

TANGANYIKA NOTES AND RECORDS

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DECEMBER
1945
No. 20

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JOHNSON REPRINT CORPORATION JOHNSON REPRINT COMPANY LTD.
111 Fifth Avenue, New York, N. Y. 10003 Berkeley Square House, London, W.1

First reprinting, 1968, Johnson Reprint Corporation
Printed in the United States of America

PUBLISHED HALF YEARLY

Tanganyika Notes and Records

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DECEMBER 1945
Number 20

PUBLISHED FOR THE EDITORIAL COMMITTEE AT DAR ES SALAAM



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Dar es Salaam, 1860 to 1940: A Story of Growth and Change

By C. Gillman

THE FOLLOWING attempt to sketch the history of our capital during the first eighty years of its life endeavours to rescue from oblivion a large number of interesting facts culled from many not easily accessible records. This story could not have been written if the author had not had at his disposal the fairly complete collection of old texts, now probably no longer obtainable elsewhere, which the library of the King George V Memorial Museum offers to the student.

The numbers appearing in parenthesis throughout this article indicate references, a list of which is furnished at the end of the text.

I.—EARLY DAYS (Before 1887)

In the middle of the nineteenth century a little settlement was perched on the raised coral cliff of Ras Chokir, a small bulge of higher ground between adjoining stretches of low sandy beach, overlooking across a broad fringing reef the wide open bay of the Indian Ocean between Msasani Peninsula and Magagoni. It is the site occupied to-day by Dar es Salaam's large European hospital, still flanked by a few dilapidating ancient graves, and every now and then, after an exceptionally heavy springtide has taken a fresh bite into the crumbling cliff, one can watch skeletons of the old inhabitants being washed out of the soft marly rock. The name of this settlement was *Mzizima*. Spelled *Msisima*, it is clearly marked on the map of East Africa showing the travels of the pioneer missionary Dr. Krapf, printed in 1860 and appended to his famous book, but is not mentioned in his text although he must have passed in close vicinity when, on the 13th and 14th February 1850, he sailed from Msasani Bay via "the haven of the village Mtotana" to Sinda Island (10, pp. 420/1). *Mzizima* is also mentioned in a list of Shirazi ruins compiled by Dr. Stulmann (19, page 855). It was probably only one of a string of such minor coast settlements the remnants of which, in the form of old graveyards, one can clearly trace from Konduchi in the northwest to Mboamaji in the south-east of Dar es Salaam along that comparatively sheltered part of the coast protected by outlying coral islands.

Of the origin and early history of *Mzizima* we learn from the stories of Swahili elders taken down in 1896 by Velten (22) that "the forest (*msitu*) was first cleared by people from Barawa, north of Lamu, and Shirazi who tilled the land, built boats, fished and traded in slaves. . . . Later came Wakamba from the interior to mingle with these coast people, but the latter called a big *Mzaramo pazi* (chief) to drive them out, which he did with a large army and then returned to his own land after having imposed a tax." The Shirazi were, apparently, firmly established under their own *jumbe*

when Arabs from Muscat conquered and settled on Zanzibar under Seyyid Said (1805-1856) whose successor, Seyyid Majid (1857-1870), eventually occupied the mainland coast with the aid of the British. Realizing the advantages of the large tranquil harbour formed by the wide estuary of an inland creek, to which a narrow entrance led less than a mile south of Mzizima, Seyyid Majid decided to create there a safe port, a new centre of trade, and a comfortable residence, much cooler than his abode on the leeward coast of Zanzibar Island. Thus, so the elders' story continues, "the Sultan's wazir, Seleman bin Hemed, came to Mzizima with presents; and later arrived masons, lime burners and carpenters from Zanzibar who built stores and houses, and the Sultan's flag was hoisted. He also sent Banyani merchants who had to pay seven Maria Theresa thalers for each house they occupied. They soon imported cloth of all kinds and Wanyamwezi from the interior brought ivory." This story is confirmed by E. C. Baker's more recent researches (1, page 1-3) who calls the early settlers of this part of the coast by the collective name of Washomvi and states that the settlement of Mzizima extended from Ras Chokir to the northern side of the harbour entrance. Another version of the story of the founding of Dar es Salaam is told by Morwenna Hartnoll (20, 3, page 117), according to which the Sultan negotiated in person at Mzizima. All this took place in 1862 (*vide* 5, 15, page 7, and 23) the year which, thus, may safely be taken as that of the birth of Dar es Salaam.

This name was given by the Arabs to the new port and settlement* although, as late as 1867 at least, the name Mzizima seems still to have been in current use for Father Hoerner of the Holy Ghost Mission of Zanzibar, who inspected the coast in 1867 in search of a suitable site for a station on the mainland (7, 1866/7), mentions in his report *Mzizima à 45 milles marines de Zanzibar, parmi les principaux endroits de cette partie de la côte*. In a German account of his travels (16, page 98) we find the following account of his visit to the new port in September 1867, the first from the pen of a white man: "On the Sultan's steamer, accompanied by a guard of honour of forty soldiers and by one of the Sultan's secretaries, the Father landed at Mzizima where the Sultan was building a palace. After having inspected the surroundings on horseback, he sailed some distance up the fine river which here enters the sea; herds of hippos surrounded the steamer and hundreds of monkeys danced on the trees along the shore. In the afternoon he visited the village of Magagoni, a trading centre occupied by Banyanis who might appropriately be called the East African jews. The place has about nine hundred inhabitants, as many as Mzizima".

After having removed the Shirazi *jumbe* and replaced him by his own administration under his Akida Said bin Abdallah, Seyyid Majid died in Zanzibar in 1870, as the story goes (20, 3, page 11) as the result of a compound

*This is not the place, nor is the author sufficiently learned, to pronounce a verdict in the controversy regarding the etymology and meaning of "Dar es Salaam". However, to the derivations quoted by Mr. Hartnoll (20, 3) and by Mr. J. W. T. Allen (20, 19) one might add that given to Leue by some Arabs (11, page 4): "The House of Salvation" (as the place in heaven is called where the Prophet kneels at the throne of Allah).

fracture of his collarbone due to a fall in his palace in Dar es Salaam. Seyyid Bargash, his half-brother and successor (1870-1888), does not seem to have shared his predecessor's ambitious plans and the work commenced so hopefully and energetically by the latter was left to decay. The Sultan's palace, of which the main building had been completed and which stood on the ground now occupied by the Sewa Haji hospital, the Public Works' workshop and the Railway station building, slowly crumbled to pieces. And so did most of the houses built and soon deserted by the many traders who returned from this trading outpost to Zanzibar. Some of the earlier houses, however, have survived and, though partly altered and reconstructed, are still in use to-day : for instance, the present headquarters of the Customs Department, next to the Post Office ; the house of the White Fathers adjoining it ; parts of the Police offices, and the commercial house at the corner of Main Avenue and Mission Street (*vide* Map I, first published in 3, vol. II, 1891, and reproduced here from page 26 of the Atlas of Tanganyika Territory by courtesy of the Chief Surveyor). Another relic of Majid's civilizing influence were the deep masonry wells scattered throughout the town which lasted during the period of German occupation and were only replaced by a modern piped water supply in the mid-twenties.

We possess several glimpses of the early town during the days of its decay. Vice-Consul Elton, who visited Dar es Salaam in 1873, reported "rank grass and brushwood growing in the streets, with house property almost valueless" (20, No. 14). Later it was hoped that trade might be revived and the town saved by constructing a good road into the interior and Sir William Mackinnon with Sir Fowell Buxton obtained a concession and actually built some seventy miles of a road of sorts between 1877 and 1881 (8, page 159 ; 20, No. 14). In 1879, Joseph Thompson, the first of the early explorers to start his expedition from Dar es Salaam and who stayed with Beardall, the engineer in charge of the road construction, "in a huge, barn-like building which formed his headquarters and store house" writes as follows (21, pages 73-75) : ". . . desolation reigned supreme. Grass now grows in the streets. The tenantless houses give shelter only to bats, owls, lizards and snakes, and the whole place wears the aspect of an old battered and deserted city, instead of a new one just springing into life. It will probably now be many years before the prevailing lethargy is dispelled and a new reign of activity commenced. But certainly, from the advantages which Dar es Salaam possesses above most places on the coast, there can be no doubt that it will, sooner or later, become all that its founder wished it to be."

The Mackinnon road does not seem to have helped much ; in fact, by the time the Germans arrived it "had become deteriorated and overgrown as it was no longer used" (Stuhlmann, in 13, vol. VII, pages 231-2). The first moves of the Germans, those somewhat adventurous "acquisitions" by Dr. Karl Peters in Usagara in 1884, after the founding of the Gesellschaft fuer Deutsche Kolonisation in March of the same year, did not touch Dar es Salaam as his "land buying" expedition started from Sadani and ended at Bagamoyo. However, after these curious "agreements" with local chiefs

had, in 1885, resulted in the "gradual crystallization" of the Deutsch Ost Afrikanische Gesellschaft, further "occupations" took place, among them that of Uzaramo for which the use of Dar es Salaam as a base had been granted by Seyyid Bargash on the 26th September 1885 (5, pages 1-32; 18, page 40). And finally, when the preliminary agreements with Seyyid Bargash of the 1st November 1886 and of the 30th July 1887 (both confirmed after Bargash's death early in 1888 by his successor in the final "Coastal Agreement" of the 28th April 1888) had secured for the Deutsch Ost Afrikanische Gesellschaft first the customs revenues and then the virtual occupation of the coast on a fifty years' lease, Hauptmann Leue, or "Bwana Loya" as the natives called him, gives us the following description of Dar es Salaam as he saw it at the time of his first landing on the 25th May 1887, for the purpose of founding one of the new Company's "stations" (11, pages 4-5): "Dar es Salaam had sunk as quickly as it had risen under Seyyid Majid. When we set foot on its soil it was a town of ruins. The place and its port were desolate. . . all the streets were overgrown with grass and bush and the individual groups of houses were joined by narrow native paths only. The town, therefore, teemed with snakes, scorpions, centipedes, mosquitoes and other pests. . . In the halls of the Sultan's palace lived bats, and castor-oil plants were rampant in its walled gardens. Part of the palace was used as a gaol and on its marble [*sic*!] slabs, where once the harim ladies' tender feet had trodden, now clanked the prisoners' chains."

At that time Dar es Salaam is said to have had three to four thousand inhabitants; but some of the Washomvi had moved a little northwards to Upanga where they cultivated their rice on what is now the golf links.

II.—UNDER GERMAN RULE (1887-1914)

A.—PRE-RAILWAY DAYS (1887-1904)

Dar es Salaam's first "Chief", Leue, had brought with him from Zanzibar seven German assistants, a number of personal servants, and a "bodyguard" of twelve Arabs sent by the Sultan for protection. He found his new field of action far from being a bed of roses and the local Arabs, including the Sultan's Liwali, far from friendly or helpful. It took some time until the small group of men, sent to found a trading station, were primitively housed in the old Arab building which to-day contains the Police charge office (11). As far as can be ascertained their trading activities in those early days were restricted to erecting a plant for sorting and washing gum copal of which large quantities were collected in the hinterland.

At about the same time, that is in the second half of 1887, the Evangelische Missions Gesellschaft fuer Deutsch Ost Afrika founded its station on the promontory commanding the northern side of the harbour entrance. As this was the first European building in Dar es Salaam, and as, though in an altered form, it still survives after nearly sixty years, it is tempting to piece together its varied history. An early picture (11, page 26) reveals it as a large single-storied building half-hidden among palms and

mango trees. Its life was short as it was burnt down on the 11th January 1889 (*vide* below); but by the end of that year reconstruction was in full swing (5, page 166) on the old site which is marked for the first time on a military sketch-map drawn by v. Wissmann and published in 1890 (13, vol. 2). The new building was double-storied with a sheltered open-roof story above and was taken over as Dar es Salaam's first hospital on the 1st April 1891 by the Mission's medical staff from Zanzibar (3, vol. 2). When the new present Government hospital was completed in April 1897 (3, vol. 7) the building reverted to mission use. During the British occupation in the first world war it was used for military purposes, then stood empty for a long time until, in 1925, it was handed back to the German missionaries who had returned to resume their activities. Later, under the regime of an ardent Nazi pastor, the famous Hitler altar was housed in one of its rooms beneath the Fuehrer's effigy painted by a local German baker and pastry cook! In 1940 the old house reverted once more to martial use when it became the headquarters of the Tanganyika Naval Volunteer Force.

After this interlude let us return to a more orderly account of the march of events. Thunder clouds were gathering and in August 1888 the Arab rebellion, led by Bushiri, broke out. Although in the beginning Dar es Salaam, protected by a German man-of-war, remained unmolested for several months, Bushiri's successes further north induced him to extend his raids southwards, mainly to recapture the freed slaves who had been quartered at the Lutheran mission of Dar es Salaam and the Benedictines' station at Pugu in the near hinterland. On the 31st December 1888 and again on the 10th and 11th January 1889 the town was attacked by the rebels' massed forces under Seliman bin Sef but successfully defended by its small garrison assisted by the Navy. On the second occasion the Lutheran missionary with his wife and niece very narrowly escaped death while fleeing to the warship and the mission building itself and part of the town were gutted. Two days later the Catholic mission at Pugu was taken, two brothers and one sister were murdered, and the other members captured. On the 17th January another unsuccessful night attack on the fort at Dar es Salaam took place and on the 25th, finally, after a battle at Ras Chokir where many Arabs fell, their last contingent of eighty men was driven out.

In the meantime the Imperial German Government had decided to come to the assistance of the Deutsch Ost Afrikanische Gesellschaft whose resources were quite inadequate to deal with a rebellion that was quickly spreading to many parts of its territory. Major v. Wissmann was appointed Imperial Commissioner and arrived in East Africa on the 1st March 1889 with a large number of officers and non-commissioned officers and much equipment, while six hundred Sudanese mercenaries and four hundred and fifty Zulu warriors were being recruited in Cairo and Inhambane in Portuguese East Africa respectively. The boma in Dar es Salaam was enlarged and securely fortified by combining both the old Arab buildings which flank what until recently has been H.M. prison. An instructive drawing of this stronghold, towering above an as yet very rough and much gullied slope down to the shore, is given in

(18, page 81.) At the same time the small fort of Kifukoni was built on the south side of the harbour entrance on the site of the present port officer's signal house. The garrison of Dar es Salaam at the end of 1889 consisted of three officers, eight non-commissioned officers and a hundred askaris, mostly Sudanese (17, pages 49-50; 18, page 80). Although the town itself was not attacked again during v. Wissmann's extensive operations which finally quelled the rebellion by the end of 1890, its garrison cleared out the neighbouring Arab strongholds of Magagoni in May 1889 (17, 66), Konduchi in September 1889 (11, pages 40-48), and Kissiju, a village at the mouth of the Mgongwe River, some forty miles south of Dar es Salaam, in December 1889 (11, pages 48-58).

Nobody interested in the history of Dar es Salaam should overlook that splendid example of the inter-relations between geographical facts and historical events provided by the fall of Bagamoyo and the simultaneous rise of the new port; nor the psychological reactions on the mind of man when he feels that such inter-relations are likely to interfere with long established traditions and vested interests. As long as traffic was not bulky and could easily be handled by small sailing vessels like the dhow, Bagamoyo's flat sandy shore, separated by a narrow and sheltered channel only from the great East African trade emporium of Zanzibar, was geographically the given port on the Azania coast. The narrow and winding entrance to Dar es Salaam, on the other hand, offered many difficulties to dhows which, moreover, were exposed during the season of the north-east trade-wind to choppy seas when crossing the southern entrance to the Zanzibar Channel between Ras Kisimkazi and Ras Dege. But once the large steamship had replaced the small sailing vessel Bagamoyo became impossible as a port, and the difficulties of approach to its nearby rival Dar es Salaam did no longer exist for powerful and easily controllable ships; difficulties, furthermore, which could easily be abolished by proper survey and efficient buoying of the channel. Having thus lost the advantages of its port under the onslaught of the mechanical age, Bagamoyo's importance as a trading centre was likewise doomed. And yet, controversy dragged on for several years, those anxious to back Bagamoyo's vested interests—and they included many a ship's captain—basing their arguments mainly on the trickiness or dangers of the Dar es Salaam harbour entrance. These futile objections only stopped when a cruiser squadron of the German navy including several large units successfully steered into and out of the port in 1892 (3, vol. 3). In 1905 a part of Rosjstwensky's Russian fleet, including large battleships, anchored in the inner harbour on their ill-starred voyage to Japan. They had come to refuel but finding German neutrality firm had to console themselves by buying up every available bottle of drink!

v. Wissmann, as Imperial Commissioner, had still been hesitating and attempting to smooth things over by retaining Bagamoyo as the seat of his government while turning Dar es Salaam, with its so much better overseas connections, into the country's main military depot (17, pages 329/330), when after due consideration of the situation by the home authorities the following official announcement was made from Berlin on the 1st January 1891 (3, vol. 2;

page 2) : "The investigations regarding the selection of a place suitable as the seat of government in East Africa have resulted in the choice of Dar es Salaam".

Accordingly, after the Reich had taken over the Territory from the Deutsch Ost Afrikanische Gesellschaft on the 1st January 1891 and it had been agreed to pay to the Sultan of Zanzibar four million marks (£200,000) for the cession of all his rights on the coast and hinterland, v. Soden, the first Imperial Governor, took over the reins in the new capital on the 9th April 1891. As the Government House, started earlier in the year (3, vol. 2) was not as yet ready for occupation the new ruler had to be satisfied for some time with the somewhat primitive accommodation provided by a few rooms in the mission hospital (3, vol. 2). Plate 1 shows the back-view of the Governor's *palast*, as the official German usage called it, from the back or park side, a front view being contained in 12, page 260.

The next thirteen years are characterized by a slow but steady growth of everything essential for converting the small "spring-board" of the early adventurers into the headquarters of a rapidly expanding and consolidating protectorate, a development undertaken with proverbial German thoroughness and, at times, in the face of serious setbacks, such as the grave Wahehe rebellion in 1891 to 1894 and several minor risings elsewhere. But apart from mere administrative requirements the desire was, of course, to secure for Dar es Salaam as quickly as possible commercial preponderance over Bagamoyo where the branches of the great Indian firms of Zanzibar felt safe as long as the great caravan roads from the interior terminated on its sandy beach. Notwithstanding the fact that the three large German commercial houses, the Deutsch Ost Afrikanische Gesellschaft, Oswald & Co., and Hansing & Co.—had moved their headquarters from Zanzibar to the new capital on the mainland, and that a number of smaller commercial enterprises and agencies had soon followed in the wake of big capital, the tenacity of Bagamoyo holding on to its past advantages, created by historical events which had bent geographical shortcomings into channels temporarily suited to the greed of man, is well proved by the export statistics for 1898/9: Against Bagamoyo's export customs revenue of Rs. 115,000 Dar es Salaam could only show Rs. 38,000, a bare third! It was rightly recognized that it was out of the question to alter these conditions by force; and that the only correct solution of the problem was, now that a new port had irrevocably been created, to link this port to its natural hinterland by modernized methods and lines of communications which, by coping with the expected increased traffic much more cheaply and more efficiently than porter caravans, would automatically and peacefully do away with the latter once and for ever (17, pages 229-30; 12, page 258). Thus, the project for a Central Railway from Dar es Salaam to Lake Tanganyika took shape early and the first serious surveys for the coastal sector of such a future trunk line commenced in 1894 and, after protracted sophistry and quibbling between the interested and competing parties, construction, all too long delayed, started in 1905 (for details see the author's "A short History of the Tanganyika Railways", this Journal, No. 13, 1942, pages 8-10).

To convey an idea of Dar es Salaam's development during the years 1891 to 1904, a rapid survey of the growth of its major features seems desirable. When the first Governor arrived he not only found his own residence but several other government offices and quarters in course of construction; and within a month of his taking office appeared a first "Bauordnung", or Township Ordinance, on the 14th May 1891, somewhat primitive as yet but accompanied by a plan indicating what already existed and along what lines immediate and future expansion was contemplated (*vide* Map I). The first houses erected were the "Kommandantur", now the Secretariat; two so-called "Normalhaeuser" for senior officials, now the High Court and the building housing the Magistrate's Court and the Education Department; and two houses for junior officials, now occupied by the Departments of Public Works and Lands and Mines, joined by the so-called "casino" or officers' mess. The lower stories of all these houses were built of masonry, the stone for which was taken from the ruins of the Sultan's palace, while the upper stories with their wide verandas consisted of steel and wooden frames pre-fabricated in Germany. All these were completed by 1893 and still serve their purpose to-day after more than fifty years—with minor alterations and, as in the case of the Secretariat, with major extensions. It is interesting to note that all these quarters were designed to comprise offices and mess rooms on the ground-floor while the upper floors served as living quarters with common bathrooms and lavatories; an almost Spartan arrangement, whereby such high officials as, for example, the Governor's Deputy and the Chief Justice were allotted only three rooms each, the Director of Public Works, Treasurer, District Judge, District Commissioner, Officer Commanding Troops and the Naval Commander two rooms each and all others only one room each (3, vols. 3 and 5).

Other early government buildings were the barracks now used as police lines behind the railway station, the police barracks beyond Kurasini Creek, now the K.A.R. lines, and a number of warehouses and customs sheds, still in use as the present high-level export sheds in Magazine Street. A further important addition was the Sewa Haji hospital for non-Europeans erected by that great Indian benefactor whose wealth had been accumulated mainly by fitting out porter caravans. It was opened on the 1st January 1897 (3, vol 8). In the same year the new European hospital was completed (3, vol. 9) and in 1899 followed the Artizans' school at the corner of Burton Street and Main Avenue; the scientific headquarters (now medical headquarters), a spacious building designed to house the Agricultural Department, the Meteorological Station and the Government Geographer, was completed in 1903, and at about the same time the Post Office and the new "boma", now the Town Hall. Simultaneously, private building activity went on apace, chiefly in the area between the south-west ends of Main and Acacia Avenues, but also to a certain extent along Acacia Avenue itself. The latter, however, retained for long the primitive Asiatic type of building with flat roofs, remnants of which have survived to this day. Plate 2 gives a good idea of what this main business street of the capital looked like in 1905 and should be compared with Plate 3, taken recently from the same spot as 2, the crossing of Acacia Avenue and Bagamoyo Street.

The Indian bazaar with, at that time, only very primitive and unhygienic single-storied, flat-roofed houses, combining shop and living accommodation, gradually wedged itself westwards between Acacia Avenue and the old native town with its untidy lanes, and most of the natives went still further west into the new rectangular pattern of straight and broad streets laid out for them by the new Administration through the existing coconut plantations. Two market halls were built one of which still stands in its original lay-out (*vide* Plate 4) at the corner of Market and Bagamoyo streets; they were taken over by the newly created "Kommune" or municipal administration in 1899 (3, vol. 10).

The first church was that of the Benedictines in their outlying establishment at Kurasini across the creek while their main station in the town had for a long time only a small chapel. This mission society had arrived in 1888 when they housed their mission sisters in the old Arab building that still stands at the corner of Main Avenue and Mission Street. Mortality among these devoted nuns must have been high as there is a small churchyard full of their graves alongside Magazine Street beyond the Sewa Haji hospital. They have long since moved to a better home a few miles inland on the southern bank of the Msimbazi valley where their vegetable and flower gardens are a boon to modern Dar es Salaam. On the 1st June 1897 the foundation stone was laid for St. Joseph's Cathedral (3, vol. 8) but the noble building was not completed until 1902. One of the lay brothers working on the roof of the tall spire unfortunately slipped and was killed in 1901 (3, vols. 11 and 12). The Lutheran church was commenced in 1898 (12, page 259).

The water supply to the growing town was provided by increasing the number of old Arab wells found at the time of occupation. The use of modern well sinking methods and skilled workers brought from Germany permitted to go deeper and thus to tap more permanent groundwater tables or pockets and the custom quickly developed that, at least in the European part of the town, each compound had its own water supply fitted with hand-pumps worked by the house-boys. Although the salinity of this water, especially in the dry season, was as a rule fairly high, the system worked satisfactorily on the whole. Projects were, however, prepared for a central supply derived from the many seepage springs in the surroundings of the Gereza Creek (3, vol. 11) and in 1902 two geologists made an exhaustive survey of the possibilities for a reliable pumped ground-water supply (9). But neither of these schemes was developed in German times.

In its earlier stages Dar es Salaam's port facilities were distinctly primitive: series of masonry stairways and shoots, up and down which all cargo was man-handled into lighters, led from the natural narrow beach up the steep slope of the lowest coastal terrace to sheds and warehouses perched along the latter's upper edge. On an instructive view of these installations as they stood in 1896 (2, page 198) not a single crane is to be seen anywhere! It seems almost incomprehensible that such conditions were allowed to persist until the beginning of railway construction in 1905 demanded long overdue improvements for which plans had already been prepared in 1901 (3, vol. 12).

More progressive enterprise was shown in providing the rapidly growing fleet of small coastal vessels and the naval units with repair facilities: a floating dock was commenced in 1900 and, after an accident which sent it to the bottom of the harbour shortly before its completion and required lengthy lifting operations, was at last taken into use in 1902 (3, vols. 12 and 15). At the same time a well equipped dockyard was constructed on the south side of the harbour beyond Kurasini Creek, across the mouth of which a causeway was thrown in 1905 to facilitate land access to the yard. Buoying of the intricate harbour entrance commenced as early as 1891 (3, vol. 2), was gradually improved and the lighthouse on the coral reef of outer Makatumbi was built between 1892 and 1894 (3, vols. 3 and 5).

Of other public services the following deserve mention as corner-stones in Dar es Salaam's history. Even before the town had become the protectorate's capital it was linked to the world's cable system by a short line to Zanzibar laid in 1890 (3, vol. 1) and a telegraph office established in October of the same year; a general post office followed a month later. Telegraphic communication with the interior, however, lagged behind, the great overland line to Tabora and Mwanza not being started until 1901; it had reached Kilosa by the end of that year (3, vol. 12). One of the first acts of the Imperial Government was the creation of a proper Customs Department under the control of a "Zoll-direktor", with its headquarters at Dar es Salaam, in July 1891. In the same year the first public pharmacy was opened by private enterprise (17, page 295); and Government established its Meteorological Service (3, vol. 2), the station net of which was gradually extended. It worked efficiently until 1915 and was instrumental in bringing about that rudimentary grasp of the country's climate without which development along correct lines is inconceivable. In 1898 a small magnetic observatory was founded (3, vol. 9).

A veterinary experimental station started functioning in the mid-nineties. It was situated astride what is to-day the seaward end of Garden Avenue and reached down to the edge of the present golf course. The luxuriant growth in the gardens of this part of the town and the quite exceptional height and girth of the exotic *Oreodoxa* palms planted thirty years later along Garden Avenue are, without doubt, due to the well manured soil of the former veterinary paddocks. Here is the place to mention the protracted efforts by the German military authorities to break in zebras for riding and driving. In 1903 Lieutenant Abel had succeeded in training a ten-year old female, caught wild, which he rode as his only mount throughout a long safari, including climbs high up into the Uluguru Mountains (3, vol. 14, page 676). Somewhat later a sturdy Sergeant-Major became the terror of Dar es Salaam and quickly persuaded all pedestrian traffic to take to their heels wherever he appeared driving, or trying to drive, a zebra "four-in-hand" through the streets of the capital, cursing and perspiring and with only his own heavy bulk to curb the animals' undisciplined boisterousness.

Perhaps the finest achievement by the German administration within the precincts of their growing metropolis were the public experimental gardens,

the so-called "Park", which included not only the present, somewhat neglected, remains bounded by Main and Acacia Avenues and Burton Street, but all of the present Government House grounds. Conceived by Professor Stuhlmann when he became the first Director of Agriculture ("Chef der Abteilung fuer Landeskultur und Landesvermessung") in 1893 and energetically furthered when, in 1900 to 1903, he was Chief Secretary ("Erster Referent") prior to his appointment as first Director of Amani, these gardens were not only of considerable scientific and economic value, but formed a great attraction to residents and visitors alike. Here, for instance, is what Admiral Rawson said in his report on an official visit of his flag-ship to Dar es Salaam (*Zanzibar Gazette* of the 30th September 1896, quoted in 3, vol. 7, page 711): "The botanical gardens deserve all praise. Laid out with great skill and with an eye to future demands of space and conditions, everything grows luxuriantly and in such manner as we have not seen elsewhere. The soil is well loosened and tilling is done methodically. . . . The borders are neat and trim, the paths broad and free from weeds. However, not everything has been sacrificed to ornament. Long seed-beds are cultivated of all useful trees and shrubs suitable for commerce and for dispatch up country. The coffee, teak and rubber trees look particularly well and healthy. . . . An extensive vegetable garden contains all possible varieties and supplied our luncheon table with delicious fresh vegetables, even with asparagus which thrives well." The first Agricultural Exhibition was held in 1904, a prize plaque issued by it can be seen in the Dar es Salaam Museum.

The development of schools, on the other hand, does not seem to have been considered of major importance during this first decade of German administration. As already mentioned, a Government school for artisans was opened only in 1899. A small agricultural school was attempted a year later in the grounds of the Lutheran mission with the laudable aim of educating future *jumbes* in better husbandry (3, vol. 12) but no records can be traced of its achievements, if any. Primary education for native children remained entirely in the hands of the mission schools, notably those of the Benedictines who kept establishments for boys at Kurasini and for girls in Dar es Salaam.

Of the social life in early Dar es Salaam we have very few records, among them complaints that the peculiar way of housing officials described above did not make for smooth relations (14, page 77), that wives only started to appear on the scene in small numbers, and that the inevitable "beer-garden" was the social centre. This latter was a comfortable and shady annex to the brewery which stood at the corner of the present Ingles and Ring streets, based on a well producing exceptionally fresh water. Since early in the twentieth century a club, only open to higher grade officials and the cream of non-official society, relieved pressure on the more plebeian beer-garden, and there were, of course, a number of messes likewise strictly preserving the typical German caste system (14, page 79). The old club building later formed the nucleus of the present Dar es Salaam Club.

Transport was practically confined to rickshas, only a few of the highest officials permitting themselves the luxury of horse-drawn equipages. It sounds

strange that as late as 1905 Dr. Paasche, the first German M.P. to visit the Protectorate, was met by the Governor in person at the quay and taken by him to Government House in the gubernatorial ricksha! (14, page 74). Of hotels, so-called, there were a few, mostly run by Greeks or Syrians, but their "comforts" were distinctly of the poorest standard. A circulating library existed since 1893 (3, vol. 4). A bi-weekly newspaper, the *Deutsch Ost Afrikanische Zeitung*, was started only in 1899 and from 1900 onwards an official gazette, the "Amtliche Anzeiger", was published regularly in the printing works of this private enterprise. Prior to this time all German official announcements had appeared in the *Zanzibar Gazette*!

This chapter would be incomplete without reference to the intricate changes in the life of Dar es Salaam's native population brought about by a somewhat abrupt supplanting of the lotus-eating existence at old Mzizima, based on Islam and the easy-going relationships between master and slave, by orderly regimentation founded on western, Christian efficiency. In his, unfortunately unpublished, treatise on "The Social Conditions of Dar es Salaam" (1), E. C. Baker has described this change with great insight and for the present purpose one cannot do better than attempt to condense his story. "In the old days the chief occupations had been barter and trading in ivory and slaves and agricultural enterprise. Interest on capital, rent and wages were unknown and profits were used for expanding the plantations by buying more slaves. Land was free and all one had to do was to clear fresh plots. But there was also a class of artizans, both among slaves and free-born, who followed their "kazi ya kushiba" (literally: work to fill their bellies) under the tradition that the worker should have an assured supply of food in order that he might enjoy undisturbed leisure to proceed with his task. Fishermen completed the picture of this self-contained community which was guided rather than ruled by their local *pazis*.

Under the new order these later were replaced by "akidas", that is by state-employed officials; the stopping of slavery and the reduction in ivory traffic hit hard and quickly at the foundations of the old life; industry was reorganized on new lines and the wage system came into force; immigrants came from inland and from other parts of the coast into the growing township. The skilled workers soon found that their methods were too leisurely and too cumbersome for their work to have much economic value and they were, accordingly, forced to learn their trade afresh and with new tools. New trades sprang up and, whereas in the old days hereditary apprenticeship had been the rule, in the new scheme of things a youth learned his trade from aliens and, as a consequence, often tended to despise the older generation as old-fashioned and unintelligent. So the parental control which was the essence of tribal life was weakened. The trading class was supplanted by the Indian and the labouring class found better paid employment with their European masters. Last but not least, rules and regulations were promulgated and a new legal code superseded the meticulously defined law of the Prophet. In short Dar es Salaam witnessed the march of western civilization triumphantly and ruthlessly over-riding the *dolce far niente* of oriental tradition.

B.—UNDER RAILWAY INFLUENCE (1905-1914)

Although dominated by, on the whole, a healthy growth of Dar es Salaam, due primarily to railway construction, the period of the town's history from 1905 to 1914 began with a temporary setback: The serious native rising known as the "Majimaji" rebellion which had broken out in August 1905 and quickly spread over considerable parts of the Territory, taxing to the utmost its military resources, threw its wavelets into the immediate neighbourhood of the capital. The latter's own military garrison, together with the marines from a cruiser that happened to be available, had been sent to Kilwa as a last reserve; and when the rebels pushed from the south and invaded Uzaramo, Dar es Salaam's immediate hinterland, the District Commissioner marched out with thirty-five police askaris to meet them at Maneromango; and a few days later the last remaining askaris followed under a military officer and in an attack on Kisangiri village dispersed the enemy on the 25th August. But rumours of approaching rebel columns spread and the Europeans of the capital seem to have become rather panicky according to Count Goetzen, the Governor's, narrative (6, pages 56, 76-80, 83). As a result, an appeal was made on the 20th August to all male European inhabitants to form a voluntary home-guard ("Buergerwehr"). In October new rebel hordes arrived in the district and burnt down Kisiju, the little port some forty miles south of Dar es Salaam which had also been a stronghold in the Arab rebellion when it was captured in December 1889 (*vide* above). But fresh troops had been recruited and two more cruisers had arrived in the meantime, so that these renewed threats to Dar es Salaam were soon dealt with and the whole district was quiet by the end of November (6, page 153).

However, all this temporary turmoil could not prevent the steamers from arriving and dumping their heavy cargoes of railway material on the shore at Dar es Salaam; and construction went on apace even though at times the rebels in the Kiserawe hills came very close to the contractors' and engineers' camps. A much more important problem and one of the first necessities for coping with this greatly increased import was a proper wharf. A still somewhat primitive jetty (Plate 5) had been built by the railway contractors as soon as they arrived early in 1905 and the same year saw the beginning of a substantial quay wall and a large low-level customs shed well served by modern cranes and transporters and joined to the higher-level of the town by a well graded road and a circuitous harbour branch of the railway. There were, of course, the usual voices of the optimists shouting for deep-water berths (14, pages 190-194) but, as history has amply proved, a lighterage port was then—and still is—amply sufficient for Dar es Salaam's trade. A lighterage company was founded in March 1914 (3, vol. 25).

Railway extension into a new country means primarily an inflow of large sums of money, new money, which temporarily at any rate, greatly increases the purchasing power of tens of thousands of workers and of a large technical personnel. The stimulus to trade is correspondingly great and importers, middle-men and shop-keepers flourish through quickly expanding business. For the time being all is sunshine and optimism and few only think far enough

ahead to ask themselves what will happen when the line is built and will have to produce sufficient revenue to pay interest on all this "new money".* Thus part at least of the temporary profits is spent on building new business premises and the inevitable increase of public and private employees, with a now steady influx of European wives and the beginnings of locally-born European children, demands an ever increasing number of living quarters. In other words, the bottle-neck through which all this new wealth in cash and material flows, the port and terminus of the great inland trunk line, cannot help itself, it simply must grow! And if it happens to be a German port designed as an outward emblem of Germany's growing colonial strength, designed also not only to catch the eye of the admiring patriot but of the more critical foreigner, it goes without saying that all these necessary new buildings will be substantially and tastefully built, often with an eye to appearance rather than to interior convenience, as witness, for instance, the double-storied staff quarters, accommodating each two families in two flats, which sprang up in what is now Park Road in 1906-7. Nevertheless, and aided by proper spacing of the houses in the residential part along a well laid out network of shady avenues, the whole resulted in the creation of a very pleasant little garden-town with its red-tiled roofs blending well into the surrounding verdure; architecturally a pleasing adaptation of Teutonic styles to a tropical environment, so different from the stereotyped spreading of the ugly corrugated-iron bungalow which in the last generation or two had become so typical for new colonial towns.

Simultaneously, in the "City", especially in Acacia Avenue and along the sea front, the older ramshackle buildings were gradually replaced by good stone houses, although a number of the former have survived to this day, not only as eye-sores but as interesting relics affording to the historian visual proof of "the march of time". Map II shows what had been achieved by 1908 and Map III indicates the extent of the residential quarters in 1914.

Among the more important additions to the town's amenities and activities during this period were, first and foremost, an efficient electricity supply produced by the railway company; the handsome railway station building; the roomy villa by the sea built for the railway director and now the Chief Secretary's residence; and the first real hotel (now the New Africa Hotel) which was built early in 1906 by the Ost Afrikanische Hotel Gesellschaft, an enterprise closely connected with the railway company; it had the proud name of "Kaiserhof" and its hot and cold water service actually functioned. The Kolonialwirtschaftliche Komité, an enterprise founded early in the century to further colonial development, built its Dar es Salaam headquarters in 1906 at the corner opposite the club. A Government school for natives was opened in the same year on the edge of the park, in Main Avenue, and a Government school for European children in 1908 at the corner of Main Avenue and Speke Street; this was removed in 1913 to a large new building next to the Lutheran

*That this revenue was not forthcoming quite as freely as many had hoped is shown by the following tonnages shipped over Dar es Salaam wharf in 1911 after the railway had reached the "granary" of Tabora: Imports (largely, of course, construction material) 71,000 tons; Exports 2,430 tons! (3, vol. 22).

church (now housing the Women's Service League), erected as the local headquarters of a Colonial Women's Association concerned with nursing and educational services. The Deutsch Ost Afrikanische Bank, which had been granted its concession (including the issue of bank notes) early in 1905, at last opened its doors in November 1909, in the fine building now occupied by the National Bank of India (3, vol. 21); and a Post Office Savings Bank was to have been instituted in October 1914.

Shipping throughout the German days was the virtual monopoly of the Deutsche Ost Afrika Line, a daughter company of the Woermann Line of Hamburg, although in later years the French Messageries Maritimes held an additional mail contract for fast mails which its steamers of the Madagascar line delivered without entering the port. The German mail and cargo boats grew rapidly in number and size, as well as in speed and comforts, and the newest and largest, the *Tabora*, commissioned in 1914, can still be seen lying on her side in the upper harbour where she was sunk early in the war of 1914-18.

In 1911 Dar es Salaam got its first public monument, a statue of v. Wissmann which was unveiled with great pomp (*vide* Plate 6). It is interesting to note the marked change in the surroundings of this monument: in 1911 still a veritable jungle of palms and mango trees, to-day (*vide* Plate 7) well covered by substantial business premises.

However, against all these improvements and embellishments stand two grave shortcomings in the town's development: Firstly, squeezed between the charming residential quarters of the "Masters" in the East, their solid and orderly "City" in the south-east and the new well-planned native town in the west, there survived that messy, labyrinthic triangle where the Indian dukas and dwellings mingled with Arab and African huts, a veritable slum area defying all efforts of proper municipal administration and sanitation, and bordered in the north by a series of large and small swamps, either natural or, mostly, due to the borrow-pits from which the building material of the countless daub and wattle structures had been dug. Too late in the day a Building Ordinance had been promulgated in 1914 which aimed at improving this state of affairs. The second stain on the town's fair reputation was the almost entire lack of an efficient drainage and sewerage system as late in its history as 1914, a fact that cannot be mitigated by merely referring to schemes which had been prepared but were stopped by the outbreak of war.

III.—THE WAR PERIOD (1914-1919)

Apart from stopping several schemes for further development the first World War proved a definite temporary setback to the expansion of Dar es Salaam and to its peaceful activities, for four years the town, as a unit of civilian enterprise, just went to sleep.

In December 1914 it was bombarded by the British Navy and Government House destroyed but otherwise not much damage was done except to the railway workshops and a few buildings in their neighbourhood. An attempt by the Germans to block the harbour entrance by sinking their floating dock and one of the smaller Deutsche Ost Afrika Line boats (the *Koenig*) proved

unsuccessful, as it merely obstructed the fair-way thus proving a nuisance rather than an effective bar to shipping. Civil administration was quickly squeezed out by the military command and early in 1915 retired up-country to Tabora. An elaborate system of coastal trenches and gun emplacements was dug and all activities not immediately required for defence ceased one after the other. On the 4th September 1916 the town surrendered and for the last two years of the war the 'haven of peace', having become the main military base for the conquest of the Territory, was a huge military camp with veritable towns of tents covering the open spaces between the existing buildings. The park was an overflow hospital, the present golf links the main remounts depot where thousands of South African horses and mules had to weather heat and rain in the open, which resulted in an appalling mortality. With the exception of a few Greek hotel-keepers managing their commandeered hotels, and of the rapidly increasing inmates of the concentration camp for civilian enemy subjects, European civilians were non-existent. And where rickshas and hand-carts had formerly plied fleets of motor-cars and lorries now filled the streets.

And then, early in 1919, the nightmare ended; on the 21st January civil administration over the whole British occupied Territory was proclaimed and on the 12th February the first British Administrator, Sir Horace Byatt, took up his residence in the old scientific headquarters between the hospital and the charred ruins of Government House; a Prince Charming come to kiss the Sleeping Beauty back to life. . . .

IV.—UNDER BRITISH MANDATED RULE (1919-1940)

In the inter-war period Dar es Salaam, as the capital of the mandated Territory of Tanganyika, developed on the whole satisfactorily and in many directions. Naturally it took some years to overcome the scars left by the war not only in the town's physical appearance but, even more so, in the composition and attitudes of its inhabitants; and, inevitably, progress was once more slowed down in the early 'thirties when the World Depression knocked at the country's door and reminded, perhaps fortunately, some at least of the optimistic enthusiasts that the reviving port's vast hinterland was not a land of unlimited dormant wealth, mineral as well as agricultural, but at best a somewhat precarious borderland of the type called in America 'the pioneer fringe'; a realm where prudent stock-taking of its resources rather than adventurous boasting and boasting was the only correct way of approach. Moreover, there was another difficulty to overcome; a very sudden switching over from one set of administrative customs and traditions, of cultural and social standards and prejudices to another, a task further complicated by the fact that from the mid-twenties onwards large numbers of the former ruling class were permitted to return to their old fields of action, those German missionaries and merchants, professional men and artisans, who added their own peculiarities and idiosyncracies to the variegated pattern of humanity that rubbed elbows in the new Mandate's capital.

When attempting to analyse this period the historian will probably be well advised to forego a strictly chronological narrative for a series of sketches,

each dealing with a particular aspect of the town's life and growth. Let us start by enumerating the fundamentals in which the old and the new differed so markedly: First and foremost stands the official and, to a large and ever increasing extent, the non-official recognition of the Indians as fellow subjects of the Empire, which led immediately to a vast increase of the Indian population of all castes and creeds (from four thousand in 1921 to eleven thousand in 1943), accompanied by much freer inter-relations, both administrative and social, between the races and by a most welcome move away from the so-called "colour bar". Secondly, there is the much greater importance in British commercial life attached to banking, so that the one monopolistic banking institute considered sufficient by the Germans was quickly replaced by three prospering British and one Belgian bank. Thirdly, the Mandatory Administration, with its quickly expanding departmental services staffed with officials who, by their standards and upbringing, expect and demand a life of greater leisure than their German predecessors, required much larger establishments and not only more houses, but houses which could be turned into "homes" by their occupants, in great and welcome contrast to the German standard of mass-accommodation. And the same principles were, of course, observed by private firms for their employees. Fourthly, military life which, with its uniforms, had been so conspicuous in pre-war Dar es Salaam was relegated to the background and one was only reminded of the small garrison living across the creek by its splendidly trained askari band and its annual parade on the King's birthday. Sports and games, on the other hand, dominated social life and in addition to the extensive playing fields of the Gymkhana Club surrounding the fine new club building in the centre of the now well drained former tidal swamps between Ras Chokir and Upanga, numerous playing fields for the Asian and African communities were soon springing up in all parts of the town.

From the physiognomical point of view the new Administration's greatest achievement is, no doubt, the successful rearrangement of the various units composing the township of Dar es Salaam, properly conceived from the beginning and energetically executed in the face of not a few obstacles. By gradually clearing a broad open belt which separates the Indian from the African town and, incidentally, acts as a reliable fire-break between the highly combustible native huts and the more valuable structures on the Indian side, that transitional wedge of intermixing cultures and standards inherited from the German municipal administration has been abolished once and for ever. Only at its northern end, in Kisutu, separation has not yet been quite completed so that this particular small area still offers a valuable field of study to the historically minded geographer or the geographically minded historian besides providing ample scope for the activities of those anxious to improve sexual morality.

Modern Dar es Salaam, thus, consists of five distinct and well bounded districts:—

(1) *The Residential Quarter* (the "Uzunguni" as the natives call it) stretching from Ingles Street north-eastwards to the open coast of the Indian Ocean and thus well exposed to the north-east trade wind, the refreshing

hot weather wind; the eastern half of the harbour front forms its southern, and Upanga Road its north-western limits. Its northernmost outlier is the suburb of "Sea View" on the site of the old village of Upanga, started in the early 'twenties. Throughout its extent the character of a garden town, as already planned by the Germans, has been well maintained with its open grassy spaces and shady avenues. There is no colour bar and anyone who can afford its amenities and complies with its high standard of municipal sanitation is welcome, a fact having resulted in a marked influx of Indian citizens during the last decade into this area. In the mid-twenties an overflow for the quickly growing official population was provided by a further suburb, about two miles north of the town, the so-called "Oyster Bay"; and wealthy private people have built a string of suburban villas along King's Way on the northern shore of the Msimbazi Estuary. Both these settlements are reached across the fine Selander Bridge, named in honour of the Territory's first Director of Public Works. A cluster of week-end cottages has sprung up on the coast between Magagoni and Mjimwema, about four miles east of the motor ferry across the harbour entrance.

(2) The "City", the wedge-shaped area bounded by Ingles Street in the north-east and tapering south-westwards between the western harbour front and India and Arab streets, where the commercial life of the town, both European and Indian, takes place with direct lateral approach to the wharf, custom sheds and warehouses. At its south-western end this "City" merges into the large area covered by the railway installations and the railway employees' distinct own little town of Gerezani where they live in pleasant bungalows grouped round their own fine Railway Club and in close proximity to their own golf course. Adjoining the railway land are the Public Works Department workshops and yards, the police barracks, the modern fire-station and the old but still very useful Sewa Haji hospital where non-Europeans are treated as both in- and out-patients. The prison, an old and highly unsanitary structure inherited from the old Arab days, which had until recently occupied a valuable site on the harbour front, has at long last been moved out of the town and is now a well laid out healthy camp on the main road to Bagamoyo, not far from Msasani Peninsula.

(3) To the west of this "City" and extending to the open belt lies the *Asian Town*, a combination of shops and residential houses, with several mosques and temples, schools, libraries and recreational halls and institutions, dominated by the clock-tower of the Ismailia Community's many-storied headquarters.

(4) To the west of the open belt lies the large *Native Town* in an orderly array of broad right-angle streets, with its as yet prevailingly daub and wattle huts and its thousands of palm trees. In its centre stands a clean, modern, open steel-frame market hall (originally brought out by the Germans in 1914 as the main hall for their planned colonial exhibition but never put to its use owing to the outbreak of war); and close to it are the inevitable *pombe* market and the native dance club where the dandies of the town with their "belles", all dressed in European fashion, including even an occasional monocle dangling

from a broad black silk ribbon, dance Fox-trots and Tangoes to the tunes of a "westernized" native band. But fortunately many natives still prefer their good old Bantu *ngomas* danced on frequent occasions on the bare sand under the palms to the old-world sounds of the drums. This native town of Dar es Salaam is an excellent example showing how African life and customs can be steered well through a difficult transitional period and gradually fitted into the scheme of Western orderliness, sanitary precepts and ideals. A mile or so further out a second African town, Ilala, is rapidly extending. It was originally laid out chiefly to accommodate those evacuated from the new open belt of *Mnazi Moja*, but is now providing also for a steadily growing number of immigrants from the interior.

(5) Finally, there is the very large area to the west of the residential quarters, between Upanga Road and the curving tidal creek of the Msimbazi River, to-day only very sparsely inhabited and mostly covered by coconut plantations. This forms a valuable *Land Reserve* well suited to relieve the serious congestion which threatens the present Asian town.

For some time there have existed elaborate paper schemes for radical town planning on most up-to-date lines and taking no, or very little, account of past development and of the many vested interests thereby established, and, no doubt, further schemes will soon be forthcoming. Whether and when any of these will ever be transferred from paper to the land only the future trend of man's foresight or folly can show. Of more immediate importance are several tasks which have thus far been grossly neglected. We have seen, for instance, that at the end of the German period modern sewerage and drainage were almost entirely lacking, and this deplorable state still continues after more than twenty years of mandatory rule. Admitted that, with so much of the town lying only a few metres above sea-level and at considerable distances from the shore, the problem is by no means an easy one and will, in all probability, require expensive pumping installations. Admitted also that plans have been repeatedly drawn up and the necessary funds been included in one development programme after another. Yet the fact remains that, thus far, these funds have not been forthcoming. Then there is the surfacing of the roads which, though steadily improving, is still very far from even a moderate standard of efficiency in many parts of the town; and the side-walks, even in the main shopping streets, are in a deplorable, indeed dangerous state, quite unworthy of a modern growing city with the aspirations of Dar es Salaam.

The actual growth of the town can perhaps be gauged best by comparing the number of houses in the residential quarter (for which alone sufficient data exist) for the three constructional periods 1888-1907, 1908-1914 and 1920-1940, these numbers are 40, 60 and 220 stone houses, including the large new suburb of Oyster Bay and King's Way and the Gereza railway settlement. These figures represent an increase of one hundred and twenty per cent during the period of British occupation over what existed at the end of German rule, though one must not overlook the fact that most of the new houses for officials are small, in fact, too small for healthily growing families. On the whole, however, this energetically furthered housing programme is a great and lasting

improvement on the pre-1914 conditions. A new Government House was built in 1922, in Moorish style, partly on the old German foundations, but with a large additional wing. The Secretariat offices also received a substantial new wing but otherwise no large additions were built to the office accommodation available from German days.

In the "City" much building, or rebuilding, has taken place during the last two decades, especially in Acacia Avenue, the main shopping street, where the beauty of the old *Flamboyant* trees had to make room for modern traffic, and where fine new shops exhibit behind their plate-glass windows the essentials and luxuries from the West and the East. The greatest change during the last decade, however, is seen in the Asian town: as a consequence of the rapid increase in the Indian population, but also of the world depression and other political considerations which induced quickly accumulating local capital to seek comparatively safe investment in house property, this limited space, debarred from growing outward, had to grow upward: a process whereby most of the old single-storied flat roofed dukas and dwellings were replaced by three to five storied buildings, some of them with almost "sky-scraper" ambitions and all built to a fairly high modern sanitary standard. Plates 8 to 12 give a very fair impression of this remarkable change. On Plate 8 one sees the contact between the European business quarters and the Asian-cum-African slums, looking up towards Arab Street from Smith Mackenzie's corner, in 1905; Plate 9 is a closer view of Arab Street with some of the earlier "improvements" as, for example, embodied in the Railway Hotel, built in 1907; Plate 10, taken on the eastern edge of the open belt, shows in close juxtaposition a remnant of the old mess still hugging a corner of the new development, with the Aga Khan's clock-tower in the centre; and Plates 11 and 12 are typical views of the modern Asian town taken in 1939.

Dar es Salaam's water supply was radically changed at a very early stage of the new regime. The scattered wells were closed and all parts of the town, including the native quarters, were given a piped supply of good water pumped from considerable depth at Gerezani and derived from the subsurface drainage of the sedimentary Pugu Hills which rise some fifteen miles inland. The growing demands have recently led to supplementing this borehole supply by utilizing some powerful springs from a shallower water table in the little tributary valleys of the Gerezani creek, a source that had already been earmarked by the Germans forty years ago. How difficult it often is to guide the native mind into modern channels is well exemplified by the string of water carriers who, day-in day-out, fetch impure water from open pools and carry it long distances to their customers living within easy reach of one of the many standpipes of the township supply, mainly, one must assume, because the water carriers charge a cent or two less for a four-gallon tin than the official collector at the standpipe!

Port facilities have been much extended during the last twenty years and the entrance to the harbour has been greatly improved by dredging after a careful survey of the channel. Part of the wharf area was handed over to the Belgians soon after the war as an extra-territorial base for their direct traffic to

and from the Congo. It is administered by a private-public utility company, the "Belbase", who have constructed their own part of the new quay and have built a substantial warehouse and offices. The Port administration as well as the lighting and buoying of the whole coast, for which the small steamer *Azania* has been commissioned, is in the hands of the railway administration, but all lightering is being done by private companies. When enthusiasm about a large increase of traffic ran high in the late 'twenties, a vast new goods and marshalling yard was added at considerable cost to the existing terminal facilities of the railway, with great new goodsheds and a long new approach line from the high ground down to the wharf. But all this has proved a "white elephant" and has never, to this day, been taken into use. At the same time a number of new sheds were built in the south-western outskirts of the town as Government and Public Works stores, some of which came in very useful at the renewed outbreak of war as a large internment camp for enemy civilians. Still further out in the same direction offensive factory sites, complete with railway sidings, were provided and gradually occupied. An aerodrome, somewhat primitive and sandy, has existed for a long time at Kurasini* and when the Imperial Airways initiated their flying boat service in 1937 Dar es Salaam also became a water airport.

A first-order meteorological station of the British East African Meteorological Service was established in the early 'thirties and a wireless station has existed from the early days of the Mandate. A great deal of anti-malarial work has been done and though not as yet a hundred per cent success, the fact cannot be denied that in many parts of the town the mosquito nuisance has been materially lessened and insect life generally has withdrawn visibly before the ever more consolidating urban life. And talking of life we must not forget death and the cemeteries necessary for coping with its harvest. The old German cemetery facing the open sea near the hospital has long been closed; the war cemetery started along Upanga Road in 1916 and used for the next twenty years is full; a new one, north of the Msimbazi Estuary, was taken into use in 1938 and there are, of course, a large number of African, Arab and Indian burial grounds scattered along the periphery of the town, while the Hindu crematorium faces the sea and even a Parsee platform can be seen near Ilala.

Hand in hand with all this material progress during the last two decades went marked changes in the cultural efforts of the growing town. Educational facilities for all communities sprang up rapidly, Government leading with a large school for Africans, a junior and senior school for Indians and a small beginning of a European school combining kindergarten and primary teaching. The old established schools of the Benedictines, taken over after the war by Swiss Capuchins, were enlarged and now have a branch for European children. They also fill an important gap by caring for the miscegenatic offspring, unavoidable in so cosmopolitan a community as that of Dar es Salaam. Many of the Indian sects have their own schools for boys and girls, foremost among them the Aga Khan's new boys' school, a handsome building in the latest

*Considerably enlarged and improved since 1940.—*Ed.*

approved style with plenty of light and air. And African Moslems have a number of private Koranic schools.

The Anglican Church of St. Albans, in pleasing modern architecture, was completed in 1934 so that Dar es Salaam's silhouette is now dominated by three church towers, and a fine Masonic Hall not only serves its own purpose but, in the absence of more suitable accommodation for the Legislative Council, offers hospitality to the latter besides forming a noteworthy addition to the town's architectural attractions. There are three Courts of Justice, the High Court of the Territory, a Magistrate's court, both housed in old German office buildings, and the Liwali's court held in a new, semi-open hall. But there is no Public Meeting or Lecturing Hall as yet, a serious gap in the capital's cultural and social achievements, so that concerts, theatricals and lectures must be performed in one of the three cinemas which, following the "march of time", have grown up during the last ten years.

The new Museum, with a slowly growing public reference library, built as a memorial to King George V, was opened in 1940, a large building of dignified outline and with a touch of Moorish Alhambra style, it stands in the centre of the old German public park, as a worthy sign that cultural aspirations can be gratified even in the face of a world war. The old Wissmann statue has long been replaced by a fine bronze monument honouring the African soldiers who died in the last war and an impressive cenotaph stands on Azania Front. The Askari Monument is the work of a London sculptor who signs himself "Myrander", and was cast by Morris Bronze Founders in 1927.

A Cultural Society, with the main object of bringing together representatives of all races, colours and creeds; an energetically and most ably conducted Amateur Theatrical Society, and a Musical Society bring much needed variety into the social life of a small "Outpost of Empire", while a very much alive Horticultural Society greatly assists in maintaining Dar es Salaam's high reputation as a garden town. Among cultural and civic amenities of a more practical nature we have a number of Indian recreational clubs, libraries, nursing institutions and dispensaries, and there is, of course, a Yacht Club and a Swimming Club.

Thus, taking a general view of Dar es Salaam's achievements, one may perhaps justifiably refute a recent American visitor who thought the town "about half the size of an average New York cemetery and twice as dead".

The growth of the town's population during the first eighty years of its existence can be gauged from the following table:—

Year	Source of Information	Africans	Asians	Europeans	Total (approx.)
1887	---	—	—	—	3,000-4,000
1894	3, vol. 5, page 108 ...	9,000	620	400	10,000
1900	3, vol. 12, page 312 ...	18,000	1,480	360	20,000
1913	?	19,000	2,500	1,000	22,500
1921	Census	20,000	4,000	600	24,600
1931	Census	24,000	9,000	1,330	34,300
1943	House-to-house count	33,000	11,000	1,100	45,100



Plates 1 and 2





Plates 3 and 4





Plates 5 and 6

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Plates 7 and 8





Plates 9 and 10



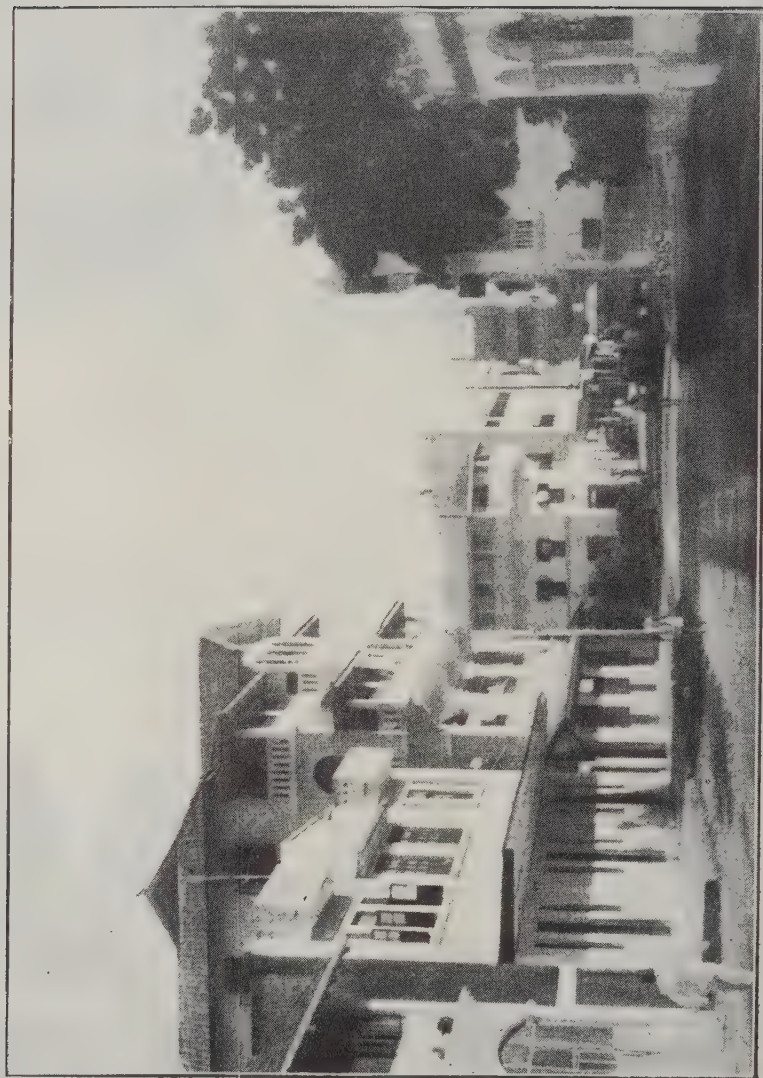


Plate 11



Plate 12

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The Climate and Welfare of Tanganyika

By W. E. Bulman and J. R. Farquharson

THIS NOTE is an attempt to review briefly the climatic conditions which are most suitable for the development of man, the climatic conditions which prevail in the Territory and the extent to which it is possible to make the best use of these conditions to ensure the raising as quickly as possible of the Territory's standard of living to the highest level which can be attained from the Territory's human and physical resources. The climatic data for Tanganyika have been obtained from the summaries of the British East African Meteorological Service for the five years 1940 to 1944. The information regarding the effect of climate on the energy of man has been obtained from *Climate and the Energy of Nations* by Major S. F. Markham (Oxford University Press, 1944). This remarkable survey of the development of civilization, of the influence of climate and of the meteorological, health, production and national income statistics of all the major regions of the world is deserving of the most careful study.

2. Major Markham reaches a number of conclusions which may be summarized as follows:—

(i) while national success has been variously attributed to climate, race, religion, pressure of population, diet, laws, language, trade routes and the emergence of "great" men and national decline has been attributed to luxury, disease and social habits, climate is practically the only permanent factor;

(ii) the four important climatic features are temperature, humidity, air movement and radiation, and of these temperature (man must keep his internal temperature near 98·4°F. or die) and humidity are most important though special consideration must be given to radiation in the tropics;

(iii) the ideal indoor climate has a temperature range of 60°F. to 76°F. and relative humidity at noon between 40 per cent and 70 per cent (a climate in which man neither shivers nor perspires while at rest);

(iv) in comparing temperatures at high altitudes and of tropical areas with those in temperate areas some consideration must be given to the additional solar radiation at high altitudes and in the tropics (this will be discussed more fully later);

(v) excessive dryness induces sleeplessness and excitability, excessive humidity lethargy and depression;

(vi) generally speaking acceptable outdoor climatic conditions approximate to the ideal indoor conditions but with readily available controls to assure satisfactory indoor conditions the desirable range for outdoor

conditions appears to be between a maximum monthly mean temperature of 70°F. and a minimum monthly mean of 20°F. ;

(vii) by improved clothing, housing and heating man has largely mastered cold and damp thus enabling civilization to progress in areas colder and damper than the ideal : these improvements are available to the bulk of the population ;

(viii) while some progress has been made it has not been possible to exercise the same control over heat and dryness and such progress as has been made has not in general become available to the poor ;

(ix) the important factor is to have a controllable climate and the means to control it (that is a climate which can be affected economically by artificial heat and the fuel or power to provide the heat) ;

(x) mean temperatures in excess of 75°F. impose a "heat handicap" ; temperatures above this reduce individual output and recovery from the effects is slow ;

(xi) mean minimum temperatures in excess of 60°F. impose a "night heat handicap" ;

(xii) relative humidities under 40 per cent at noon impose a "dryness handicap" ;

(xiii) man adjusts himself to a rate of activity appropriate to the natural climate and the artificial climate he creates ;

(xiv) in the United Kingdom "mobile" industries are moving to the climatically best areas ;

(xv) in the U.S.A. (with a wide climatic range) the "directing centres" are mostly situated in the climatically best areas though the "fixed" industries which they direct may be in areas which are less desirable climatically.

3. The question of solar radiation presents difficulties and has not been closely examined by Major Markham. Indeed it is probable that there is little reliable information on the subject. The following references from Major Markham's book will show the difficulties in coming to definite conclusions :—

Pages 33 and 34:—"The main point I wish to make is that the greater the intensity of solar radiation the greater the heat discomfort for humans, no matter what the thermometer in the shade may say. I think it is only fair to assume that as we approach the tropics we must add an increasing heat factor to allow for the greater sensation of heat felt by a human being working in the sun. I suggest that at least 1°F. should be added to the shade temperatures for each 5° of latitude from the 40th parallel to the tropics and a further 1° for each 1,000 feet or so of altitude."

Pages 64 and 65:—"Consequently, to primitive races with no knowledge of heating systems, the most congenial climatic areas were the fertile valleys in the tropical highlands, even though the average shade temperatures are several degrees lower than those of the riverain civiliza-

tions in the old world. This is a very interesting point, and to it we can bring the great authority of Roget, who, in his *Altitude and Health*, shows that in the Alps there are three horizontal layers of climate, namely:—(1) the valleys below 3,000 feet, which are cold and sunless, (2) the layer of moisture condensation, up to about 4,000 feet, which is damp and cold, (3) the elevated areas, over 4,000 feet, which enjoy bright sunshine with great solar intensity at all seasons. Roget's conclusions have been amply corroborated by Professor Dorno of Davos, who has shown that although the shade temperatures of Kew and Potsdam are 9°F. higher than Davos the year round, Davos is actually warmer in terms of human comfort, as indicated by the Kata-thermometer, mainly because of the intensity of solar radiation in the rarefied atmosphere of 5,000 feet altitude.

In the tropical highlands this difference would surely be accentuated, owing to still greater solar intensity. The question follows: What allowance should we make for this sunshine factor? I suggest that it should be at least 1°F. per 1,000 feet of altitude above the layer of moisture condensation, but later research may show that it is more likely to be nearer 2°F. per 1,000 feet of altitude."

Page 76:—"How much should be allowed for the fierce effect of tropical sunshine, it is difficult to say."

Page 178:—"At elevations over 4,000 feet, the rarefied air presents far less an obstacle to the sun's rays than the denser air at lower altitudes."

On the basis of these comments it is proposed to adjust by 1°F. for each 5° of latitude from the 40th parallel and by 1°F. for each 1,000 feet over 4,000 feet. Corrections for solar radiation are necessary for day temperatures only and the full correction will be made only to the mean maximum temperatures which will be examined when considering the "heat handicap" of the hottest months. Half the full corrections will be made for the mean annual and the daily mean temperatures.

4. In considering the climate of Tanganyika a cross section of eight stations will be taken from the total of nineteen observation stations in the Territory. Corrections for solar radiation in respect of these eight stations are shown in Table I.

TABLE I

STATION	Altitude feet	Lat°	Correction for Altitude °F.	Correction for Latitude °F.	Full correction °F.	Half correction °F.
Dar es Salaam	47	6° 50'S.	—	6.6	6.6	3.3
Tabora	4,151	5° 05'S.	0.2	7.0	7.2	3.6
Dodoma	3,675	6° 10'S.	—	6.8	6.8	3.4
Kondoa-Iran	4,547	4° 55'S.	0.5	7.0	7.5	3.8
Lyamungu	4,100	3° 14'S.	0.1	7.4	7.5	3.8
Iringa	5,380	7° 47'S.	1.4	6.4	7.8	3.9
Mbeya	5,768	8° 56'S.	1.8	6.2	8.0	4.0
Sao Hill	6,500	8° 20'	2.5	6.3	8.8	4.4

5. A summary of the mean annual temperatures, daily mean temperatures and relative humidities at Tanganyika stations follow in Table II.

TABLE II

STATION	Mean Annual Temp. °F		Daily Mean Temp. °F*				Mean Relative Humidity*	
			Coldest Month		Hottest Month		Coldest	Hottest
	Actual	Adjusted	Actual	Adjusted	Actual	Adjusted	Month	Month
Dar es Salaam ...	78.2	81.5	74.4	77.7	81.8	85.1	75	80
Tabora ...	73.4	77.0	70.3	73.9	78.2	81.8	48	43
Dodoma ...	72.9	76.3	67.6	71.0	76.3	79.7	59	57
Kondoa-Irangi ...	70.3	74.1	64.8	68.6	73.5	77.3	60	60
Lyamungu ...	66.9	70.7	61.7	65.5	71.4	75.2	80	61
Iringa ...	66.1	70.0	61.7	65.6	69.1	73.0	57	54
Mbeya ...	63.9	67.9	57.9	61.9	67.5	71.5	61	54
Sao Hill ...	61.3	65.7	55.2	59.6	64.5	68.9	72	60

*Figures given are the average of observations at 8.30 and 14.30 hours. The results approximate to a true daily mean.

The figures show clearly that in the coastal areas (Dar es Salaam being typical) both the temperature and humidity far exceed the ideal range except during the coldest months while in the dry central area the temperature during the hot months substantially exceeds the range. Only Lyamungu, Iringa, Mbeya and Sao Hill have adjusted mean temperatures under 76°F. throughout the year.

6. "Heat handicap"—mean temperatures.—Major Markham considers that any area with mean monthly temperatures in excess of 75°F. suffers from a "heat handicap" which can be expressed in terms of the number of months when the mean monthly temperature exceeds 75°F. The position at the various Tanganyika stations is shown in Table III.

TABLE III

STATION	Mean Annual Temp. °F		No. of Months with Adjusted mean temperature over 75°F
	Actual	Adjusted	
Dar es Salaam ...	78.2	81.5	12
Tabora ...	73.4	77.3	10
Dodoma ...	72.9	76.3	9
Kondoa-Irangi ...	70.3	74.1	6
Lyamungu ...	66.9	70.7	1
Iringa ...	66.1	70.0	Nil
Mbeya ...	63.9	67.9	"
Sao Hill ...	61.3	65.7	"

The "heat handicap" in the coastal areas is almost intolerable while in the main part of the central plain (as exemplified by Dodoma and Tabora) the handicap is most severe. Even at high altitudes in this area (for example Kondoa Irangi at 4,547 feet) the burden is hardly tolerable, the handicap of six months comparing with four to five months in the Mexican Gulf States of U.S.A. Lyamungu with a rather special climate on the rainy side of Kilimanjaro has a small handicap while there is no handicap at Iringa, Mbeya and Sao Hill.

7. "Heat handicap"—mean maximum temperatures.—While the mean temperatures must be the main indication of heat handicap it is necessary especially with the high diurnal temperature range experienced in the tropics

to take account of the maximum shade temperature reached daily and in the details which follow in Table IV the full allowance has been made for solar radiation.

TABLE IV

STATION	Mean Maximum Temps °F		No. of Months over 75°F	
	Actual	Adjusted	Actual	Adjusted
Dar es Salaam	85.3	91.9	12	12
Tabora	84.2	91.4	12	12
Dodoma	84.2	90.8	12	12
Kondoa-Irangi	80.8	88.3	12	12
Lyamungu	76.9	84.4	7	12
Iringa	75.8	83.6	7	12
Mbeya	74.4	82.4	4	12
Sao Hill	71.0	79.8	Nil	11

The table demonstrates the extreme difficulty of obtaining ideal outdoor climatic conditions in the tropics during the middle of the day. Mad dogs and Englishmen are, after all, rather foolish to go out in the mid-day sun. Conditions at the first four stations are severe, Lyamungu, Iringa and Mbeya are tolerable while Sao Hill shows up favourably with no heat handicap indoors.

8. *Night heat handicap (mean minimum temperatures).*—Major Markham considers that minimum temperatures in excess of 60°F. impose a handicap as over this temperature conditions are not conducive to sound sleep. Details follows in Table V.

TABLE V

STATION	Minimum mean Temperature °F		No. of months over 60 °F	
Dar es Salaam... ..	...	71	...	12
Tabora	...	62.5	...	10
Dodoma	...	61.8	...	8
Kondoa-Irangi	...	59.8	...	7
Lyamungu	...	57.3	...	1
Iringa	...	56.8	...	Nil
Mbeya	...	53.4	...	"
Sao Hill	...	52.2	...	"

The coastal areas again have a most severe handicap while conditions in the central plain are far from satisfactory.

9. *Humidity/dryness handicap.*—Major Markham considers that relative humidities of less than 40 per cent at noon impose a "dryness handicap" which it is difficult to correct. Humidities in excess of 70 per cent at noon impose a humidity handicap which can only be readily corrected (by internal heating) at low temperatures. Throughout East Africa observations are taken at 14.30 hours (about the driest time) each day, these figures will not vary greatly from noon figures. The position at Tanganyika stations is given in Table VI.

TABLE VI

STATION	Mean humidity. at 14.30 hrs.		No. of months under 40%	No. of months over 70%	Humidity/ Dryness handicap		
	%						
Dar es Salaam	...	71	...	7	...	7	
Tabora	...	46	...	5	...	5	
Dodoma	...	46	...	2	...	2	
Kondoa-Irangi	...	49	...	—	...	—	
Lyamungu	...	60	...	—	2	...	2
Iringa	...	52	...	2	...	—	2
Mbeya	...	59	...	—	3	...	3
Sao Hill	...	60	...	—	2	...	2

It should be noted that the small humidity handicap at Mbeya and Sao Hill can be readily corrected indoors by heating as it is associated with low temperatures. The unsatisfactory humidity of the coast and the dryness handicap in the central plain and at Iringa should be noted.

10. *Summary of climatic handicaps.*—An attempt can now be made to survey the results as a whole though it is difficult to allocate weights for the different handicaps. The "heat handicap" at mean temperatures is clearly the most important factor and will be given twice the weight of the other factors which will be considered as of equal importance. In the case of the "heat handicap" at mean maximum temperatures the average of the indoor (actual) and the outdoor (adjusted) figures will be taken. The position is summarized in Table VII.

TABLE VII

STATION	Heat handicap		Heat handicap		Night heat		Humidity/ Dryness		Total handi- cap	Percentage handicap 100% = 60	
	mean temps.		max. temps	mean	handicap		handicap				
Dar es Salaam ...	24	...	12	...	12	...	7	...	55	...	91
Tabora ...	20	...	12	...	10	...	5	...	47	...	78
Dodoma ...	18	...	12	...	8	...	2	...	40	...	67
Kondea-Irangi ...	12	...	12	...	7	...	—	...	31	...	52
Lyamungu ...	2	...	10	...	1	...	2	...	15	...	25
Iringa ...	—	...	10	...	—	...	2	...	12	...	20
Mbeya ...	—	...	8	...	—	...	3	...	11	...	18
Sao Hill ...	—	...	6	...	—	...	2	...	8	...	13

It can reasonably be deduced that (i) the coastal climate is hardly tolerable and certain to lead to low productivity, (ii) that the central areas up to an altitude of about 5,000 feet have a heavy climatic handicap, (iii) the rather special climate of Lyamungu at 4,100 feet is reasonably tolerable and (iv) the areas from about 5,500 feet to 6,500 feet (and probably higher) have an almost ideal climate marred only by high mid-day temperatures outdoors (most difficult to avoid in the tropics) and brief spells of excessive humidity (easily corrected by suitable heating arrangements).

11. *Areas with good climates.*—Apart from the isolated Ufipa plateau and a few small isolated blocks only four major areas in the Territory lie within the range specified: (a) the "islands", Kilimanjaro, Meru, Oldeani and Mbulu, in the Northern Province, (b) the Usambaras, (c) the Iringa-Mufindi-Sao Hill block and (d) the Njombe-Rungwe-Mbeya area. Unfortunately meteorological data are not available for the Usambaras, and the Northern Province highlands are represented only by the Lyamungu station which is not located in a typical area. It is suggested that steps should be taken to remedy these defects in the Territory's recording arrangements. The high areas in the Northern Province are already closely peopled, while the Rungwe highlands are in the extreme south of the Territory. The Iringa-Mufindi-Sao Hill area appears to offer the most suitable site for the development of the Territory's chief centre for industrial and administrative activities. Provincial centres could, of course, be established in the other areas.

12. Having outlined the views of Markham and recorded the climatic conditions ruling in various parts of Tanganyika it is interesting to consider how this information could be used in the interests of Tanganyika and its

peoples. At the present time Tanganyika is one of the poorest countries in the world and the first objective on the way to increasing the national income must be to increase the average productivity of its people. This problem of poverty can and must be attacked from many sides, by the provision of educational, medical, housing and other social services, by the provision of capital equipment and by the spread of "know-how" among all grades of the people so that each individual's capacity is improved. But the study of climatic conditions with which this paper is solely concerned becomes a matter of fundamental importance in connection with the general attack on poverty in a country such as Tanganyika where vast areas suffer from climatic conditions falling far short of what is necessary for the reasonable development of man.

13. The Territory's population is almost entirely agricultural, but mining is likely to become of increasing importance while a number of minor industries are developing in the towns. Certain members of the population, for example, miners, sailors, port-workers, fishermen and railway station staff must by the nature of their work live near their work and must be considered as "tied". Certain other members, for example, students and teachers of higher learning, the patients and staff of central hospitals, industrial workers in all except extractive or "tied" industries, employees of the Central Government, leading business and professional men and their employees, research workers and the central staff of the Transport Services could (assuming reasonable facilities in other directions) be located at any point within the Territory and can be considered as "mobile". The large body of agricultural workers remains to be considered. With the primitive economy of the Territory these have been considered as relatively "tied" and different tribes have developed agricultural practices suited to their environment. In addition the big sisal plantation industry has attracted a large body of permanent workers who are practically as "tied" as mine workers. Nevertheless with the development of new crops, with the benefits to be obtained from the division of labour, with the supply of capital equipment and with the greater willingness to experiment (which should follow from improved social services) it seems probable that a substantial movement could reasonably take place from agricultural activities of low productivity to other agricultural activities of higher productivity, for example, movement of manpower to pyrethrum growing in Njombe might have great economic advantages (both to the individual and the Territory) over rice growing in the Kilombero valley. While largely "tied" at present the agricultural population could to some degree be capable of movement towards the better climatic areas and it could be considered as "elastic". In establishing these terms of "tied", "mobile" and "elastic" it will of course be realized that while the groups at any one moment can be fairly easily defined individuals will at all times be moving freely between the groups.

14. As the mining industries develop (as they seem destined to do) and the commerce of the Territory increases it is inevitable that the numbers of the "tied" population must increase absolutely but they will still form only a small part of the population. They constitute an important section of the

community but nothing can be done to move the location of their activities to areas with better climatic conditions.

15. The "mobile" population is likewise relatively small at present but in a developing economy it will inevitably increase rapidly. This group comprising the industrial workers, the directing staff of the Central Government, the research workers and the leading industrialists and traders is of critical importance in a primitive economy if the maximum rate of development is to be achieved. It is most necessary that, to achieve maximum productivity per head, this group should be located in areas with climatic conditions which approach the optimum as nearly as is practicable. It should be stressed that it is not a question of finding a congenial climate for the few Europeans at present forming an important section of the group. Major Markham has pointed out that it is not a racial question (negro workers in the North-East States of U.S.A. have a higher productivity than white workers in the Southern States); whatever the racial composition of this group may ultimately be (and the industrial workers must be predominantly African in any case) the need for the best possible climatic conditions in which they may operate cannot be exaggerated.

16. The great mass of the population is in the "elastic" group closely bound to the different tribal areas and to traditional methods of agriculture. For many years this group will be almost "tied" as any movement into more suitable climatic conditions will require the careful examination of many economic and social factors. Nevertheless as a long-term policy the movement to better climatic areas will probably prove of great importance in any widespread attack on poverty by raising individual productivity.

17. The Territory probably stands at the beginning of a period when there will be a substantial volume of investment both of private and public capital. If the best results are to be obtained for the benefit of the Territory it is most necessary that the capital should be wisely spent. The "mobile" section of the community is at present so small that there would be a negligible waste of capital equipment if its location were changed gradually (say over ten to fifteen years) for the equipment gradually released would be taken up by the "tied" and "elastic" sections of the population. If, however, more equipment (in the form of industrial installations, offices and houses) is constructed for the "mobile" group in areas with inferior climates, and consequently of low productivity, it is unlikely that succeeding generations will face the waste involved in abandoning these assets. A great opportunity, which may not within reasonable distance recur in such favourable form, presents itself now for the Territory to take the first steps in breaking the iron ring of poverty.

18. While this note has dealt only with climatic conditions it is suggested that for reasons of health (for example, probable absence of malaria and hook-worm), for social reasons (Lord Lugard has drawn attention to the demoralizing effect of ocean ports on the indigenous population) and for defence reasons the development of centres in the highland areas would be in the interest of the Territory.

19. This is scarcely the place to discuss in detail the many practical problems which may present themselves in formulating any schemes to make the best of the Territory's climate but the following outline of possibilities may be of interest :—

(i) residential and industrial townships should be planned in each of the four major areas where climatic conditions are the most suitable for the best development of man ;

(ii) one of the areas (the Iringa-Mufindi-Sao Hill block appears to be the most suitable) should be chosen to provide the seat of the Central Government ; the precise site would depend on climatic, health, social and transport factors ;

(iii) capital investment by the Central Government and by Government agencies in industries, offices and houses should be concentrated in these townships until all "mobile" Government staff can work and live in those areas ;

(iv) "mobile", commercial and industrial concerns should, by all practicable means, be encouraged to move to these new settlements while private investment by "mobile" concerns in other areas should be discouraged ;

(v) all forms of transport facilities should be planned to integrate these settlements in the most economic fashion with the Territory's transport system.

The Intensity of Solar Radiation at Various Places in Tanganyika Territory

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SOLAR RADIATION, which provides our planet with an indispensable amount of energy, is a most important factor in the environment influencing human, plant and animal life. Although this fact was realized at a very early stage of human development, the problem of how far its influence on the human body is detrimental or beneficial is still far from being solved. The difficulties in studying the question arise because intricate physiological reactions of the human body are influenced by an equally intricate complex of physical factors in the environment. There is no doubt, however, that progress along this line of research is only possible if accurate and reliable information on the physical factors form the basis of the biological research. Only then we can hope to get nearer the solution of a problem which is of such vital importance to white settlement in the tropics.

Mr. C. Gillman, who has always been very interested in every aspect of natural history, made it possible for a preliminary survey of the intensity of solar radiation to be carried out in Tanganyika Territory during April and May 1935. The opportunity presented itself when I was occupied with measurements of the intensity and quality of solar radiation at Nairobi (Kenya), under the auspices of the Institute of Physical Therapeutics of the University of Jena and the British East African Meteorological Service under the directorship of Group Captain A. Walter. A set of carefully calibrated instruments was then available in East Africa and Mr. Gillman provided every possible assistance at various places along the railway line, so that in a comparatively short time observations could be collected at several localities in the Territory. I wish to express again my sincere thanks for this valuable help which made possible the collection of the data presented in this paper.

The marked advances in heliotherapy and the excellent results obtained by carefully dosed exposure to solar radiation will not be discussed here. Solar radiation plays, however, such an important rôle in the every-day life of people living in tropical countries that everybody has formed a certain opinion on the subject. Most of these opinions are based on personal experience rather than on physical or physiological facts. There is no doubt that whilst one person can walk in the sunshine for quite a time without feeling any ill effects, another will develop a headache after a few minutes' exposure. This, however, does not prove the "danger" of tropical sunlight as such, but rather that one person may be far more susceptible than the other. In the present paper, therefore, some facts with regard to the actual intensity of Tanganyika's sunlight are given.

The question we may ask is the following: Is there really such a great difference in the intensity of solar radiation in the tropics and that experienced, for instance, in Europe? After all, the source from which we obtain the

energy at any place on the surface of the earth is the same. How, then, is the radiation altered on its way from the sun to the earth, in other words, on passing through the atmosphere?

The so-called "solar constant", that is the intensity of the solar radiation outside the atmosphere, has an average value of 1.94 gram calories per square centimetre per minute, varying during the course of the year from 1.88 to 2.01 gr.cals./sq.cm./min. (1 gr.cal. is the amount of heat required to increase the temperature of 1 cubic centimetre of water by 1° centigrade). Out of the total incoming radiation only a certain part reaches the surface of the earth because some of it is absorbed, some is scattered and only the remainder reaches the surface. The two effects, absorption and scattering, influence the various parts of the spectrum to a varying degree. Water vapour, for instance, is mostly responsible for the absorption of the red and infra-red rays, whereas dust-particles, smoke and other pollution chiefly reduces the blue, violet and ultra-violet portion of the spectrum. The scattering effect of the atmosphere predominantly influences the blue, that is the short-wave rays of the spectrum, a fact which is apparent by the blue colour of the sky.

The question now arises how great is this effect of absorption and scattering, that is, how many of the original 1.94 gr.cals./sq.cm./min. penetrate the atmosphere and actually arrive at the surface of the earth in various places of the globe? This amount depends on the thickness of the atmospheric layer which has to be penetrated by the solar rays. At sunrise and sunset this path is very long and the reduction of intensity is considerable. At noon, when the sun is highest up in the sky, the atmospheric layer which has to be penetrated is thinner and the intensity consequently greater.

The fact that the sun does not rise to the same altitudes above the horizon in various regions of the earth results in a variation of midday intensities incident on different localities and at different times of the year. In the tropics the sun reaches a midday altitude varying from about 67° to 90° during the course of the year. In places far remote from the equator, for example, in Potsdam, Northern Germany, the altitude at noon is not more than 14° in mid-winter and 61° in mid-summer.

A.—MIDDAY INTENSITIES

Unfortunately there are not enough data available from Tanganyika Territory to follow up the variation of midday intensities during the course of the year. The measurements collected during a few days' stay at various places allow, however, a comparison of midday intensities in different parts of the Territory with readings obtained in other parts of the world. These data are given in the table below:—

MIDDAY INTENSITIES IN EUROPE AND TANGANYIKA

Place	Altitude above sea-level metres	Geogra- phical position	Time of the year	Midday inten- sities gr. cal.
Potsdam (Germany)	... 106	... 52° 23'N.	... mid-winter	... 1.01
			mid-summer	1.25
Davos (Switzerland)	... 1,600	... 46° 48'N.	... mid-winter	... 1.37
			mid-summer	1.46
Nairobi (Kenya)	... 1,660	... 1° 46'S.	... December	... 1.56
			February	1.55

Place	Altitude above sea-level metres	Geogra- phical position	Time of the year	Midday inten- sities gr. cal.
Tanganyika Territory:				
Dar es Salaam	... sea-level	...	May	1.33
Mwanza	... 1,140	...	April	1.47
Tabora...	... 1,150	...	April	1.48
Dodoma	... 1,150	...	May	1.46
Iringa	... 1,600	...	May	1.47
Kilimanjaro (Peters Hut)	3,800	...	March	1.63

The figures in Table 1 show that at the inland stations of Tanganyika Territory during April and May the intensity of the solar radiation at noon is about equally great as that experienced at noon at Davos in Switzerland in summer at an altitude of 1600m. This fact alone clearly demonstrates that the intensity of tropical sunlight cannot be considered to be "extremely" high. At the coast (Dar es Salaam) the midday intensity during May is lower than that measured at Davos during mid-winter. At great altitude (Peters Hut, Kilimanjaro) the midday intensities in March are approximately ten per cent higher than those measured at a lower level in the interior of Tanganyika. Midday values for Nairobi in December show about five per cent higher readings than those obtained at the Tanganyika inland station.

B.—THE INTENSITY OF SOLAR RADIATION DURING THE COURSE OF THE DAY

A comparison of readings of the intensity obtained during the course of the day at various places in Tanganyika is presented in figure 1. It will be noticed that all the observations from the inland stations show but little deviation from the curve. This indicates that whether you are in Mwanza or Tabora, in Dodoma or Iringa, you will be exposed to a similar amount of solar radiation presuming that the sky is fairly clear and cloudless. This is not surprising, since the altitude of the various stations mentioned is similar, except that of Iringa, where the readings would probably have given higher values if a day with a really clear sky had been encountered. This was unfortunately not the case and the low readings at Iringa must be ascribed to a thin layer of Cirrus clouds which covered the sky during the period of observation.

Observations taken at Dar es Salaam (indicated by open circles) are distinctly lower but otherwise show a similar variation over the day. Readings obtained at Nairobi during December are higher than the April and May observations of the Tanganyika inland stations. The greatest intensities, that is slightly greater than those at Nairobi, were measured at an altitude of 3,800m. on the slopes of Kilimanjaro.

C.—COMPARISON WITH OVERSEAS DATA

A comparison with data from overseas, where the length of the days varies a great deal from summer to winter, is demonstrated in figure 2, (a) and (b). The intensities measured at high altitude at the inland stations of Tanganyika are compared with readings from Davos, the altitude of which is similar to that of Iringa; the readings of the coast at Dar es Salaam are compared with those of Potsdam at 100m. above sea-level.

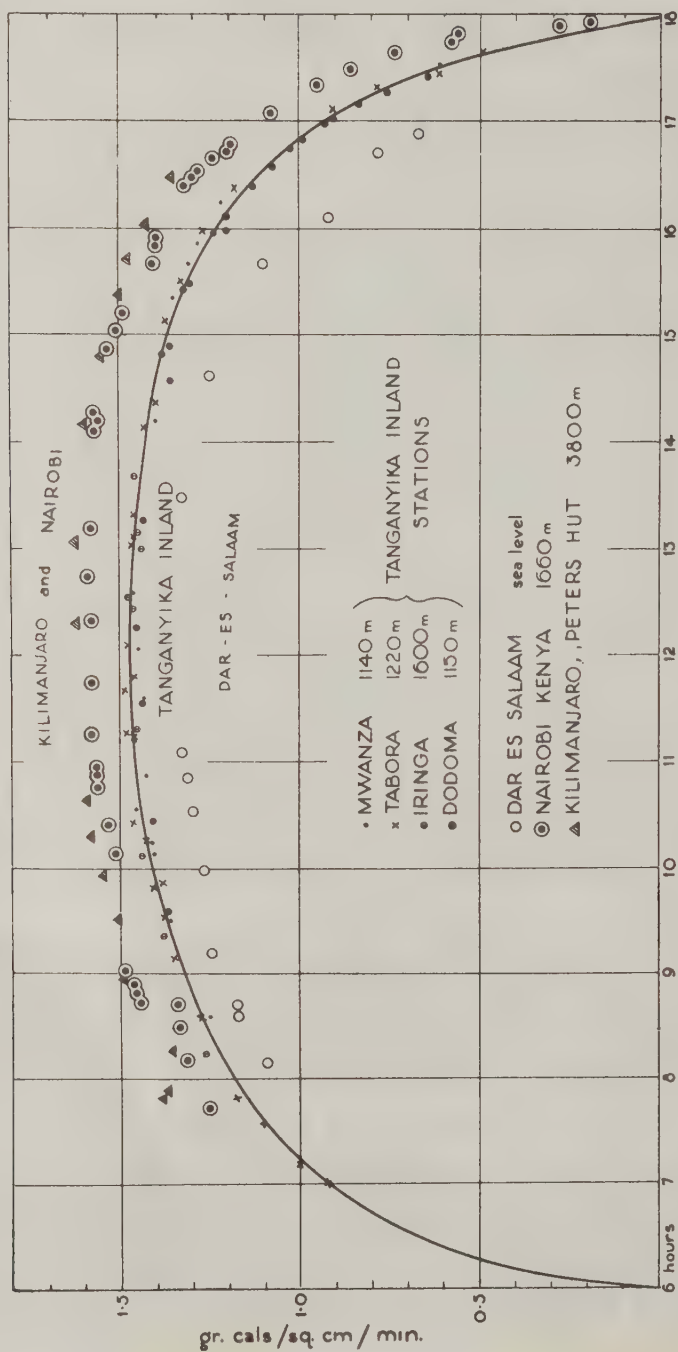


Fig. 1.—Intensity of the direct solar radiation at various places of Tanganyika Territory (given in gr. cal./sq. cm./min.)

The most striking feature of the curves is the great extra amount of radiation which impinges in Europe during the early morning and late afternoon hours of the long summer days, and, in contrast, the much smaller amount obtained during the short days of the winter. The intensities measured in Tanganyika during April and May amount to an intermediate value between the two extremes of summer and winter in Europe. Since the sun over Tanganyika rises to similar altitudes all the year round and, furthermore, since the days are approximately twelve hours long during the whole course of the year, the April and May readings more or less represent conditions as they prevail during all seasons in Tanganyika, varying only to a small extent due to changes in the turbidity of the atmosphere.

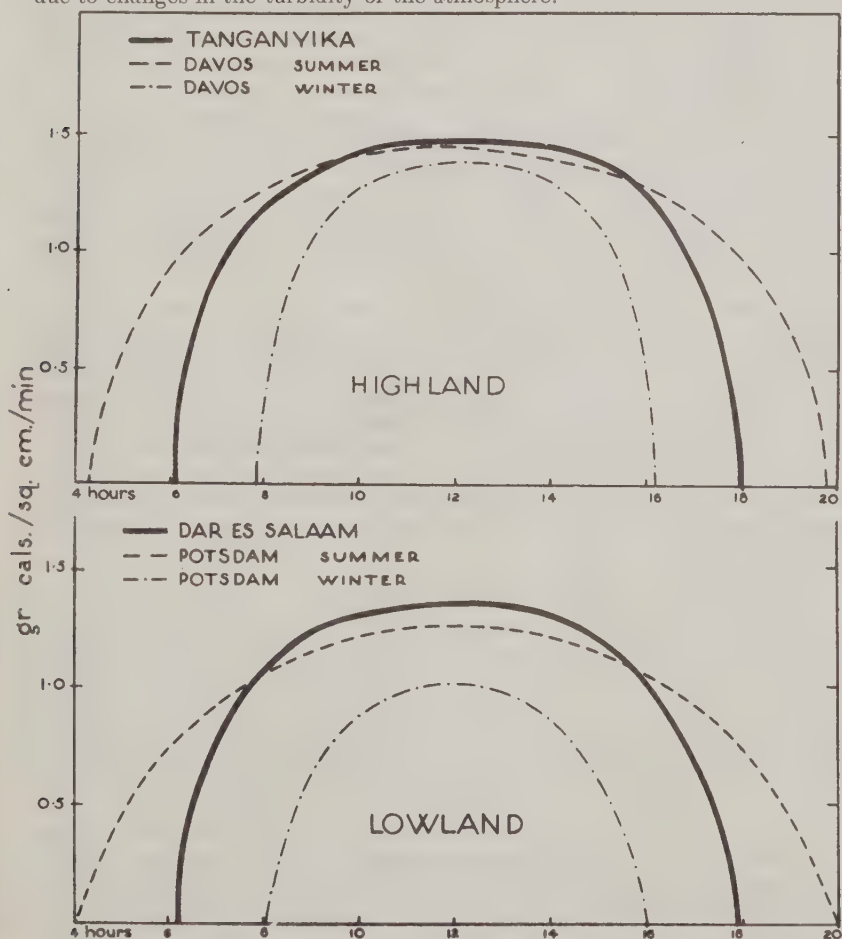


Fig. 2.—Comparison of the intensity of direct solar radiation in Tanganyika Territory and in Europe; (a) at high altitude above sea-level, (b) at, or near sea-level.

The above statements refer to the readings obtained at places at high altitudes as well as those measured at sea-level. This can be seen in figure 2 (b) which gives a comparison of lowland observations. The same general features of the curves can be noticed; the main difference is again due to the length of the days, and only a minor difference is to be ascribed to the lower midday intensities in Potsdam during the winter months.

The general conclusion which we can draw from the data presented above is that the intensity of the direct solar radiation on cloudless days is not very different in Tanganyika Territory from what it is in Europe under similar conditions of altitude above sea-level and altitude of the sun above the horizon. The reader must, however, not be misled by this statement, because it is only valid within its limitations. Direct solar radiation is only *one* of the contributing factors of the radiation climate and the intensity of it does not tell us anything about total incident energy or about its quality.

Since observations of the direct solar radiation can only be made when the sun is shining, the data discussed represent more or less clear days only. However, life continues, whether the sun is shining or whether it is cloudy! The total influx of energy depends to a large extent on the prevailing cloudiness and so-called "fair-weather" radiology does not represent the true conditions.

The second, and even more important point is the fact that the above statement on the small difference between Tanganyikan and European sunshine refers to the quantity only, and not to the quality. From a biological point of view, the quality, in particular the ultra-violet radiation is most important because it is in this region of the spectrum that most of the biological effects have been established. The erythema of the skin, the bactericidal effect and the formation of vitamin D in the human skin are all due to the ultra-violet radiation. In stating that the intensity of direct solar radiation in Tanganyika is not very different from what it is under certain conditions in Europe, nothing is said as to whether the amount and the quality of the ultra-violet radiation also differs only little from that in Europe.

The extension of the ultra-violet radiation towards the short-wave, and at the same time the most potent region of the spectrum depends to a great extent on the ozone content of the high layers of the atmosphere. It is known that, generally speaking, the ozone content is small in the tropics and greater at higher latitudes. It is, therefore, quite possible that the main difference between the solar radiation in Europe and in Tanganyika will be found to be due to the quality, that is the content of ultra-violet radiation.

During my stay in Tanganyika I was able to take spectrograms of the solar radiation which allow of the determination of the last wavelengths which penetrated the atmosphere. The significance of these spectrograms and the results obtained will be published in a later number of this journal.

The Need for Anthropological Research

By J. P. Moffett

THE EVENTS of the war have focussed attention on the Colonial Empire as never before. This has meant criticism as well as commendation of British colonial policy. While some of the criticism has been very ill-informed some of it has been very much to the point and Britain has been called upon to justify her colonial policy before the world. She has responded by declaring that the theory of "trusteeship" is now becoming one of "partnership" and that eventual self-government for all her colonies is her avowed aim. There is nothing new or startling in this but what is new is the interest that is now being taken, both by the home government and by the man in the street, in the Colonial Empire. One expression of this is the allocation of £120,000,000 to the Colonial Development Fund, another is the way in which the present Secretary of State for the Colonies regards his office. The era of complacency and *laissez faire* is over and the old Imperialism is dead, or at any rate dying. We are called upon to give a satisfactory account of our stewardship, satisfactory not only to the Imperial Treasury (as, unhappily, was almost all that was at one time required) but also to world public opinion. Are we quite satisfied with the account we can now give? Our colonial record is not the brightest page in our history. We are prepared now to admit this and have a genuine desire not to repeat our past mistakes. But are we doing all that we can to see that we do not repeat them? The relationship between governors and governed, especially when the one is a twentieth-century Briton and the other a primitive African, is not as easy as it may on the surface appear. To call it one of "trusteeship" or "partnership" does not make it any easier. Historically, the relationship is that of conqueror and conquered and we should recall this, not because we wish to emphasize, far less to perpetuate, that aspect of it, but because the African is continually reminded of it by our very presence and by the rules and regulations which he must now obey. We tend to forget that we are still "Red Strangers" to millions of them. In their eyes we are the Great Unknown, unpredictable and arbitrary. And what do we know of them? Although we in Tanganyika have been administering the Territory for close on thirty years our knowledge of its people is still very incomplete. The student wishing to learn something about the tribes of Tanganyika will find a few monographs, some now rather out-of-date, and one or two books such as *Anthropology in Action* which will give him some idea of the nature of the problems that arise here. But on the whole our knowledge of our wards is, for conscientious trustees, grossly inadequate, and the material contained in district books hardly suffices to fill the gaps. Without deep knowledge and genuine understanding there are bound to be serious stresses and strains in such a difficult relationship. Government then becomes the mere imposition of a foreign rule with all the unfortunate

results which that is bound to bring in its train. There should be no need to labour this point; it will, I imagine, be generally admitted that our knowledge of the African is woefully insufficient and that an increase in knowledge is not only desirable but imperative. Nothing less, I submit, than the success or failure of all "development" proposals is at stake. Much fuller and more exact knowledge is essential: how are we to acquire it?

In present circumstances officers have less time than ever to devote to the study of the people they are administering. Not only are numbers inadequate but the amount of office work which has to be done, most of it a direct result of the war, increases steadily. There is not time to get to know the people thoroughly and staff shortages make frequent transfers unavoidable so that there is little inducement even to a District Commissioner to devote the time and trouble he should devote to getting to know and understand the people entrusted to his charge.

Much could be done, and doubtless will be done, by improving the staff position to allow of that degree of leisure or, rather, of freedom from office work which is essential if officers are to keep in touch as they should with their people. And the arrival of women administrative assistants will help to a small extent, though only in the larger stations. The point I wish to make here is that, of recent years, officers have had, through force of circumstances, less and less time to devote to a side of their duties which is of paramount importance. "Native affairs" have become crowded out by military affairs; and economic control, price fixing and the hundred-and-one other burdens imposed by the war have made it more and more difficult for officers to safari. This has been inevitable and it is perhaps surprising that "native affairs" have not come to adverse notice more frequently than they have done. But the fact remains that less and less time is now devoted to understanding the people and to enlisting their *voluntary* co-operation in the various schemes now afoot for their betterment. I have no doubt that Government is well aware of this and deplores the unfortunate necessity which has brought it about. It would seem, however, that an increase of staff, which would go a long way towards helping to better the present situation, will not of itself be sufficient. It is imperative that all Government officials, and administrative officers especially, should have as complete a knowledge as possible of the native people with whom they have to deal and everything possible should be done to enable them to obtain that knowledge; but it is at the same time true, that the degree of knowledge which is, I think, now necessary, is not easily attainable by Government servants. The very fact that they wear the well-known "twig" in their hats militates against their success from the start. They may conduct the most tactful and careful enquiries but their questions are inevitably viewed with slight suspicion. No one who has, as a Government servant, tried to obtain exact knowledge of certain aspects of native life will minimize the difficulties involved. The fact is that while such enquiries should and must be made, Government servants, known to Africans as such, are not the best people to make them. Before going on to discuss the rôle that the social anthropologist can play in the

solution of this problem it may perhaps be advisable to try to show why his services, and the knowledge and understanding that he will be able to place at the disposal of all those concerned with the government of the African in Tanganyika, are so important. It is, I think, true that Government servants, immersed in the day-to-day business of administration (using the word in its widest sense), tend to forget that there is still a tremendous gulf fixed between us Europeans, with our twentieth-century ideas and outlook, and Africans. Superficially, especially on the coast and in the larger towns, they may appear to have absorbed a certain amount of our ideas, even of our "culture", but fundamentally they are the same as they were before the "Scramble for Africa" began. We rather forget that this was still "Darkest Africa" sixty years ago and that in those sixty years the vast majority of Tanganyika Africans have remained essentially the same under European domination. They are outwardly adaptable and, being also quite surprisingly tactful, they have quickly adjusted themselves to encounters with the European. But their way of life has, for the majority, been little altered, their outlook is largely unchanged, their thought patterns are the same as they have been for centuries. Their desire to please leads them to disguise from us the depth of the gulf that exists between us and them, but any one who has lived in daily and intimate contact with East African natives for a period of years will testify to the fact that their real thoughts are hid from us. One may think that one knows their customs and beliefs and even something of their habits of thought but sooner or later one is brought up with a round turn and one has to confess that one is at a loss to understand. I think this lack of complete understanding is best revealed by the fact that the European does not exist who will, in respect of the people of a certain tribe, prognosticate unerringly their reactions to a given set of novel circumstances, for example, the introduction of a new crop, of vaccination, of registration of births, deaths and marriages. I do not think that such *complete* knowledge and understanding can ever be achieved by any European; but that is no reason why he should not go as far along the road towards that goal as is humanly possible. I merely use this as an illustration of the fact that Europeans and Africans are fundamentally different and that this difference is not just one of degree. It is so deep that it deserves the very closest study and only when this study has been given and recorded can we hope to make any real progress towards the final aim of complete understanding and willing co-operation.

There is, indeed, a sad lack of knowledge, understanding and appreciation of the African amongst those who are placed in authority over him. This is brought to light from time to time when "incidents" occur. Nearly all such incidents need not have occurred if more pains had been taken to understand his outlook. Appointing Commissions of Enquiry into riots after they have occurred and resulted in death, disorder and general distrust is merely bolting the stable door after the horse has gone. This is rather self-evident; nevertheless I have yet to see the report of such a commission which recommends as one way of preventing further "incidents", the appointment of a social anthropologist to advise Government on matters affecting the people concerned.

It is not, perhaps, sufficiently appreciated in just what ways the African is different from the European, or, more particularly, how the African native in Tanganyika differs from the British officer who is placed in authority over him. They are various reasons for this, some historical, some racial, some economic, but perhaps the chief one is that the African lives on such a very much lower plane that the assumption that there is therefore little good in it and little point in investigating it is all too common and easy to make. Were he a little more advanced in "civilization" more care would be taken to understand the exact stage at which he had arrived; but whatever the reason it is, I think, true to say that the difficulty of getting "at the back of the black man's mind" has not been generally appreciated in all its implications. There was a time when those of a certain school of thought were so impressed with the difference between black man and white that they postulated the theory that the black man was "illogical" or "pre-logical" and that the workings of his mind were past finding out and quite unpredictable. While this theory is now discredited, the more eminent of modern anthropologists make no attempt to minimize the differences that lie between. Thus Westermann says :—

"The African has never progressed so far as natural laws. He possesses a certain amount of knowledge of nature, that is the beginnings of natural science, but for the greater part it is pseudo-science, knowledge mixed with a child-like play of imagination. A problem commands interest so long as it is a pleasant diversion, but not beyond that, and not for its own sake. The idea of any event happening from an inner necessity or a natural law is quite strange to him because his imagination and ideas depend so much on impressions of the senses. Behind every occurrence there is for him the 'one-who-causes'. If a tree or a person dies, then some one, a spirit or a man, has been the cause. For inner necessity or natural causes is substituted a personal will. In many of his utterances in daily life the negro* reveals a completely normal logical faculty, and the mental processes as well as the actions resulting from them cannot be distinguished from our own. It is, however, evident that there are differences between the mental activity of the negro and that of the European. A significant difference is that the negro is more dominated by unconscious or half-conscious impulses than we are; for him emotional thinking outweighs logical reasoning and when emotion is the guide ideas and actions may result which are not in conformity with logic. With the negro emotional, momentary and explosive thinking predominates."†

It is necessary I think to emphasize this fundamental difference because it has far-reaching consequences and refusal to accept it has resulted in misunderstanding in the past. It lies at the root of the difficulty, experienced by all who have dealings with the African, of predicting his reactions to any given set of circumstances. We all tend to judge others by ourselves and to expect others to react rather in the way we ourselves would. I remember being

*In which term Westermann here includes the Bantu.

†*The African To-day* (1st Edition) by Diedrich Westermann, pp. 36-40.

very surprised to find, in a case that came before me, that the father of a victim of rape did not feel the same feelings of rage and indignation that I should have felt. His reaction was not to seize a stick and go in search of his young daughter's assailant but to take her to him and to ask him to look after her as it would be "unlucky" for him (the father) to have the girl back in his house after what had occurred. Examples could be multiplied indefinitely. Books such as *The Golden Stool* and *Red Strangers* were written to show that our ways are not their ways, neither are our thoughts their thoughts. Almost any modern monograph on an African tribe will leave the reader impressed with the fact that between us and the African there is a gulf fixed. It can be bridged but only by those qualified to do so. And of course if all our plans are not to come to naught and if we are not to repeat in Africa the mistakes we have made in India, the West Indies, and elsewhere, the gulf must be bridged. It will not be bridged satisfactorily by Government officials who can only devote a portion of their time to the problem, who are seldom long enough in one place properly to appreciate the dimensions of the problem, who cannot speak the language of the people and who are not in any case qualified to engage in the research involved. That it can be bridged, however, is not in doubt. An interesting example of how it can be done, of the method of approach to the problem and of the ways in which the willing co-operation of a native people can be enlisted can be found in an article published in *African Studies* for March, 1944, entitled "The Magical Thought-Pattern of the Bantu in Relation to Health Services" by J. D. Krige, the well-known South African anthropologist. The tribe to which most frequent reference is made is the Lovhedu and Krige begins by saying:—

"A prerequisite to rapid mass education is at least sufficient understanding of the basic conceptions of African medicine to articulate the two systems. This is, of course, not a plea that we should approve magic but it is a plea for a better appreciation of the presuppositions and logical structure of African medicine, with a view to securing their willing co-operation and effecting the most useful changes with a minimum of misunderstanding and a maximum of success."

He then examines the empirical basis of Kilovhedu medicine and of its properties. He points out that the Lovhedu do not discriminate between properties that inhere in matter and properties that are merely ascribed and imaginary. "Just as the drinking of the sap of a euphorbia indubitably and self-evidently causes intestinal upheavals, so, to take an extreme example, the eating of a lion's heart gives a man great courage". He illustrates this "illogicality" in various ways, one of the most interesting being in his description of "heat", which is conceived by the Lovhedu to be destructive, to cause disease, to reduce the effectiveness of medicines and charms, to stir the gods to anger, to provide the condition in which the criminal propensities of witches can operate. "These destructive powers that are ascribed to 'heat' are intelligible only against the total cultural background, particularly the anti-thesis between heat and the main basis of a sense of security, namely, the cooling, life-giving rain. Every major activity and arrangement in the society

is directed towards the supreme end of strengthening that basis and combating any threats to it: the royal institutions, the succession to the throne, the consecration of the queen as rain-mother and controller of half the cosmic forces, the magico-religious structure"

It can readily be imagined what a flood of light possession of this knowledge will throw on every activity of the tribe and how mystified one would be without it in understanding, to take the simplest examples, such customs as the burying of persons dying of consumption or of twins (both manifestations of "heat") in wet soil.

Krige gives several other illustrations of the medical conceptions of the Lovhedu and concludes by saying:—

"In applying any national health scheme to the Lovhedu and to Africans generally it is dangerous to ignore not merely the available facilities and materials and the psychological and sociological forces that condition their effectiveness, but also the framework of knowledge and the thought-pattern in terms of which they assume meaning and become significant for their intended purposes. The problem here is no different from the problem of introducing any new technique or measure; and success depends to a very large extent upon factors of a sociological nature. Only a positive and intelligent, co-operative response from the African can ensure that our efforts have their maximum effects, and one of the conditions of such a response is the intelligibility of our schemes. If they are presented as scientific in contrast to the superstitiousness of African conceptions, they are liable to be resisted or circumvented or at all events to be segregated and rendered of limited value."

This is a point the importance of which can hardly be over-emphasized: that any scheme, to be successful, must be intelligible and acceptable by African standards. It is not sufficient to explain it in a way which would make it intelligible to a European. A great deal more than this is required—in short, that degree of knowledge and understanding of African thought-patterns and assumptions which will enable us to see a problem through African eyes and so to appreciate the peculiar point of view of the African as to be able to graft our schemes and ideas upon existing knowledge and ideas. All parents are faced with similar problems in explaining things to their children, and any parent who has tried to explain, say, thunder and lightning, to an intelligent child will appreciate how necessary it is to try to see the problem from the child's point of view. But the African is not just a child and the difficulties of explanation are immeasurably enhanced by the fact that he has grown up in an atmosphere as alien to our own as that of the Incas. Without real understanding and deep knowledge of that atmosphere the imposition of any scheme of "betterment" may produce friction, opposition and resentment. With knowledge and understanding the seemingly impossible can be accomplished. Krige cites cattle-dipping as an example of this. He says that it was regarded by the Lovhedu as "a sinister device of the European to keep down the number of cattle, for no one believes that ticks have anything to do with cattle disease". Then he describes how it was possible to explain to the

Lovhedu that ticks, mosquitoes and other carriers of sickness are manifestations of *muridi* (a kind of "shadow" that was conceived of as accompanying certain conditions that are harmful and contagious). This he managed to do only because, of course, he had such a complete knowledge of the Lovhedu conception of *muridi*. Without that knowledge, or with incomplete knowledge, his best efforts at explanation would have failed. From the Lovhedu point of view he would have been speaking a different language and would have been as unintelligible as the Theory of Relativity is to most people.

It will be readily conceded that "development" of the African and of his country will be sterile and ineffective without his willing co-operation. The object of this article so far has been to try to show that to obtain this willing co-operation we must first have knowledge and that this knowledge is less easily attained than is sometimes thought. It is never easy to gain deep and accurate knowledge of a people different from our own, this has been abundantly shown in the present war by the difficulties that the Americans and ourselves have experienced in understanding each other, and when the people are as different from ourselves as the Bantu are then the difficulty is indeed formidable. It is a task for the specialist, for the social anthropologist. The aid that anthropologists can give has it is true been recognized in the past, especially in South and West Africa, but other governments have been slow to call in their aid. The pernicious system whereby each colony has had, until recently, to finance development and research out of its own surplus balances has no doubt been partly responsible for this. But the allocation of £120,000,000 to the Colonial Development Fund opens up entirely different prospects and I suggest that one way in which advantage should be taken of this expression of the British taxpayer's belated realization of the existence of the Empire is by a request for funds to finance anthropological research in Tanganyika.

I have tried to show that there is a lack of understanding of the people we are called upon to administer, that this lack cannot be made up without expert assistance and that for this assistance we should look to the social anthropologist. Now I would like to make a concrete suggestion. I suggest that, if Government has not already done so, it should consider the posting of a qualified anthropologist to each of the proposed new and enlarged provinces. Provision has been made for the posting of an anthropologist to Usukuma to assist in the development schemes proposed for that area. But one anthropologist in a country the size of Tanganyika is not enough. There should be, I submit, at least one in each of the re-constituted provinces. Their terms of employment should be such as to attract the best men available. Amateurs are not required. While they should be Government servants they should be as free and unfettered in their work as any scientist or research worker ought to be. They should *not* wear uniform and should be connected with the machinery of Government as unostentatiously as possible. (The "Twiga" in one's hat is unfortunately a most effective "bar sinister".) They should have *no* executive functions. They should not be employed for terms of years but permanently. If their services are admitted to be useful then it follows that

they will be of continuing usefulness as "development" produces more and more new problems. To my mind their services are indispensable and I think that, once they have taken their places at the "Provincial Councils" or whatever the bodies which will advise the future Provincial Commissioners come to be called, this will, in time, be generally admitted. It is not unusual, after all, to ask the advice of a specialist in dealing with a problem on which he is specially qualified to advise, and the administration of primitive peoples is no longer a matter to which rule-of-thumb methods should be applied. Again and again this fact has been brought forcibly to our notice, notably, of late, in the West Indies, and complacency has been rudely shaken. In the article in the *Round Table* for June, 1944, entitled "New Era in the West Indies", our failure in the past to understand the needs and wants of these still primitive people, and their ways of thinking and behaving, is frankly admitted and we are reminded that the Royal Commission "in words indicating the breadth and depth of the gulf separating governors and governed urged that local governments should adopt a much more positive policy of bringing their point of view before the mass of the people." One feels constrained to add "and vice versa". But at least the existence of the gulf is recognized.

One of the best ways of bridging the gulf is, I have suggested, by calling in the aid of the qualified engineer, the anthropologist. The gulf can be bridged from both sides however. This possibility has been overlooked still more in the past. The European, trained as a social anthropologist, can be of inestimable benefit to those whose duty it is to understand the African. But may not the African, similarly trained, be of equal use in explaining to the European the ways in which his people think? Untrained, he tries to explain, it is true, but how far does he succeed? The continued existence of the great gulf is sufficient answer. While still in his tribal environment he cannot, in the nature of things, realize the kind of answers we want. He has grown up to a certain mode of life, has been taught to accept certain things as right or wrong, seemly or unseemly, normal or strange. He has not been taught to question, to refuse to take for granted, to compare and contrast. Even if he has travelled extensively he still tends to think that "home is best" and that those who do and think differently from him are therefore peculiar and, indeed, wrong. The necessity for tribal cohesion has made any form of heresy the sin against the Holy Ghost. One must conform. This makes a good citizen, of a kind, but a very poor apologist. If one has been taught to accept and not to question and analyse one can give but a poor description of the reasons underlying any course of action. The tribal African (the average African in Tanganyika for a long time to come) is so immersed in his environment, takes it so completely for granted, that he cannot explain it satisfactorily to an outsider. And the fact that, as was mentioned above, his thought is not completely logical, but also emotional and intuitive, does not make it any easier for such a complete outsider as a European to understand either him or his way of life.

This however is not to say that the African cannot be trained to appreciate the strictly logical, scientific, European approach. Just as an intelligent

Englishman, interested in primitive peoples, can be trained by undergoing a course in anthropology to understand and appreciate the African, so, I submit, can an intelligent African be trained by undergoing a similar course to understand and appreciate us. And in the process the African, and this is a most important point, is taught to think logically. He is, in fact, taught *how* to think, how to marshal his ideas, how to be explicit, how to reason (even if only in a small way) scientifically. Once he has achieved this stage he is in many ways better fitted than the European anthropologist to explain his people's thoughts, way of life and aspirations to us. He *knows*, because he is one of them. Once his eyes have been opened and he has been taught how to express himself his usefulness should be very considerable.

He can help to bridge the gulf from the other side. I do not know if many Africans from the West Coast have gone to the United Kingdom to be trained as anthropologists and have then sought to interpret their people to the world, but the one case known to me of an East African who has done so is, I think, worthy of consideration. Jomo Kenyatta, the Kikuyu who was trained as an anthropologist under Professor Malinowski in London, wrote an account of his people in a book he called "Facing Mount Kenya". The pronounced anti-government bias of the book did not make it popular in Government circles but in its way it was a remarkable achievement. It showed what could be done and no one could read the book without gaining an insight, if not into Kikuyu ideas, at least into the fact that their ideas and ours correspond remarkably little. Personally, I was very impressed by the book and by the possibilities for increased understanding that it opened up.

So I would suggest that selected Africans should be sent home to undergo a course of anthropological training to enable them to assist Government to understand their people. Two Africans have already been sent home to undergo a two-year course in social service and the results of this experiment are awaited with great interest. Even should it be a failure, however, I do not think that this should be considered a good reason for not making the experiment now suggested. If the men are carefully selected and if they know that they are going to England to be taught how to render a service of supreme value to their people they will, I think, respond and be only too glad to fulfil the rôle assigned to them. They need not necessarily be the sons of Chiefs but they should be able to look forward to occupying a responsible position, with a salary corresponding, in the tribe on their return from England. If they can assist in bridging the gulf the experiment will have been worth while.

The International Red Locust Control

By A. P. G. Michelmores

THE CORNERSTONE of modern locust control is Uvarov's phase theory (Uvarov 1921). According to this theory locusts exist in two different forms or "phases", the solitary and the gregarious. The phases differ not only in habits but also in form and colour. In some locusts, such as the Red and the Desert, the differences between the phases are small but in such as the Migratory and Brown locusts the differences are large. The different phases were formerly thought to be distinct species of insects. According to the phase theory they are considered to be different forms of one species and to be able to change into each other in the course of a generation or two under certain conditions. During the course of the change intermediates between the two extreme forms are found. These are termed phase *transiens*. The insect of the solitary phase is in reality a grasshopper in that it is solitary, relatively inactive and migrates never or only sporadically. The gregarious phase comprises true locusts which are more active and migrate almost continually in swarms. The phase theory has now been abundantly proved with nearly all important species of locusts and must be considered a fact.

Many workers have found that crowding of hoppers of the solitary or *transiens* phases in breeding cages causes them to turn towards the gregarious phase. Conversely separating gregarious hoppers one by one in cages or breeding jars turns them towards the solitary phase. In the field also these observations have been confirmed, that is to say, that crowding induces the gregarious and isolation the solitary phase appearance and habits. Research work (Faure 1932, Uvarov and Thomas 1942) points to the fact that the increased activity of a crowd of hoppers alters the physical and chemical working of the insides of the insect and that this in turn reacts on colour, form and instincts.

So far field work has failed to show any one master factor controlling the formation or disruption of swarms in nature. It is probable that many factors such as climate, floods, vegetation and fire enter into the matter. The causes probably vary from species to species of locust and within one species from place to place and from time to time.

Following on the discovery of the phase theory came its corollary which is of immense practical importance. Field workers soon found that, though locust swarms cover huge tracts of country of many different types, the solitary phase is restricted to certain special types of vegetation. These types may be widely distributed but cover only a small total area compared with that invaded by swarms. Furthermore the areas in which the solitary phase congregates and gives rise to swarm outbreaks are only a very small part of the total habitat of the solitary phase. For instance, the recent great outbreak of the African Migratory locust, which covered almost all tropical and sub-tropical Africa, started only on the swamps of the middle Niger south-west of Timbuktu.

In the case of the Red locust it has been proved (Michelmores 1934, 1937; Lea 1938) that not only the solitary phase, but even isolated individuals of the gregarious phase left behind by swarms, have a strong predilection for open grasslands. Now open grasslands, though in the total quite extensive in tropical Africa, form only a very small proportion of the total area (Michelmores 1939). The most extensive areas of grassland are the rolling upland ones. Happily it is precisely in these upland grasslands that the solitary phase of the Red locust exists in the smallest numbers. It is to be found most numerous in lowland, seasonally swampy grasslands. It is, therefore, probable that the outbreak areas are confined to this type of country. Lowland, seasonally swampy grasslands large enough to be capable of producing new outbreaks of the Red locust certainly exist in certain numbers, mainly in tectonic depressions of the earth's crust, but they form only a very small proportion of the total area of open grasslands. For the whole of tropical and sub-tropical Africa they are less than fifty. It already appears that a number of these never support solitary Red locusts in sufficient numbers to give rise to an outbreak. There is reason to hope that further work will whittle down the number of possible outbreak areas still more until it is absolutely certain that preventive action on a mere half dozen or so areas, totalling a mere few thousand or even a few hundred square miles, will protect the continent from the recurring plagues of Red locust.

This first line of attack on the problem of the outbreak areas is therefore their discovery by a process of elimination. Another line is by studying closely the general conditions and the causes of swarm formation in the definitely proven outbreak areas where new swarms are known to have formed from the solitary phase within recent years.

By the time that the recent great outbreak of the Red locust started people were already alive to the danger, owing to the fact that the Desert and Migratory locusts were already in full activity. Inquiries made by W. Allan and W. V. Harris, entomologists of Northern Rhodesia and Tanganyika respectively, proved that the outbreak started in Mweru wa Ntipa in the former country, and also from Lake Rukwa in the latter (Allan 1931, Harris 1933). H. J. Brédo (Brédo 1932; Pynaert 1932) traced the first swarms in the Congo and proved that they came from the Lake Mweru area, to which the Rhodesian outbreak had by that time spread.

From this time on the chief work on the problem of the origin of outbreaks of the Red locust was British, Belgian and South African. Brédo was working on the control and biology of locusts in the Congo, with short trips to Northern Rhodesia and Uganda, and the Imperial Institute of Entomology employed the writer as locust investigator to study the biology of the Red locust in British territories. The results of most of this work are still unpublished but some brief reports appear in the Proceedings of the successive Locust Conferences (Conferences, Pretoria 1935, London 1934, Cairo 1937, Brussels 1938). The most important outcome was confirmation of the view that the outbreak areas giving rise to the present outbreak were only the two mentioned above though

reasons were given for believing that others might perhaps function at other times. Excellent work was done by the South Africans, A. Lea and D. van V. Webb, in Portuguese East Africa and at Lake Rukwa. This has already been published (Lea 1938; Lea and Webb 1939).

As early as 1936 it seemed advisable to use this knowledge by preparing to nip future outbreaks in the bud at their outbreak centre. Professor J. C. Faure and the British locust investigator put forward a preliminary scheme for an organization to be based on Abercorn for the control of these outbreak areas, to be subscribed to internationally (Conference, Cairo, 1937, Recommendation 1 and Appendix 20).

Later in the same year the United Kingdom Locust Committee enlarged the plan agreed upon at Cairo and made it the basis of a discussion with representatives of the South African Government. The discussion unfortunately broke down on the question of how the proposed organization should be controlled.

Independent field work proceeded but no further agreements for international co-operation in control work were made until the Fifth International Locust Conference at Brussels in 1938. Of the representatives of interested countries present at this conference the South African delegate was unable to participate in any such agreement. The Portuguese also, though equally concerned in the results, wished each country to manage the work in its own territory (Conference, Brussels, 1938, Rapport No. 33, pages 313-314). An agreement was signed, however, by the British and Belgian delegates on the basis of the plan previously debated between the United Kingdom and South African governments (*id.* pages 76-81).

After this conference Belgian research work continued independently in the field but the British Government was so preoccupied with the impending and then the actual war that nothing more was done for a time. Then in 1940 the British colonies interested prevailed on the British Government to start the control scheme on a reduced scale with a single British locust officer, for which post the previous locust investigator was selected. At that time the refugee Belgian Government in London had not been reformed and no formal realization of the Brussels agreement could be arranged. However, the locust officer, who was sent to Rhodesia early in 1941 to found the control service, managed to wheedle out of the Colonial Office in London a verbal permission to try to arrange co-operation locally with the Congo Government, which was at the time more or less autonomous. On arrival in Rhodesia he therefore set to work to found the new organization and to arrange for Mr. H. J. Brédo, the Congo entomologist, to join him and help in the work. Mr. Brédo reached Abercorn at the end of 1941 and stayed for some weeks before proceeding to South Africa on long leave, from which he returned in July 1942, to take up active duties. Several requests to Government to permit complete fusion of their resources were made but were refused and they remained in a state of informal but cordial collaboration. The British locust officer ran the organization and took charge of the Rukwa area while the Belgian locust officer was given charge of the Mweru wa Ntipa area. He also from time to time helped to run the labour at headquarters.

An abandoned agricultural station had been provided for headquarters at Abercorn and funds for capital expenditure. The single house was vacated and renovated for the Belgian locust officer. A nine-room building for laboratory and offices, a new house for the British locust officer, sundry outbuildings and a native compound were built. An abundant water supply was led from a stream a little way away. Owing to the war, materials and skilled labour were difficult to get and nearly everything had to be supervised personally.

At the end of the 1941/42 rains the central station was far enough progressed for it to be possible to get away. A long tour was made in the Rukwa area and a series of permanent camps were set up to be inhabited by locust scouts. The whole region was parcelled out between the different camps, whose scouts had to patrol their respective sectors continually and write all observations on locusts in note books. The sectors were grouped in larger areas, each under a senior locust scout. His duties were to travel around to check the work of the scouts and to send in a monthly report based on the information given in the note books, verbal amplifications by the scouts and his own observations. His work, as well as the work of the junior locust scouts, was further checked by the tours of inspection of the locust officer.

On the return of the Belgian locust officer from leave a joint tour was made in the Mweru wa Ntipa area. A similar system was established there, and the area was formally put under his control, though the majority of the scouts continued to be paid from British funds.

The existing maps of the outbreak areas are so inaccurate as to be almost useless for detailed work. The Belgian locust officer has made a rough map of the whole of his area. In Rukwa a good deal of detailed survey work has been done and it is hoped to construct an accurate topographic and vegetation map as soon as time permits.

Although enough is now known of the Red locust to enable a start to be made at controlling the outbreak areas much further research is badly needed even for immediate practical purposes. Up to the present shortage of staff and pressure of construction, administration and training have not allowed time for any research. However the need for it has not been forgotten. Also numerous field observations have been made during the course of tours of inspection.

The natives of this part of Africa, though with many good points, need continual supervision if they are to do reliable work. A large African staff of locust experts has to be built up from this raw material. The more educated men are often those who work worst out in the field so the training up of a reliable staff is a slow business. A lot of trouble has been taken over this, and unsuitable men are continually weeded out, and new ones tried and the best put in positions of responsibility. Though the result is still far from perfect, a sound foundation has been laid and the work of the scouts improves every year.

When the work was started the history of the Red locust outbreaks as far as known suggested that actual control work would only have to be undertaken against incipient outbreaks in the outbreak areas at long intervals. Actual experience has proved that outbreaks start much more often than had been supposed. Action has had to be taken in fact against smaller or larger hopper bands every year since the work started.

In Mweru wa Ntipa in 1941/42 there was a breeding of swarms from an unknown origin before we started regular field work. In the 1942/43 rainy season only very small and scattered concentrations could be found and they were destroyed by beating and catching in sweeping nets. In 1943/44 there were numerous small concentrations and bands of local origin in several areas, and a few large bands due to layings by one or two immigrant swarms from the south-west. These bands and concentrations were destroyed by beating, baiting and trenching. In spite of this, two swarmlets were recorded in the dry season in the north but they later disappeared and were supposed to have disintegrated. In 1944/45 breeding was again on a small scale and swarm formation was prevented by baiting and beating incipient bands.

In Rukwa the start of field work in 1942 found a considerable outbreak already in progress. The swarms having already reached the adult stage, no control was possible, but luckily the outbreak died out by itself during the course of the dry season. In 1942/43 there was a dangerous little outbreak over an area of twelve to sixteen square miles and a little breeding of incipient bands elsewhere. These were controlled by beating, with a little experimental poison spraying and baiting. In 1943/44 scattered invaders gave rise to another fairly severe but local infestation which was controlled by beating. Elsewhere several other small outbreaks, but more extensive than those of the previous year, were also controlled by beating. In three areas some breeding took place undetected until too late owing to the facts that the British locust officer was fully occupied with the main campaign and that the native staff was still not fully reliable when not continually supervised. In spite of this no real swarms developed but some large concentrations of adults were present during the dry season in certain areas. In 1944/45 preparations were made for a large campaign but the outbreak exceeded anything that had been believed possible. In the south, west and part of the north all swarms were destroyed but in the biggest infested area in the north about half of the swarms reached the flying stage. The Tanganyika Government gave much help during this campaign. As soon as the danger of flying swarms appeared, an appeal was made for aircraft equipped for poisoning from the air, but they could not be provided. Attempts were therefore made during the first four months of the dry season to destroy these flying swarms from the ground but only a small measure of success was gained. A considerable number of swarms left the outbreak area for the north. Plans are being made for a very large campaign with special funds and temporary European locust officers to try to crush this dangerous outbreak in the coming breeding season before it is too late.

The chief lesson taught by these efforts to control the Red locust in its outbreak areas is that the existing organization is too weak to be certain of

doing so. Efforts are at present on foot to enlarge it and particularly to increase the funds and to add two extra men to the European staff, to enable supervision of the native staff to be more complete.

It has also been clear for some years that the two known outbreak areas are not certainly the only areas which could ever produce swarms of the Red locust from the solitary phase. As long ago as 1943 the British locust officer was invited to prepare a scheme for an enlarged organization to deal with other suspected areas also. Since he had already enumerated most of these at previous locust conferences (see Conference, Cairo, 1937, Resolution 17, p. 72) this was soon done. The scheme was discussed with the Belgian locust officer before being sent to Government for approval. The chief addition to the existing organization was that of three extra men on the European staff. The occasion also was seized to press once again for the amalgamation into one department of the British and Belgian sections, which had hitherto been repeatedly refused. Although informal collaboration had worked well so far with the two individuals in question it was felt that it would be bound to lead to difficulties in time. In order to cement the *entente cordiale* and to prove that collaboration had already become close enough to justify complete amalgamation, the British locust officer recommended that his Belgian colleague be made Director of the combined service. This enlarged plan, with authority to cover all suspected outbreak areas of the red locust in British and Belgian territory in south-central Africa was finally approved at the end of 1944. The Belgian locust officer took over the title and function of Director on the 1st January 1945. The division of the field work remained as before. Unfortunately it has proved easier to vote the money than to find qualified men and the department still contains two entomologists only with a temporary lady secretary. Should the still more recent proposals already mentioned be approved, and the men available, there will be a total staff of seven Europeans. It is hoped that this will be capable of dealing with any eventuality.

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To Utete By Ship RUFJI RIVER PILOTAGE

By L. P. Lane

UTETE, lying between seventy to eighty miles up the Rufiji River, was for some twenty years before the days of the weekly air service⁽¹⁾ an outpost of empire rather cut off from external communication and, it is believed, an appointment that was to be avoided generally if possible.

How pleasantly astonished then would the District Officer (old style) of those days have been to find the *Azania* for instance arriving off his Boma, and the title above heads no tall yarn for, although it might prove impossible to-day, a sea-going vessel larger than *Azania*⁽²⁾ reached Utete with passengers and cargo on two occasions within the last thirty years.

Peace-time users of the Rufiji waterways may possess or have seen the two charts of that river published by the hydrographer of the Navy; it was due to a war-time necessity of reaching the Utete area with supplies that these charts came into being, and what follows is a short account of those local historical happenings compiled from information derived from Naval sources.

In January 1917 during the East African campaign, British forces then in occupation of the Upper River and also the Mohoro-Utete areas were held up by the rains. Boats that had been transferred overland in sections during the dry season and launched on the Upper River had proved of great use there but, owing to the Germans still holding positions on the Lower River, could be of no help to our troops below them whose rationing became a matter of urgency. Consequently the Navy were asked to assist in transporting stores by water to the Mohoro area.

A small party from H.M.S. *Mersey* (who previously, together with her sister monitor H.M.S. *Severn* had sought out and destroyed the *Königsberg* in the Rufiji) were thereupon detailed to make a sketch survey of the Mohoro River, Mohoro itself being some sixteen miles upstream. On completion a small transport called the *Mafia*⁽³⁾ was piloted several times on the flood up the Utagite Branch as far as Bongwe (about nine miles up) but, although several hundred tons of stores were thence transported in dhows towed by motor boats, increasing floods soon made it evident that the distribution of sufficient supplies could only be practicable by using the Rufiji route up to Utete.

Thus the same party from H.M.S. *Mersey* were now detailed for a similar survey of the Rufiji River, no light project in the circumstances. A small scale chart was available for the Suninga Branch as far as Salale (seven miles from the mouth) at which place ocean-going vessels had called before the war. Knowledge otherwise was limited to the fact that *Königsberg*⁽⁴⁾ had passed beyond Salale on the way to her hide-out, that the wreck of the s.s. *Somali*

lay about one and a quarter miles above it, and that a stern-wheeler called the *Tomondo*⁽⁵⁾ had ascended the river at all seasons before the war although frequently grounding during the dry season. (See also footnotes (6) and (7).

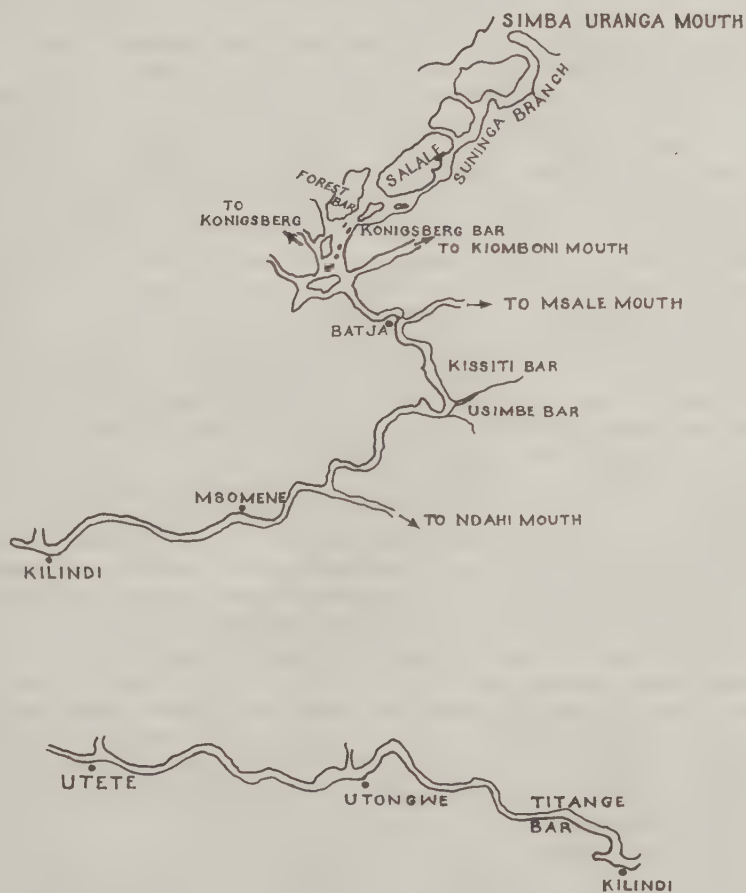
The survey party were accommodated in a small vessel called the *Bajune*⁽⁸⁾ and had the use of three motor boats. In mid-February they proceeded with *Mersey*⁽⁹⁾ up to Salale and, after erecting tide poles there and requesting the Army to keep rise and fall records at Utete, *Bajune* commenced the survey.

The river at this time was seven feet above the dry season level and rising steadily, reaching sixteen and a half feet above shortly after mid-April; the former height was taken as datum for the survey. The current averaging three was in some places as much as five and a half knots but the variation was not necessarily connected with the rise in the river, depending rather on the width at any place and becoming further variable where overflowing of the banks occurred; also where the flood caused sand to collect, the bed of the river rose with the water. The work was carried out by taking compass bearings of conspicuous objects from the sounding boat, basing distances on the width of the river measured at intervals with a measuring pole and sextant angles, a theodolite being used as soon as the banks became more defined. A line of soundings was taken across the river every few hundred yards with additional soundings when necessary to determine the channel. Tide poles were erected at the limits of shoal areas, and buoys and beacons placed to mark the channels, but many of these were either washed away or rendered useless by the frequently changing conditions in the river.

On the third day the survey having reached the head of the Masale entrance just above Batja, the *Bajune* returned to Sallle (about ten miles) in order to coal from *Mersey*, both ships proceeding the following day up to the completed limit when the work was recommenced. Up to this point the river had been uninteresting but now the thick mangrove lined banks gave way to open country where, across the reed fringed lower banks, grass plains dotted with trees and bush, distant mountains and habitations with surrounding cultivation could be seen. Also the flood stream was no longer felt to any extent.

Msomene, about twenty-six miles from Salale, was reached in another three days and the *Mersey* was piloted there without much trouble although the *Bajune* had grounded on the Usimbe Bar some miles below. This was *Mersey's* limit and her arrival caused some consternation amongst the natives as no vessel of her size had hitherto ascended so far. From here therefore the *Bajune* had to take her own precautions against the possibility of attack, consisting of an early morning search of both banks ahead by an armed motor boat before work commenced and posting Askari sentries in the ship's vicinity at night. Each evening, having proceeded to the limit of the completed survey and made fast to the bank, the boats returned and plotting the day's work began, often continuing until very late. Despite considerable trouble and delay experienced through the boats' propellers becoming fouled by floating sud, etc., the work which was on a three-inch scale now progressed at an average rate of six miles a day.

ROUGH SKETCH MAP
OF THE
RUFJI RIVER



As the survey advanced so the terrain altered with the higher level of the land and habitations increased. Kilindi, a large settlement where both the main Dar es Salaam-Kilwa ferry and an overhead telegraph cable crossed the river, was the next place of note being also the place which the *Königsberg* had hoped to reach. Further on Titange Bar was come to where, as at the Usimbe Bar, many shifting shoals were encountered, and in spite of the greater width of the river at these places (up to thirty yards) the available channel was often less than half. At Utongwe red cliffs were to be seen on the now higher south bank, huts were built on piles, and the land was more highly cultivated.

Utete, about forty-five miles from Msomene, was reached within eight days of arrival at the latter. As the final bank was rounded towards the close of the day the large fort-like ex-German Boma, situated on rising ground overlooking the river, was sighted by the boats' crews a mile or so distant. It was in use both as general headquarters and hospital and the garrison already on reduced rations warmly welcomed the party, but unfortunately the *Bajune* had not been able to load provisions owing to the necessity for all available space being required for coal. The General Officer Commanding and Senior Naval Officer were immediately signalled, however, that the survey had been completed. *Bajune* returned to Msomene to coal and provision from *Mersey* and transfer the survey party, except one officer who remained to watch the river for any changes.

Early in March the *Mersey* commenced her return passage which was expected to be more difficult than stemming the current and was so. The first experience was at the Kissiuite Bar, requiring a right angle turn across the river through a narrow channel between sandbanks, when she failed to turn in time and grounded and although coming off again without trouble was swung bows up stream. Unfortunately the river was narrow at this point and the ship had to be piloted stern first for some distance down stream before it widened sufficiently to swing her. At sharp bends bumping the banks was unavoidable owing to her length and beam, but at Forest Bar she failed to take the bend and brought up amongst the mangroves. Reaching the sea without further incident she reported to the Senior Naval Officer (H.M.S. *Talbot*) off Niororo Island and then proceeded for Dar es Salaam.

Thus the survey was completed in about a fortnight under strenuous conditions necessitating working by day in the full heat of the sun, either the mangroves or the height of the banks denying any possible breeze, and with repose at night disturbed by the noise of hippos and the pestering of mosquitoes. Almost all the survey party and half the *Mersey's* complement contracted malaria. Great care had to be exercised also in the erection of marks owing to the presence of numerous crocodiles.

In the meantime the transport *Mafia* had been ordered to prepare for the voyage to Utete. Leaving Dar es Salaam with passengers and stores one day towards the middle of March she reached Salale after dark the same evening and Utete on the evening of the sixth day, from which it may be inferred that the voyage was not accomplished without difficulty; in fact the attendant risks were well realized and only undertaken in view of the urgent need.

The height of the river was about the same as when the survey was completed by *Mersey's* navigator who was embarked in the *Mafia* as pilot. The first trouble occurred at the Usimbe Bar where she had to be hauled off after vainly endeavouring to force a passage at full speed and, before success was achieved, cargo had to be discharged to the full capacity of *Bajune's* ships' boats, and some pontoons which were part of the cargo, thereby reducing the draught to eight and a quarter feet. Proceeding again after reloading all went well until at Kilindi the overhead cable had to be cut and replaced by a submarine cable brought for the purpose. Finally she grounded on Titange Bar but here a new channel was soon found and marked. Cheering crowds of natives were gathered at the villages *en route*.

The return voyage commenced in the morning four days later, the ship having embarked sick and wounded. Despite encountering fog just below Utete, and being delayed whilst a new channel was found owing to the shifting of the Bar at Usimbe, Salale was reached in under ten hours.

Mafia's second voyage to Utete took two days longer than her first and began at the end of March when the river had risen considerably: due to this more cargo was loaded and some two hundred and fifty troops crowded her decks.

For the first night the ship anchored above the Königsberg Bar and, as there was a likelihood of dragging on the ebb making, secured a hawser to the bank. When after a few hours she did drag, the hawser carried away before the engines could be put ahead and she was swept broadside on to the bar. There followed some anxious moments as she heeled over on impact but she settled with the falling tide and came off easily with the help of wires at daylight. Trouble was again experienced at Usimbe where the bar had shifted as usual and, although anchoring and disembarking troops to *Bajune* before trying a new channel, she grounded. It was some hours later before she was hauled off and secured to the bank where cargo was unloaded as before, a further attempt then being successful.

Titange Bar, reached at dusk, also again proved an obstacle, and as no channel could be found a not very suitable anchorage below it had to be resorted to. Next day *Bajune*, having embarked as many troops as she could, proceeded to Utete whilst *Mafia* unloaded cargo into the boats. Then, when she attempted the crossing, a critical situation developed due to her coming broadside on after grounding thus allowing a sandbank to form against her and, in spite of efforts to move her by laying out anchors, the current not only caused her to drag but the sandbank shifted in company. Eventually it became possible to get a hawser out to the bank and as her head gradually came round the sandbank washed away leaving the ship in deep water. On *Bajune's* return further troops were transferred to her and more cargo unloaded when finally she managed to push her way through a new channel.

Apart from pilotage worries owing to the difficult state of the river with the surrounding country appearing as a vast lake, increased current, trouble with steering gear, and malaria, no other set-backs were experienced and Utete was reached in another two days.

The return voyage commenced three days later with two hundred or so passengers embarked and, although the *Mafia* touched at Titange Bar, no real trouble occurred until reaching Usimbe where she had to make fast to the bank whilst a new channel was found. This caused some delay and eventually the ship had to proceed stern first, her bow being purposely run on to an island so that the current could swing her round, after which she secured to the bank again for the night and reached the sea the following morning.

By this time it was the first week in April and, in the circumstances of the rapid rise in the river, it was decided that this was to be *Mafia's* last voyage to Utete. She made two more voyages, however, as far as Usimbe where her cargo was transhipped below the bar, the *Bajune* carrying it thence to Utete.

That then completes an account worth recording for its interest not only in a past achievement but also, one ventures to think, as reminding us of the possibilities of Tanganyika's largest river. Firstly, one imagines what might be accomplished with some of the many, various, and hitherto unorthodox, types of modern craft developed through the urgent needs of another war. Such possibility, of course, is unquestionably related to the economic potentiality of this vast inland waterway, especially considering the ever present annual uncertainties caused by floods and other varying conditions experienced. Yet, secondly, one can imagine that perhaps a great deal of this could not only be controlled by scientific survey, planning and resultant engineering works, but also through such control achieving the fertilization of, and agricultural return on, large additional areas which are now of little if any economic value. The Chinese, it is believed, are already visualizing a somewhat similar project for the great Yellow River, in normal times a placid stream of prosperity but in certain spate seasons a calamitous torrent taking heavy toll in lives and property.

REFERENCES

- (1) Inaugurated not long before the outbreak of war in 1939 and thence perforce discontinued.
- (2) *Azania*: Length 150 feet, beam 29 feet, draught 8 feet; capacity 140 tons.
- (3) *Mafia*: Length 161 feet, beam 30 feet, draught 9½ feet; capacity 200 tons.
- (4) *Königsberg*: Length 359 feet, beam 46 feet, draught 17½ feet. She actually reached Batja in an unsuccessful effort to make Kilindi, prior to returning to find her final resting place.
- (5) *Tomondo*: Length 75 feet, draught 1½ feet. R. de la B. Barker in *Tanganyika Notes and Records*, Vol. 4, October 1937, "The Rufiji River", states that the *Tomondo*, sunk by British shellfire in 1917 at Ngahri eighty miles from the coast, was repaired in 1928 and operated again (by Kilimani Estate) until the 1930 floods, after which economic conditions did not warrant the service she supplied. (*Tomondo* was then laid up for some time at Dar es Salaam, her ultimate disposal not being known.—L.P.L.).
- (6) R. DE LA BARKER in *East African Annual*, 1940/41(?), "The Rufiji River", states that in 1927 a steamer called the *Simba* (presumably the coastal tug ex-African Wharfage Co., L.P.L.), towing a lighter, ascended to Utete during the spate season but did not collect enough cargo to warrant a repetition of the enterprise, and that, subsequently, a small steamboat called the *Anna* tried the navigable waters of the Rufiji but ran aground just below Kilindi and remained there until being refloated the following season when she went off to Tanga where her Greek owner was employed.
- (7) *The Africa Pilot*, Part III, 1939, states that in 1892 the Rufiji was ascended by a German officer, in a steamboat drawing 5½ feet, who reached Kunglio (over seventy miles in a direct line westward of Msomene) whence further progress was stopped by the Pangani Falls slightly above it.
- (8) *Bajune*: Length 105 feet, draught 6 feet.
- (9) *Mersey*: Length 265 feet, beam 49 feet, draught 6¼ feet.

Three Tales

Translated from Chifipa by D. H. A. Bell

I.—THE HARE AND THE PEASANT'S WIFE

ONCE UPON a time there was a hare who went and finished off all the groundnuts in a peasant's field. So the peasant carved a tree in the image of a woman, smeared it with bird lime, and then stood it in his field. In the evening the hare arrived and he looked and looked. Finally he said, "Perhaps it is a man or possibly a woman", and the hare said, "Good evening, Miss", but the image didn't reply. So the hare went right up to it and again greeted it, "Good evening, Miss", but the post made no reply. Then the hare said, "This girl has breasts", and he caught hold of her. But the bird lime gripped the hare by his arms and legs and then his whole body. The hare wailed loudly "Miss, you've caught me completely", but there was no reply.

When it was light next morning the peasant arrived and addressed the hare, "So you're a cunning hare", and then he said to himself "Perhaps the hare is dead": but in fact it was only shamming. The man took the hare, rolled it in a grass mat and tied it up with string. He gave it to his son, saying, "Take it back to the village. On arrival give it to your mother and tell her to cook it". His son replied, "Yes, father", took up the bundle, and put it over his shoulder. He'd got hardly any distance away when he felt the hare shaking in the bundle. Then it addressed the child; "My boy, what did your father tell you?" The boy replied, "Father said to me, Carry this hare back to the village. On arrival give it to your mother to cook, so that when I come home in the evening I can eat it". Then the hare said to the boy "You're a liar: your father said nothing of the kind. What he said was this, 'Take this hare. On arrival in the village hand it over to mother and let her heat water for him to bath. When he has bathed she should anoint his body with oil. When he has been anointed with oil let her take him to her bed. After he has lain with mother let her take the family cock and slaughter it for the hare to eat. When I arrive in the evening I want to find that it has been thus'." But the boy replied, "Father never said anything like that. You've got it all muddled". So there they sat arguing the point and in the end the boy said "Perhaps I've forgotten what father said to me." Then they entered the village.

On arrival the boy spoke to his mother thus: "When father handed over this hare to me he said, 'Take it to the village and when you get there tell your mother to heat water for a bath and when he is bathed she should anoint him with oil. When she has done this let her get into bed and lie with the hare.

Afterwards she should kill the family cock so that he can eat till he is replete. In the evening on my return I want to find that she has done all this'. And the wife said, "Did your father really tell you this?" And her son replied, "Yes, that's exactly what father said". So the mother went and boiled water for the hare to bathe, anointed him with oil, got into bed with him, and finally killed the family cock for him to eat. When the hare had finished eating he climbed up into the rafters and lay down there.

Very shortly afterwards the peasant returned from his field. He had been hoeing and he was very tired. On arrival he deposited his load of firewood and asked admittance. Those in the house said, "Come in", and then, "How did the hoeing go?" He replied, "Alright". The woman put porridge over the fire to cook. She stirred and stirred and then dished out the porridge and beans for her husband. But her husband said, "I don't want to eat beans to-day. Where's that hare which I sent ahead so that I should find it ready for me". And the hare who was in the rafters heard him. The woman asked him, "Which hare? Who brought it?" The man said, "Didn't I give it to my son, saying 'Take it to the village'?" But the mother said, "Was this hare alive or dead?" The man replied "I tell you the hare was dead." His wife said, "Are you lying?" Then her husband turned to their son and asked him, "My child, what has happened?" The boy said, "When you gave me that hare you said, 'Take it to mother and when I arrive in the evening let me find it ready cooked,' but before I'd reached the village, indeed I'd gone hardly any distance at all, I felt it moving and said to myself, 'Perhaps it's alive but if I take it out to kill it perhaps it will run away and then father will thrash me'. Then the hare spoke to me saying, 'What did your father tell you to do?' So I explained to it as I have explained to you. Then the hare said, 'Don't you listen carefully to what your elders say to you? Whilst your father was giving his instructions wasn't I listening too? What he said was, 'Take this hare to your mother and when he arrives let her boil water for him to bath, anoint him with oil, get into bed with him, and kill the family cock for him to eat'. That's what the hare said when he was wriggling in the bundle." And the old man said. "O my son, that hare was just deceiving you": and the child replied, "Was he really?" When the father asked him again, "Has the hare eaten the cock?" he replied, "Yes, he's eaten it", and then, "Has he been in the bed with my wife?" he replied, "Yes, he's been to bed with her." Then the man asked, "Where's the hare gone now?" and his son replied, "He's up in the loft". And the man shouted, "bring a ladder". They brought it and he shouted, "Let me get at him". But that hare had made off hours and hours ago. So they went hunting him with dogs but in vain finally they returned to the village. Then the men called all the villagers together by beating a drum and they collected at his house. The peasant addressed them thus. "Never before have I seen a hare which spoke, ate porridge, and slept with a man's wife. Certainly I have experienced extremely bad luck".

And all the people were astonished to hear of such goings on.

II.—THE PIED WAGTAIL, THE HYENA AND THE LION

Once upon a time there was a Wagtail, a Hyena, and a Lion. The Lion and the Hyena were talking together and they said, "Let us go to the Chief". And the Hyena said, "The reason why I am going to the Chief is that I want to beg some claws, for I cannot catch hold of anything which is high up as I haven't any claws." And the Lion said, "My trouble is progeny, for in a whole year I only have two cubs. I want the Chief to increase this to six". All this while the Wagtail was sitting on the roof of a house and he said to himself, "The bastards, so that's how it is".

Next day when it was light they got up and went to the Chief and the Wagtail went too, the others following on the ground. When they arrived at the Chief's he asked them what they wanted. He said to the Hyena, "What's brought you here?" and the Hyena replied, "It's claws which have brought me here. I have to knock down trees by butting them with my head, for I've no claws". And the Lion said, "I've come about my offspring. Two cubs a year is not enough; I want six". Then the Wagtail said to the Chief, "Don't listen to them; if you allow the lion six cubs every year what's going to become of the human beings. As for the Hyena he is a bad enough thief as it is; give him claws and he'll be stealing all the people's belongings until there is nothing left". And the Chief's Court said, "That's right. We agree with the Wagtail's advice. You can't grant either of them their requests". Then the Hyena and the Lion turned to the Wagtail and said, "You mind your own business". But the Wagtail replied, "I'm a village dweller. If they break up the village and move elsewhere I'll be following them. If I go into the bush what shall I do there?". Hearing this the Court said, "Be off with you—the villager and the Chief have refused and they've talked sound sense, both of them."

To this day who has seen a Wagtail in the bush? Nobody. Since the first day of God's creation he has lived in the village and the Hyena and the Lion in the bush. The Lion has not yet borne six cubs a year, but only two, nor has the Hyena claws like a Lion.

III.—THE OLD MAN AND THE DJIN

Once upon a time there lived a djin and an old man and they made a bargain with one another. The old man spoke to the djin saying, "Venerable Spirit, if I give you my three children to be yours, what will you give me in return?" The djin replied, "You will be my friend for life and further I will give you all my wealth". The old man said, "That will be excellent". So the djin took hundreds of shillings and gave them to the old man saying, "Now go and fetch me your children". But the old man replied, "I will give them to you another day".

The djin waited without getting them. Finally he went to the old man's hut, which was situated in his fields, and he said, "I will wait for him here until he arrives. I do not want his children for he has been deceiving me for such a long time." The old man came to his field and when he saw the other he greeted him without approaching closely, saying, "Greetings, O great big djin". Having spoken thus he said to himself, "That djin is angry". So he ran away and the other pursued him. When the old man reached a borassus palm he started to sing, "Let me climb up and jump from branch to branch in the borassus palm. I must hurry up into this tree. In the borassus palm I'll beat this djin. I must hurry up into this tree." Thus the old man. Then he climbed up the tree and the djin remained below on the ground. And he stayed there for three days. As for the old man he suffered dreadfully from hunger and he realized that at this rate he would soon die. So he said, "Let me go down," and he descended from the tree. But the djin killed him and ate him.

To pretend you will give your brother something in return for what he gives you and then to deceive him is bad. So when the old man was dead his children refused to inherit the money which the djin had given him, as did their mother and all his family.

Collecting Live Snakes for Scientific Purposes

By C. P. J. Ionides

THE FOLLOWING methods have been employed to collect live snakes for scientific purposes in this range :—

1. *Pythons*.—Three or four men are required according to the size of the snake. The best time for this is during the cold of early morning when all reptiles are sluggish. If the python is in a hole it is necessary to dig it out. The technique is then as follows in the case of a big one :

1. Number one seizes the neck with his hands and lifts.
2. Number two seizes the tail with his hands and lifts.
3. Numbers three and four take the body and straighten it out.
4. The reptile is then conveyed to the receptacle in which it is desired to place it. This may be a sack, box, or bark *kungwa*. It is then stuffed in tail first and the head is only released when the snake is well inside. The receptacle is then closed or tied up.

2. *Mambas, Cobras, Garter Snakes, Boomslangs and Vipers*.—A long forked stick is employed with a noose on the end of it which may be drawn tight by pulling the string with the hand. If the head of the snake is raised the noose should be gently slipped over the head and drawn tight round the neck. The snake may then be gripped by the back of the neck, the noose removed, and, holding by the neck with one hand and the middle of the body with the other, the reptile may be removed to a box or sack and put in. If the head is on the ground the forked end of the stick is used to pin the snake behind the head and it is then caught as above. If the quarry is in a hole, it must either be dug out and noosed or pinned ; or noosed in the hole.

In the case of a Mamba, it should be watched carefully for any signs of anger before being attacked. Should it adopt an aggressive attitude its capture should not be attempted.

In the case of a Cobra goggles should be worn as some species of Cobras "spit" their venom at the eyes.

Boomslangs and Garter snakes can be noosed or pinned without much risk but care should be taken that they do not bite as they are venomous.

Vipers of the genera *Bitis* and *Causus*, that is, Puff Adders, Gaboon Vipers, and Night Adders, are easy to catch by noosing or pinning but the heavier Puff Adders and Gaboon Vipers should be grabbed by the body immediately they are noosed to prevent them throwing themselves about and damaging themselves. *Atractaspis* or Burrowing Vipers, small smooth harmless looking black snakes, are very quick to strike and, being highly venomous, should be treated with caution.

3. *Other species.*—These if correctly identified may be taken with forked stick, noose, or bare hands without any particular precautions as their bite is not dangerous.

4. *Precautions to be observed.*—Snakes should be handled gently as they are delicate creatures and easily damaged. Puff Adders even when tame are liable to fits of surliness and should not be trusted. Some species such as Garter snakes, Hissing Sand snakes, and Sharp-nosed snakes become tame almost immediately if gently handled and may be kept as pets in the store to deal with the rats, as Garter snakes are venomous however it is as well not to put them where they may be trodden on.

5. *Feeding.*—The larger snakes may be fed by inserting a funnel in their mouths and giving them an egg flip. Hissing Sand snakes, House snakes, Stripped-bellied Sand snakes, and Sharp-nosed snakes usually feed readily in captivity on rats and lizards. Other snakes, such as Night Adders, are said to do so too, but I have not succeeded in inducing them to myself. Smaller snakes should be sent off quickly as it is almost impossible to feed them. All snakes can exist for a long time without food.

MAKONDE SNAKE "DAWA"

A half Makonde half Mwera snake "Fundii" named Mohamedi Mloleji is in my employ. He frequently vaccinates himself with his "dawa" and I myself have been vaccinated a number of times. I have tested the effect of this "dawa" by allowing myself to be bitten by a small Night Adder (*Causus rhombeatus*) about nine inches long twice in the evening and twice the next morning. The results were less painful than those of a bee's sting and the only after effect was a small pimple at the site of each of the punctures which disappeared in a few days. Mohamedi Mloleji himself has been bitten by a juvenile Cobra (*Naja Nigricollis*), a quarter grown Puff Adder (*Bitis arietans*), and several Night Adders (*Causus rhombeatus*) on the hands in my presence and the only result has been a local swelling which has disappeared in a day or two.

One day on safari three large Mambas (*Dendroaspis angusticeps*) were located, one just outside a hole under a rotten tree stump and two inside the hole. This hole had two entrances, one large, one which divided into two just inside the main hole, and one smaller one on the other side of the stump. The Mamba outside the hole was pinned and placed in a box. Mohamedi Mloleji then started poking about at the larger hole to try to drive the snakes out of the smaller hole where I awaited them with a noose. Eventually Mohamedi Mloleji succeeded in noosing one of the Mambas in the hole and pulled out the head. Thereupon I came round, grasped the head, released the noose, and tried to pull the snake out of the hole, but was unable to do so as it had coiled its body round a root. The third Mamba then put its head out of the second entrance of the same hole and threatened me with wide open mouth. I therefore handed back the head to Mohamedi Mloleji, told him to hold tight, and tried to noose the threatening snake which then retired into the hole. In a few minutes its head emerged from the smaller hole on the

opposite side of the stump where I noosed it, grasped the head, released the noose, and drew the snake out of the hole. Mohamedi Mloleji then replaced the noose on his Mamba's neck, gave the stick to a porter, and told him to keep the noose taut. There being no other Mamba in the hole, he then went to the opposite entrance, put in his hand, uncoiled the snake from the root, and, the porter pulling, they manipulated it out. Mohamedi Mloleji went back to remove the reptile from the noose. Unfortunately the noose had worked loose and grabbing the Mamba carelessly he was bitten on the index finger of the left hand by one fang which went in fairly deep and drew blood. He drew my attention to this but, as I also had my hands full of Mamba, I could do nothing to help. I asked him if he felt able to bring his snake back to the camp as, if he should be in danger of fainting, we should have to kill it. He replied that but for pain at the site of the puncture he felt quite fit. We, therefore, returned to camp which was only ten minutes walk away and packed the Mambas in small bark *kungwas*. It being then quite futile to use permanganate as the poison had already gone into the system, I placed two tourniquets, one at the base of the finger and one on the upper arm a little above the elbow. This was little more than a matter of form as it was already too late. I instructed Mohamedi Mloleji to release the tourniquets every twenty minutes or so and to use his own "dawa" as I could do nothing for him. He, therefore, made several incisions in his hand and wrist which bled fairly freely and rubbed in his "dawa". I visited him periodically for the rest of the day and removed the tourniquets completely after three hours. Except for a little diarrhoea and pain at the site of the bite he seemed to feel no ill-effects and ate a hearty meal. At about nine o'clock at night, nine hours or so after being bitten, Mohamedi Mloleji had a violent shivering fit which lasted about five minutes. This passed off and he went to bed and slept well. In the morning he was up and about and, except for a slight numbness in the hand which lasted a couple of days, he felt perfectly fit and no further after effects have been experienced since.

An Ostrich Scouting for Wildebeest

By R. de la B. Barker

DURING OCTOBER 1945, I visited one of the dry-season gum-collecting camps on the Wembere steppe or what a veterinary officer here more specifically called the Wembere depression. An Arab trader at another gum market, Mkomero, sent me two natives to show me where I might find game to shoot so that a meat ration could be shared round in the seasonal camps where cattle are not regularly slaughtered.

At Ngongora camp about twenty miles south of Sekenke men coming in the camp from the gall-thorn wilderness around, with their day's pickings of gum, were questioned about game. Those from the north said there was a herd of wildebeests or gnus about four miles north. We were told to look for a cock ostrich and if we saw him to make for him and look about for the wildebeests who were never far from the tall black-and-white plumaged bird, an easier object to descry at a distance in this sun-drenched land of mirage and scrub, than the comparatively squat buck, who might be lying down in the shade during the heat of the day or the afternoon when I set out to seek them.

A gum gatherer with a long spear eagerly flanked my party, casting his eyes afar for the quarry. Soon he beckoned and showed us at a distance the black blur on the heat-quivering distant scene which was, he said, the cock ostrich. We made for the object and so it proved.

The big bird stood just like a sentry about two hundred yards to the east of a herd of about twenty gnus who were part standing and part lying beside a largish tree in the middle of a grassy space or mbuga about a mile wide. We approached at a tangent not to alarm the buck and after getting within about three hundred or so yards I tried a careful shot over forked sticks held in my left hand against the fore-end of the rifle while I sat on the ground. A gnu fell and the others went off with their curious rocking gait and disappeared into the thorn cover north. The ostrich trotted off north-east but stopped at the edge of the mbuga or clear area.

When one of the guides approached the fallen gnu to cut its throat according to Mahomedan custom the beast jumped up and lit out across Africa at the most sensational speed. At fifty yards he stumbled a complete somersault, horns into the ground chucking up dust and dirt, hairy tail and mane tossing with all the spectacular effect of a cropper. But he was on his feet again in a flash and off at the same furious speed to repeat his head-over-heels stunt again within forty yards. He did another quick recovery and another spurt of speed and yet another tumble before getting on his feet again and disappearing into the thorn-scrub cover, together with the ostrich for whom he had been making.



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QUARTZ CRYSTALS FROM TANGANYIKA

We followed and soon came on the big black-feathered object the ostrich made on his tall legs but could see nothing of the gnu. Scouting around we finally sighted the rest of gnus at about a mile distance eating the grass with their heads down, backs and humps only visible over the grassy vegetation.

The ostrich was stalking towards them. Then when I got within likely range I felled a gnu with a shot from the side of a tree. The herd cleared off. The guide went to *hallal* the fallen buck and when looking for it another gnu sprang up from the grass and sped after the herd and joined it, with this time no somersaults. It all looked as if that ostrich piloted the first shot gnu to his pals.

CORRIGENDUM

Tanganyika Notes and Records, No. 19, June 1945 :

"The Mudvolcanoes of Moa, near Tanga": Page 6, line 3 : The first sentence should read :—"A second visit to the locality on the 4th of September 1944, revealed some changes. The rains had filled up the pools . .".

Piezo-Electric Quartz in Tanganyika

(*Tanganyika Notes and Records*, No. 19, June 1945)

We are able to publish in this issue a photograph of some of the quartz crystals from Chamtui described by Dr. B. N. Temperley in his article This photograph illustrates an official report on the crystals by Quartz Crystal Control, Ministry of Supply, London.

NOTES

The Mountain Club

THE KILIMANJARO section of the Mountain Club of East Africa is proposing to revive its activities. Would any readers of *Tanganyika Notes and Records* who are interested or who have information of routes up the mountain during the years of war, kindly communicate with the Honorary Secretary, P.O. Box 66, Moshi.

