugar, coffee and tea, wheat and flour, pyrethrum and pineapples. Though electric power has been available in all the larger centres for many years, special mention should be made of the Owen Falls hydro-electric scheme which will make use of the enormous power of the lake water as it passes through a gorge nearly half a mile wide at Jinja and becomes the river Nile.

Mau Mau atrocities dominate Kenya news at the moment, but this subversive criminal pagan outbreak is localised, and though calling for stern suppression, directly affects but a small fraction of the population and total land area.

Historical.

Sugar cane has long been a native crop grown on the edges of swamps or in moist ground, used for chewing and the preparation by crude methods of alcoholic drinks. The places selected by the Africans for cane have had much to do with the local fallacy that it is a swamp crop. Choice of land has really been dictated by the fact that cane can only survive if supplied with ample water during its period of growth, and most of East Africa experiences little or no rainfall for the greater part of the year. Because of this some of the earlier sugar ventures were established in unsuitable areas.

Cane sugar production by modern methods was commenced in 1924 at Miwani near Kisumu in Kenya. Up to that time locally produced cane sugar was confined to "jaggery," usually made then, as to-day, by direct concentration of the cane juice in open pans. A refinement of that simple method, copied from the West Indies in 1917, was the partial separation of impurities by defecation with lime and heat, followed by concentration to saturation by stages, using open pans. At the strike point the massecuite was ladled into wooden boxes and stirred with paddles until it crystallized. The sugar which was golden yellow in colour was afterwards dried in the sun. The product sold readily at £40 per long ton. This was the first serious attempt at organised cane growing and sugar manufacture.

The cane was grown under irrigation, water being brought by canal from the Athi River over a distance of two miles. The three-roller mill was water-driven. It may be of interest to record that the earliest attempts at chemical control in East Africa were made in connection with this venture. This and other investigational work on sugar cane conducted at that time provided a basis for the later establishment of larger enterprises. Among the significant facts observed were the richness of the canes then grown and the high purities of the juices. Details are to be found in the Annual Reports of the Government Analyst and Director of Chemical Research, Nairobi, for 1917 and 1918.

Production and Distribution.

To-day there are five estates with vacuum pan factories in operation, two in Kenya, one in Tanganyika, and two in Uganda. Jaggery continues to be made, particularly in Uganda, and in western Kenya near to the Kavirondo Gulf, where more than forty units were working in August, 1952. In one district alone 2,000 acres of cane are solely used for jaggery production, the yield being reported as 200 lbs. per long ton of cane, sold then at 10s. per frasila (35 lbs.).

The five factories produce direct consumption sugar by the sulphitation process. The Miwani organisation in Kenya, near Lake Victoria, is the only one which accepts cane from a considerable

Fig. 1 Irrigated fields of sugar cane, Kiboko Flats, Kenya, 1917

Fig. 2. The first organised attempt at sugar manufacture, Kenya, 1917

number of farmers, who in almost all cases own jaggery factories, and sell their cane when it suits them. There is no regulation of farmers' production and deliveries, nor any control of the price paid for cane by the manufacturer. One company in Uganda purchases cane from adjoining estates engaged for the main part in other agricultural ventures. Prices and distribution of sugar are controlled by the Director of Produce Disposal, East Africa High Commission. The retail price is the same for all grades of vacuum pan sugar, locally produced and imported, and at present there is no regulation of quality. The price at the factory is based on the Ministry of Food price for direct consumption sugar, the profits allowed to main agents, wholesalers and retailers being controlled.

Details of annual production for the past six years for the periods 1st July to 30th June are given in Table 1.:

TABLE 1

Production by territories in long tons commercial sugar

	Kenya	Tanganyika	Uganda	Total
1946-47 ...	4,845	6,565	46,185	57,595
1947-48 ...	10,498	7,206	66,130	83,834
1948-49 ...	11,050	5,593	53,012	69,665
1949-50 ...	11,682	8,546	49,593	69,821
1950-51 ...	13,196	7,585	52,576	73,357
1951-52 ...	14,301	9,952	50,936	75,189

The companies operating the estates and factories are:

Kenya: Miwani Sugar Mills (Kenya) Ltd., Miwani, near Kisumu. (MIWA)
Kenya Sugar Ltd., Ramisi, via Mombasa. (KENY)

Tanganyika: Tanganyika Planting Co. Ltd. Arusha Chini Estate, Moshi. (TANG)

Uganda: Madhvaninagar Sugar Works Ltd., Kakira, near Jinja. (MADH)
Uganda Sugar Factory Ltd., Lugazi, near Jinja. (UGAN)

Abbreviations used in tables which follow are indicated after the name of each company.

TABLE 2

Production by factories in long tons, 1st July to 31th June

	MIWA	KENY	TANG	MADH	UGAN
1946-47 ...	1,423	3,422	6,565	32,615	13,570
1947-48 ...	6,332	4,166	7,206	40,159	25,971
1948-49 ...	5,384	5,666	5,593	30,535	22,477
1949-50 ...	5,460	6,222	8,546	30,591	19,002
1950-51 ...	8,248	4,948	7,585	33,987	18,589
1951-52 ...	10,428	3,873	9,952	28,481	22,455

Miwani Sugar Mills (Kenya) Ltd. are successors to the Victoria Nyanza Sugar Co. Ltd., the original company operating in Kenya, having purchased the estates and factory in June, 1947.

Details of sugar consumption for the past three years are given in Table 3, which includes the figures for Zanzibar, military requirements, and industry.

TABLE 3

Long tons, for annual periods 1st July to 31th June

	Kenya	Tangan-yika	Uganda	Zanzibar	Military, etc.	Total
1949-50 ...	42,485	20,297	22,411	4,989	348	90,530
1950-51 ...	39,561	24,316	30,848	4,400	200	99,325
1951-52 ...	40,747	25,773	33,555	3,900	325	104,300

The difference between local production and consumption has been provided by importation through the British Ministry of Food, the annual quantities being:

1949-50 ... ... 26,665 tons
1950-51 ... ... 21,650 tons
1951-52 ... ... 33,932 tons

Consumption.

Estimated consumption for the year ended 31st December, 1952, was 109,030 tons. Excluding Zanzibar and military requirements the consumption of sugar per person on the basis of the figures quoted was at the rate of only 13.2 lbs. per annum. For Kenya alone, where the non-African population is greater than in Tanganyika or Uganda it was 16 lbs. per person. It is evident that demand exceeds supply, and that were more sugar available it would readily sell. During mid-1952 retail purchasers in many large centres, particularly Nairobi, could not obtain their full requirements, while much of the sugar that was on offer was of sub-standard quality and unfit for human consumption. This position continued for some weeks, and was another indication of the inability of the local industry to satisfy consumptive demand. In fairness to the East Africa producers it should be stated that the low quality sugar had been imported.

The Need for Expansion.

A conservative estimate of the present annual shortfall between production and demand is 40,000 tons. This will undoubtedly increase year by year until by 1957 it will be more than twice as much even if the existing producers expand their output from an annual average total of 71,590 tons to 100,000 tons.* The three companies in Kenya and Tanganyika have embarked on schemes for progressive increases in production which should reach a

* Weight figures are in terms of long tons of 2,240 lbs.

Fig. 3. Irrigated cane at Arusha Chini, Tanganyika, 1952

Fig. 4. A typical labour "camp"

total of 25,000 tons a year in five or six years. Present indications are that annual output when that expansion has occurred may be expected to remain at an annual average of 100,000 to 110,000 tons for the five operating factories unless increased capacity is provided at those in Kenya and Tanganyika, where the companies concerned have reserves of land capable of providing more cane. Assuming that this took place, a further 25,000 tons a year might be produced by 1959-60, but annual demand would by that time reach or exceed 200,000 tons.

The inevitable conclusion is that East Africa needs an immediately effective development programme of sugar production to overtake the shortfall, keep pace with expanding demand, and make the region self-supporting in respect of sugar. An exportable surplus for the growing needs of the Eastern Belgian Congo, the Sudan, and other adjacent countries might be attained with advantage.

In addition to the present expansion projects, there is great need of new enterprises, one initially planned to produce 40,000 tons of sugar per annum, capable of future extension to double that capacity, and one or possibly two of the order of 20,000 tons output, similarly to be doubled. This may at first glance appear to be an optimistic interpretation of the position, but the evidence of careful enquiries and close observation in the course of an extensive tour of the region rather points to the probable inadequacy of a sugar development scheme even of that magnitude.

Outline of Existing Industry.

Climate and soil are favourable to sugar cane grown under natural rainfall in parts of Uganda and Kenya near Lake Victoria. The deposition of dew plays an important part in providing water for cane in these areas. The three projects within this zone now provide 80 per cent. of the total annual production of East Africa. At the coast some forty miles south of Mombasa is the only other enterprise with satisfactory rainfall. Irrigation schemes are however being put in on the two Kenya estates for part of the cane lands. The one company in Tanganyika is operating in an area with an average annual rainfall of 16.73 inches, and the cane lands are irrigated by a gravity supply.

Agricultural operations are highly mechanized on all estates. It should be noted that agricultural

TABLE 4

Factory	Altitude feet	Varieties	No. of Ratoons	Av. Age at Reaping Months		Yield per Acre, 1951-52 Long Tons		Average Rainfall inches	Area Reaped 1951-52 acres[2]
				Plants	Ratoons	Cane	Sugar		
MADH	3800 to 4000	P.O.J. 2725 B./3172 Misc. 2 %	2	18–20	15–18	38	3„0[2]	45.00	9853
UGAN	3900	P.O.J. 2725 P.O.J. 2878 P.O.J. 2961 Co. 419	2	18	18	41	3.9[2]	55.30	5826
MIWA	3959 to 4500	Co. 281 Co. 290 Co. 421	2	22 normal 14 swamp soils	20	25[3]	2.34[2]	49.55 to 54.79[4]	3239 estate[4]
KENY	50	Co. 281 Co. 419[1] B./3172	3	14	13	20[3]	below 2[3]	57.35	—
TANG	2300	P.O.J. 2878 Co. 421[1]	9 (max.)	18	14	plts. 45-50 rts. 25-30	3.9[2]	16.70	2500

Notes. [1] Area being extended. [2] From official returns. [3] Approximate figures.
[4] Farmers supplied cane from 1,650 acres additional. Recorded figures apply to estate operations.
[5] Lowest and highest of four stations.

machinery and equipment, including tractors, implements, and tools essential for their maintenance, are imported free of customs duty from all countries. Imports from hard currency countries are controlled. Crop data and other information are given in Table 4.

The cane variety position is not generally satisfactory and though attention has been given to the matter, the selection and testing of new introductions are poorly organised and inadequate for the needs of the estates. A collection of ninety is maintained by the Kenya Department of Agriculture in Kisumu. Among them are seven members of the N:Co. series including 310. The wide range of conditions in East Africa makes it impossible to centralise experimental and varietal investigation. Such work should therefore be undertaken on the estates' land in such a manner as to study the requirements of each area. The absence of an association of cane planters and sugar manufacturers is an undoubted drawback to co-ordinated investigations as well as to the resolution of industrial problems. The failure to form such a body appears not to be related to economic interests but to some unconnected conflict of views. Thus at any time it is possible to bring four out of the five companies into union, but the fifth, which may be one or the other of two, is consistently in opposition. The solution may be found in some form of legal sanction, as the industry is unquestionably of high importance in the general economy of the region.

Labour.

The employment of labour in East Africa is controlled and regulated by law, the principles of the legislation being basically similar in each territory. Labour departments administer these laws as well as those concerning health, safety and welfare in factories. The establishment of industrial relations between employers and employees by the formation of staff associations and works committees is encouraged. Official annual reports are published in respect of labour administration.

The provision of housing by the employer is a legal obligation unless employees can return to their homes at night, and on the sugar estates labour camps provide accommodation for most, if not all, of the labour employed. The site, design, and construction of labour camps are subject to approval. The number of persons to the acre and to each room are regulated. Health and welfare services are compulsory, and rations must be supplied for unskilled labour in accordance with approved scales. The recruitment of labour is conducted by licensed recruiters who may operate only in particular districts which are specified from time to time.

Communications.

The map at Fig. 5 shows existing and projected railways and the routes of lake and river steamer services within East Africa. Four of the five sugar enterprises are on or near the railway. The other depends on road transport, though communication with other coastal areas by water could be developed. The Arusha Chini factory is connected with Kahe Junction by an E.A. standard gauge tramline eight miles in length over which the estate traffic is manually propelled. The road system of the territories is extensively used for heavy traffic. The East African Railways and Harbours is the controlling authority for rail and steamer services, as well as for bus services on certain main routes. The map reveals projected railways of which that from Kampala to Kasese is under construction. Another important link is the proposed new line in Tanganyika which will run from Korogwe south-west to join the Central Line. The route has not been finally determined, but if constructed, the line will pass through a promising new area for a cane sugar project near Turiani. The possibility of a rail link with Rhodesia has been explored.

The success of cane sugar ventures depends upon ease and cheapness of communication and transport, as well as upon the climatic, agricultural, and technical requirements of successful cane production and sugar extraction. The locations suitable for new enterprises are limited by these considerations, and by the availability of sufficient areas of land within economic distance of satisfactory sites for factories. Though large scale agricultural undertakings in East Africa are of modern origin, they have been established in most instances by private enterprise with no regional crop planning schemes. This has brought about a form of ribbon development along the lines of communication, especially the railways, in zones where soil and climate are suitable for particular crops. A striking example of this is sisal in the mid-Pangani valley of Tanganyika where a chain of monocrop cultivations follows the track of the Tanga-Moshi railway line. Excellent conditions for large scale sugar production under irrigation are presented in this area, but they are also highly suited to sisal, and it seems unlikely that there will be a change to sugar.

Factors Affecting New Enterprises.

There are, however, extensive runs of land where conditions are favourable to the success of new sugar enterprises, though with the exception of the north-eastern lake area irrigation would be desirable, and in some cases essential. Apart from the advantages of the lake climate, the availability of ample supplies of water of excellent quality is important. The average temperature of lake water calculated on the

mean of figures obtained weekly at four depths ranges between 24.1°C in August to 26.7°C in March.

An important feature is that in all the developed and undeveloped cane areas, reaping and manufacturing operations can be conducted throughout the year. Factories can count on not less than three hundred days' gross grinding time. It is only during the season of heavy rain that there is any serious interruption of operations, and this is of short duration. These factors exercise a highly favourable effect on the organisation of plantation work and factory economy. Staff and labour can be continuously employed on the same operations, with improved efficiency and the absence of seasonal peaks.

The governments of the East African territories have carried out extensive studies of climate, hydrology, and soils, the results of which are being used to make preliminary selections of land suitable for various forms of agricultural development including sugar cane. Further intensive investigations are then made in relation to the conditions of the particular enterprise decided upon for each area.

New cane sugar ventures of economic size and output require heavy capital outlay, which is much greater than was needed prior to the last war. Despite this the exceptionally favourable conditions in East Africa, which are here described, support the view that well planned and properly conducted enterprises will prove successful and profitable.

Mr. Dymond said that he thought everybody would agree that Mr. Barnes had given an interesting picture of conditions in East Africa. He was particularly interested in Mr. Barnes' description of the large number of jaggery mills in a small area. This reminded him of Brazil where fifteen years ago there were over 40,000, most of them of the type described by Mr. Barnes. Under economic pressure and development these were absorbed into the larger centrals.

Mr. Walsh paid tribute to Mr. Barnes for his fine description of the East African sugar industry. No one was more capable of doing this than Mr. Barnes and he paid tribute to the work done by him in East Africa. Mr. Walsh said he had visited East Africa several times in the past ten years and had been struck by the lack of advancement and the lack of co-ordination. Much of the operation was done by officials who had little experience. He said that South Africa's procedure was being very closely followed in East Africa and there was a great deal of jealousy at the co-ordination and activity in South Africa. South Africa had many links with East Africa. In the Miwani plant was the milling plant from Reunion and equipment from Verulam and Sezela. There were many South Africans in the area who welcomed a link with South Africa.

Mr. Walsh said he was sure Mr. Barnes could go further into the possibilities of East Africa. It was fantastic to think of factories that could crush for fourteen months at a stretch. He felt more could have been done in East Africa if they had had the advantage there of an organisation such as South Africa had, together with better canes and better technical supervision. If this were done, the future of East Africa would probably be illimitable.

Dr. Dodds endorsed Mr. Walsh's tribute to Mr. Barnes' paper. He said that some years ago at the Experiment Station a letter of enquiry had been received from East Africa asking about the effect of cold water on sugar. Some of the water used in East Africa was very cold, just a few degrees above freezing point.

Mr. Barnes, replying to Dr. Dodds, said that he knew of no cane subject to irrigation in such conditions. The only concern using irrigation was the one in Tanganyika situated at 4,000 ft., where it was intensely hot during the day and where the water temperature was probably not less than 35 degrees; this in spite of the fact that the water came from the snows of Kilimanjaro. He thought this query might have come from one of the remoter parts of the territory. One venture near Nairobi had failed entirely because of the slow growth of the cane.

Dr. McMartin said one point occurred to him in connection with the varieties grown. He asked whether it was known whether the early canes grown by the natives were grown before the white people went to East Africa. A moot point was whether sugar cane in Natal preceded the Europeans or the Europeans preceded the canes. The point was held by some people that the cane cultivation came only after the Europeans while others felt that sugar cane was distributed in the very early days, mainly by the Arabs, and that the natives continued this distribution southwards into Natal.

Mr. Barnes replied that it was a very interesting speculative subject. He would say unquestionably that the canes were grown in East Africa before the advent of the Europeans. David Livingstone mentioned cane in some of his writings. He said Uganda had been in contact for a thousand years via the Nile with Egyptain civilisation, while Arabs had penetrated what is now Tanganyika. Some of the canes in East Africa had local names. A remarkable thing was that many of the locally grown cane had persisted through a long period of years without being affected by mosaic. He expressed the view that sugar cane was grown in these territories and was used by natives long before the European arrived.

Mr. Dymond congratulated Mr. Barnes and asked that a hearty vote of thanks be accorded to him for his paper.

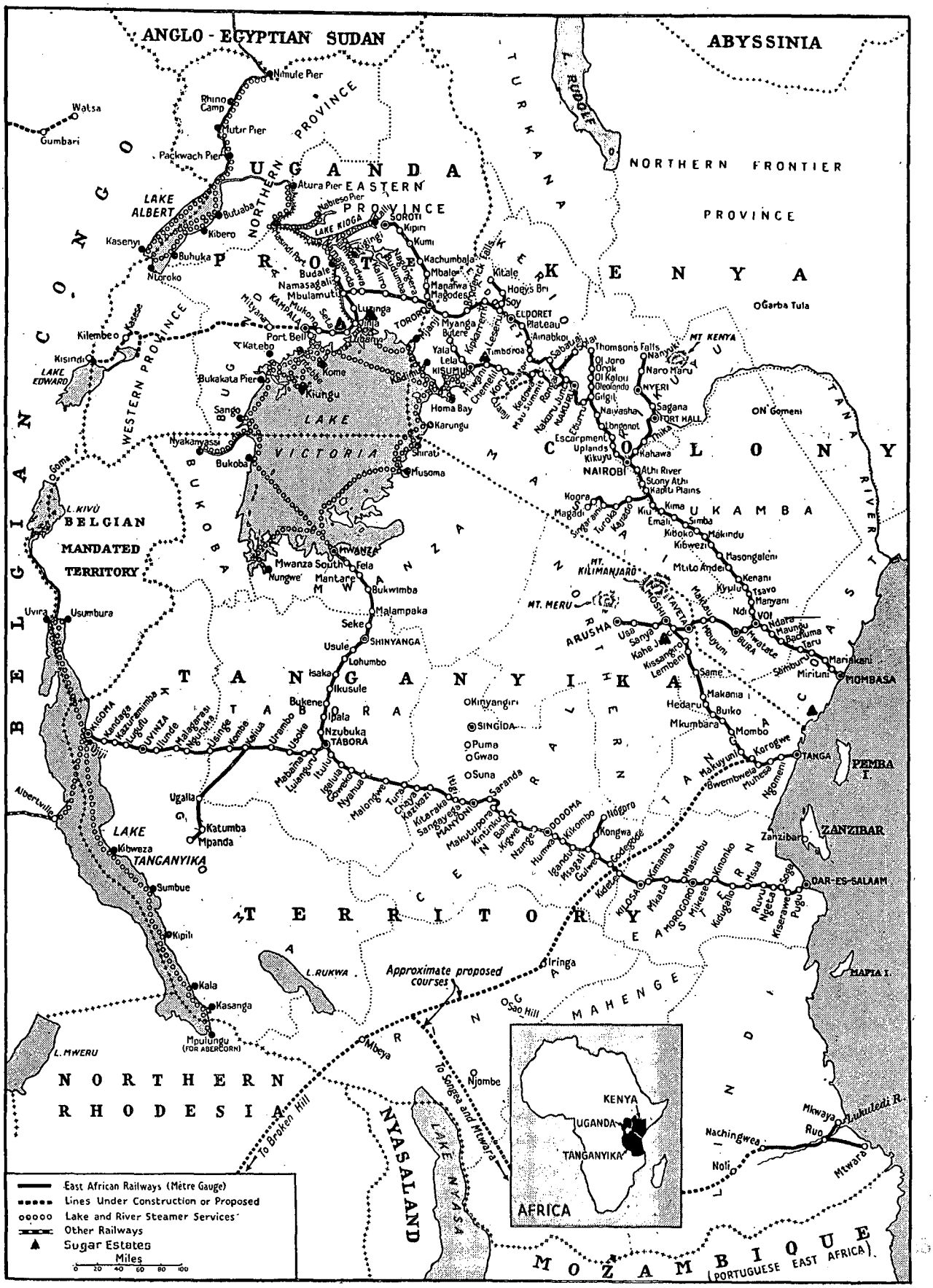

Fig. 5. Railway and steamer communications map.