

TANGANYIKA NOTES AND RECORDS

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Obituary Miss Jessie Robertson

MANY READERS of *Tanganyika Notes and Records*, especially those who have lived in Dodoma and Dar es Salaam, will learn with regret of the death of Miss JESSIE ROBERTSON on the 28th July of this year in Nairobi Hospital. An inveterate wanderer, Miss Robertson, who was a trained geologist, travelled during the course of a long life in many remote parts of the world. A good German scholar, she rendered valuable assistance to the Tanganyika Geological Survey in searching and translating official geological and mineralogical records of the former German regime. In the aggregate Miss Robertson must have spent a considerable portion of her life in the East African territories, and was *persona grata* with the staffs of their geological surveys.

The independence and courage of this frail old lady could not fail to impress all those who had dealings with her.—F.O.

The Tribal Insignia of Heru*

By W. B. Tripe

1.—THE GREAT SPEAR, M'KALINGA

PROBABLY no article of tribal insignia has played a more important or significant part in the life of a tribe than the great copper spear of Heru known as M'kalinga. Mr. Claude Grant, a former District Officer, who achieved remarkable results as an anthropologist, naturalist and cartographer in the years following the last war, wrote in 1922: "This Spear (M'kalinga) is in the charge of a man named Nkatula, and no one knows where he keeps it. Once a year the spear is produced and obeisance is paid to it by all, even the Mwami (chief) clapping his hands to it. The spear cannot be stolen as it cannot be lifted by a thief, though any well intentioned person can handle it with ease". No European had ever seen it.

When I went to Uha in 1929 I was naturally, being a keen amateur anthropologist, very anxious to know more about this remarkable spear. In the course of a year I acquired a great deal of interesting ethnological information on the Ha people but I learned very little more about M'kalinga except that he (for they personify the spear) was of copper and very beautiful to look upon. When I asked to see the guardian Nkatula I was met with polite but firm evasion. Indeed by the time I left Uha in 1930 I was beginning to think that Nkatula and his spear were mythical. However, it was my good fortune to go back to Uha in 1937 and I again returned to the charge. My friendship of over eight years with the Chief, Mwami Gwassa IV, now stood me in good stead; the old man Nkatula was dead and had been succeeded by his son Gomura; Gomura, the Mwami thought, would be more amenable in disclosing the mysteries to a mere European. So one bright but cold afternoon Mr. J. V. Shaw, Assistant District Officer, and myself, armed with cameras, note-books, tape measures and other paraphernalia, waited in the pleasant fields adjoining the sacred grove of Jebera on the high open plateau of Heru. And we waited rather anxiously. For nothing seemed to be happening. All would be well, the Mwami assured us. But Gomura was not to be hastened and after a wait, perhaps of an hour, we were conducted into the grove. There in a small open space, speckled with sunlight and standing on a *giha* mat, gleamed the fabulous M'kalinga surrounded by his satellites.

M'kalinga is on view during the great annual festivals and ceremonies: the blessing of the crops, the harvest thanksgiving (*Ndolegwa ya Mpeche* which includes the *Tambiko la Mwami* who is identified with the deity *Imana*, the vehicle of all things both good and evil); and on the death or installation of a chief. The spear is closely guarded at all times and when on view is dug

*For a fuller understanding of the insignia's significance the reader should consult: *Man*, Article No. 54, 1935, and Article No. 21, 1939.



Fig. 1—"There in a small open space, speckled with sunlight and standing on a giha mat, gleamed the fabulous M'kalinga." (Second from left.)



Fig. 2—"Lying on the Leopard skin were the Itaba and Mulinga wa Imana, 'God's Bracelet'."

into the ground though a *giha* mat (*kilago*) as described. All persons present must pay obeisance to him. This is synonymous to paying obeisance to the deified Mwami. While doing so all people must pluck grass and strew it on the *kilago* in front of M'kalinga. When M'kalinga is returned to his hut at Jebera by the guardian, the grass is removed to an enclosure in front of the three fig trees personally sacred to the reigning chief. These trees actually form the grove at Jebera and are planted at the accession of each Mwami.

Fig. 1 shows the sacred spears with their guardian Gomura s/o Nkatula. Left to right they are : Kabagabaga (in the hand of the guardian); M'kalinga; the agent of M'kalinga; and M'vulgera. Kabagabaga is the personal spear of the guardian. His office is hereditary and the spear passes to his heir on his death. The offerings of grass may be observed in the bottom right-hand corner of the illustration.

(Details of M'kalinga : Total length seven feet nine inches, length of blade two feet six inches. The copper blade is of fine workmanship; the staff is of wood of the *mtakula* tree, now very rare in Uha.)

2.—IN THE HEART OF THE GROVE

Penetrating to the very centre of the grove we were received by the guardian of the insignia (other than the spears and drums). This was a woman Tirondegwa, mother of the Mwami, a tall and typical Tusi with light skin, slender limbs and beautifully modelled hands and feet. There in a dark hut where only a little light filtered in through the narrow doorway were spread out a leopard skin and a toga; lying on the leopard skin were the Itaba and the Mulinga wa Imana, "God's Bracelet".

The skin, which is replaced when worn out, must always be taken from a beast who has first killed a man. The skin is said to have been replaced once since the inception of the present dynasty; the toga is woven from the bark of the sacred fig (Mirumba).

Both are worn by the Mwami on certain ceremonial occasions; both were very old and tattered.

The Itaba, a napkin-ring-like band of brass with two dotted bands, can only be worn by the Mwami; no person is permitted to copy it. In order to wear it the Mwami would have to have it clamped on by a smith. However, it is unlikely that any Mwami has worn it since Kimenyi I came down from the mountains of Urundi and established his dynasty in Uha.

So interesting is the Mulinga wa Imana that it really deserves an article to itself. I am so anxious, however, to have recorded what I have been able to find out about this remarkable object that I am tempted to write more about it than perhaps is really justified in an article of this kind.

The Mulinga wa Imana, worn by the first Tusi Chief of Uha, is no different in appearance from the Mulinga commonly seen on the wrists of well-to-do Tusi and, in these days, well-to-do common Ha tribesmen.

These Mulinga are of copper and weigh from two to three pounds. The copper is said to have been brought into Uha by people called the Baramaliza. Just who these people were or where and how they got their copper is not known. Some hold the theory that they were Arabs but for various reasons this is unlikely. In present-day manufacture a smith melts down four to six shillings' worth of German *hellers* and it is usual for the purchaser to proffer to the smith of his choice a pot of beer to ensure a really beautiful result.

The "nose" is called the *zuru* and is always worn pointing outwards so that the owner can admire it. The chased designs round the bracelet itself are also called *zuru*; the bracelet, excluding the "nose" *zuru*, is called *warutuku*.

There is a legend that very long ago Mulingas were worn merely as ornaments. A man who owned one fell ill and died so that his son inherited the prized Mulinga. But he in turn fell ill, and being alarmed, consulted a Swezi diviner regarding the cause. The diviner asked him if his father had worn a Mulinga and on finding that his father had done so he advised the man to wear his on the left arm instead of the right as thereby the spirit of his father would be appeased. Thus the wearing of the Mulinga on the left arm is always connected with spirits; otherwise the object is merely ornamentation. The son of a deceased father is often advised by a diviner to wear a Mulinga on the left arm.

The wearing of a copper Mulinga is the exclusive privilege of men while the wearing of the brass Mulinga is the exclusive privilege of women.

The Mulinga wa Imana is particularly interesting because our visit to the grove disclosed for the first time that, in theory at least, no person whatsoever may acquire or wear one without applying to the guardian through the Swezi cult of witchdoctors and diviners to whom a fee must first be paid. Having done so the applicant must then gain admission to the insignia hut and contemplate the Mulinga wa Imana for a short time. This done he must make offerings (*tambike*) to the spirits of all departed Waami (chiefs) and to the reigning Mwami; and not till the Baswezi declare all spirits to be appeased dare he have the coveted Mulinga clamped on to his wrist.

This is a good example of the Tusi Chiefs' ability to bind their alien subjects to them by a multiplicity of ritual and in the process to make them pay handsomely for the benefits received. It is typical, too, how they were for a long period able to retain the allegiance of powerful groups like the Swezi by extending to them tremendous privileges which they have abused and continue to abuse.*

The guardian of the insignia (other than the spears and drums) is always the mother of the Mwami. Her sign of office is the Lugoli, a headband of plaited reed grass two inches wide with small triangles dyed brown at intervals

*I am indebted to Mr. J. E. S. Griffiths' notes in the "Kasulu District Book" for some of the information on the Mulinga.



Fig. 3—"The Ancestral Drums of Heru beating a lusty welcome to the Mwami."

of three inches. Tirondegwa lives a secluded life in the grove at Jebera; her only daily companion is the Mwami's spirit wife.

3.—THE DRUMS

Emerging from the grove we saw the ancestral drums of Heru beating a lusty welcome to the Mwami.

Not all these are the original drums. Mr. Leahey, a former District Officer, often affectionately called the "King of Uha", in editing and collecting various notes by Administrative Officers on the subject wrote: "The drums of the Mwami were originally in Heru, at Kabona, but the people of Ushingu stole them one night and took them to Nyange in Ushingu, where to-day they are kept in a special hut, tended by an old woman who uncovers them each morning and covers them up at night. It is said that Ruhinda, son of Kimenye I, caused these drums to be stolen at the time his father was sick. When Ntale came to be Mwami it was found that these drums were missing. All the Wami up to Ntale IV tried to get the drums back but peaceful methods failed. After the failure of Ntale's war in Luguru and on his death Ruhinda refused definitely to return the drums and styled himself Mwami of Heru saying that the drums had been captured and the Mwami of Heru beaten in war.* These drums are called respectively Lugabo the male drum, Mazunzu the female drum and Nyabatimo the child drum. The keeper of the drums must either be a young girl who has not menstruated, or else a woman vowed to chastity or one who has ceased menstruating."

And there they remain to this day.

From right to left in Fig. 3 are to be seen: Buhabugali, the great drum of Uha; Imoheru, Insama, Ipokazo, Nterusa, Ipokazo and Ibanza. Mutaka and Muheba are in the hut to the right of the great drum (not seen in the illustration).

I have already referred to the *Ndolegwa ya Mpeche* which is perhaps the most important ceremony of the year in Uha and of the utmost cultural and social importance. Often called the Harvest Festival it is really much more than this; indeed at one stage it ceases to be called *Ndolegwa* and becomes purely *Tambiko la Mwami* (offering to the chief). It is, in fact, another device of the Tusi overlords to bind the Ha tribesmen to the alien system. Here the Ha and his wife and children give public recognition and thanks to the deified Wami for all the good things of life. And of course the ancestral drums play a great part in the affair.

The ceremony is always held during the millet harvest when the moon is in the last quarter so that the first week in July often witnesses the event. The Abagabo, councillors to the chief, decide the date and the voice of the ancestral drums booming out over the rugged highlands calls the tribesmen in

*Ruhinda seems to have been a thorough going rogue or a competent statesman or both; it is also related that he attempted to steal M'kalinga who, of course, at once became too heavy.

by the thousand to Buseko Mountain where the people, in the old days as many as eight thousand at a time, will dance, as E. A. Leakey put it, "for an octave of eight days". Leakey wrote: "The centre of attraction is the line of drums which are very efficiently played, the tribesmen standing round in crowds, while others walk round and round in opposite directions, their spears held straight up. There are women too, holding hands, sometimes watching a young man do a stamp dance by himself, but generally they keep on the move."

The *Tambiko la Mwami* starts on the fifth day. The hereditary slaughterer selects a young ox in good condition, being careful to see that the ox comes willingly for sacrifice to the hut where the ancestral drums are kept. After the sacrifice the meat is dealt out to the Abakimbiri—men of the Mwami's clan—who will attend him during the *Tambiko*. The Mwami, accompanied by about seven Abakimbiri, proceeds to the village of Ntakande, hereditary brewer of the ritual *pombe*. On arrival Ntakande adorns the party with garlands of mireembe grass and the Mwami presides over the gathering. As there is a rival village claiming the same rights, the Mwami and his attendants proceed, when the *pombe* is finished, to this village where the ceremony is repeated.

On the seventh day from the inception of the *Ndolegwa*, the Mwami and his retinue return to the village of Yunguru where the final ritual has been conducted ever since the ruling family imposed itself upon the Ha. The Mirumba (*Ficus*) planted here are sacred to the Mwami and departed Waami. Now wearing the royal toga of Mirumba bark the Mwami and his attendant Kimbiri are again adorned with garlands of mireembe grass and served with *pombe*.

As the ritual proceeds departed Waami are called upon by name. Though their guidance is not sought the Waami are begged to bring about the future good of the tribe. (A significant point about this ceremony is that this is perhaps the only occasion upon which it is ever safe to name the dead in public. If you ever have to ask a Ha the name of his father do not be surprised, should his father be dead, if he hesitates and then lies blandly.) During this final ceremony M'kalinga, now decorated with the tail of the sacrificial ox, is placed before the Mwami who holds in his left hand the Mulinga wa Imana—God's Bracelet. On his return home next day the Mwami receives the smaller of the ancestral drums which are carried before him, lengthwise, by the Abakimbiri attendants.

And so ends another *Ndolegwa ya Mpeche*.

As we descended that night to the old fort at Kasulu, I thought a little sadly, how, in the course of a few years, many of these interesting and wholesome ceremonies, so important in the tribesmen's lives, were assuming less and less significance for them. To-day the *Ndolegwa* attracts so few people that its celebration can pass unnoted by the handful of Europeans living near by.

The Geology of the Rufiji District, including a small portion of Northern Kilwa District (Matumbi Hills)

By G. M. Stockley

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6. The Sulphur Deposits in Northern Rufiji District.
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DURING GEOLOGICAL investigations carried out during the 1942 field season in the Rufiji District and in the Matumbi Hills of northern Kilwa District certain observations were made and the following account is a brief compilation of the writer's own notes and those of previous workers. German geologists had visited the area and their observations are referred to in the various sections.

Communications.—Communications are poor. The best road is that which connects Dar es Salaam with Utete; but the section close to the Rufiji valley is often flooded during the rainy season. The Utete ferry functions chiefly between the months of June and February. The Nyera ferry, which communicates with the western Rufiji valley, is usually ready in time for the cotton season, namely end of August to February.

Although the Dar es Salaam-Utete road is repaired by the Public Works Department, it can only be considered a dry-season track. The road to Nyakisiku from Utete is usually available for the cotton season. The Utete-Kipatimu road, which connects with both Liwale and Kilwa by way of the Matumbi Hills, is very sandy and is often heavy going. There is a road from Utete to Mohoro and Kilwa, and a number of feeder tracks connecting the main Dar es Salaam road with the coast.

Three geological maps* illustrate this article : they consist of a geological map of the district and the adjacent country; a geological map and sections of the area traversed by the writer in the Karroo region in the west, south of the Rufiji; and a geological map of the Kipatimu (R.C.) Mission area. There is also a sketch of the area including the Sulphur Deposits in the northern part of the district.

1.—GENERAL TOPOGRAPHIC FEATURES

Rufiji District is governed largely by the Rufiji River and its delta, of which the latter comprises the flats in the centre of the district extending fan-shaped

*In pocket, page 3 cover.

out to the east coast. The Rufiji descends from Ulanga District in the south-west and suddenly drops at the Pangani Rapids in its sharp curve from a north-eastern direction to that directly east. In this area north and south of the rapids there are several hills, otherwise the region of the Selous Game Reserve is flat. One group of hills, north of the river, include Hatambulo (2,170), Tagalala and Mtondusi (1,580) Hills: they are clustered together horseshoe-shaped, the bend of the horseshoe facing east. South of the Rufiji is the isolated inselberg of Luhembero (750), situated a few miles south of Mpanga: from thence to as far as Liwale District it is sandy undulating miombo unbroken by any distinctive feature.

In the south-central and north-east-central portions of the district there are two groups of hills. In the south stretching from Utete towards Kilwa District the country gradually rises to the Kichi and Matumbi Hills. These hills slope east and north-east, their steeper profiles face south-west and west. It will be shown that the rocks underlying these hills are soft Jurassic sandstones and grits. The Kichi Hills attain heights of one thousand five hundred feet and those of Matumbi as much as two thousand feet above sea-level. The valleys in the Matumbi Hills are generally steep-sided and flat-bottomed invariably covered with dense thicket forest. Miombo forest prevails in the hilly country of Kichi. The other area to the north comprises what is termed Magongo, but, although undulating country, it is much lower than the corresponding hilly country to the south. The highest point is approximately one thousand feet above sea-level. It is probable that the sandstones underlying this country are of Jurassic age.

2.—GENERAL GEOLOGY OF THE AREA

List of Geological Formations.

AGE	ROCK FORMATION
Recent and Quaternary.	... Rufiji River alluvium and deltaic deposits.
Tertiary (Neogene)	... Marine coastal sediments, chiefly coral limestones, sands and clays.
Cretaceous	... Not exposed in Rufiji District. Fossiliferous marine sediments in north-east Kilwa District.
Jurassic (<i>Matumbi Series</i> , 1,300 feet thick.)	... <i>Kipatimu Beds</i> .—Marine sandstones and grits with some argillaceous members. Fossils rare. Nine hundred feet thick. <i>Mtumbi Beds</i> .—Chiefly oolitic limestones with some sandstone intercalations (Bajocian and Vesulian stages). Four hundred feet thick.

Karoo System	... <i>Rufiji Beds</i> .—Sandstones and arkosic grits with some purple marls (Beaufort to Stormberg stages). <i>Ruaha-Hatambulo Beds</i> .—Sandstones, conglomerates, arkoses, shales, etc. (Ecca to Beaufort stages).
Basement Complex	... In Ulanga, south-east Morogoro and north-east Liwale districts. Chiefly gneiss, crystalline schists, marbles and various granulites.

The above list of formations shows that Rufiji District is occupied by sedimentary rocks of various ages. The ages of the individual formations are gained by a study of the fossil flora and fauna entombed within them. Thus the Karroo rocks, which outcrop in the western part of the district and also both in Ulanga and Morogoro districts, are characterized largely by the fossil plants so far discovered. The characteristic plants are cryptogams, such as *Equisetales*, *Filicales*, *Pterodosperms* and *Lycopods*; but the form-genus is *Glossopteris*, which dates the Lower and Middle Karroo. Karroo rocks in this area consist of lacustrine conglomerates, sandstones, grits and shales. The chief economic mineral found in the Karroo is coal (Ecca stage).

Jurassic rocks are exposed in the Kichi and Matumbi hills in the south-eastern part of Rufiji District and also in the north-eastern portion of Kilwa District. They consist of marine sediments and in this district mainly of grits and sandstones. Their age is determined from the fossils found in the extension of these rocks to the south, near Kipatimu Mission.

The Tertiary and Quaternary rocks have not been studied in any detail owing to the lack of good exposures and their poor economic value. They are, of course, of great interest to the agriculturist as they yield the rich and most valuable soils of the Rufiji valley and coastal region.

In addition to the sediments there are several volcanic dykes and plugs which intrude the Karroo rocks in the vicinity of Luhembero Hill in the western part of the district. They are trachytic phonolites and by analogy with other volcanic rocks they are considered to be of Tertiary age. Other evidence of volcanicity is the existence of hot springs in the Selous Game Reserve at the eastern foot of Tagalala Hill. Teale determined the temperature as 58°C. and noted that the water was saline. Carbon dioxide gas was evolved with the large volume of hot water.

A fresh hot spring occurs at Nyakubila, about two miles south-east of Utete Boma. The writer measured the flow and calculated that some twenty thousand gallons of water issue per hour. There is a small fall of twenty feet below the spring.

The hot sulphur springs in the Luhohi valley will be described in some detail in the sequel.

In the Kedai area, about seven miles east of Pangani Rapids, an explosive breccia, infilling a vent, was found. The material composing the breccia includes sandstones, grits and silicified mudstones and shales. It is about three-quarters of a mile long and is lenticular in shape. It strikes in a north-west direction crossing the river at a narrow point.

Geological History.—The pre-history of this region is one of lake desiccation and the gradual retreat of the sea, with repeated uplift and subsidence; the movements causing which were connected with late Tertiary or Rift Valley tectonics. After the desiccation of the Karroo lake, which then occupied the western region of the district, the incursion of the sea commenced in middle Jurassic times. The Jurassic coastline then stretched from Ngerengere on the Central Railway south-eastwards to west of the Matumbi Hills and the sea gradually retreated during Jurassic, Cretaceous and Tertiary periods, until the coastline occupied a site somewhat east of the present coast. Mafia Island was once connected with Tanganyika, probably as an extension of the Rufiji delta. Its separation was produced by the subsequent drowning of the coastal belt in late Pleistocene times.

The uplift of the African littoral was accompanied by certain dislocations which influenced much of the evolution of the earlier topography. The Pangani Rapids and the Rufiji Gorge were affected by the two north-west trending faults, situated respectively above and below the rapids. As a result of the faulting, the region, east of a line from Behobeho to Mpanga, subsided at least fifty feet, while west of Mkalinzo another subsidence lowered the country to the south-west. During these movements the river was endeavouring to carve its way down to an even grade, and the level of the flats has since encroached from Mpanga to its present position just below the rapids.

The Proto-Rufiji was thus compelled first to work north-westwards along the strike fault, above the rapids and against the dip of the rocks, and thence by way of major joint planes found its outlet direct to the plains to the east. It is probable that the eastern fault is principally responsible for the fall at the rapids; the downthrow of fifty feet corresponds to the actual difference of levels above and below the rapids.

3.—THE KARROO BEDS IN WESTERN RUFJI DISTRICT

For many years Karroo rocks have been known to outcrop in the Rufiji River area south-east of Kissaki. The Germans explored this area in some detail and it was for a long time a favourite region for big game hunting. In 1894 the German geologist Lieder traversed the northern bank of the river close to the Pangani Rapids. In the Sumbadzi River gorge close to the rapids he found two fossil plant fragments within the shales, but unfortunately they were lost. Bornhardt who followed him in 1897 mapped the area from Vuga Hill between the Rufiji and Kissaki to the Ruaha River, including areas on both banks of the river. Most of the early work has been summarized by the

writer (1936) and needs no repetition here. Bornhardt could discover no coal and judging from the geology described by him its presence was considered as improbable. The beds were considered to lie horizontally, but the base was not observed, although Bornhardt considered it to lie undisturbed upon the gneiss. By analogy with other areas it was thought to be bounded by faults. Janensch visited the area at a later date and published his results in 1927; he raised the question of a younger age for the beds lying in the Luhembero Hill country, where Bornhardt had previously discovered the presence of young Tertiary volcanic dykes penetrating Karroo rocks.

At Mkalinzo Janensch discovered some fossils in a greenish fine-grained sandstone which contained some plant remains, identified by the palaeontologist, Professor W. Gothan, as *Janenschia obscura* and at Mkumbi his party obtained the ostracod *Estheriella bornhardti*. Again at Mkumbi in the bed of the Sumbadzi River he found micaceous sandy shales with comminuted plant remains, among which were *Equisetales*, *Glossopteris* sp., cf. *Bothrodendron leslii* Seward and *Sphenopteris* sp. He also records that Lieder was the first to discover at the Sumbadzi River close to its junction with the Rufiji soft laminated sandstones, somewhat micaceous, with small remnants of plants most of which were stems of *Equisetales*. He states that "Bornhardt observed in the valley depression of the Sumbadzi, clay-shales and laminated sandstones, which appeared to him to belong to the lower beds". The writer's work in the Vikindu village area on the Ruaha, a few miles to the south-west of the junction of the Sumbadzi and Mkumbi rivers, corroborates this correlation. Ostracods, plant fragments and fossil fish were found near the Kufue River (1936) in shales which overlie the basal grits, arkoses and conglomerates.

The object of the writer's visit was to locate a reported occurrence (1937) of coal at the Pangani Rapids and to investigate its potentialities for commercial exploitation.

The Geological Structure of the Karroo Beds.—A geological map and two sections illustrate the results of the traverses made by the writer in the Mpanga-Mkalinzo-Luhembero Hill region.

The lowermost beds are found at Kondo on the Rufiji about 1.85 miles north-east of Mpanga. A small quarry has been opened up and a small section also occurs on the river bank. The dip is about 7° to the south-west. This outcrop is north-west of a small krantz forty feet high seen on the Nyakasiku-Mpanga track, and it lies close to the fault which marks the Karroo boundary. Here medium-grained micaceous, pinkish to greyish, sandstones contain grey shale pellets, in which are embedded carbonized plant fragments. The sandstone has a nodular aspect and fractured surfaces exhibit lustre mottling.

All the area around Mpanga is very sandy and it is therefore assumed that the sand is derived by weathering from these sandstones, for no other rocks outcrop until Utungi, two and a half miles north-west by west of Mpanga. Westwards, dips are seen to vary between east and south-east, and it must

therefore be concluded that a slight synclinal fold has bent the strata. The beds, however, resume their south-west to westerly attitude between Utungi and Kedai. These basal sandstones, outcropping in the Utungi and Kedai area, are either buff calcareous sandstones, often slabby and well-bedded, or nodular micaceous calcareous sandstones. One mile and a quarter east of Kedai massive coarse grits overlie the calcareous sandstones. Overlying the grits are fine-grained greenish sandstones containing plant fragments, among which the following have been identified: *Glossopteris indica* Schimper, *Glossopteris communis* Feistmantel, *Glossopteris cf. conspicua* Feistmantel, *Gangamopteris cyclopteroides* Feistmantel, *Schizoneura gondwanensis* Feistmantel, and equisetaceous leaf sheaths and stems.

Further west greenish shales and flagstones outcrop overlain by massive and thick grits. In the shales the following plants were identified: *Glossopteris indica* Schimper, *Schizoneura sp.*, and equisetaceous stem fragments.

West of Kedai another series of greenish shales, flagstones and fine-grained sandstones lie intercalated between massive grits and coarse sandstones. Within the greenish shales a grey shale bed yielded a number of plant fragments and carbonized stems, among which the following have been recognized: *Glossopteris communis* Feistmantel, *Glossopteris conspicua* Feistmantel, *Glossopteris retifera* Feistmantel, *Schizoneura gondwanensis* Feistmantel, a leaflet of either *Odontopteris* or *Neuropteris*, and many fragments of equisetaceous leaf sheaths and stems.

Other horizons were found in these shales containing carbonized leaf remains but the venation and vascular bundles have been obliterated, rendering identification impossible.

The hilly country between Kedai and Mkalinzo consists of massive grits and coarse sandstones dipping gently to the south-west and west. The banks of the Rufiji River, between the fault north of Mkalinzo and three miles west of Kedai, are occupied by massive coarse sandstones and grits. At the Pangani Rapids massive and well jointed coarse sandstones form a small gorge about one hundred feet high. Close to the swift sliding river the sandstone is coated by a thin film of limonitic iron oxide, which has become highly polished by the action of the swift moving waters. This polished black appearance of the sandstone has suggested the possibility to some observers, that the rock has been "baked"; but the coating by iron oxide in the vicinity of streams is a common phenomenon. Above the rapids the Rufiji, during the months of low water, flows through a narrow rocky channel not more than thirty yards wide. During the months of heaviest rainfall the gorge must be an impressive sight; natives state that it swells enormously and rises some fifty feet above the low water mark. The record, it is said, is some eighty feet above the dry-season flow.

At Mkalinzo the Kedai greenish shales, flagstones and fine-grained sandstones are repeated by a fault, and the beds are better exposed. The dip

angles in the Mkalinzo area are inclined to the north-west and west. In a grey micaceous shale many fragments were collected, among which the following were identified: *Glossopteris indica* Schimper, *Glossopteris cf. retifera* Feistmantel, *Glossopteris sp.*, and equisetaceous stems and leaf sheaths. This outcrop occurs one mile and a quarter south of Mkalinzo.

One-third of a mile east of the Government Camp this shale was again found and the following plant fragments were collected: *Glossopteris cf. indica* Schimper, *Glossopteris conspicua* Feistmantel, and equisetaceous stems.

From a sandy buff-coloured shale one mile and a quarter on the Mkindu road the following plant fragments were recognized: *Glossopteris cf. indica* Schimper, *Glossopteris conspicua* Feistmantel, and equisetaceous stems and leaf sheaths.

Glossopteris was again found on both banks of the Hami River which cuts the Mkindu road about three miles east of Mkalinzo. On the west bank in a pale buff-coloured sandy shale both *Gl. conspicua* and *Gl. indica* were identified.

The following facts prove the presence of the Mkalinzo fault: (a) the repetition of the greenish shales, flagstones and fine-grained sandstones with their fossils; (b) the presence of a fault breccia, on the face of which slickensided surfaces indicate a downthrow to the south-west; and (c) a topographic feature. Teale found evidence of faulting in the Sumbadzi River and the extension of the Mkalinzo fault north-westwards coincides with the dislocation seen in the Sumbadzi.

The presence of an unconformity, as indicated in the second geological section, is unproved; but the writer observed the unconformity of similar sandstones in the Vikiindu area, to the south-west of Mkalinzo. The correlation of the Rufiji beds with those seen around Luhembero Hill and Mkindu is based on lithological similarity and the presence of abundant fossil wood. These silicified tree trunks strongly resemble those seen by the writer higher up on the Rufiji and in the Liwale District. They are referred to *Dadoxylon dantzii*. Janensch, who visited this area, also remarked upon the lithological difference between the Mkindu rocks and those outcropping on the banks of the Rufiji. The presence of purplish marls intercalated within the sandstones supports this correlation.

The rest of the track from the Hami River to Mpanga is sandy and no more Karroo rocks outcrop. Sandstones outcrop at a village to the south-west of Mkindu and between Mkindu and Luhembero, but from thence southwards no rocks outcrop for many miles. The very sandy surface indicated that the Karroo continues into Liwale District.

To what stage may the Karroo rocks in this region be referred? As the best economic seams of coal usually occur in the Eccia Series, it is of paramount importance to determine to what stage each formation may be referred. The

type area is South Africa, where the stages have been worked out in some detail. The determination of the various stages is made from a study of the fossils and in this particular area from the fossil plants. Fortunately the collection includes those plants which have a zonal value, that is, they are limited to certain geological strata and thus become characteristic.

The presence of *Gangamopteris* in the lowest fossil horizon suggests that east of Kedai the beds may be referred to the Eccla stage, that is to the Upper Carboniferous and lowermost Permian. Both *Neuropteris* and *Odontopteris* extend from the Upper Carboniferous into the Permian. On the other hand *Glossopteris retifera* has a narrow range and is confined to the Lower Beaufort. The genus *Glossopteris* is, of course, confined to both the Eccla and Beaufort stages. It is therefore evident that those beds outcropping east of Kedai belong to the Eccla stage and those west of Kedai to the Lower Beaufort stage. Thus the palaeontological evidence points to the probability that the main coal horizon (if any) of the Karroo in this area is either absent or occurs beneath the sandstones outcropping between Kedai and Mpanga, where the base is not seen.

The Prospects for Finding Coal in Western Rufiji District.—It has been shown that no coal occurs in the area south of the Rufiji, between Mkalinzo and Mpanga. The nearest approach to coal are the thin shale intercalations containing abundant carbonized fragments of comminuted *Glossopteris* and equisetaceous stems.

Teale found a small lenticle of good gas-coking coal in the Sumbadzi River, and the writer has looked up Teale's original field notes and extracted the following: Teale started from Ngerengere and approached the Selous Game Reserve from the Mgeta River and Mkulazi in the north. He walked over a good deal of the country and his work may be considered as a good supplement to the original fine work of Bornhardt. Definite evidence of a fault forming the north-east boundary was found between Behobeho and the Rufiji, at the eastern foot of the Tagalala Hills. Evidence of faulting in the vicinity of Viranzi in the north, where the western boundary of the Karroo is faulted against the Basement Complex, was also found. Teale noted basal conglomerates, purplish-red in colour, and purple mudstones in the cuttings of the Viranzi Stream. These rocks apparently underlie Bornhardt's basal rocks (*vide* correlation table) and judging by the included gneiss pebbles the base of the Karroo is not far from the surface. Search was made in a large number of streams and hill sections. Teale also noted evidence of faulting in the neighbourhood of Hatambulo. His observations along the northern bank of the Rufiji, between Mpanga (Kipembawe) and the Sumbadzi River, closely resemble those of the writer, although not so many fossil plant horizons were discovered.

Teale's notes on the Sumbadzi River area are of interest as he found overfolding and crushed breccias further to the west, in addition to that referred

to above. *Glossopteris* sp. was found in shales just south of Mtondusi, ten miles to the west of the faulted boundary near Mpanga on the northern bank of the Rufiji; and also in the Sumbadzi River at several localities, below the junction of that river with the Mhumbi Stream. Intensive searching did not yield any coal seams.

In 1931 the writer explored the country around and east of Vikindu Village above the confluence of the Ruaha with the Rufiji. The base of the Karroo was found in the Kindangalila Stream south-west of the village. Here massive reddish conglomerates with large boulders of gneiss rest on the Basement Complex. They are overlain by arkoses with small shale intercalations, which in turn are overlain by shales, thin limestones and greenish fine-grained sandstones. There is a continuous section and some one thousand one hundred and fifty feet thick of beds are exposed. To the north this sequence is interrupted by a fault, while to the south the whole succession is overlain unconformably by feldspathic sandstones and purplish marls. The latter rocks, named by the writer as the Rufiji Beds, continue up the Rufiji valley and occupy vast regions of Liwale and Ulanga districts. No coal has yet been found in the Rufiji Beds, and no coal of economic thickness was found by Teale, Bornhardt, Lieder or Janensch in the Selous Game Reserve.

From the observations so far made it seems that the structure of the Karroo is not simple. Basal rocks occur on the Ruaha River and at Viranzi in the north. Dip angles suggest that the Karroo is folded into a major syncline with its axis lying in a north-west direction and pitching south-east towards Mpanga. Evidence has been submitted that shows that this syncline has been cut up by several faults. It is therefore probable that the complete sequence has not yet been determined and that some beds have been cut out and that they may include a coal seam. The presence of hidden coal seams can only be proved by deep boring in selected localities. It will be necessary, however, to carry out a detailed geological and palaeontological survey, before any exact site can be selected. Such a geological survey should bring out precise stratigraphic markers, which will aid in the correlation of the various sequences and thus reveal if any beds are missing.

In consideration, however, of the researches already made in this region, the prospects for finding economic coal seams are not very promising.

4.—THE LIGNITE OCCURRENCES NEAR KIPATIMU MISSION

Kipatimu (R.C.) Mission is situated in the heart of the Matumbi Hills in northern Kilwa District, not far from its boundary. It is forty-four miles from Utete by motor road: it is connected by motor road with both Kilwa and Liwale.

Reports of the presence of lignite (brown coal) in this area made it imperative to investigate the possibilities of these deposits as a source of fuel, especially as they were said to be situated relatively close to the coast.

The Work of Previous Observers.—Forty-five years ago (1897) the German geologist Bornhardt marched through the Matumbi Hills on his way to the Rufiji valley, and in his three days spent there he made valuable observations not the least of which was a small collection of fossils. He concluded that the Matumbi Hills were occupied with Upper Jurassic rocks (Corallian and Oolite stages). His collection consisted of the following forms: *Velopecten abjectus*, *Astarte cf. pullus*, *Rhynchonella aff. lotharingica*, ? *Pteroperna costatula*, and representatives of the following genera: *Ostrea*, *Exogyra*, *Lima*, *Arca*, *Chemnitzia*, *Alaria*, *Nerinea*, *Belimnites* and fragments of ? *Perisphinctes*.

Thirty-seven years later (1934) Professor E. Hennig of Tübingen University visited the Matumbi Hills and made further observations, which were published (1937) in *Palaeontographica*. He confirmed Bornhardt's original observation that the lowermost beds are oolitic and sandy limestones with calcareous sandstones, overlain by soft buff sandstones and marls with some septarian nodule bands. Hennig showed that the country rises from the coast in a series of steps or terraces, but he was unable to decide whether these terraces were due to the weathering effects on an alternate series of hard and soft rocks or to the actual pauses in the general uplift of the coastal belt, which succeeded the period of deposition represented by the marine sediments. At some localities gravels were found in somewhat unexpected places, such as on the hill summits; but it is probable that Hennig's "gravels" are derived from the weathering out of pebbles from the neighbouring sediments.

His most interesting observations refer to the evidence of disturbed beds. For instance in the Namayuni valley he found vertical Cretaceous beds, which suggest a fault in the coastal region. A unique discovery was a series of clay-shales, bedded sandstones and conglomerates and "breccia banks with a powerful dip", found in the lower Mtumbei valley. He considered these rocks to be Karroo, but excepting their lithology, there is no proof forthcoming, as the rocks were unfossiliferous. He explained the anomalous position of Karroo rocks in Jurassic beds as an "inselberg" of Karroo submerged by marine Jurassic. In his discussion of the lithology he compares these beds with the Karroo in the Mbarangandu River region, but here he is a little astray, for the Karroo in that region comprises reddish sandstones and grits with thin alternating marls which are not unlike the Upper Jurassic themselves in the Matumbi Hills. The recorded lithology resembles the Karroo of the Lower Rufiji, rather than those in the Upper Rufiji valley. He estimated a total thickness of about seventy metres; they are said to strike north-east by east dipping at 27.5° to the north-west by north.

At some distance from this section were more sandstones and conglomerates but their relation to the major section was obscure. These rocks occur close to the gneiss and therefore at the base of the Jurassic formations.

Hennig considered that a fault occurs at the base of the Matumbi Hills, situated close to the Jurassic-gneiss boundary: it strikes north-west and downthrows the Jurassic against its own lowermost beds. It is possible that this fault explains the partial absence of the Jurassic in the coastal region to the south and the predominance of the Cretaceous, while in the Matumbi Hills there is the predominance of Jurassic and absence of Cretaceous.

From the Nangoma limestone cave Hennig collected the following fossils: *Rhynchonella concinna* J. Sow., *Chlamys ambigua* and a *Clavotrigonia*, which may be either *goldfussi* or *geographica* or a new species. He also collected some new species of *Limas* from the Mtumbei valley and an *Astarte* from a flaggy sandstone used in building the church at Kipatimu.

Geology of the Kipatimu Mission Area.—The writer estimates that the Jurassic in the Matumbi Hills comprise some one thousand three hundred feet of sediments, which he has divided as follows:—

Matumbi Series ... Kipatimu Beds.—Massive buff sandstones alternating with an argillaceous series of marls and septarian nodule bands with mussel beds. Fossils rare. Nine hundred feet thick.

Mtumbei Beds.—Oolitic limestones passing into sandstones, and sandstones. Fossils not rare. Four hundred feet thick.

The septarian nodule bands may contain various *ostreidae* and the mussel reefs both *ostreidae* and *astarteidae*, but in the upper beds fossils are absent. Hennig in the Ninyanyu and Itogoro-Nyundo areas south of Kipatimu Mission recorded several thick sandstones alternating with several reddish and grey marls, in which septarian nodules were frequent. From his figures it is apparent that many of these sandstones are as much as fifty to seventy feet thick. My own observations in the Bulwer and Ngwina streams show that the massive sandstones may attain a thickness of one hundred feet.

On the Utete road at Nandete and near Kitunda (close to the Liwale road turn off) the writer found a number of silicified wood fragments, which had obviously been brought into the Jurassic by rivers draining the Karroo rocks to the west. These fossil tree fragments may be referred to *Dadoxylon dantzii*. At Utete, where the coarse grits outcrop close to the Boma and Ferry stage, similar but smaller and well-rounded silicified wood fragments weather out. It is difficult to state at which stage of the Jurassic the Utete grits occur, but as the dip is to the north-east they may well belong to the uppermost Kipatimu Beds.

In the Kipatimu area both calcified tree trunks and lignite occur in the lower portion of the Kipatimu Beds. It is pertinent to note that both Bornhardt and Hennig omitted to observe these fossilized tree trunks. Neither makes any reference to the calcified fossil wood, the silicified wood, or to the occasional occurrences of lignite.

Within the sandstones two nodular calcareous beds were found the one on the track to the Bulwer Stream and the other just below Nandete Mission. Both of these beds contain numerous *Ostrea* sp. and in that at Nandete two specimens of *Astarte* sp. were also found. At Kipatimu within the sandstones casts of tree branches are commonly seen and in many localities fossil (calcified) wood was picked up, obviously weathered out of the sandstones. In the Bulwer Stream fossil tree trunks were found *in situ* associated with the sporadic fragments and miniature seams of lignite. Carbonized woody fragments were noted in many localities in all horizons of the sandstones. The sandstones are usually massive, current-bedded, and contain lenses cemented by calcite. Within one of these harder lenses the following fossils were collected on the Nandete motor road, about two miles north-west of Kipatimu Mission: *Modiolus* sp., *Gryphaea* sp., *Ostrea* sp., *Astarte* sp., internal casts of *Pleuromya* sp. and what appears to be *Echinotis echinata* (W. Smith).

The last mollusc has the ornamentation characteristic of that form, but as the hinge area is not discernible the identification is uncertain. This sandstone is remarkably like that collected above Kwandule Gorge, although its stratigraphical position must be higher.

The Mtumbei Beds may be studied in the area of Kwandule Gorge, south-west of Kipatimu Mission and the lower Mtumbei valley. A large portion of the area is covered by dense bush and the best sections occur in the tracks and lower portion of the valley: the upper flat-bottomed valleys yield no or very poor sections.

The lowest rocks consist of massive oolitic limestones with a variable sand content. Interbedded within the limestones are calcareous sandstones, which pass laterally into limestones and vice versa. Above the Kwandule Gorge, about two hundred and fifty feet above the stream, is a richly fossiliferous calcareous sandstone. The oolitic limestones contain numerous fossils, but the majority are rhynchonellids and terebratuloids; the calcareous sandstones on the other hand are rich in mollusca and some corals.

In the Tawa River close to Maengo Cave the following have been identified in the oolitic limestones: *Zeilleria* (*Ornithella*) *depressa* Sahni (among other terebratuloids), *Kallirhynchia concinna* (J. Sow.), *Astarte* cf. *voltzi* Ziet., and *Pecten* sp.

At Kwandule Gorge the following fossils were collected from the oolitic limestones just above the river in the vicinity of the track: *Zeilleria* (*Ornithella*) *depressa* Sahni (among other terebratuloids), *Kallirhynchia concinna* (J. Sow.), *Rhynchonella* cf. *praestans* C. Reed and *Rhynchonella* sp., *Pecten* sp., and *Serpulae*.

From the calcareous molluscan bed above the oolitic limestones the following mollusca have been identified: *Trigonia* cf. *duplicata* Sow., *Trigonia v-costata* Lycett, *Trigonia* sp., *Astarte seemani* de Lor, *Astarte* cf. *voltzi* Ziet., *Astarte* sp., *Pecten* sp., *Pecten* (*Camptonectes*) sp. cf. *Ceromya* sp., an

aptychus of a gasteropod and numerous internal casts of what appear to be *Pleuromya* sp. and *Pholadomya* sp.

The Geological Age of the Matumbi Beds.—The above fossil assemblages indicate that these rocks are of Upper Jurassic age and it seems most probable that they may be assigned to the lower stages, namely from Bajocian to Argovian. In the Mtumbei Beds the rhynchonellids represented by *Kallirhynchia* and *Rhynchonella* cf. *praestans* indicate a Bathian stage. *Pecten* (*Camptonectes*) *lens* Sow. is considered a distinctive fossil of the Stonesfield Slate and the specimen collected closely resembles this species. The *Trigonias* suggest the lower stages; for *Tr. duplicata* and *Tr. v-costata* are characteristic of the English Inferior Oolite (Bajocian and Vesulian stages).

Zeilleria (*Ornithella*) *depressa* comes from the Oxfordian and Kimmeridgian stages of India; but according to Sahni (1939) there is some uncertainty with regard to its stratigraphical position. It is possible that it may be eventually relegated to the Inferior Oolite (Vesulian stage).

The small *Astarte voltzi* is known from the middle Jurassic and therefore suggests a relationship with the older stages. The larger *Astartes* are remarkably like those known from the Inferior Oolite but owing to the diagnostic features being obscure their exact identification is not possible.

Echinotis echinata is regarded as a variable species which persisted (Cox, 1940) from the Bajocian to the Divesian and it is probable that the Kipatimu Beds belong to the Bathian and Callovian stages. It is a typical fossil of the English Cornbrash.

The Mtumbei Beds may be assigned to the Inferior Oolite, or Bajocian and Vesulian stages.

The Lignite Occurrences.—There are three localities in the Kipatimu Mission area where lignite has so far been discovered. The largest is found in the Bulwer Stream, on the main Kibata track, which crosses the stream about three miles and a half north-east of the Mission. A small seam a few inches thick is seen in a small cave or overhanging ledge. Most of the rock enclosing the lignite is sandstone with harder rock formed by a calcareous cement. Fossil wood or fragments of tree trunks are associated with the lignite: some of the wood is completely carbonized and shows no organic structure. Much of the wood is calcified. A traverse above and below the track-crossing following the stream bed yielded no further occurrences, although the rock cuttings are numerous. Bulwer Stream was followed down to its junction with the Ngwina and the latter was followed up back to the track-crossing. In neither case was any further outcrop of lignite seen.

Local natives showed the writer two other occurrences, the one in a tributary valley of the Bulwer about one mile and a half above the track-crossing. At this spot a coarse sandstone contains a small fragment of carbonized wood, but there are no indications of any other ligniferous wood occurring near.

The third lignite occurrence reported to the writer was located at a village called Mwika, which is situated about three miles and three-quarters north-west of Kipatimu Mission. A small lens of lignite in soft current-bedded sandstones was found: the largest slab was two to three inches thick and two to three feet long.

The examination of the Bulwer and Ngwina streams' sections, which are developed along the strike, and the excellent road sections on the Nandete-Utete road, which are developed across the strike diagonally, shows that no lignite seam occurs. The occurrences of lignite so far unearthed prove to be sporadic fragments without continuity and with no suggestion that a seam may be found. Finally, the palaeontological evidence shows that these sandstones are marine with some deltaic intercalations, but the prevailing conditions of deposition exhibited by these rocks were either off-shore or bordering on deltaic conditions. The general impression gained by this study is that the general horizon was either deep marine, as suggested by the oolitic limestones, or shallower marine with intermittent deltaic conditions. Deltaic conditions do not appear to have been either persistent along the strike or continuous over a period of time to have allowed thick seams of lignite to accumulate.

No direct reference has been made in the above account to the caves which are found in the oolitic limestones in the Mtumbei valley. The writer has prevailed upon Father Hilmar to give a short account, as he has studied the Nangoma cave in some detail and knows the history of its discovery. None of the other caves are of any importance.

5.—A GIANT CAVE IN THE MATUMBI HILLS

By Father Hilmar, Kipatimu (R.C.) Mission

In the Mtumbei valley there are several caves which are formed in the limestone formation. The largest cave is known as the Nangoma Cave and it lies about five miles to the south-west of Kipatimu Mission. The name Nangoma, the natives state, is derived from the curious drum-shaped stalactite standing inside the entrance. Other caves are Tawa and Maengo situated further east of the Nangoma, but they are much smaller and are not worth description. They are formed of course by the solution of the limestone, principally by rivers seeking an outlet. In each case a stream flows through the cave and their outlets have been found on the south-western side of the Mbinga ridge, a distance measured on the surface some three to four miles from the inlet.

The Mtumbei valley is situated in Umatumbi, a mountainous country between Utete and Kilwa, and became notorious during the Maji Maji revolt of 1905, which originated from this place. In those days Umatumbi was thickly populated and the German officers, who were instructed to quell the revolt, were continually astonished to find villages but no people. The population had disappeared, but returned at once when the troops marched off.

In August 1909, a German sergeant-major in the police, named Weckauf, was camped at Nandembo, a small village situated at the eastern foot of Mbinga Mountain.* Seeing a much wooded hill, Weckauf ascended the hill despite the vigorous protests of the natives and began to search for large trees useful for timber. In the course of his search he discovered Nangoma Cave, a giant hole hidden at the bottom of a much wooded funnel. Thus the first of a whole network of caves was discovered accidentally.

In February 1910, Weckauf was accompanied by the Benedictine Father Ambrosius Mayer of Kipatimu (then Nambiligya) Mission and they both made a more thorough examination of the cave. In the *Mission Journal of St. Ottilien* (1910) Father Ambrosius Mayer wrote a description: "A gigantic cave in the Matumbi Mountains"; and it will be of interest to quote some of the Father's description. His report is as follows:—

"We approached a dome-like hill, covered with thick undisturbed forest growth, which was all the more striking as the surrounding hills and rounded mounds had been cleared and replanted. In parts this was demonstrated by the low scrub which had sprung up during the last two or three years. But here trees thirty metres in height towered from the midst of wild impenetrable bush, straight as a match, and with a girth a man could not span. Such a sight alone was worth the journey. This primeval splendour was, however, only a prelude to what was to be still more impressive. Suddenly the path sunk down into a funnel-shaped valley. It could hardly be called cauldron-shaped because of the narrowness of the ground. Opposite, on the other bend of the funnel, the steep wall vanished, and half the way round a perpendicular bare rock arose surrounded on all sides by greenery, bush and primeval forest, a scenery worthy of paradise, which increased with every metre we took downwards. On the floor of the funnel an enormous chasm opened, twenty-one metres high and forty-three metres broad. We scrambled over great decayed tree trunks, rock rubble and water-borne heaps of soil covered with a prolific vegetation. Finally we stood at the entrance of the cave, which had the form of a giant vestibule, rather oven-shaped, with the front part missing, the back part of which sunk down to hidden depths thus veiling the continuation of the cave. The entire cave as far as the sunlight reached, seemed to radiate a fairy-like green light, which was reflected upon us and the floor which sunk in the direction of the background. In this enormous vestibule, beneath this dome of grey horizontally bedded limestone, which was decorated with a film of green algae, man appeared small and diminutive. This great chamber measured about one hundred and forty metres long, one hundred and sixty-five metres in diameter, with an aperture letting in the sunlight of forty-three metres in breadth and twenty-one metres in height. Thousands of bats fluttered and flickered around in frightened circles. Silent and dumb we allowed this dome, this mass of hidden rock, this peculiar action of light and

*Compare *D. Kol. Blatt*, 1910, pp. 654-56, and 1911, pp. 308 and 660.—EDITOR, *T.N.R.*

this magnitude to work their spell upon us. Then suddenly we seemed to wake as if from a trance and began to notice individual points. Each step, each glance brought a new surprise, as by lantern light (keeping left), we investigated the depths and washouts. We noticed an unruffled still pool of water which appeared to be of considerable depth. A small snake lay near which we killed, we, who were intruders into its domain!

“Through the entrance of the cave water had penetrated, flooding the sides, and had carved itself out a bed in the centre of the funnel, which to the right behind the concave part, was full of debris, that is rock fragments. The action of the water had caught these boulders and caused them to sculpture out grotesque forms like shafts, portals, basins, synclines, etc.

“I lay down in a stone trough and looked away into the depths beyond, where a native was descending with a lantern. It looked as if he was climbing down a circular ladder. Suddenly the ray of light broke intercepted by dark masses of rock and the man crept into another cave. So much for the vestibule.

“We passed on now into the central part of the cave by climbing out of the back part left of the vestibule, over numerous rock fragments strewn in our path. Here where daylight failed, I found it impossible to gauge the magnitude, its breadth and height. Nevertheless we guessed the height at about eight metres and contented ourselves in estimating its length. We can affirm that the central part of the cave had a length of one hundred and forty metres. What was so interesting was that the floor was strewn with ashes from hearths and fragments of victuals. One may state, without exaggeration, that five thousand persons with personal belongings and stores had camped here unmolested, while Europeans and soldiers sought for rebels in vain outside their mountain refuge. Neither smoke nor the glare of fire revealed the thousands. The brooks supplied water so that when the fugitives had brought in their provisions, there was no further need to leave the cave and reveal their presence to the soldiery by their tracks. The central part of the cave was evidently the principal camping place of the fugitives.

“Where it ended the roof slanted more and more downwards, so that we had to be careful of our heads and pick our steps. Here gradually a streak of daylight penetrated and we had to go forward on hands and knees, until we reached the tube-like passage leading into the cave's exit, which was about fifty metres long. Both the breadth and height were considerable. If the entrance was towards the north-west, the exit must have been south-east. This again was framed by an immense portal, almost architectural in structure, which opened into a wild ravine. The outer gorge at the exit was sixteen metres broad and about seven metres high, but half of this exit was filled up with masses of earth rubble brought down by the floods. Traces of these deposits had been noticed in the cave, but were not so evident as at the north-west portal. To the south-east the cave exit opened out into the depths

of the gorge. As we had neither food nor drink, and had no desire to await the judgment day here, we returned by the same route, climbed the mountain side; rested a little, breakfasted and proceeded on our way highly contented. The ascent out of the funnel presented the greatest difficulties."

In my own account I will be content with giving the barest details. The entrance of Nangoma Cave has a width of forty-eight yards and a height of twenty-four yards. It leads to a giant hall measuring about one hundred and seventy yards in length and having an average diameter of some seventy yards and a height of perhaps twenty-four yards. The floor is covered with boulder alluvial and sand and sinks to the far end of the hall. On the left side of the hall there is a hollow place containing water issuing through the rocks. The natives state that this stream never dries up even in the driest dry season.

On the right hand a funnel-shaped passage has been dissolved out by the water and leads to another cave, the cave which Father Ambrosius explored for two days before he succeeded in gaining the open air at the far end. Since the Father investigated it no one for the last twenty-five years has made another visit.

The main cave or giant hall contains two large drum-shaped stalactites which give it its name. The hall measures one hundred and seventy yards long and may be nine yards high. On the floor a soft layer of guano, originating from the thousands of bats, has been deposited. Father Ambrosius had made an excavation into the guano deposit and found human remains but his notes and the specimens were lost during the last war. Some attempts were made by Professor Hennig but without any useful discovery being made.

At the far end of the main cave the roof descends and the floor also slopes steeply, leading to the third cave of some fifty yards, which leads to the very end. The exit is big enough but not as majestic as the entrance. It has a width of eighteen yards and a height of eight yards, but half the height is filled up with sand and boulder stones.

In the neighbourhood of the exit there are some very low caves formerly used for burial purposes.

NOTE.—Professor Hennig (1937, pp. 155-56) accepts the discoverers' measurements as correct.—G.M.S.

6.—THE SULPHUR DEPOSITS IN NORTHERN RUFIJI DISTRICT*

The sulphur deposits are situated about eighty miles south of Dar es Salaam: by road they are about ninety miles from the capital and about four to five miles east of the Utete road. There are two occurrences; the one, an impregnated sandstone at Wingayongo Hill, and the other about three to four miles to the south-west, the Nyongoni Hot Sulphur Springs in the Luhohi River valley. Koert in his summary of the geology of Tanganyika

*Op. Bornhardt, pp. 400-1.

(then German East Africa), 1913, states that: "At Wingayongo there are flat-lying sulphur-bearing sandstones, which on account of their similarity with occurrences south of the Rufiji appear to be Upper Jurassic." In the following year the *Bulletin of the Imperial Institute* published an article entitled "Economic Resources of the German Colonies" (Vol. XII, No. 4, 1914) which refers to the presence of sulphur in this area: "*Sulphur*. The sandstones of Wingayongo are impregnated with sulphur, crystals of which occur in the cavities of the rock. The amount of sulphur present in the sandstone is stated to be too low to make the rock workable as a source of sulphur."

Both of these occurrences are located near to a motor road, which is traversable for nine months in the year. Within recent years a short branch motor road (now disused) of five miles was constructed, connecting Kibiti and Ngaru. Ngaru is one mile and a half north of Wingayongo Hill, and the latter is about three to four miles north-east of the Nyongoni Hot Spring. Kibiti is a Native Administration centre and is eighty miles south-east by south of Dar es Salaam. For transport purposes it might be less expensive to convey the prepared material to Kikale, north of the Rufiji delta and about twenty-five miles east of Kibiti. From Kikale to Dar es Salaam it could be carried by dhow.

As the region surrounding both occurrences is well forested adequate supplies both of wood and small timber are available.

The Nyongoni Hot Sulphur Springs.—These springs are correctly marked on the 1:300,000 scale, E6, Mohoro map, on the northern bank of the Luhohi River. They occur below the main bank of the valley and above the actual river channel. Local natives state that in the rainy season the river washes around the base of the small cones from which the several hot springs issue. During the rains elephant often visit the springs and according to A. Wakefield, Agricultural Officer, enjoy bathing in the hot water and will stand in the hot springs for hours.

The springs are a little difficult to get at without a native guide, as there is no track direct to them except by that from Ngaru which passes close to them. Native guides can be obtained from the *Jumbes* at Kiguli and at Dimani villages, on the motor road north of the Luhohi River.

The springs cover an area of about four hundred feet by three hundred and fifty feet. They occur in the sandy alluvium of the main valley and are completely hidden in the tall grass and surrounded by forest. A small outcrop of sandstone is exposed below the springs and near to the Luhohi River channel, but with the exception of the calcareous tufa forming the spring cones no other rocks occur. The writer counted some thirty points of ebullition and all these boiling springs issue from small calcareous vents. The tufa forming these cones is being deposited contemporaneously with the issuing water. The inner portions of the vents and the streamlets flowing away from the cones are lined at water edge with small crusts of a pale yellow sulphur

deposit. It is probable that some calcium carbonate contaminates the sulphur, precipitated at the same time. The water is boiling and has a clear bluish colour, when viewed from above a vent; but it is not potable.

Neither gaseous sulphuretted hydrogen nor sulphur dioxide emanate from the boiling springs, but a slight sulphurous smell is noticeable in the area itself. Surrounding the calcareous tufa cones is a flattish sandy area devoid of vegetation sloping slightly to the river channel, and across this area several streamlets make their way. Through this sand myriads of micro-vents penetrate and films of sulphur are deposited therein.

The hot springs are considered to be connected with recent vulcanism, although no volcanoes or volcanic rocks are actually known in this area. Tertiary volcanic dykes are known from the western portion of the district in the vicinity of Luhembero Hill and Mkindu. The writer found an explosion vent with silicified breccia cutting through Karroo grits; and this may be taken as a volcanic manifestation. On general grounds it is probable that these springs are connected with Tertiary volcanic activity. It is possible that both this Hot Spring and that occurring east of Utete are connected with Quaternary faulting, but there is no direct evidence to support this suggestion.

A large quantity of hot water, with a high salt content, flows away from the springs and a certain amount of sulphur is precipitated as soon as the temperature of the water falls, but the sulphur content appears to be very small. The proportion of sulphur in the sand and in the calcareous tufa appears to be too low for commercial exploitation.

Wingayongo Sulphur-bearing Sandstone.—With the exception of a coastal strip the only rock that is exposed in northern Rufiji and southern Temeke districts occurs on Wingayongo Hill. A small patch of sandstone, similar to that at Wingayongo, occurs close to the hot spring at Nyongoni, but natives state that no rocks outcrop until the coast is reached at Kihita Hill near Kikale in the east and in the west close to the Selous Game Reserve.

Wingayongo Hill consists of a more or less flat-bedded sandstone, medium-grained; and dead-white in colour. The sandstone is cut by both vertical and horizontal joints, which latter may be parallel with the bedding planes. The topographic feature, forming the ridge stretching northwards from Wingayongo Hill towards Kibiti and facing eastwards, suggests either a fault scarp or a dip towards the west and north-west. It is probable that a fault is responsible for the scarp facing eastwards, down-throwing the area to the east, where a flat plain stretches to the sea.

Wingayongo Hill is not more than fifty feet above the level of the Ngaru-Luhohi track which passes close to the hill. The sandstone is limited to a small area of 120,000 square feet, that is a little less than a quarter of a square mile.

The sulphur-bearing portion of the sandstone is limited to the lower and eastern section comprising an area of about one-fifth of the whole rock area

exposed, namely about twenty-four thousand square feet. In addition, however, there is another sulphur impregnated sandstone to the west of Wingayongo Hill and equalling in extent about the same surface area.

Sulphur occurs in the cracks and joints of the sandstone both as encrustations and small infillings. Masses of sandstone, when broken or fractured, often reveal tiny sulphur-filled vugs. The sandstone is also impregnated for a short distance from the joint or cleavage surface where it appears to replace the original calcareous cement. In addition to sulphur a blackish hydrocarbon is associated with the sulphur and this ingredient must be considered as having a deleterious effect. It adds to the difficulty of obtaining a clean separation. Both the sulphur and the hydrocarbon are not limited to any special stratum but appear to have emanated from depth. An analysis of the blackish hydrocarbon is given in the *Bulletin of the Imperial Institute*, previously referred to in another section. It is as follows :—

“An occurrence of material described as bitumen has been observed at Wingayongo Hill. It gave on analysis—

Carbon	...	20.29 per cent.	Sulphur	...	1.89 per cent.
Hydrogen	...	1.75 „	Water	...	1.85 „
Oxygen	...	0.99 „	Ash	...	72.21 „
Nitrogen	...	1.02 „			

The high percentage of carbon and the low percentage of hydrogen in the ash-free portion of this material would appear to indicate that it is more in the nature of a coaly material than true bitumen; and the occurrence is not such as can be regarded as an indication of the presence of petroleum.”

The association of an hydrocarbon with the sulphur is of interest. On general grounds it is safe to conclude that the sulphur has originated from a deep-seated source, that is accompanying juvenile emanations. Small amounts of hydrocarbons have been known to occur in volcanic rocks. Deep-seated material ejected by Vesuvius in 1904 contained hydrocarbons. Hydrocarbons are found in the Drakensberg lavas in South Africa and Basutoland and some authorities consider these to be of chemical origin rather than derived from possible ligniferous or coal-bearing formations existing in depth.

The second occurrence, which lies a quarter of a mile to the west of the western end of the hill in a small depression, consists of large blocks of sandstone heterogeneously arranged. A small mass of sandstone, considered to be *in situ*, is partly hidden by blocks and by sand washed down the hillside. As in the hill occurrence the sulphur occurs in the joints and in the sand in the depression. It is also associated with the black material containing hydrocarbons, which appears to be admixed with the sand. This occurrence needs opening up before any reliable estimate can be made. It is probable, however, that it is comparable with the Wingayongo Hill deposit. No analyses have been made of the sulphur content in the sandstone and an estimate of the

probable quantity available must therefore wait: but the indications do not suggest any workable deposit.

Age of the Sulphur.—Both Koert and Bornhardt consider these sandstones to be of Jurassic age. The sands derived from the weathering of the sandstones Bornhardt considered to be of Tertiary age and places them in the Mikindani Beds. On a map showing the *solid* geology, it is evident that he thought these sands to be purely eluvial in origin; and therefore there is no reason why all these sand hills should not be mapped as Jurassic. Although there is no direct palaeontological evidence to prove their age these sandstones seem to be continuous with those of Matumbi Hills to the south, which have been proved on palaeontological grounds to be of Upper Jurassic age.

As the sulphur occurs both in the sand and the sandstone it must be considered to be younger than the sands; that is post-Mikindani Beds. The presence of a sulphur spring active in the near vicinity suggests a common origin and it is therefore probable that the sulphur is sub-recent if not of recent age.

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Acknowledgments.—The writer is indebted to the late Miss J. H. Robertson for both her translations of Professor Hennig's description of the Matumbi Hills and his geological observations thereon, and for the description of the Nangoma Cave by Father Ambrosius Mayer: to the Chief Surveyor for his help in the matter of the redrawing and printing of the maps: and to Mr. E. Harvey of the Survey Division, whose careful supervision of the drawing of the maps is gratefully acknowledged.

Tanganyika's Greatest Asset

By R. C. Jerrard

IN JUNE, 1943, No. 15 of *Tanganyika Notes and Records* contained an article by Mr. A. T. Culwick under the heading "New Beginning".

The editorial note on that issue invited discussion from those interested in the future of Tanganyika from a social and scientific point of view. "New Beginning" has hit many a nail firmly and squarely on the head. It has given many grounds for serious thought. Those who do the thinking, those who are responsible for the future planning, would do well to remember that time is short. Thinking and planning are all very well, but what is needed in addition is prompt and concentrated action.

As stated in that article—"There is a growing body of opinion in Tanganyika which holds that our post-war life must be planned, planned as an oecological whole, that haphazard excursions along different lines of advance must give way to a broadly conceived scheme based on scientific utilization of our resources, human and natural".

The African man power of this Territory is its greatest asset. On its correct and careful use depends not only the future of the African himself, but that of the whole Territory. Incorrect planning, lack of sound policy, hasty and ill-considered plans can have but one result, that is, the deterioration of this Territory's greatest asset with all its resulting unpleasant repercussions, which would adversely affect not only this Territory, but which would in addition be a blot on the system of Colonial Administration.

The very urgent need for a sound post-war plan which will embrace careful arrangements for the welfare of the Territory's man power must be speeded up. The field for discussion opened up in "New Beginning" is enormous, the various aspects of the problem require the individual attention of all those who are qualified to study them. Here, it is proposed to make one or two (what is hoped may prove useful) suggestions which deal exclusively with certain initial and fundamental points which are an essential part of any post-war problem of replanning, in the hope that those who are entrusted with the vast responsibility of its organization will keep the points raised well in mind during their deliberations.

Recrimination as to past or present methods of administration, and the results so far achieved (or not achieved) in the education and training of the African, would serve no useful purpose. Instances (regrettably not always favourable) are available on every hand, and we can but hope that these "living examples" will have made it clear where we have gone wrong and at least show us what must be avoided in future.

We are after practical results. An administration which will look things squarely in the face, without glossing anything over, is the administration which is the most likely to achieve those results.

First and foremost, therefore, it should be clearly understood that for the scheme of post-war planning to be successful vast sums of money must be invested in it. Those who agree with and who would act on the following suggestions, but who say it would be "too expensive", and who try on that account to modify such schemes on those grounds alone, should realize that without adequate funds the whole scheme is doomed to fail in its final objective, which is, social security and advancement for all.

I suggest, therefore, that any scheme for the eradication of past evils, and for improvement in the future of the Territory's greatest asset, must include in its make-up the following seven vital points.

(1) *Almost Unlimited Finance*.—I suggest that this might be raised by subsidy, and also by possible help from the Colonial Development Fund.

(2) *Registration*.—It has often been said that registration would be "tampering with the freedom of the African". It is also said that "the interests of the African are paramount". I find it difficult to reconcile the two statements. Registration is essential; it is unquestionably to the advantage of the African that he should be registered. The longer registration is delayed the greater will be the damage caused not only to the African but to the future progress of the Territory as a whole. It cannot be denied that had we been blessed with registration twenty years ago the conditions under which the African lives would be very much better than they are to-day. One simple illustration of this out of many: what employer of labour, for instance, can reasonably be expected to spend large sums on feeding, housing, sanitation, for employees who may only work for a few days or months and then go off elsewhere? The answer is, very few indeed, and in consequence, after a quarter of a century, all these things, and many others, lag alarmingly behind the ideals which most of us would like to see and which are in fact our declared aims.

(3) *An Improved Educational Policy*.—Co-ordination here is necessary. Not to turn out half-educated pupils whose only ambition in life is to become clerks, office boys and the like, but a class who look upon agriculture as their main interest and who have been taught this honourable profession in a business-like and thorough manner. It should be easy to estimate the numbers of clerical staff required over a given number of years, and those requirements, and no more, should be turned out of school as the efficient and *completed* article at regular intervals. The facilities for teaching trades, such as carpentry, masonry, engineering, etc., should be considerably increased and allowed for.

When dealing with education it must be more fully realized that it is uneconomic to attempt to teach children who are too poorly nourished to be

able properly to understand or assimilate the teaching they are given. The remedy is obvious.

(4) *Housing*.—I submit that the lack of proper native housing, not only in the urban districts, but in the rural areas, is a major evil and can only result in demoralization and the undermining of the native community as a whole. Immediate action for improvement in this connection is of vital importance.

(5) *Medical Arrangements*.—Large sums of money must be spent by the medical authorities to improve the physique of the African. This expenditure must cover not only disease but education in all matters concerning nutrition. It must be tackled with a large and qualified staff, and at its source; by that I mean right from the time the child is born, no matter where that may be, whether in the tribal areas or in the employment areas.

(6) *Industrial Welfare*.—This is a subject that has been sadly neglected in Tanganyika. In its widest sense, and here I quote* : “Industrial welfare is considered in Great Britain to include any arrangements of working conditions, organization of social and sports clubs, and establishment of funds by a firm, which contribute to the workers’ health and safety, comfort, efficiency, economic security, education, and recreation. Frequently the workers are consulted about and participate in the operation of their schemes. To specify in greater detail, the following subjects are included within the scope of welfare work :—

(i) Activities within the factory :

- (a) *General well-being of the worker*—supply of drinking water, mess-rooms and canteens, protective clothing, cloakroom, washing and sanitary conveniences, changing rooms and baths (for some industries and occupations), general amenities.
- (b) *Health*—ventilation, removal of dust, heating, lighting, medical supervision.
- (c) *Prevention of fatigue*—length of working day, rest intervals, facilities for sitting, labour-saving appliances.
- (d) *Safety*—prevention of accidents, first-aid and ambulance.
- (e) *Fitting the worker to the work*—selection, training, transfer and promotion.

(ii) Activities outside the factory :

- (a) *Education and recreation*—lectures, clubs, sports.
- (b) *Financial*—benevolent, thrift and pension schemes.”

(7) *The Financial Status of the Employer of Labour*.—Too frequently we have seen capable, keen employers of labour who realize how important it is to look after their labour, yet they are denied the wherewithal to do it. That denial of funds must be tackled at its root. This can in some cases better be

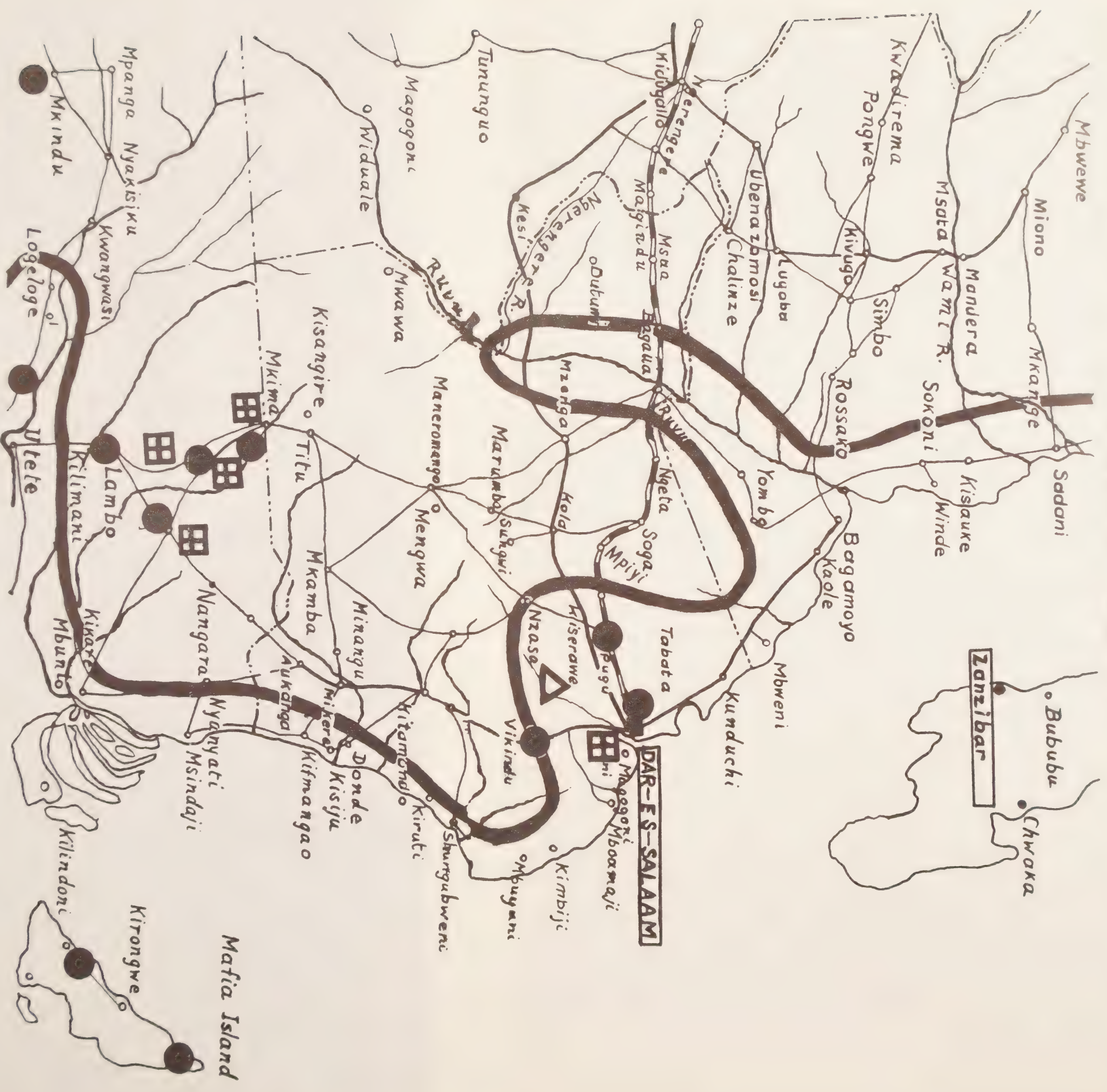
*See “Industrial Relations in Great Britain”, by J. Henry Richardson, M.A., Ph.D., published by P. S. King & Son, Ltd., Orchard House, 14 Great Smith Street, Westminster, London, S.W.1.

done in Europe. Its cause, all too frequently, can be traced to company promoters, boards of directors, shareholders, etc., of large concerns who sometimes have one main train of thought, and that is their own personal interests, without regard or knowledge as to the conditions which render the payments of their dividends possible. A lot of this, mercifully, is due to ignorance, but not all of it by any means. These people have to be taught and educated up to a state when they can visualize with understanding the conditions on their properties, which are often situated in countries about which they may have only a vague idea. Here I suggest the establishment of a regular system of lectures to be held (for sake of argument, let us say) in London, where lectures, films, and general discussions can take place. Where, for instance, bad conditions prevail, films should be taken of them and the people concerned should be shown exactly where they are going wrong, and how to improve these conditions. The remarks so frequently heard, such as, "I should be only too pleased to improve conditions, but you know what directors at home are like", must be abolished; it is up to us to see that they are abolished. No longer can we permit such retarding and unworthy influences to impede progress. The writer for one would willingly give assistance in this matter when on leave in Europe if called upon to do so, and I know that there are many others, who have the interests of the African at heart, who would do likewise.

It is only by the inclusion of these suggestions, which are few in comparison with the countless others which must also be considered, that we can hope for improvement in the external and internal aspect of economic development. These few are, however, some of the most important points which must not be lost sight of and which cannot be divorced from the general plan.

To make the "New Beginning" (as suggested by Mr. Culwick) a success, we must begin now and not wait till after the war. We must, as he says, have a "plan" based on co-ordinated regional schemes. Time, as stated at the beginning of this note, is short. Let us ask ourselves these questions. If the war ends this year or in 1944 (it might), are we prepared? Have we made our plans? And are we going to carry them out? Do we know exactly what major works or undertakings are ready for the employment of that grand fellow the African soldier on his demobilization? Have we the machinery ready to put all this into immediate operation? If the answer to these questions is in the affirmative, then we should know about it. If the answer is in the negative, I urge those responsible for this post-war planning not to let another moment slide and to take active measures so that grass does not grow beneath their feet. Their responsibility is enormous. This problem calls as no other for unremitting thought and service on the part of the European; for an intelligent long-time plan, for confidence, sympathy, and patient understanding. The future of Tanganyika's greatest asset may well depend on the success or failure of our efforts.

MAP SHOWING TSETSE POSITION IN THE DAR-ES-SALAAM AREA TODAY

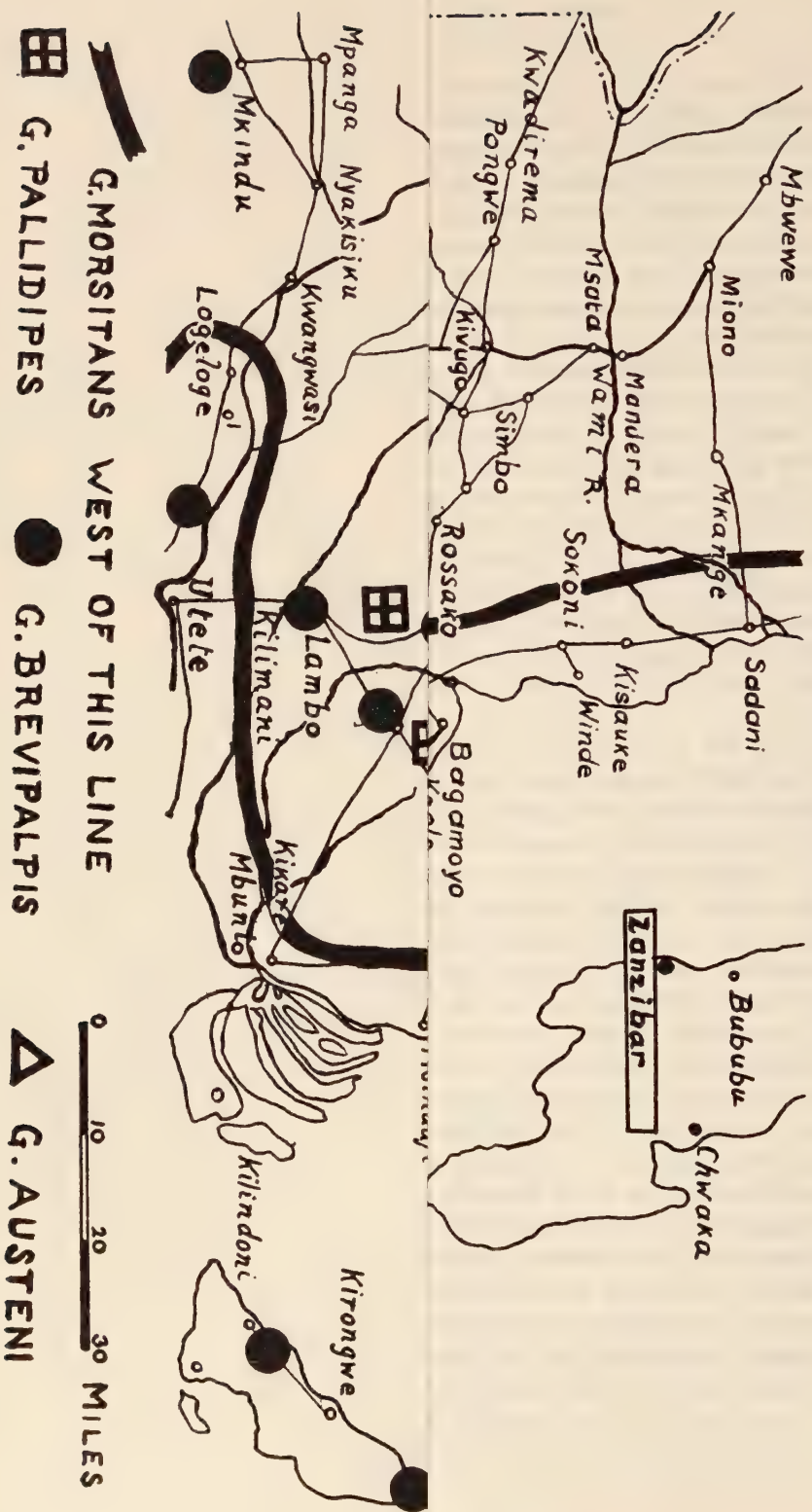


■ G. MORSITANS WEST OF THIS LINE

■ G. PALLIDIPES ● G. BREVIPALPIS ▲ G. AUSTENI

0 10 20 30 MILES

MAP SHOWING TSETSE POSITION IN THE DAR-ES-SALAAM AREA TODAY



Notes on the presence of Tsetse fly, between 1857 and 1915, in the Dar es Salaam Area

By S. Napier Bax

MR. GILLMAN raises an interesting point in the correspondence columns of the November 1942 number of the *Tanganyika Notes and Records* when, in connection with the Mackinnon road and a reference to tsetse which I quoted from Coupland, he remarks that during railway construction between Dar es Salaam, Ruvu and Ngerengere, where he lived and worked for eighteen months, there was no trace of fly and none of the many mules employed by the construction personnel was ever infected between 1905 and 1907. An examination of the tsetse map to-day shows a very different picture from the one Mr. Gillman's evidence implies, for although the eastern edge of the great eastern *Glossina morsitans* belt lies back in a semi-circle from Dar es Salaam, leaving the town in an almost *morsitans*-free bay, forty miles in length from north-west to south-east and twenty-five miles wide, that is only a fraction of the distance to Ngerengere, and furthermore the bay is by no means free of other species of tsetse, for *G. brevipalpis*, *austeni* and *pallidipes* flourish within it. Further to the west a narrow tsetse-free strip thrusts southwards along the comparatively treeless grasslands of the Ruvu River. Otherwise the district is almost wholly given over to tsetse. However, as we know to our cost, the tsetse front may change rapidly and the position to-day is by no means an indication of the position yesterday, or to-morrow, though we are more accustomed to seeing advances than retreats. Mr. Gillman's evidence would lead us to infer that there has been a deterioration in the tsetse position around Dar es Salaam, and this has led me to try and find out exactly what evidence we have of the state of affairs in that area in the early days. By the Dar es Salaam area I mean approximately the Dar es Salaam administrative district as shown on the 1:2,000,000 map of the Territory.

At the present day the tsetse fly is confined to the African continent except for a small belt behind Aden. The first fly of the genus *Glossina* to be scientifically described (by Wiedemann) was a specimen from the west coast of Africa as early as 1830.

Hale Carpenter⁽¹⁾ gives a very interesting account of the history of the white man's contact with the tsetse fly. He tells how the early African travellers of the middle of the nineteenth century were much impressed by the fly which was so well known to the natives for inflicting a "poisonous

(1) HALE CARPENTER, G. D., *A Naturalist on Lake Victoria*, 19, et seq.

bite" upon their cattle. He quotes Gordon Cumming's experiences and Livingstone's⁽²⁾ brilliant and remarkably prophetic passage in his *Missionary Travels and Researches in South Africa*. Such early explorations made the tsetse *Glossina morsitans* well known in England as long ago as 1850, though exactly how it killed cattle was not discovered until nearly half a century later. In 1895 Bruce, working in Zululand, made the vital discovery that the connection between the tsetse fly and the disease of "nagana" in domestic stock was a trypanosome, thus paving the way for the discovery of the cause of sleeping sickness in man, a disease which was to devastate the regions about Lake Victoria a few years later.

It is not to be supposed, however, that every explorer entering Africa after 1850 was able correctly to identify a tsetse fly. Three blood-sucking genera, *Tabanus*, *Pangonius* and *Haematopota* of the family *Tabanidae*, and belonging to the same order as the tsetse—the *Diptera*—must often have been mistaken for it, as must the biting fly *Stomoxys*, which looks like an ordinary house-fly and which is a closer relative still, belonging to the same family as the tsetse fly—*Anthomyiidae*. These horse-flies, gad flies or clegs make fierce attacks on man and beast and *Haematopota* and *Stomoxys* are even to-day often included in collections of tsetse flies sent to the Tsetse Research Department. The collectors have evidently not been clear on the two certain points of identification of the tsetse fly—the wings lying flat, parallel to the surface on which it sits, and closing over each other like the blades of scissors when the tsetse is at rest; and the hatchet-like form of the cell or space which can be seen in the middle of the wing. It is quite obvious from his own words that even such an able explorer as Stanley⁽³⁾ could not at one time distinguish a tsetse fly from other biting flies, for at the outset of his expedition in 1871 to find Livingstone, describing various flies, he says: "This fly I *subsequently* found to be the 'tsetse' ". The italics are mine. The difficulty, therefore, in identifying correctly the tsetse-fly exposes to suspicion all but the best attested evidence. Fortunately, however, there is another text by which we may judge whether the pest was present or not. In my opinion the distribution of cattle—an observation often noted by the early explorers—forms an excellent index of the presence or absence of the tsetse. If we could see a cattle map of Tanganyika of 1850 we should probably be broadly right in assuming that

(2) HALE CARPENTER writes: "After noting the symptoms of 'fly disease' Livingstone continues: 'These symptoms seem to indicate a poison in the blood, *the germ of which enters when the proboscis is inserted to draw blood. The poison germ, contained in a bulb at the root of the proboscis, seems capable, although very minute in quantity, of reproducing itself*'. The words which I have put in italics were written by Livingstone about fifty years before the discovery of the trypanosome by Bruce, and some years before the first discovery of micro-organisms of disease by Louis Pasteur."

Actually, of course, the bulb is not a receptacle for the "poison germ", but trypanosomes are in fact contained in the proboscis, and Livingstone's supposition therefore is remarkably near the truth.

(3) STANLEY, H. M., *How I found Livingstone*, 87, et seq.

where cattle were not, the tsetse fly was.⁽⁴⁾ Much of the early evidence that I produce below is based on the distribution of cattle, though it should always be borne in mind that other causes than tsetse might account for the absence of cattle, for example, disease, theft, poverty, and in the dry season absence of sufficient permanent water. Sometimes the early travellers express surprise at the absence of cattle and yet 'do not record the tsetse fly, and to me it seems a pity that they did not more often cross-question the natives as to the reason why they had no stock; but there was the language difficulty and doubtless their minds were often filled with more pressing matters, and it may well have been that the natives themselves were unwilling to give information. I believe that travellers must frequently have passed through tsetse-belts without their having been aware of the fact. Their very mode of travelling—in an immense caravan—would weigh against their seeing tsetses except when a small party left it on a hunting expedition or for some other purpose: season of the year, time of day, whether the day was hot or cold, cloudy or sunny, whether there was a high wind or not, and the experience of the traveller himself in spotting a tsetse would all be important points in deciding whether the tsetse fly was observed during the comparatively rapid passage through the infested area.' The species of tsetse concerned would also be an important factor. *G. pallidipes* does not appear freely to man, and even such a widely distributed species as *morsitans* may sometimes be present in such small, though still deadly, numbers, that it is not readily seen. Thus direct evidence of the presence of the tsetse is meagre in the earliest records, but indirect evidence—the presence or not of cattle—is more abundant.

I come now to the references that I have been able to find, which are necessarily, I fear, somewhat disconnected.

The earliest references are from the famous traveller Burton⁽⁵⁾ who gives an account of the live stock on the coast during his years of exploration between 1857 and 1859. He writes:

"Black cattle will not exist upon the coast from Mombasah to Kilwa, except about Konduchi and its adjacent islets: they cannot live in Uzaramo and Khutu [apparently between the Ulugurus and the Ruvu], and yet they are found upon the Pangani River, at a few miles distant from the sea. The people attribute this phenomenon here to brackish water, there to a poisonous grass; the animals die, according to the Arabs, sometimes from entozoa in the liver, at other times from an eruption like smallpox, accompanied with frothing at the mouth, and ending fatally after the third or fourth day. Of a herd, even when kept on the sea-board for a few weeks, many will be lost, and only change of air will save the rest. It may be

(4) Mr. Lowe, Director of Veterinary Services, in a letter to me, endorses my opinion. He writes: "... for the purposes of historical records I would be prepared to accept the presence of cattle as proof of the absence of 'fly' and vice versa."

(5) BURTON, Capt. R. F., "Lake Regions of Central Africa", *Journal of the Royal Society*, Vol. XXIX, 390-91.

remarked, however, that no cattle are found in the low and marshy central tracts which form the kingdom of the Kazembe [Katanga]; the deficiency should, therefore, be attributed to climate rather than to a merely local accident. Moreover, from the specimen brought home by the Expedition, it is evident that the tsetse, so fatal to all the bovine and equine race, has not died out of the land⁽⁶⁾ On the line of road followed by the Expedition no herds were seen eastward of the central heights of Usagara."

At first sight there appears to be direct evidence here, but the tsetse referred to, identified as *Glossina morsitans* in the British Museum, was⁽⁷⁾ "met with in the country between the mountains and [Lake] Tanganyika," which puts it outside the area under consideration. Mr. Lowe⁽⁸⁾ tells me that the symptoms described do not suggest trypanosomiasis. It would certainly have been interesting and satisfactory had we even had evidence of that kind, but nevertheless, for the reasons already given, I believe the almost complete absence of cattle from the vast area between the central heights of Usagara and the sea must be interpreted as meaning the presence of tsetse. Burton also makes other references to cattle in the coastal areas, which are worth quoting. He writes,⁽⁹⁾ "cattle do not exist everywhere upon the coast, but all the villages are rich in poultry and goats". There is an extremely interesting reference to the driving of cattle by Wanyamwezi to the coast which would of course imply but few cattle there. Writing of a village, Zungomero, at the southern end of the Ulugurus, Burton⁽¹⁰⁾ says, "Meat is scarce: the only cattle are those driven down by the Wanyamwezi to the coast; . . .". But the trade was not great for later he writes,⁽¹¹⁾ "Black cattle are seldom driven down from the interior, on account of the length and risk of the journey". Finally he states (loc. cit.), "The island of Zanzibar is supplied with black cattle, chiefly from Banadir⁽¹²⁾ and Madagascar". If cattle were available a few hours' sail away on the African mainland, they would certainly not have been obtained from Madagascar. All the above quotations from Burton are consistent with my first quotation from him, describing the coast as possessing a few herds with a great empty country inland.

⁽⁶⁾ This curiously biblical sentence is tantalising: ". . . has not died out of the land . . ." would seem to indicate that Burton had heard of tsetse in this area before, though it is possible he had in mind the discoveries of tsetse much further south by the other great explorers and hunters. But even so there would remain an implication that tsetse had been reported as becoming scarcer.

⁽⁷⁾ BURTON, op. cit., 113.

⁽⁸⁾ Mr. Lowe writes in a letter: ". . . in my opinion the description of the symptoms does not suggest trypanosomiasis. They might be those of east coast fever, heartwater or even bovine pleuro-pneumonia. The entozoa were probably flukes and the skin disease streptothricosis neither of which can as a rule be regarded as a fatal disease."

⁽⁹⁾ BURTON, op. cit., 48.

⁽¹⁰⁾ BURTON, op. cit., 79.

⁽¹¹⁾ Ibid, 445.

⁽¹²⁾ BANADIR. Burton, op. cit., 31. "Of later years the half-Somali towns of Makdishu, Lamu, Barawa (Brava), Bette (Patta Island), and those adjacent are placed in the 'Barr el Banadir', contracted to El Banadir, 'Harbour-land', or 'the Harbours'".

Speke, who had been Burton's companion in the discovery of Lake Tanganyika and who himself discovered Lake Victoria on the return journey when Burton lay ill at Tabora, started off on a new expedition soon after he reached England to prove his assertion that Lake Victoria was the source of the Nile. Writing of this expedition⁽¹³⁾ which left the coast in 1860, he says, "The Wazaramo are strictly agriculturists; they have no cows and but few goats". He thus fully endorses Burton's observations in this his second visit to the area.

In 1873 Lieutenant Cameron,⁽¹⁴⁾ who was in charge of an expedition for the relief of Livingstone, gives a description of the country about Msuwah. His Msuwah must be in the neighbourhood of the station Msua (the second station west of Ruvu) on the railway to-day, with a village of the same name three or four miles to the north which is shown on the 1:1,000,000 map of the Territory. Cameron writes:

"I was much astonished at the total absence of cattle, as we noticed no tsetse and the country seemed admirably adapted for grazing, being well-watered⁽¹⁵⁾ and provided with trees to afford shade during the heat of the day."

I do not suggest that the absence of cattle at Msua actually proved the presence of tsetse there; but for the reasons I have already given I do think that their absence is most suggestive and the fact that Cameron saw no tsetse must by no means be accepted as proof that there were none.

The next reference is in a speech by Sir Fowell Buxton⁽¹⁶⁾ made at a meeting of the Royal Geographical Society in 1878. Speaking of the Mackinnon road which had then progressed forty miles, he said:

"There has been no lack of traffic . . . some little effort had been made to introduce wheeled conveyances drawn by oxen, and it could not be said that those experiments had failed owing to the presence of the tsetse fly. Accidents of one kind and another had occurred, and possibly there had been carelessness in dealing with the animals, and nothing definite could be concluded from the attempt which had been made to use

(13) SPEKE, Capt., *Journal of the Discovery of the Source of the Nile*, 17.

(14) CAMERON, V. L., *Across Africa*, Vol. I, 48.

(15) Mr. Gillman has drawn my attention to the fact that Cameron passed through Msua in April, that is during the rainy season. He states that Msua actually lies in a notoriously poorly-watered region. Lack of water supplies for much of the year may thus have been responsible for the absence of cattle.

[Since supplying this information I have found the following statement by the geologist, Dr. Dantz, who camped at Kisemo on the 15th February 1898, only ten miles west of Cameron's Msua crossing: "The village is inhabited by an industrious people and, with its stately herds of cattle and goats forms an agreeable contrast to the usually poor villages of the Wazaramo." (*Mitt. D. Sch.*, Vol. XV, 1902, p. 37.) This village, practically deserted to-day, lies in the upper reaches of the Msua drainage, some seven miles north of Kidugalo railway station, where limestones provide better water supplies and where the natural vegetation is miombo woodland.—C.G.]

(16) *Proc. Royal Geog. Soc.*, 1879, 95.

oxen or horses as beasts of draught. There was this encouragement, however, that the donkeys which had been employed had done their work efficiently and well, and had kept in good health”.

There is a further reference⁽¹⁷⁾ later in the same year to animal transport on the Mackinnon road :

“Mr. Beardall, formerly of the Universities’ Rovuma Mission, left England, on the 28th of November, to take charge of the works in connection with the road now making from Dar es Salaam to the interior of Eastern Africa. Sergeant Richards, R.E., followed in December to work under him. Eight out of the ten bullocks brought from Madagascar are doing good service on the road, and it is therefore clear there is no tsetse fly on the forty miles already traced of the route,”.

It is worth while noting the significance of the fact that these early pioneers now had tsetse more definitely in mind. This would argue that the pest was known to be present somewhere in the neighbourhood—probably from native report—for the natives would have tried the acid test of keeping cattle. In areas not far from the coast, even as early as 1873, tsetse fly—if I may be forgiven—were in the air. Boundaries were not known, species were not identified, but the country was believed to be potentially dangerous; it was not regarded as clean country free from the curse of tsetse.

I now come to the earliest direct evidence of tsetse fly that I have been able to find for the area under consideration.

Rankin⁽¹⁸⁾ gives an informative account of the journey up-country of the Indian elephants imported by King Leopold of the Belgians in 1879, which readers will remember recently formed the subject of an interesting article by Sillery⁽¹⁹⁾ in this journal. It will be noticed that Rankin’s evidence supports the previous evidence on the freedom from tsetse of the first part of the Mackinnon road. The caravan followed the road for forty-one miles to Vikeruti which was as far as the road had got at that date. It then made the Kingani (Ruvu) crossing and forded the “Lungerengere”. To quote Rankin :

“On July 17th [1879] we first saw the tsetse fly in a belt of country infested by it, through which we had been marching since crossing the Kingani. . . . We were now near the Lungwa River at Charinzi, where food was very dear”.

It is clear then that tsetses were met with between the Kingani crossing and the Lungwa River at Charinzi. A place called Tscharinsi is marked on the German 1 : 300,000 map (Mohoro Sheet, E.6) as is also a river near it, the Longwa. This must be the Charinzi of Rankin and it is interesting to note

(17) *Proc. Royal Geog. Soc.*, 1879, 128.

(18) RANKIN, L. K., “The Elephant Experiment in Africa; a brief account of the Belgian Expedition on the March from Dar es Salaam to Mpwapwa”, *Proc. Royal Geog. Soc.*, 1882, 257.

(19) SILLERY, A., “Indian Elephants in Tanganyika”, *T.N.R.*, No. 11, 64.

that it is situated only four or five miles to the south-west of the Dar es Salaam-Morogoro road as shown on that map. Indeed it seems exceedingly probable that the German road followed fairly closely one of the old caravan routes running west from Dar es Salaam (Mboamaji just to the south of Dar es Salaam was an important centre) to Morogoro.

I come now to the reference in Coupland,⁽²⁰⁾ to which Mr. Gillman alludes. Coupland quotes Kirk's description of his visit to Dar es Salaam in 1881 :

"Unfortunately the presence of the tsetse fly after the first forty miles from the coast makes it hopeless to attempt the use of horses or bullocks".

Dr. (later Sir John) Kirk, Consul at Zanzibar, must be regarded as a first-class witness. He was a trained botanist and qualified doctor who had been recommended to Livingstone by Sir John Hooker, Director of Kew, and had accompanied Livingstone's Zambezi Expedition in both capacities; there he had made full acquaintance with the tsetse. In 1865 he published a very good article, judging from the extracts I have seen in the *Journal of the Linnean Society*, "On the 'Tsetse' Fly of Tropical Africa". Although I have been able to find no record, it is almost certain from the position Kirk assigns the belt, "after the first forty miles" that the species involved was *G. morsitans*, though *G. pallidipes* may have been present too. The distance mentioned also lends force to Rankin's statement, previously quoted, that the elephants actually met tsetse fly.

The next reference is from Lugard⁽²¹⁾ who, writing in 1893, says :

"In German East Africa throughout the broad zone, which he describes as the coast area, Dr. Pruen says 'the tsetse fly holds undisputed sway'".

The German scientist, Dr. Franz Stuhlmann, writing in 1902, as quoted by Austen⁽²²⁾, says :

"A few specimens of a biting fly, which, on examination, proved to be '*Glossina tabaniformis*, Westw.', '(*Gl. fusca*, Walk.)', were caught in January 1902, at Mangamara, a little way to the north of Dar-es-Salaam, beyond Msimbasi Creek".

Actually it seems certain that this fly was *G. brevipalpis*, a species of the same group as *fusca*. *G. fusca*, or for that matter *tabaniformis*, have never been found by the Tsetse Department in the Territory, and the latter fly to-day is believed to be restricted to Central and West Africa. Thus it would seem that Stuhlmann in 1902 was the first to discover *G. brevipalpis* in the

(20) COUPLAND, Prof. R., *The Exploitation of East Africa, 1856-1890*, 303.

(21) LUGARD, Capt. F. D., *The Rise of our East African Empire*, Vol. I, 390-91. I have not been able to find out who Dr. Pruen is or where Lugard's quotation comes from.

(22) AUSTEN, E. E., *A Monograph of the Tsetse flies*, 252. The title of Stuhlmann's paper is *Vorkommen von Glossina tabaniformis (Westw.) bei Dar es Salaam*, and it was published in *Berichte über Land- und Forstwirtschaft in Deutsch-Ostafrika*, Vol. I, 173.

GLOSSINA MORSITANS AND OTHER BLOOD-SUCKING DIPTERA WHICH MAY BE MISTAKEN FOR TSETSE FLIES



Haematopota villata. Drawn from Austen. ($\times 3$ about).



Tabanus longitudinalis. Drawn from Zumpt. ($\times 3$ about).



Pangonius varicolor. Drawn from Zumpt. ($\times 3$ about).



Stomoxys calcitrans. Drawn from Austen. ($\times 3$ about).



Glossina morsitans. Drawn from Austen. ($\times 3$ about). Note the wings closing over each other like the blades of scissors.



Right wing of *Glossina morsitans*. Drawn from Austen. ($\times 4\frac{1}{2}$ about). Note the hatchet-like form of cell or space in the middle of the wing, illustrated separately below.



Glossina morsitans. Drawn from Austen. ($\times 3$ about). Note the wings lying flat, parallel to the surface on which the tsetse is resting.

Dar es Salaam area where that species is still found. Stuhlmann goes on to say :

“This biting fly is evidently not rare near Dar-es-Salâm, and no case of Surra [that is trypanosomiasis] has yet been observed originating from there. At the place where the flies were caught the same cattle and goats have grazed for a long time, without disease appearing among them. The examination of the blood of the goats has so far not revealed any Trypanosomes, but this examination must be continued and extended to cattle and donkeys. I think, however, it may be assumed that Surra-disease is not conveyed by *Glossina tabaniformis*”.

It is believed to-day that trypanosomes can be carried by *G. brevipalpis* in nature so as to infect cattle, but as that species of fly is crepuscular in its habits, active especially at twilight, it generally does not come into close contact with farm stock kraaled some distance from the bush; hence losses may be negligible or very small in its neighbourhood. But it is important to note that Stuhlmann states definitely that in 1902 no case of trypanosomiasis had been observed originating from Dar es Salaam. This is most interesting and would seem to indicate that *G. pallidipes*, which to-day makes such a great nuisance of itself to stock-owners in and around the township, was at that time absent, at any rate from its immediate vicinity.

Austen⁽²³⁾ quotes a further reference by Stuhlmann to the areas under tsetse. Stuhlmann says : “In the Hinterland of Dar-es-Salâm the low ground bordering the Gerengere River is under suspicion;”. On the map accompanying his paper Stuhlmann marks a red line, “*Wege auf denen Viehtransporte infiziert sind*” (roads on which cattle transport is infected), from as far east as Kiserawe, westwards right out of the area under consideration. Under these circumstances his suspicion amounts almost to a certainty, in the light of present-day knowledge, that the Ngerengere valley was at any rate lightly infested, with the possibility that odd tsetse flies might have been carried by caravans eastwards as far as Kiserawe.

In passing, it is interesting to note that the early direct evidence does not point to a peninsula of tsetse protruding into the Dar es Salaam area from some vague central fly-belt, making the district peculiar in that respect. On the contrary, were I not confining my remarks to the Dar es Salaam District I would point to clear evidence, both to the north and to the south, showing that the conditions that ruled in the Dar es Salaam area were normal for the coastal belt, namely that tsetse was widespread.

All the references given so far are from before the construction of the Central Railway, but I have found the following later ones.

(23) AUSTEN, E. E., op. cit., 262. The title of the paper is *Notizen über die Tsetse-fliege (Glossina morsitans Westw.) und die durch sie übertragene Surra-krankheit in Deutsch-Ostafrika, Berichte über Land- und Forstwirtschaft in Deutsch-Ostafrika*, Vol. I, 137.

The *Handbook of German East Africa*, published by the Admiralty War Staff⁽²⁴⁾, 1916, describes conditions which existed about 1910 among the tribes in the district of Dar es Salaam :—

<i>Name of tribe, etc.</i>	<i>Manner of life and subsistence; cattle; donkeys</i>
1. <i>Waswahili</i> and vassals: Dar es Salaam town and along the coast.	Agriculture . . . Few cattle.
2. <i>Wandengereko</i> : in southern interior of the District; thickly settled near Mkamba.	Agriculturists . . . Cattle and donkey rearing impossible on account of tsetse.
3. <i>Wazaramo</i> : in northern interior of the District.	Agriculture . . . Very little cattle on account of tsetse.
4. <i>Arabs, Indians, Banyans, Somali</i> : thickly settled in Dar es Salaam town, and scattered about along the coast.	Merchants, traders, oxen, goats, etc.

This catalogue of few cattle or no cattle on account of tsetse is very revealing of the state of affairs throughout the district and it is reinforced by the following account of road communications from "a German military authority of 1911"⁽²⁵⁾ :—

"*Animal Diseases*.—Tsetse, coast-fever, and horse-sickness were reported in 1911 prevalent throughout the District. In 1915 an area about thirty miles in circumference, lying on the railway west of Dar-es-Salaam was specially reported as infected by tsetse".

I now come to the German tsetse map of 1913 made, I believe by the German veterinary authorities. It is a surprisingly poor product, for it omits many important tsetse-belts with which the Germans were certainly familiar. It shows no tsetse at all at Dar es Salaam, but an oval belt, about eighty miles in circumference, lying along the railway from Mpiyi station to a point just east of Bagalla station. The belt nowhere touches the Dar es Salaam-Morogoro road.

Finally, there is the very small-scale British military "Fly-Map" of 1915. It gives an excellent picture of a tsetse fly for identification, but the distribution shown is not helpful. In the Dar es Salaam area there is a small belt on the railway, probably the same one indicated on the German veterinary map.

I have not yet made any reference to a factor, which on first consideration may seem to be far removed from the subject of tsetse, but which I believe played an important part in its distribution, namely the Slave Trade. For many hundreds of years slaves had been taken from East Africa, but when

⁽²⁴⁾ Admiralty War Staff, Intelligence Division, January 1916. *Handbook of German East Africa*, 46.

⁽²⁵⁾ Ibid, 316.

Seyid Said transferred his capital in 1840 from Muscat to Zanzibar the trade was intensified. Coupland⁽²⁶⁾ puts the annual loss of population to East Africa, by enslavement and the slaughter it occasioned, at about eighty thousand to one hundred thousand annually. He says that such an authority as Livingstone would have put it higher. Both the man power and the productive capacity of wide areas west of Kilwa and Zanzibar were being steadily diminished. As an example of what was happening it is worth while quoting Coupland⁽²⁷⁾ categorically on the subject of Kilwa, one of the chief slave ports :

“There is no reason to doubt the information given to Rigby [an early consul at Zanzibar] by men who knew the Kilwa slave route. ‘Natives of India who have resided many years at Kilwa . . . state that districts near Kilwa, extending ten or twelve days’ journey, which a few years ago were thickly populated, are now entirely uninhabited . . .’.”

A statistician could no doubt work out what the effect would be of an annual drain from a comparatively restricted area of tens of thousands of persons annually in the thirty-six years between 1840 and 1876 (and later) on a population which probably was not very large at the outset. This was a true drain for most of the slaves were exported and for the remainder, if the experience of Zanzibar was true of the coastal areas of the mainland as no doubt it was, the birth-rate was very low indeed. But perhaps from the point of view of this paper far more important than the actual loss of population was the great disruptive effect on the whole life of the community. Tribe warred against tribe to gain slaves, cattle were driven off, villages were burnt down and crops destroyed. There would be no encouragement to lead a settled life and large stretches of land would go out of cultivation, the bush would grow up and the tsetse would come in. If there is any truth in my supposition the Dar es Salaam area would certainly have been one of those to suffer, though not as heavily as areas abutting on the chief slave ports. In 1876 the slave trade as an organized business was dead, but it still continued on a reduced scale for many years⁽²⁸⁾; and then with the partition of Africa by the European powers and the occupation of Tanganyika by Germany a new disruptive force made itself felt before the East Coast entered on a short period of peace and development. It must not be deduced from this that I suggest that there was a Golden Age before 1840. I do not. I merely suggest that the peak years of the slave trade and the first years of German conquest created conditions particularly favourable for a steady advance of the tsetse fly.

I have purposely alluded only to the first years of German conquest, stormy though some later years were, for with the close of the Arab revolt in 1889 there arose a factor, adverse to the tsetse, of such importance that it must

(26) COUPLAND, op. cit., 233-34.

(27) Ibid, 140.

(28) COUPLAND, op. cit., 229.

have overridden every other one and temporarily held the field to itself. Rinderpest, which is enzootic in Asia, appeared in Abyssinia in 1890⁽²⁹⁾ and spread rapidly southwards. By the summer of 1890 it was just beginning to show its effects in Uganda and Kavirondo⁽³⁰⁾. It had reached the north of Lake Nyasa by about July 1892 (*loc. cit.*). This plague must, therefore, have swept through Tanganyika in about 1891. Tens of thousands of cattle and game died. Lugard⁽³¹⁾ writes :

“Never before in the memory of man, or by the voice of tradition, have the cattle died in such vast numbers; never before has the wild game suffered. Nearly all the buffalo and eland are gone. The giraffe has suffered, and many of the small antelope—the bush-buck and reed-buck”⁽³²⁾

This contemporary European evidence does not come from Tanganyika, but to my inquiry as to whether the Masai had any tradition of the Great Rinderpest, Mr. Page-Jones, District Commissioner, Masai, has kindly replied as follows :—

“Yes, the Great Rinderpest certainly did sweep through Masailand in 1890-91; it was allied with a very virulent outbreak of smallpox, and cattle and people died in thousands. The combination of rinderpest and smallpox (foretold by the Loibon Mbatian) is very vividly remembered indeed by Masai elders. It is said that the whole of the Masai District in Tanganyika was denuded of Masai and cattle⁽³³⁾, the only exception being in the Ngorongoro Highlands, where a few people managed to survive with tiny herds, say of ten to fifteen head of cattle, with a few goats. Those species of game susceptible to rinderpest . . . are also said to have been wiped out, again with the exception of a few which managed to survive ‘*kando kando*’.”

(29) WORTHINGTON, E. B., *Science in Africa*, 226.

(30) LUGARD, *op. cit.*, Vol. I, 526.

(31) *Ibid*, 527, *et seq.*

(32) With regard to the susceptibility of the various kinds of game animals to rinderpest, Mr. Lowe, writing in *The Empire Journal of Experimental Agriculture* (Vol. X, No. 40, October 1942), says : “Our knowledge regarding the relationship between game animals and rinderpest is far from complete and is a subject that is now engaging our attention; it may be said here that certain species are known to be highly susceptible, such as buffalo, eland, greater kudu, giraffe and wild pig. Other species, such as wildebeeste (gnu), are also known to be susceptible to the disease, but to a lesser degree.” All the above animals, with the exception of wildebeeste, are valuable sources of food to the tsetse.

(33) I am indebted to Miss Lee, a missionary of the Universities' Mission to Central Africa, of Zanzibar, for the following information. She has told me how on her safaris she has noticed elderly Masai women in the Uzigua country married to Uzigua men. The explanation is this. At the time of the “Great Scourge” when all the cattle and animals died the Masai brought their children to the Wazigua asking them to keep them as their slaves to save their lives, as their cattle having died they were in danger of extinction themselves. They said that if they survived they would return and redeem their children. A great many of the children were eventually redeemed but a few of the girls had married Uzigua men, and of these some chose to remain. This has resulted in a bond between the Masai and the Uzigua which remains to this day.

What was the effect on the tsetse? I have not been able to find any direct evidence from Tanganyika but there is a good record from Southern Rhodesia and it may be surmised with reasonable certainty that something of the same kind happened here. The Great Rinderpest reached Southern Rhodesia in 1896 where it killed off a large part of the game⁽³⁴⁾. This was followed more or less immediately by the complete disappearance of the great southern belt of *G. morsitans* and the reduction of the northern belt to a few isolated spots (loc. cit.). Although the point cannot be proved few people I believe would care to contend to-day that this catastrophe was not the direct result of the great mortality among the host animals⁽³⁵⁾. It will have been noted that the species of tsetse concerned was *G. morsitans*, the species which is present in the savanna woodland behind Dar es Salaam. We must conclude, then, that about 1890 to 1891 the *G. morsitans* in the Dar es Salaam District suffered a heavy blow and retreated. I am not so certain that this would have applied equally to other species of tsetse, such as *G. pallidipes*, but it is probable that they also suffered severely at Dar es Salaam. But the tsetse fly is able to make a very quick recovery in actual population and can reinvade surprisingly quickly the country which it has lost. In Tanganyika the Tsetse Research Department has watched advances making three miles a year on a considerable front. By 1913 in Southern Rhodesia, seventeen years or less after the catastrophe to the tsetse population, the northern belt had recovered quite a substantial part of its old territory. Almost immediately, then, in the Dar es Salaam area we must imagine the tsetse fly gathering its strength and commencing a new advance, small nuclei which may have been left isolated gradually expanding and eventually coalescing and the whole position degenerating once more. No doubt the newly-constructed railway played a part in this spread, for as is well known tsetses can be carried in great numbers on trains.

I must now make an attempt to sum up the evidence and draw the various threads together, though what the actual position was must always remain largely a matter of conjecture.

I have put the year 1857 in the title of this paper because that is the date of the earliest evidence that I have been able to find. But I think we have reasonable excuse for trying to reach back beyond that date, say to just over one hundred years, to before 1840, to before the intensification of the slave trade. In 1857 Burton records that there were few cattle on the coast.

(34) JACK, R. W., "Tsetse Fly and Game", *Bull. No. 915*, 3.

(35) Organized game destruction (acting like the Great Rinderpest) is the method Southern Rhodesia employs to-day to keep her great northern *G. morsitans* belt in check and to reclaim land from the tsetse in that area. Organized shooting is done on a front of several hundred miles and of course must be maintained indefinitely. There is no doubt that the measure has been successful under the conditions ruling, but it must by no means be assumed that it would be equally successful under other more difficult conditions where the bush is thicker, and with other species of tsetse. Unfortunately, a large, scientifically controlled experiment in the elimination of game, which had been started by the Tsetse Research Department in this country, had to be closed down on the outbreak of war.

I feel that an experienced explorer, as Burton was, who wrote so fully on the country and the people, would certainly have discovered and mentioned the important fact if, twenty years before his arrival, cattle had been present in much larger numbers than those he saw. I suggest, then, that even previous to 1840 the tsetse position in the Dar es Salaam area was bad.

The years 1840 to 1876 were the worst period of the slave trade, which still continued, however, on a considerable scale until much later. During this period large areas of native land would have gone out of cultivation almost everywhere except immediately on the coast, where the development of the Arab slave *shambas* would have led to a temporary thrusting back of the bush. I believe, therefore, that this era must be regarded as one favourable to the tsetse and that, generally speaking, land was overrun by it, though on a narrow strip on the coast the tsetse would have been pushed back. But this coastal strip would not have survived for long. As the slave years drew to their close, so the Arab *shambas* declined and were abandoned, to grow up into tsetse-bush.

In the opening years of the eighteen-eighties the first unexceptionable witness, Kirk, gives us direct evidence of the presence of tsetse in the Dar es Salaam district. The savanna tsetse, *G. morsitans*, is almost certainly the species which was found forty miles up the Mackinnon road, only a few miles further from Dar es Salaam than it exists to-day.

In 1890-91 the Great Rinderpest must have passed through Tanganyika, and, judging from the effects seen elsewhere, enormous numbers of game must have fallen victim to it. From Southern Rhodesian experience it is probable that *G. morsitans* suffered a severe blow and in places the fly-belt is likely to have been much reduced. Other species of tsetse would also no doubt have suffered.

In 1902 there is direct evidence of the presence of tsetse from a second witness of the utmost reliability. Stuhlmann discovered *G. brevipalpis* near Dar es Salaam and suspected "the low ground bordering the Gerengere River" of harbouring tsetse. Both points are worth enlarging on; to take the second point first, if account is taken of the rapid opening up of the country at this period, and the gain in knowledge, it seems curious that Stuhlmann merely suspects tsetse in the neighbourhood of a locality where twenty years before Kirk actually stated them to be present. The explanation would seem to lie in the rinderpest which must have passed through only about eleven years before. The disease probably caused a retraction of *G. morsitans*. In many places where previously it had been abundant, the tsetse fly was still absent or scarce. With regard to Stuhlmann's discovery of *G. brevipalpis* near Dar es Salaam, it is worth while remarking that this species is frequently associated with two other species, *G. austeni* and *pallidipes*, in the coastal areas to-day, and that this association extends at least from the south of Tanganyika Territory right into Kenya. I believe it highly probable that the latter two

species were present with *G. brevipalpis* near Dar es Salaam in 1902 and long before. *G. austeni* might well have been overlooked; indeed it was only as recently as 1941 that the Tsetse Department in an intensive survey found the first specimen recorded near Dar es Salaam, but there is no reason to think it had not been present for many years. The apparent absence of *G. pallidipes* is more puzzling because it immediately makes its presence felt wherever there are live stock. But in this case, too, rinderpest may have played an important part in thinning and destroying the species, though leaving pockets ready to invade the land once more. Furthermore, *G. pallidipes* requires reasonably high thicket and it may well be that by 1902 the Arab *shambas*⁽³⁶⁾ had not reverted on a large scale to the coastal debris type of vegetation which is so common where they used to flourish and which forms an ideal habitat for *G. pallidipes* to-day.

In 1905 to 1907 Mr. Gillman was working on railway construction between Dar es Salaam and Ngerengere and saw no tsetse; nor were the mules infected. This is only three or four years after Stuhlmann's evidence and is in reasonable harmony with it, particularly when it is realized that Gillman is referring to the railway alignment which runs ten to twenty miles north of the road on which Stuhlmann was reporting, and through country which is possibly not so favourable to *G. morsitans*. About fifteen years had elapsed since the Great Rinderpest and though much of the ground which had been lost by the tsetse would surely by that time have been recovered, I believe the disease was at least a contributory cause of its possible absence or more probable great scarcity at this period. There are other factors, too, which may have played a part. Years, or successions of years, come when climatic conditions are unfavourable to the tsetse and the population is reduced. This may make no difference to the size of the area infested, only affecting the density of tsetse, but it may lead observers into thinking that the pest is absent when in reality it is still present and merely awaiting a favourable season to increase once more to its previous numbers. Secondly, *G. morsitans*, (unlike for instance *swynnertoni* and *pallidipes*), is a tsetse which the Tsetse Department has found often to withdraw in the face of great activity by man. The construction of a railway means intense human activity and it may well be that for the period of construction (though not after completion) the majority of what tsetse there were moved away from the railway. Mere odd tsetses may easily be overlooked by a person not actually searching for them. The great scarcity of tsetse (I think in view of Stuhlmann's evidence I am hardly justified in writing absence) would account for the escape of the mules.

The last evidence I shall discuss here is that of the *Handbook* which describes conditions in 1910 and 1911 and which must, I think, be taken as reliable. The position had much deteriorated, or perhaps closer acquaintance with conditions in the district had revealed the presence of tsetse where they

(36) Many readers must be well informed on this and I should be glad to hear from them.

had not been suspected before. However that may be, the words "Tsetse . . . prevalent throughout the District" might with equal truth have been written of the state of affairs to-day.⁽³⁷⁾

Any attempt to reconstruct the past, especially when evidence is slender, as it is here, inevitably exposes the writer to many pitfalls. I can only hope to have avoided the most serious ones; I cannot have escaped all. The subject is of genuine scientific interest and value and I should be very glad to hear of references I may have missed, of native testimony—often so valuable and of which I have none—and of the first-hand experiences of those who, like Mr. Gillman, knew the Dar es Salaam district in the early days.

I have acknowledged my debt to Mr. Lowe, Mr. Page-Jones and Miss Lee in the text. It remains to thank Mr. Potts of the Tsetse Research Department and Mr. Gillman who have kindly read through the draft and made valuable suggestions.

⁽³⁷⁾ But the prospects are very different. Our knowledge of the tsetse and how to deal with it have extended vastly in recent years. A thorough survey has been made of Dar es Salaam and its immediate environs, the area from which the town's chief milk supply comes. From the technical viewpoint there is no reason why the tsetse which infests the area should not be completely eliminated to-day; and indeed practical measures are likely to follow before long.

Observations on *Utani* customs among the Ngoni of Songea District

By the Rev. Eberhard Spies, O.S.B.

THE NAME Ngoni is used here to denote a number of formerly independent tribes, for example, the Mawindi, Pangwa, Yao, Ndendeule, Nindi, who were subdued about one hundred and twenty years ago and have since been ruled over by the Ngoni proper. These subject peoples are commonly referred to as *Sutu*, that is slaves, while the true Angoni like to call themselves Swazi (Kizulu). The custom of *utani* is still common among this very mixed conglomeration of people.

On the name Utani.—According to the information I could gather I am inclined to believe that the name *utani* is of Bantu origin and more precisely of “Kisutu” origin. Johnson, in his *Standard Swahili-English Dictionary*, considers it to be of Arabic origin. But the fact that the Zulu had already adopted the word *utani* from the local tribes of this country instead of their own Zulu word *ulashi* when the first Arabs under Nkosi Hawai (ca. 1840) entered this district, seems to prove that the name *utani* is of native origin. Very old people whom I asked do not know of any other word for these inherited tribal customs except *utani* and affirm that even their fathers and grandfathers used only this word. Furthermore; the *Sutu* have a tribal verb *kutanila* which means really *kunyang’anya au kumnyima mwenzake haki yake* which would explain a rather essential function of *utani* relationship. Through the Ngoni wars it might have been carried to other tribes where it is in use.

On the origin of Utani-relations.—I. The inter-tribal *utani* or external *utani* originated as a rule in warfare, but only if both sides were brave soldiers, so that on both sides heavy losses were inflicted. Thus the Ngoni have *utani* with the Hehe, Nyamwezi and Sukuma tribes, but not with the Matengo, Yao, Pangwa and Pogoro people who were easily defeated by them. My informants explained it in this way: both tribes had heavy losses, there was no one defeated so as a kind of armistice between them they initiated a “*utani*-relationship”, saying: *sasa tuko watani; nendeni mkazae na sisi tuzae, wapi-gane tena wajukuu wetu*.

But there was also another origin of inter-tribal *utani*. I was told by several old Ngoni people that they have *utani* with the Sokili (Nyakyusa) tribe on the ground of a burial. “When we made war with the Sokili they were defeated, but at the end they captured the brother of our Nkosi Mharule, by name Towatowa, and killed and buried him and because they buried him we have *utani*-relations with them up to our times”.

In addition to that, all my informants agree that inter-tribal *utani* can originate also on the ground of "a good Samaritan act" as Scrivenor calls it.*

II. Several ways of origin of *utani*-relationship between different clans of the same tribe (internal *utani*) have been mentioned by the informants such as :—

(1) Funeral attendance by a foreigner without being asked; the main act of the *mtani* according to Ngoni customs being to receive the dead body and lay it into the grave (but not digging the grave); some affirmed that the washing of the corpse is also an act by which *utani*-ties are contracted.

(2) A soldier, saved by his comrade from death; for example, a Ngoni soldier has been knocked down by a Bena soldier, but a comrade of the Ngoni comes to rescue him by killing his enemy; there will be *utani*-relationship between these two soldiers and their clans.

(3) "a good Samaritan act" between people of different clans as explained above; but a serious illness is required or an accident ("if an ear is cut off", was the example given), where the other sews the parts together.

(4) *Utani* can also originate when a man of high standing (*nduna* or *nkosi*) cannot pay his debts (*ng'ombe*, etc.), but is helped to do so by one of his subjects without hope of being repaid; between them and their *ukoo* will exist *utani*-relations. But this custom seems to be restricted to the Swazi clans only in the Songea District.

III. There exists also *utani* between individuals of one and the same clan with the usual *utani* rights and customs. These individuals are (1) the great-grandchildren with their great-grandfather or mother, and (2) children of cousins in the third generation where the family-ties seem to be no longer in force.

The question whether *utani*-ties can be and are really concluded even to-day was promptly answered in the affirmative by all my informants. They referred to a number of actual *utani* cases between different clans which were initiated through assistance in the burial. The proceedings are just the same as in olden times. The head of the mourning clan will, two or four weeks after the burial, prepare beer and kill a hen and call his *mtani* to associate in the ceremony of "closing the mourning time". Here the *utani*-relations between the two families are publicly announced and from this day onwards the *utani* rights and ceremonies are observed, that is the *mtani* will in future never be "invited" for beer, etc., but he may come to take whatever and whenever he likes.

*NOTE A.—"Some Notes on *Utani* or the Vituperative Alliances existing between the Clans in the Masasi District" (T. V. Scrivenor, *T.N.R.* 4, 72-74, 1937). For example, if a chief of the Ngoni falls seriously ill in another tribe's country and there he is cared for by a chief of that tribe and finally cured, there will be *utani*-ties between these tribes. Unfortunately they could not tell me of an actual case of this kind.

All informants admit also that even inter-tribal *mtani* could be contracted to-day, giving as an example that a chief of the Ngoni could be helped by another tribe when seriously ill; although the younger generation would in such cases prefer "the European ways of asking payment for their help".

On some Utani customs.—The *utani* customs described by Mr. R. E. Moreau in his article in *Tanganyika Notes and Records** were generally admitted by my informants.

According to Ngoni customs the *mtani* receives the corpse of the dead and lays it into the grave (main *utani* act). There was no mention of a duty to assist also in future burials of his *mtani* clan, nor of any obstruction of the burial attempted by him.

The *utani* hospitality seems to be of a rather special nature. According to the information I obtained the *utani*-relatives will never "invite" or "call" each other on an occasion of beer or banquet or any celebration like nuptials or burial, except the first time after the actual burial done by the *mtani*. The *mtani* may come at each time to look for beer or meat, etc., and take it without asking permission or without being blamed for it. But such "sharing of property" is mutual and restricted by the laws of custom. There have happened cases where the custom was broken by some individuals, then the respective "wazee" of the clans would interfere and dissolve the *utani*-ties between the two "quarrelsome persons", whereas the other members of the clans continued with the *utani*-relations. I was told that before the Europeans came it was impossible to bring such a case to the "baraza", as such quarrels were always settled by the heads of the clans.

It seems to me that the most striking feature of the *utani* customs among the Ngoni is the mutual abuse and horseplay. Whenever *watani* meet each other they will either insult or jeer at each other, whereas other *utani* customs will be observed only occasionally. There is no limitation between different ages, except that the older *mtani* will always begin the horseplay when his *mtani* is much younger. All kinds of obscene expressions might be used among grown-up people, but never before young people who are not yet married.

The forfeits and quasi-magical functions referred to in the article of Mr. Moreau were in use also with the Ngoni proper, but only some of them with the Sutu tribes of this district, for example, meat carried in the hand without some wrapping; clothes to dry on the roof of the hut. The Ngoni informants mentioned another case of forfeit: if a *mtani* did not carry his shield or spear properly (according to custom), his *mtani* relative would take it away from him; the same if the spear was not kept clean.

The explanations given as regards these customs are different. Some said they did so in order to save the *mtani* from bad luck; but others said that the *mtani* takes "meat and clothes laid out on the roof" away "because the

*NOTE B.—"The Joking Relationship (*Utani*) in Tanganyika" (R. E. Moreau, *T.N.R.* 12, 1-9, 1941).

other wants to show that he is richer than other people" that is in order to teach the *mtani adabu* (good manners). This last explanation would certainly hold good for some of the customs of forfeits.

The prophesy of evil upon evil that would befall a member of the *mtani* clan on certain occasions was explained as a "preventive means of saving the *mtani* from the bad influence of black magic". The facts stated before me all referred to sick persons in the *mtani* family. The *mtani* prophesies death in order to "deter eventual *wachawi* in the neighbourhood from doing harm to the sick showing them that he knows of their intentions".

On the cessation of Utani-ties.—Formerly, it was never possible to break off the *utani*-ties between two clans; but when some individuals quarrelled because of taking away property, it was the custom to dissolve the *utani*-ties between these quarrelling persons through a judgment of the *wazee* but never before the *baraza*.

Nowadays the younger generation does not so much favour the *utani* customs and therefore quarrelling among *watani* is a common fact to-day; "obstinate people" may even bring their case before the *baraza* on the assumption that the "European Government does not acknowledge the rights of *utani*"*.

But also in old times *utani*-ties were legally dissolved with the Ngoni when two *watani* married. Marriage did not only free the couple themselves from *utani* relations, but all the members of the two clans, because they entered the *hali ya udugu*—the bond of family relations.

On the comparison between clan relations, blood-brotherhood and Utani relations.—According to the information I obtained, the strongest bond of relationship is that between the members of the clan (*jamaa*) for the three successive generations. Clan relations are based on mutual respect and help and sanctioned by many *miiko*.

Next to it comes the blood-brotherhood (*uchali*) which is really an extension of blood- or clan-relationship to a foreigner. The effect seems to be the sharing of equal respect and help as with blood relatives.

*NOTE C.—That the local native courts do recognize the *utani* customs is shown by the following cases from their records:—

Case No. 16 of 1942 of Mkurumusi. The defendant was ordered to pay Shs. 4/- as damages to the plaintiff, together with costs, because he had taken three jars of beer, the property of the plaintiff. Defendant claimed that he was an *mtani* of plaintiff, but the court ruled that as such he was only entitled to take one thing only, for example one jar of beer!

Case No. 35 of 1942 of Liuli. The accused was fined Shs. 2/- and ordered to pay Shs. 3/- damages to complainant for assaulting him after he had drunk the accused's beer. The complainant claimed that he was an *mtani* of accused and therefore entitled to drink the beer. The elders agreed that complainant was an *mtani* and that accused was at fault for assaulting him. (Note by A. W. Wyatt.)

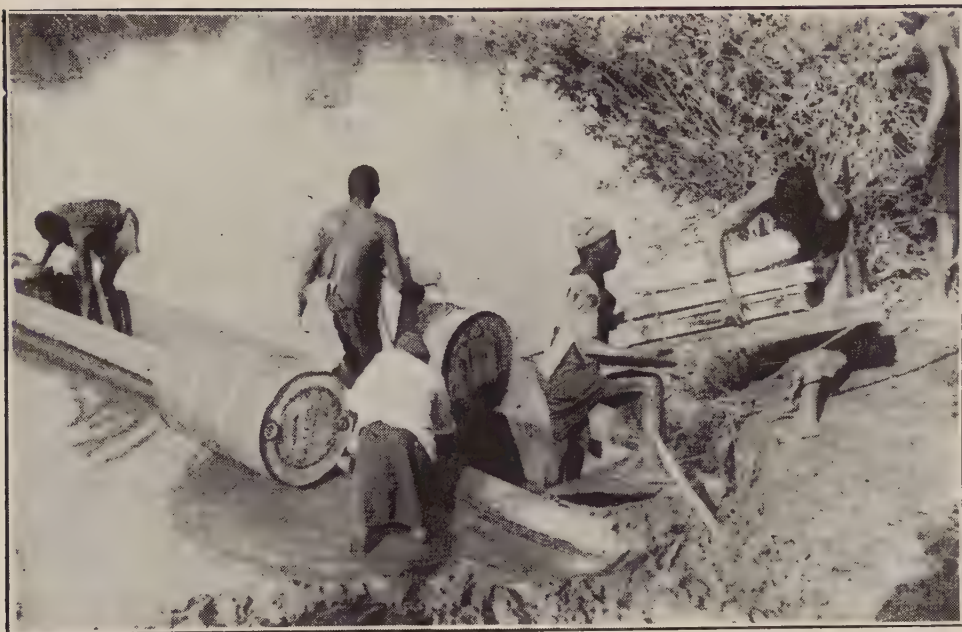
The *utani*-relations are of quite a different character among the Ngoni. In some respect the *mtani* is nearer to the members of the family than even the blood relatives themselves as 'he can behave according to custom as he likes'. But on the other hand he seems to count for little in the actual life of the clan, as he is never invited to share or decide in clan affairs, whereas the *mchali* is a person of respect who is called to all important family ceremonies and whose help is asked for in case of distress. My informants stated unanimously : *bora uchali kuliko utani*.

A Raft on the Malagarasi

By J. P. Moffett

IS THE MALAGARASI River navigable? More particularly, is that part of it navigable which lies between the ferry on the Kasulu-Kibondo road and the railway? The question has interested everyone who has been stationed in the Kibondo area and various attempts have been made to answer it. Since Kibondo is one hundred and forty miles from the railway and water transport is so much cheaper than road transport, the importance of the question to this remote district need not be emphasized. The river rises in the mountains north of Kigoma, flows north-east, forming the boundary between Urundi and Tanganyika, then east and south, separating the districts of Kibondo and Kasulu; finally, just south of the Central Railway, it turns sharply west and flows into Lake Tanganyika. It thus describes a huge loop, some five hundred miles long. It is a large river even at the end of the dry season. The first attempt to navigate it was made, I am told, by a German (name unknown), prior to 1914. He went down the river in a bark canoe with two *wakiko**, was attacked by a hippo and he and his paddlers thrown overboard and his canoe sunk. Apparently he did not get very far. The next attempt was made when Mr. Bagenal was Provincial Commissioner of the old Kigoma Province. I am told (there would appear to be no official record of the attempt) that he sent "a European boat" to Malagarasi station by rail. There it was unloaded, put in the river, and poled upstream some twenty miles to a place called Kakobe (probably "Ngengeru" on modern maps) by a crew of thirty. At Kakobe it was boarded by Mr. Hering, then District Officer, Kibondo, and his wife. They continued upstream but had not gone far when the boat was attacked by a hippo and Mrs. Hering was thrown overboard. After that, the Herings returned to Kibondo on foot and the boat was pushed, pulled and paddled upstream to the ferry by its native crew. It was in June, when the river was in spate, and it took three months to do the complete journey. Soon afterwards, the Kasulu-Kibondo road was put through and any idea of using the river for transport purposes was abandoned. Mr. Grant also attempted the journey; and the project was revived in 1937, when an aerial examination of the river was made. This was not encouraging, and it was considered that the navigability of the river was more than doubtful. No one had ever made the journey from ferry to railway to settle the question once and for all. When the difficulties of transport became more and more acute as a result of war conditions, I determined to make the attempt and, if possible, to take a raft

*Aboriginal hunters and fishermen living in canoes in the Malagarasi and neighbouring swamps. See "Water-Gypsies of the Malagarasi" in the issue of *Notes and Records* for June 1940.



The experiment that failed



The raft (Second Edition)



The "New Model"



The Wakiko

downstream the whole way. The raft was strongly made of planks and beams, supported by ten empty oil drums. It carried a crew of four besides myself and my tent and loads for a three weeks' safari. I kept a diary of the trip, knowing that I would be unlikely to do it again and that, in these days, it was rather an unusual safari and promised plenty of incident. It was written for private circulation amongst my family, but I have been persuaded to publish extracts from it.

Sunday 30th August 1942.

Put the raft together this morning and set off at 11.30. But not without incident. I sent the raft, with its crew of Hamisi the cook, Makulilo the cook's toto, Ahmadi the fundi and Ramadhani the old hand—the only one of us who had done the journey before—I sent them out into mid-stream while I stood on the ferry pontoon to take a snap of the start. The current seemed slow but was in fact strong. Hamisi and Ahmadi held on to the ferry rope but the raft was slowly pushed downstream and they could not hold it. Gently they both collapsed into the water. I've never seen two people reach shore quicker, hand over hand along the rope! Neither could swim! Fortunately the raft did not just shoot off downstream, Ramadhani and Makulilo brought it in with their paddles and I (suppressing a wide grin) and the other two, dripping and a bit shaken, climbed aboard. We were actually off. All went well at first and we glided smoothly and silently in mid current. Suddenly we rounded a nasty corner and were all entangled up in a tree. A bit scratched, we emerged eventually—only to crash into another. It took us a lot of strenuous effort with our punting poles to get out of that. Everyone except the stolid Makulilo thought he knew best how to direct the four paddlers. Hamisi and Ahmadi nearly came to blows in the "stern" over their conflicting orders. Things were not made any easier by the bark canoe we were towing, for use, I thought, should we stick in a shallow spot in the middle of the river, with deep water each side. When we approached an overhanging tree and it was obvious we were going to get entangled in it the canoe would see fit to jam its high prow under a branch and hold us fast just as we thought we had got clear. It was while we were in such a predicament that Makulilo and Ramadhani tried to pass each other along one side of the raft. Makulilo was on the outside, and, with a look of sheer horror on his face, tumbled in! He was out again at once, trembling at his unaccustomed ducking, but both his and Ramadhani's paddles were in the middle of the stream. We might have caught up with them if it hadn't been for more trees.

Before I started on the trip I wondered what I would do for exercise. I need not have worried! Anything more strenuous than heaving, pushing and pulling at a fully-laden raft, stuck fast on a submerged branch, or frantically paddling to keep it from doing so, I don't know. At 2 p.m. I called a halt for a rest. Then we learnt a sharp lesson. We just pulled in to the bank, without carefully examining our get-away. I decided to jettison the canoe and

we left it tied to a tree and pushed off, only to be carried by the current into a perfectly impossible position, a regular tree-trap. We could not move upstream out of it. So I jumped ashore with a rope—into some nice long grass I thought. I did not see the briars until I had landed. Hamisi followed me, and together we pulled. I thought my arms would come out of their sockets! But we moved the colossus out and, all frantically paddling, just cleared the edge of the loathsome trap. On we went, this time in better order, I insisting on giving directions—and no one else—though not without a lot of non-violent non-co-operation from the other four. We were beginning to think we had the thing taped when the current quickened and we went grinding, crashing, bumping into a tree which jutted out over a narrow channel of clear fast water. Our stern disappeared beneath the muddy stream and each one of us clutched wildly at something to steady himself. Ramadhani clutched at a branch of the tree and, as we suddenly swung free, was left literally out on a limb. But we did not go far; paddling furiously to escape another such clutching tree, we ran aground. Two feet of water and gravel beneath. Ramadhani, now on dry land, looked on sympathetically from the bank, but could offer no advice. We poled and poled and moved perhaps a couple of feet. Then I thought I'd see if I could take a rope across to the bank Ramadhani was on—and was nearly swept downstream: there was a deep channel under the bank.

“Off we get” I said, “and lift her clear.” We did, and she shot off suddenly. Too suddenly for Hamisi and Ahmadi, who were left standing in the water, with very vexed expressions on their faces!

So there we were; Makulilo and I in sole possession, Ramadhani on one bank, and Hamisi and Ahmadi on the other. We rescued all three quite quickly—being very careful though of where we came inshore; Makulilo did not think much of “yachting” on the Malagarasi at this juncture, least of all when he saw a large school of hippo, with a giant in the foreground, right in midstream, looking as though he would dispute our passage and fairly snorting with rage at having his sanctuary disturbed. He submerged when we were within 50 yards. It is the neatest submergence imaginable, though the three or four crocs we saw did not make much splash as they sought refuge at our approach. At 4.30 we began looking for a place to camp. The first “possible” didn't please the crew and I let them have their way. We set off once more, now definitely in good order, gliding between branches almost touching each other and using a new technique of swirling past, rather than shooting straight through. As we had little power, and therefore no rudder, we found it best to give in as much as possible to the vagaries of the current, and “bow” and “stern” changed places every few hundred yards. We would often approach a dangerous-looking branch sideways-on, and do a quick double-turn past it. Even at that we were just saying how much better we were at the game—at least I was saying it with grudging assent from the crew—when a punting pole, caught in a branch as we waltzed past, swept Hamisi into the

water once more. He didn't think it was at all funny and wanted to jettison our spare poles as dangerous impedimenta.

We were all very weary when eventually, just after five, we glided into a smooth backwater and tied up. Not much of a camping site, we considered. However, just off a hippo trail we found an elevated few yards of dry ground. We fired the long grass and soon had a space cleared for the tent. And the "kitchen" was quickly established under a tree close by. It took us a long time to unload, to manhandle the loads up the bank, and to carry them along the hippo trail to "camp." But we got settled in just before dark. The crew were all sound asleep at 9.30, oblivious of the hippo blowing and grunting within twenty yards.

Monday 31st August.

Although we were all up before dawn it was 9 a.m. (8 o'clock sun time) before we got off. We were careful to rope on the loads securely and to make all firm before we set off. It was just as well we did. We had not gone a hundred yards before we were driven in under a huge dead tree with great force. We stood up to ward it off—our paddling was to no avail—and the raft began to tilt over. It continued to tilt, the current forced it down still further, and in a few seconds it had turned upside down and was continuing on its way downstream, drums uppermost, leaving us all hanging to branches of the tree. That was a bad moment. Everything we possessed immersed in the water! We tore after it, getting scratched to bits by the ubiquitous brambles. After an hour or so it suddenly grounded on some unseen snag and remained stationary, near the opposite bank. We debated for some time what to do. I thought of swimming across and detaching the mooring rope and swimming back with it, hoping the five of us could then pull it in to our bank. But even if I had done so we could not possibly have righted it, and we could not have untied the loads in the deep water at our side. So we abandoned it and cut canes and set out to walk back to our starting-place the ferry. That was at 10 a.m. We kept on hitting the river and lost a lot of time following its windings. Then, at my insistence, we struck well off to the right, and soon afterwards came out on the laterite pan which runs along the north bank for miles. We were back at the ferry by noon, so we had not covered more than about three miles in a straight line yesterday.

At the ferry I found a White Father, and he very kindly lent me a bicycle, on which I returned to Kibondo.

Tuesday 1st September.

Collected a second lot of safari things and set off by car to rescue the loads. Found a couple of swimmers had gone yesterday and tied the raft by a bit of rope to a tree, but it had not moved. With fifty men we pulled it over to our side, turned it over, and hauled it out—just! There were the loads! All but my camera and lamps and other small things which were loose.

Saturday 12th September.

I have been wondering if a canoe supported by four empty drums would not be the solution for another attempt. If it could be ready by, say, to-day, I'd transport it to the river and try again. But this time only I and two of the ferry boys who know both how to swim and to paddle will go in it. My loads will go overland by porter. We cut down an *mkungwe* tree and I put all the available "fundis"—there are not very many—on to the work of chopping and cutting and shaping a canoe out of it. But it was obvious it could not be ready before Monday, at the earliest, so I sat down to think of some way of using the empty oil drums so as to fulfil the conditions we found essential: (1) impossible to capsize; (2) easily manoeuvrable; (3) small and narrow.

Sunday 13th September.

At length I evolved a scheme which I put into operation to-day at the exact spot where we had ended the first attempt, that is, where we hauled our capsized raft out of the water. I coupled six drums together in three lots of two. Then, instead of having the drums in the water and the raft on top, I put the "raft"—a single plank only between the drums—in the water and the drums stuck up in the air. This meant that the weight, when one stood on the plank, was actually below water level, so it was most unlikely that the raft would capsize. It proved to be fairly easily manoeuvrable and was only five feet wide as compared with the eight of the original raft.

I was late in finishing it because I went out at dawn to try and get some meat for the porters, and wounded and did not drop outright, a waterbuck, so we had to follow it for miles before we got it. However, the raft was put together and all was in readiness by 1 o'clock, and off we went.

As usual, we had not gone very far before we were taken by a strong current into a tree and stuck fast. It looked an impossible position, especially when our attempt to pull the raft out of it upstream, with a rope from the shore, proved a complete failure. After a lot of pushing and shoving we eventually got free—and that, I am very glad to say, was all the trouble we had to-day.

We did not lack excitement, however. There were lots of hippo about and as we approached one pool there was a school of twenty, right in our path, all snorting and blowing away. As there were lots of mothers with young about I thought we might have trouble and got my gun ready. Some looked menacing and did not submerge until we were within ten yards, and we actually bumped over one giant, but we were left alone and floated over the snorting, blowing monsters, without incident.

As we drifted downstream with the current, sometimes in utter silence for long periods, we disturbed some form of wild life—including Waha fishermen on the banks—at every turn: hippo, crocs, iguana, waterbuck, bush-buck, wart-hog, and innumerable kinds of birds. One variety of fish-eating bird like a small cormorant fluttered out of almost every tree we passed. If it had settled

on a branch less than about ten feet above the water it could not "take off" without first swooping down on to the water and paddling madly along the surface—a very noisy bird. We passed a huge colony of beautiful red and blue birds, with forked tails, which build their nests in holes in the sandy bank. And every now and again we would disturb a huge bird of prey—I counted six different varieties—which had, one presumed, been digesting a good meal up aloft. Kingfishers of every size and hue darted about, but I did not see a single duck or goose.

The most dramatic disturbance was a sudden clatter and a loud splash as a great fat crocodile came down the bank, near which we were drifting peacefully along, straight for us, and disappeared practically under our bows. Even the phlegmatic crew were driven to cries of astonishment—both said *Mama yangu!* with one voice, and rolled their eyes. It looked just like the croc in "Peter Pan". I almost began to look round for Captain Hook and to listen for the ticking of an alarm clock. Of course the brute was not interested in us, but was seeking shelter by the nearest route—and fast!

Monday 14th September.

We set off at 7.30 this morning, after a little preliminary work on the raft, making the seats more secure and tightening up ropes, with a crew of five, counting myself. One swimmer-paddler I left behind, to come aboard at noon with three others to relieve the paddlers who had been working since morning. That was the idea, but it did not work out that way. The relief crew could not keep up with us on account of the long matted grass which lined the banks for miles, and we carried on as we were. At 4 p.m. we came up with the porters, who had been told to do a two-hour safari, leaving about an hour after we did. Actually they had done nearer a five-hour stretch, arriving at camp at 1 o'clock. We had twisted and turned about so much we took seven hours to cover the same distance.

Leaving the porters where we found them, to pitch camp, we carried on for another hour and a half, thinking we'd still be quite near even then. It took us just under an hour to retrace our steps! And it was only then that we realized quite how free of tsetse we had been on the water. They were ravenous, and unceasing in their attacks. I know few minor discomforts more difficult to bear than tsetse in any number.

We had trouble with trees three times only to-day. And, even then, we would not have been delayed more than a few minutes if we'd had an axe with us. Once we were completely jammed, in a fast run of water, and looked like remaining there indefinitely, as all our efforts to move up, down or sideways were to no avail. We got out eventually by passing our mooring rope round a branch and pulling on it until the rotten branch which was holding us up broke suddenly and let us out.

We saw few hippo but many crocs. For long stretches the banks were clear of trees and we bowled along peacefully. Three times we ran aground.

Twice there was a deeper channel which we could not follow because of trees, but once no such channel was apparent and a boat of greater draught than twelve inches could not pass at this time of the year.

I calculated we averaged three miles per hour, from watching the banks slide by, and from various tests of the time taken to cover an estimated distance of two hundred yards. As we were eight hours paddling we must have done over twenty miles to-day.

Wednesday 16th September.

Yesterday morning, as soon as I could get the crew away from their *ugali*—they take much longer to have breakfast than I do—we went back to where we'd left the canoe. I had a vague idea of the general direction in which it lay, and, left to myself, would have followed the river bank until I came to it; but the young hunter who was guiding us—one of the Chief's bodyguard—struck across country and brought us out right at the canoe. There were no obvious landmarks and we were out of sight of the river. It was country in which he had never been before and anything more monotonously the same for mile after mile than "miombo" woods I have yet to see. I was lost in admiration.

We set off, leaving the porters to follow as soon as they'd packed the loads. They were to do a two-hour safari before sending scouts down to the river bank to await our arrival. I would then gauge how much further we could go—if any—before dark. We soon ran into rapid water and bowled along at a good pace despite the trees on either side, which had again closed in and remained with us all day. We grated on the bottom once or twice, but we did not stop except for half-an-hour's rest at midday. And that was our undoing. 3 o'clock came, and still no sign of the porters; 4 o'clock, and we began to think we must have outstripped them; 5 o'clock, and we were sure of it and tied up and set off inland to hit the track to Buhoro, which one of the crew said was nearby. To do so we had to cross a huge "mbuga." Suddenly three waterbuck appeared in front. I shot one and was looking at it, thinking how pleased the porters would be, when Nyamweru, another of the crew, cried out, "Shoot these buffalo, Bwana!" I turned round, and there, coming straight for us, was a herd of sixty or so, full tilt. All the stories I'd heard about how dangerous buffalo were at once came to mind and I stepped forward, praying hard I'd not miss. They wheeled and passed within fifty yards and disappeared in a cloud of black dust. I resisted the temptation—wisely I thought—to let one have it as they went past. As I had nothing but solid bullets and am far from being a good shot I would probably have regretted my recklessness! But I could see from the faces of the crew how disappointed they were. And they seemed quite unmoved at having been "charged". When I asked about this Nyamweru explained that his shout had been one of exhortation, not of warning, that buffalo don't just charge like that, they all melt away at the sound of a shot. We live and learn! It was my first encounter with buffalo and my

respect for them was greatly exaggerated. I followed them up and was just getting within range again when some zebra gave the alarm and they were off for good.

In the meantime we had heard the welcome sound of axes on trees and arrived at "camp"—as we thought—just as darkness was falling. But it was a party of honey-hunters and not our people, and they had neither seen nor heard the porters. We found the Buhoro track quite near and Ahmadi and Makacha went back along it and rent the air with shouts. Not a sound. So we prepared to spend a night in the bush with the honey-hunters. They helped to collect firewood and leaves for beds. The grass, apparently, stings badly and leaves a nasty rash. We lit three fires and the six of us gathered round them, ate some honey, and prepared for a cold and uncomfortable night. I was still in hopes that a party bearing a lamp might appear, but when 9 o'clock came and there was neither sight nor sound of anyone we settled down for sleep. But the mosquitoes thought otherwise! And when one is not used to it the ground seems very hard to sleep on, even with the help of leaves (horribly cold leaves!) So we swapped stories, "Brer Rabbit" stories. I told the one which appears in Alice Werner's "Swahili Grammar" and heard in return a much better version:

"There was drought in the land and the animals all gathered together to dig a well. All except the Hare; who said he was too busy to help. When the well was finished the Hare went along all the same, and drank his fill. Not content with this, he stirred up the mud and fouled the water. When the other animals came in the morning they were very angry and asked who had done this. But no one knew, so they set the Frog, who could live in the water, on guard at the well. During the night the Hare came, and was quenching his thirst when the Frog seized him. 'Why are you holding me?' exclaimed the Hare. 'Because you fouled our water,' replied the Frog. 'Did you see me do it?' asked the Hare. 'No,' said the Frog. 'Then how dare you accuse me. Let me go at once.' And the Frog let him go. The Hare finished drinking and, before the Frog could stop him, stirred up all the mud in the well and ran away.

The next morning the animals were very angry and asked the Frog how it had happened that the water had been fouled again when he was on guard. The Frog explained what had happened. 'Well,' said the other animals, 'now we know who it is, see you hold him fast if he comes again.'

The next night the Hare came again and the Frog seized him and held him fast despite all his entreaties.

When the animals came in the morning they praised him and said to the Hare 'Now we have caught you and we're going to kill you.' 'Yes,' said the Lion, 'and I am going to do it.'

'Very well,' said the Hare, 'but let us do it properly. Don't imagine I can be killed by being thrown on a rock or anything like that. As I am to die I might be allowed to choose the way of it.'

'Certainly', replied the Lion, 'it's all one to me. Don't think you can escape me, whatever way you choose.'

'We Hares like to die by being thrown on to sand, not rock,' said the condemned one.

So the Lion took him and threw him on the sand. As he fell, the Hare kicked up the sand into the Lion's eyes and blinded him for a moment. And in that moment he was off.

But the next day he was back again at the well, and in the morning too, when all the other animals were there. They seized him and held him fast, saying, 'Now! You won't escape from us this time!'

'I have no desire to escape,' replied the Hare, 'I know I have to die. That is why I have brought this honey with me, to divide amongst you.' And he gave them all some of it. It was delicious and they all wanted some more.

'Show us where it comes from', said the Lion.

'Oh,' said the Hare, 'I have my well of honey, just as you have yours of water, but I will not let you see it, since you won't allow me to use yours.' So much did the animals want some more honey that they let him have some water, on condition that he showed them his well. The Hare drank, and, before anyone could stop him, fouled the water again and was off.

And the next day back he came! All the animals pounced on him and held him fast.

'All right! all right!' said the Hare, 'I know I have to die. That's why I have my hair done like this. Isn't it nice?' And the animals all had to admit that it was very nice indeed. In fact they asked the hare if, since he was such an expert at hairdressing, he wouldn't do their hair too before they killed him.

'Oh yes,' replied the Hare, 'I don't mind, but I've left my things at home, my cords and things.' 'Never mind,' said the Elephant, 'I'll soon get you some cord.' And he pulled down a *miombo* tree and stripped it and made cord.

Then the clever one began to do the animals' hair, making each come under the shade of a tree. And as he braided their hair he fastened it to the tree. Last he did the Lion, and when he was finished he gave him a slap in the face and said, 'Now do your worst, you!'

'What!' roared the Lion, and made to spring upon him, but his hair held him fast.

The Hare dashed away into a great ant-hill nearby, and by the time the animals had freed themselves he had gathered five or six of his relations to help him. The animals started to dig where they had seen him disappear. As soon as they had dug down a good bit a hare would poke his

head out of another hole and say 'What are you doing there? Here I am!' And so it went on, every time they thought they had him, a head would appear somewhere else and a mocking voice say: 'What are you digging there for? Here I am!'

At last they gave it up and called out loud, 'You can come out, we are beaten, have all the water you want.' The Hare had won.

But the Frog remains on guard in the well to this day."

During the night we heard the distinctive cries of elephant, hippo, buffalo, lion, baboon, bushbuck, reedbuck and zebra. Fortunately none so close as to make us wake the sleepers; the two swimmer-paddlers and Makacha slept like the logs their heads were pillowed on. We were glad to see the dawn: it seemed a long time in coming, and it got increasingly colder until the sun did appear. Then, for the first time, I went really sound asleep, and awakened to find a search party arriving, with a thermos of hot coffee! Nectar! They told us that, when we didn't appear, they thought we must have struck trouble of some sort higher up the river, and by the time they had gone back to find out, it was too late to follow us. We must have done over thirty miles.

While awaiting the porters and the Chief—who was worried not so much on my behalf, as on account of the trouble she'd get into for "losing" me! I went out to see if we could pick up the buffalo again. But we saw nothing.

Eventually, after various reiterated explanations and condolences on each side, we parted again from the main body and were paddling downstream once more at 10 a.m. It was a dull day. The river got increasingly slower and wider, especially after its junction with the Makere, and paddling became heavy work. We all developed cricks in the neck. The sun was very hot, and there were no hippo to relieve the monotony. The previous days they had given us a good laugh time and again. Anything more ludicrous is hard to imagine than one of these massive great brutes putting its head above water and suddenly ducking it back again when it finds we are closer than it thought—like a child playing hide and seek! But why the Greeks, or whoever first called them "river-horses", likened them to that noble animal is hard to imagine. There are, it is true, very superficial resemblances about the head, and hippo do certainly snort—it is their chief characteristic! but when one thinks of a horse one thinks of grace and beauty, whereas when one thinks of a hippo one thinks of grossness, of quite fantastic obesity and clumsiness.

We came upon our "scouts" at 1 o'clock and told them to go on ahead with the porters for another couple of hours. We rested an hour then and set off to follow. The river got slower and slower and in places was over fifty yards wide. Again at 6 o'clock we had seen no sign of the scouts. Had we missed them again? Were they behind us? or ahead? A nasty predicament, with an hour of daylight left. We decided to tie up and strike inland while it was still daylight. Two of the crew then said they could hear a drum ahead—this was the agreed signal to indicate camp. I and the others could hear

nothing. However, we gave them the benefit of the doubt and set off in the direction indicated. Silence. We carried on. Still silence. Then someone said he heard the drum again and three others supported him. I still could hear nothing and was steeling myself for another night of cramps and shivers when I caught the unmistakable drum beats. That was a good moment! But we took so long in coming up with the drummer that I began to wonder if it wasn't an hallucination. We must have been four miles off when the others first heard it. We arrived in camp black from head to foot from walking through freshly burned long grass—which doesn't burn completely, falls over, and is one of Nature's more cunningly devised snares for the feet of man. But camp seemed a good place to us and a very haven of peace and civilization.

Thursday 17th September.

The temptation this morning to say to the crew, "Go on, boys, fetch her down, I'll wait for you here," was considerable. But I felt sure it would be in just that stretch of water that there would be some snag! So we retraced our way upstream through the ensnaring grass to our raft and made a late start at 8 a.m. It was interesting to see how long it took us to cover the same distance by land and by water. By land it was a walk of three-quarters of an hour; by water exactly an hour.

As we came near the place where we had camped, a bark canoe shot across the river. "Ah", we exclaimed, "Wakiko!" Apparently three canoes of them had preceded us down-stream yesterday, returning from a hippo hunt up river. I was most anxious to see them. But the canoe we saw turned out to be one used as a ferry by natives travelling between Buhoro and Makere.

To-day was a long dull day of solid paddling. We were nine and a half hours on the water, and arrived at camp just at dusk. We found the river so wide that trees no longer formed any obstacle. From the junction with the Makere river the average width of the Malagarasi is about forty yards; a wide, majestic, tree-lined river. But not deep! We bumped over stones, rocks and sand in several places to-day, and twice, where the rocks appeared above the surface, we had to dismount from our perches astride the oil drums and lift the raft over. However, in both these places the water between the protruding rocks was quite deep and I imagine a couple of sticks of dynamite would soon clear a channel.

We passed two little tributaries of delightful, crystal-clear water, on the right bank. Apart from the Makere, they are the only ones we have seen. And their clear streams were a refreshing sight after the muddy waters of the Malagarasi. It is an odd thing, and I have not been able to find the explanation, but in the rains, when it is in spate, the river is comparatively clear, and now, after months without any rain at all, it is so opaque one cannot see the end of one's paddle in the water.*

*I have since been told the explanation: irrigation in the higher reaches during the dry season.

The best moments of the day are the start in the early morning, when all the world seems smiling and fresh; the sound of the drum in the evening as we come near camp; and when, later, bathed and refreshed, one emerges from one's tent to see all round the friendly flickering fires of the porters—a cosy little island of security in this wilderness of bush. One forgets then the maddening tsetse, the crick in one's neck which never goes, and the exceeding hardness of a plank after one has been sitting on it for nine hours. The crew, I find, forget these things as quickly as I do and remain awake chatting until nearly midnight. So do the porters, which is, I think, surprising. Perhaps it is because they are so many and it is such a grand opportunity to chat! I would like to know what, with their ever-suspicious minds, they have decided for themselves is the real ulterior motive of this safari!*

We saw exactly two hippo and two crocs to-day. We had no excitements at all in fact. Even the bird life, which hitherto has been a constant delight, was not so much in evidence, though we did see a most magnificent blue heron—a huge bird—and two more varieties of stork. I have counted eight varieties of stork, from the marabou down, and seven of kingfisher. One kingfisher is, I think, the most brilliant thing I have ever seen in nature. As it flashed past us, in bright sunlight, its iridescent metallic green wings shone like a gem and one marvelled at the beauty of its colouring.

Friday 18th September.

We reached our first objective to-day—the ferry over the river connecting Buhoro with Kasulu. The river grew more and more placid, and although our porters, starting after we did, reached here at noon, we did not tie up until after 6 o'clock. It was another nine and a half hours of solid paddling. But to-day we relieved the monotony by singing. I sang every song and hymn-tune I could remember! It was just noise, of course, to the crew. I tried to teach them "Yankee-Doodle" but without much success. We found the best paddling tune to be a working song which the Wanyamwezi, who worked on the building of the Central Railway line, used to sing. It goes like this:—

Solo: *Ukunguni tumanile wenebo.*
Ariomera Bwana Mkubwa.

Chorus: *Ariomera wa mabale.*
Tufilagi ma Bulaya.
Ukunguni tumanile wenebo.

And the literal translation is, they tell me:

Laziness we have.
(But) *Bwana Mkubwa* has spoken.
The Big Man has spoken.
(So) let us go (even) to Europe.
Laziness we have.

*The crew told me later that the porters had believed that as soon as they reached the railway they would be put on the train and sent off to the War!

It has a catchy tune, but it is difficult, I found, to fit the words to it—like singing some of the psalms—the accent must fall on the right syllable or one is lost. We came into camp singing it lustily, to the amusement of the throng gathered on the bank, more especially when they saw that I joined in!

This afternoon we passed bean and sweet potato gardens along the banks, in places where the land is inundated during the rains, by the torrent the Malagarasi then becomes. The crew said they were made by the Wanyahoza (which is what the Wakiko are called here) and again I had hopes of seeing them. We noticed that they were placed in a part of the river which is so shallow for miles in either direction that no hippo would linger there. Also that the gardens were carefully fenced with stakes made of the stout branches—or rather leaf-stems—of the borassus palm, which abounds in this neighbourhood. But when we eventually found a man at work in one of them, and paddled over to him in some excitement, he turned out to be a Muha from the nearby settlement at the ferry. So we have yet to see one of these elusive primitives.

Sunday 20th September.

Yesterday and to-day have been spent on dry land. Yesterday morning we dragged the raft out of the water, took it to pieces, and substituted the lightest pieces of dry wood—firewood in fact—for the heavy timbers we had used previously. We also cocked the drums up in the air a bit, so that they would not present such a blunt resistance to the water. Then we fitted her up to use with oars and sent the porters to cut down poles of light wood for them: the blades were made of pieces of petrol boxes.

In the afternoon we all went to Buhoro, ten miles "inland." This is the original seat of the Chiefs of Muhambwe, and still contains the sacred tribal emblems: drums, shields and a special basket woven of bamboo. The Chief pays a visit, annually in theory, but less often in practice, to the shrine to perform the rites connected with her office. It was because of its spiritual importance to the tribe that Buhoro had been left thus completely isolated in the bush. Now, however, the Chief has agreed that the emblems can be moved—as they have been moved in the past—and they will be brought back with her now on her return to one of the S.S. concentrations. At the same time the people still remaining there, some three hundred and fifty families, will be evacuated, and the object of my visit was to make arrangements for their removal. At the same time I was hoping to see the tribal emblems, but I was unlucky. Their guardian was away on a honey-hunting expedition, leaving his wife in charge, and apparently it was essential that he should be present. Whether or not this was a polite way of letting me know that I could not be admitted, I do not know, but naturally I could not press the matter further and left without gratifying my curiosity.

I left at noon and walked the ten miles back to the river in what I had feared would be a furnace-like heat. But though the sun was stultifyingly hot



The head of the Baswezi.



The Chieftainess with her retainers (Baswezi).

in the open it was cooler in the light shade of the woods and the walk was not the unbearable grilling I had expected. Nor were the tsetse as hungry as usual—perhaps they had fed on the porters who went ahead! So I had time and inclination to notice my surroundings. The path—it is only a winding native track—leads through “miombo” forest the whole way. There must be thousands and thousands of acres of identical woodland in Central Tanganyika, mile after mile the same. Yet it has a fascination of its own. At this time of the year it is so dry that the smallest movement produces a loud crackle. Everything is hard, brittle and desiccated, the life sucked out of it by the pitiless sun. A hot, dry, pungent smell, slightly resinous and entirely characteristic, pervades the air. At infrequent intervals one notices a sweet hyacinth-like odour. It comes either from a tree or from a plant growing close to the ground. Both have white flowers and produce the same delightful scent. But apart from these the red burned earth is bare save for fallen leaves. The trees grow closely, so that one can seldom see more than two hundred yards through them. It is this, I suppose, this limiting of the horizon, which gives to all woods that atmosphere of remoteness, of solitude and secrecy and mystery, which at night even the bravest feel, however intrepid they may be in the bright light of day. For long stretches there is almost no life except insect life. Unless water is close one does not even see a bird. But insects of every kind, especially ants, abound. The air is full of the chirring, hissing sound of what I suppose must be crickets. So unceasing is this noise that one does not notice it unless one is paying special attention to it. Another sound, equally characteristic, but which one comes to dread, is the purposeful buzz of the tsetse—the tyrant and uncrowned King of the *pori*.

On the way, I decided to take the thirty-foot dug-out canoe, which is used as a ferry here, for the rest of the safari, leaving the locals a raft of four drums to use instead. The crew keep telling me about the ferocity of the hippo at a place ahead called Kakobe, where the “Sultan” of all the hippo lives, who charges on sight! I feel sure he, like any other self-respecting hippo, will do a crash-dive at the sound of a shot, but in case he does prove awkward I have firmly fixed a drum on each side of the canoe near the stern, and just above water-level, like panniers on a donkey. I have tried hard to capsize the canoe, but of course the resistance of an air-tight drum is tremendous, and all I succeeded in doing was in drenching myself from head to foot.

The crew have been very glad of these two days’ comparative rest, I think. It is interesting the way their various characters—and those of my boys—have been shown up by the stresses and strains of this safari. Hamisi the cook, an ex-German askari, shows unmistakable signs of his early training. He would prefer to order rather than ask, always, and he bullies the porters in a way I have seldom seen a native do. He is a dreadful bore! He must have his say, no matter how much the subject or incident under discussion has already been exhausted. He raises his harsh voice and in a slow, didactic manner puts his

point of view—as if he were Moses propounding the law. Makulilo, his assistant, on the other hand, has turned out to be a cheery and most helpful servant. I am never quite sure whether he is looking at me or not—he has a bad squint—but there is no mistaking the genuineness of his grin as he brings the tea the minute I step ashore in the evening. I wonder if even he knows just how welcome it is! Kapera, the office messenger, is the boob of the safari. I had not noticed that he was more than averagely unintelligent before, but his stupidity on the safari passes belief. He and I occupied the front two drums of the raft, as steersmen, for three days. The first day he was so terrified lest he should fall in that I did the steering myself and concentrated on getting him to put his paddle straight in the water. The second day I showed him that if one moved one's paddle sideways through the water to the right one directed the raft to the left, and vice versa. One would imagine even the feeble-minded and semi-imbecile could grasp that. But not Kapera! I refused to believe that such stupidity could exist and spent a third day demonstrating at every bend of the river. He was then all right except in an emergency. If we wanted to avoid a tree's clutching branches, quickly, he would be found doing his very best to propel us into them. I had to acknowledge defeat then and put him in the middle of the raft, where all he had to do was just paddle.

The best company of the lot is Ahmadi the "fundi." The lines of his face fall naturally into a smile and he looks strained when he is solemn. He is unfailingly cheerful, never grumbles, no matter what occurs, and has a tremendous sense of humour. He is a born raconteur and has the largest store of imitative words—"ideophones" I believe they are now called—that I have ever heard. His version of the "rat-tat-tat" of a small drum is "brip-brip, brip-brip, brip-brip." He was describing how an enraged husband, catching his wife's seducer *in flagrante delicto*, attacked him with a knife. "He slashed his stomach," said Ahmadi, "*pah!* and *mwah!* and that was the end of *him*." He spoke of a road being cut through new country *kakala kakala kakala*, meaning "at great speed." His imitation of the "*onk-onk-onk-onk*" of a hippo was quite frightening!

Tuesday 22nd September.

Yesterday and to-day were spent in an endeavour to get as speedy a craft as possible for these placid waters. The result has been that we have made the worst two days' run yet!

On Monday it took nearly three hours to transport the loads and the porters across the river. From now on they follow the right bank. When at last we were ready to set off in our canoe, a youth appeared from the direction of Buhoro with a herd of goats and sheep. Our raft was little use to him, so we took pity on him and transported him and his herd across. Then at last we were off, I with visions of a really good turn of speed from now on. We began by weaving about from side to side. Try as we might we could not keep straight.

So we tried reversing ends. This was a bit better, but not much. There we were, in placid water, heading inexorably for the bank. I was in the bows and nearly broke my paddle in two trying to head her off. It made no difference, crash into the bank we went. This was something we had not foreseen. We backed out and tried again. We hit the other bank. The crew's faces were a study. They waited for me to speak, and when I suggested that perhaps this was not so good they agreed with feeling and in one voice. So we went back the quarter-of-a-mile we had come—it took about twenty minutes—landing Ahmadi first to chase after the porters and bring back the tools. Later, in a merciless sun, we laboriously reconstructed the "new model" raft we had despised. Eventually, at 3 p.m., we were in our old places, paddling downstream once more. I don't suppose we did more than about five miles before we reached camp.

To-day we have all been suffering from reaction, I think. We have got used to the river, the raft and the daily routine; the river alternates between fast-running rocky places where we bump along the bottom and wide utterly placid reaches where we long for a corner to relieve the monotony; and hippo and crocs are few and far between. However, we saw a pair of bushbuck feeding contentedly at ten yards' distance: we were not paddling and so were gliding downstream in complete silence. Graceful creatures.

We got to camp early and dragged the raft out of the water, removed the seats, and turned it over. Now that there is no longer (I am told) any danger from trees, I feel we can have the superstructure on top of the drums instead of beneath them in the water, where it must exert considerable resistance to our progress. With just the drums in the water, we should move through it more quickly. But we shall have to be careful to distribute the weight evenly, otherwise we shall capsize again!

At this rate we will reach Kakobe by Thursday and the Railway on Friday. That gives us Saturday—one day—in reserve. It is cutting it fine.

Wednesday 23rd September.

We got on the raft this morning at 7 o'clock and got off it this evening at 7 o'clock, having done the last hour by moonlight. The porters had not waited at the place arranged but had gone on to a crossing-place "just near by." It may have been just near by on foot across country; following the river it took us three hours. When we got off we could hardly straighten up and I know that never, since I was at school, have I been so sore!

We had not gone very far this morning before we realized that the new arrangement of the raft, with the "superstructure" on top, was too precarious and, in any case, made no difference to our speed. So we stopped at a sand bank conveniently appearing in midstream and removed the seats, turned the raft over once more, made all firm and replaced the seats again. The crew heaved a sigh of relief as they found themselves back in their old places, into which they have almost grown by now.

A little beyond this sand bank we came on another—and there was a hippo sunning himself and quite oblivious of our presence. We stopped paddling and drifted slowly and in complete silence towards him. His head was hidden behind a natural wall on the bank and we glided past within ten yards. Then he saw us, and “galumphed” into the water with a tremendous splash. When in the water, with only their heads showing, hippos seem enormous great brutes, but seen on dry land their heads are quite dwarfed by their stupendous bloated bodies. They give, I think, a greater impression of sheer bulk than any other animal, not excepting the elephant.

Later in the day we saw in the distance six or seven balloon-like, black shapes on another sandpit. We went ashore high up, out of sight, and approached them from a high bank. I was leading, and just as I was getting to the edge and looking forward to studying the brutes at close quarters, I almost stepped on a large crocodile, sound asleep in the sun and in just the place where we would get the best view. It is difficult to say just why, but there was something obscene and loathsome about the creature as it lay there asleep. Perhaps it is the loose skin round the jaws—and the colour of it—at any rate it was a repulsive sight. As I was looking at it, it woke up. With a sudden twist it was gone, hurling itself straight into the water below. The splash was of course reverberating, and precipitated the hippo into the water. The noise they made was quite deafening!

We re-embarked and, to pass the time, the crew told stories and asked riddles:—

“There were three brothers who all wanted to marry the same girl. Nor was this surprising, for the girl was surpassingly beautiful, and most accomplished. She herself, like the dutiful daughter she was, was quite prepared to marry whichever brother her father found most suitable.

So the three set off to earn some money for the dowry. They worked hard, and when they had each earned a hundred shillings they set out together to return home. When they were within only one day’s march of home they stopped for the night in a certain village. Each went off by himself in the evening for a stroll. The eldest got into conversation with a medicine-man, who told him that he had all sorts of most powerful medicines, even one that would revive the dead. When the eldest brother expressed polite disbelief the medicine-man said, ‘Well, as it happens, a man has just died in this village and I expect the relatives are even now coming to fetch me.’ He had no sooner spoken than, sure enough, the dead man’s relatives came with the necessary fee and besought the medicine-man to bring back from the dead their deceased brother. The medicine-man went along, administered his medicine, and lo! and behold! the dead man sat up and spoke and was alive again. Greatly marvelling, the eldest brother asked the medicine-man if he would sell him some of this wonderful medicine. And the medicine-man sold him some for a

hundred shillings. So he rejoiced, because he thought, 'Now, even if my beloved should die, I can bring her back to life again.' In the meantime, the second brother had met with a man who had a most wonderful mirror. If you looked in this mirror you could see all that was going on in your own home, no matter how far away you might be. The second brother thought it the most marvellous thing he had ever seen and asked the owner to sell it to him. The owner said he would only part with it for one hundred shillings. So the second brother paid him his savings and went off with the mirror, well pleased.

The youngest brother met a man who told him he had a bird which could carry people on its back and could do a hundred days' safari in one. The youngest brother asked to see it and when he was shown it he wanted to possess it. And the man sold it to him for one hundred shillings.

So the three brothers returned to camp with their purchases. Each admired the other's, but in his heart thought his own the best. Then they began to look in the mirror, to see what was happening at home. They saw a funeral, and when they looked closer they saw it was the funeral of their beloved. They were about to break into wailing and lamentation when they remembered their other purchases. 'If we hurry,' said the eldest, 'my medicine can revive her.' 'Yes,' said the youngest, 'and on my bird we can be there in a trice.'

So they all got on the bird's back and were carried home in the twinkling of an eye. The eldest brother administered his medicine to the dead girl and she revived and came to life again.

Then arose the problem: who should marry the girl?

'I,' said the eldest, 'because it was my medicine which brought her back to life.'

'But without my bird you would have been too late,' said the youngest.

'And without my mirror you would not have known she was dead,' said the second brother.

Who do *you* think deserved to marry her?"

And this was one of the "riddles."

"If you were taking your mother and your mother-in-law across the Malagarasi in a canoe, and the canoe capsized, which would you save?"

If you reply: 'My mother,' the questioner will say, 'and when you go home, what will your wife say?'—'Oh, so you let my mother drown, did you?' and you will never have any peace in your house.

If you reply: 'My mother-in-law,' the questioner will say, 'and what will your wife say to that?'—'So, you would not even save your own mother? A nice husband and father you will make!'

Having discussed it at length, the crew came unanimously to the conclusion that the best thing to do would be to let both drown!

Thursday 24th September.

This morning two of the elusive Wanyahoza (or Wakiko) were announced. I invited them into my tent. Imagine my surprise when two great strapping natives wearing *shukas*—and one with a white cap such as houseboys wear—came in, and began to speak in fluent Kiswahili! But they themselves admitted they were genuine Wanyahoza and I noticed that they did not speak Kiha to each other. I crossed the river in one of their canoes, which they manage most expertly, and went to see their “village.” It consisted of half-a-dozen small huts, Kiha type. There was no sign of cultivation, though bananas had been planted recently. They told me they bartered earthenware pots for food with the Waha and did not themselves cultivate. Of course a large part of their diet is hippo meat and fish. They showed me the spears they use. They are about eight feet long, the metal part about two feet long with a small head, and the wooden part of an exceedingly light wood and bound at the bottom with dry papyrus stems, so that the spear will float if they miss their mark. I bought one for a shilling; a princely sum the owner thought, judging by his expression. I took a photograph of the original two and another whom I found in the village, and offered them ten shillings each if they would come to Kibondo and tell me about their tribal customs and relate a few stories in Kinyahoza so that I could take them down in writing.

Apparently they are, as a tribe, taller than the average Muha: perhaps because of their diet of meat. The two I spoke with had picked up Kiswahili while on their frequent visits with fish to the settlements along the railway line. In the old days the Wanyahoza and the Batwa were the sole suppliers of pots to the Waha, to whom it was “forbidden” to engage in this craft. Now, of course, pots are made in almost every village—but never *in* a hut.

I persuaded one of the Wanyahoza to come with us on the raft, as Kapera the office messenger was obviously not looking forward to to-day’s trip and Ramadhani said he had a stomach ache. But when the hippo-hunter got on to the raft he said he was afraid. “What of?” said I. “The hippo,” said he! So I let him go, and Ramadhani, with a bad grace, came instead. The Wanyahoza followed us for miles, along the bank, to watch our progress. There were certainly plenty of hippo about, but we were not perturbed as we have passed over so many of them without any trouble. Two came close and the water “boiled” within a few feet of the raft. But we were used to that. We were just laughing at a youngster who bobbed up and shot beneath the surface again with comical alacrity at our near approach, when there was a crash at the stern, Ahmadi and I, who were sitting there, were thrown forward, and a great pair of open jaws disappeared under the water. I lost my paddle, and all of us lost some of our equanimity and thenceforward steered wide of any hippo in our path. But the crew were impressed with the way our raft had withstood the hippo’s attack. I of course encouraged them in this, though secretly I was apprehensive of what would happen if one of the brutes attacked from the side instead of the stern.

Then for a bit there were no hippo, and we paddled along in placid waters. Ahmadi and I were at our one pair of oars, amidships, the other four paddling forward and astern, when without the slightest warning a pair of jaws came out of the water and seized the paddle Ramadhani was using. He and I were facing each other and I saw clearly just what happened. Ramadhani, although naturally startled, held on to his paddle. The jaws crunched pieces out of each side, and let go. At first I thought it was another hippo, then I saw it was a crocodile. I did not need to be reminded by the crew that I had been sitting in that seat a few minutes previously, with one of my legs dangling in the water—as I had sat since the beginning of the safari.

That was event number two. We had not long to wait for number three. After our brush with the enemy I had got my heavy .425 rifle ready and had, on Ramadhani's suggestion, fired a shot over the heads of another collection of hippo which looked menacing. And whenever we saw a mother with a baby (or should one say a foal?), I made ready for action. We came round a corner and there was a mother with twins. They submerged at our approach and we steered in close to the bank to avoid them, I at the same time seizing and loading the gun and preparing to fire when mamma reappeared. The next moment there was an almighty crash and all six of us, and our raft, were hurled high in the air, as from the back of a bucking bronco, and thrown into the water. Still holding my gun, I disappeared beneath the surface, topee and all. I emerged to find Ramadhani, who could not swim, clutching the reeds and clambering out. Ahmadi I could not see, the other three had clambered back on to the raft. For an awful moment I thought I would have to abandon the gun to help Ramadhani, but he pulled himself out bit by bit. In the meantime I was up to my neck, treading water, the heavy gun in one hand and some reeds in the other, quite unable to pull myself out without abandoning the gun. I must admit I was very conscious—for the second time in twenty-four hours—of my seat, and hoped fervently that no croc would take a mean advantage of my predicament and that the hippo would not return to complete the job. Ahmadi and Ramadhani pulled me out, and we congratulated one another all round on our escape. Then we surveyed our raft. Two drums were loose, their supports broken. Only two paddles and one oar remained. So we tied her to a bundle of reeds, removed our axe, and set out to walk to camp. It was then 3.30 and I began to dry my matches in anticipation of another cold night in the bush. My topee had remained on my head throughout!

We followed hippo trails along the bank, the hippo snorting at us—in derision, we felt—as we went. There was a huge swamp on our right and a narrow ridge of dry land between it and the river on our left. As we went, we disturbed the inevitable sleeping croc, and several bushbuck. But what gave me a thrill was a leopard—the first I have seen—which loped off from behind a tree, disappearing in great silent bounds. He was magnificently marked and his colour seemed much browner than I had expected. We came

on large flocks of geese, of a kind I have not seen before, and I noticed several varieties of duck which I did not recognize.

Then the hippo trails failed us. They had been conveniently leading us along the bank but now we were faced with an impenetrable wall of papyrus in front, the river on one side, and the swamp on the other. As we stopped to debate whether it should be papyrus or swamp, we heard a very pleasant sound—someone shouting. Camp was not so far off. We tried the swamp and found it was not as bad as it looked. In places we walked over a matted quaking carpet of grass and reeds, which sank beneath us, but did not give way. At last, climbing on to a termite mound, we saw the tent in the distance. Then we blessed our luck in having been thrown out on the same side of the river as our porters—there is no crossing-place for miles here.

Camp is in a dry spot in the swamp-water all around us. My tent is pitched on a comparatively level spot, but the whole area is pitted with hippo footprints. That means depressions about eight inches across and anything up to a foot in depth. I have had the greatest difficulty in getting both table and chair on an even keel.

The crew are rather subdued to-night and I have given two of them aspirin. But I feel so relieved that all six of us emerged from the day's events unscratched, that I cannot feel depressed at this delay. And there is a most gorgeous full moon shining through the palms.

Friday 25th September.

Hamisi, the cook, told me this morning that while they were waiting for us to arrive yesterday they counted forty-one hippo in the pool near camp. If they were all—or even a few—as like-minded as the Sultana who attacked us, perhaps it was as well we quitted the water when we did!

We set off to retrace our steps through the swamp and along the hippo trails to recover our raft. I had more time to observe just how hippo-haunted the place was. Literally, for mile after mile, every foot of ground is pitted and honeycombed with their footprints. Walking over such a surface is a sore trial, and one has to watch every step one takes. Again I was amazed at the ability of the native to find his way about in the bush. I was quite certain we had gone too far when with one voice the crew said, "That's the palm-tree beside the place we left the raft!" And it was. We clambered back through the tough reeds and once more, up to our waists in water, took the raft to pieces.

Then we cut across country to a settlement of Watusi in a large plain west of the river, to which, in the meantime, the porters had gone direct from camp. We were told it was quite near. But we had not bargained for the type of country we had to traverse. It was mostly a great "mbuga", looking flat and "easy" from a distance. Never have I walked through worse country. Give me long grass—even the clutching kind—thorns, reeds, quaking bogs, but spare me grassland like that. What appeared to be a flat expanse of

ground with a thin covering of grass was in reality a sea of grass, bent over at knee-height, through which one sank at every step. One staggered and reeled, floundered and flopped, lurched sideways, sat down abruptly. No matter how slowly and carefully one went one had still to lift one's knees high at every step, put one's weight on the foot in advance—and await the unknown. One might sink into a hole containing water and emerge wet to the waist, or one might hit a high dry spot and lurch off it to sprawl on hands and knees. Running through the sea, knee-deep, which is tiring enough, is sheer joy and relaxation by contrast. How the porters, balancing on their heads forty-four-gallon oil drums, managed to get through it at all I just do not know.

At length we came out on a normal grassy plain, grazed by the Tusi herds, and I saw my tent in the distance.

The local Watusi confirm what we have already heard from the Mtwale of Buhoro and the Wanyahoza of yesterday, that in the swamps ahead the grass has grown completely over the water in a thick mat, strong enough in places to bear a man's weight, and of course completely blocking all surface progress. I held a council of war and asked the crew what they thought. They discreetly left the decision to me, while—and this was genuine—stating they'd come with me if I wanted to rebuild the raft and see the swamp for myself. This I am strongly tempted to do, despite the fact that there is not a tree for miles and miles and that we need new and wider supports for the drums. But even if we were to construct some sort of raft, and paddle down to the obstruction, we would merely confirm what I believe is sufficiently well established—and we would be in a nasty fix. For we would be blocked in every direction, progress to the side as well as to the front being out of the question. There are no proper banks here and the water is deep for miles on either side of the main channel, and choked with reeds through which, as we found this morning, it is quite impossible to push a raft. There would be nothing to do but to return upstream—if we could—we find it difficult enough as it is to move downstream at any speed. So, after thinking a long time about it, I decided it was clearly wiser to investigate the "sinde", as the crew calls such an obstruction, from the south, upstream, possibly in a fast canoe. The crew—for obvious reasons—agreed this was very wise. So we start for the Railway—and civilization—in the early morning. I hear Kapera, the office messenger, singing happily to himself as I write. And the porters are very lively and cheery. Still, we shall all miss the reverberating, throaty, "*onk-onk-onk-onk*" of the hippo—never for long out of our ears—a sound impossible to convey to anyone who has not heard it, but, once heard, not likely to be forgotten.

Naval Visit, Dar es Salaam—November 1914

By L. P. Lane

THE INCIDENT noted here is of interest on its own account but also deserves record as being the occasion of an award of the Victoria Cross for an act of valour performed at Dar es Salaam and further remarkable in that this highest distinction was a Naval one gained in this Territory, Naval V.C.'s being comparatively rare and a Tanganyika one probably unique. The detail derives from Naval sources and there is also an account of it in E. Keble Chatterton's *The Königsberg Adventure*.

On the 27th November 1914, H.M.S. *Fox* (cruiser, old), H.M.S. *Goliath* (battleship, old), H.M.S. *Duplex* (small armed merchantman, old and slow) and H.M.S. *Helmuth* (a tug captured from the Germans), all lying at Zanzibar, on being ordered to proceed to Dar es Salaam to disable all shipping inside the harbour, anchored off there at daylight the following day. *Goliath's* picket boat was sent in under a flag of truce but damaged her rudder on a reef. White flags were then hoisted at both Makatumba Lighthouse and the Signal Station and later a motor-boat came out containing Herr Humann, the Acting Governor, who proceeded on board the *Fox* (senior officer) where the former British Consul at Dar es Salaam, Mr. King, acted as interpreter.

The Acting Governor on being informed of the nature of the operation and that no injury to personnel or material ashore was contemplated, but subject to bombardment if opposed, requested time to consult the military authorities without which he could give no guarantee. He was told that he would be allowed a short time after landing to inform the population of these intentions and it was observed that he called at the Signal Station on his way back. Meanwhile Lieutenant Corson was sent in the *Fox's* steam cutter to sound and buoy the channel. The day was fine and sunny with a slight breeze.

At about 10.00 the *Helmuth* proceeded towards the entrance to be followed later by *Goliath's* steam pinnacle. Passing over the floating dock (sunk by the Germans when war broke out) she rounded the *Tabora*, which was flying the red cross flag and had a red cross painted on each side, and on continuing up the creek was followed up by an official in a motor-boat from the town, who returned after discussion with Commander Ritchie. After going alongside the *König* and taking prisoner her crew and that of the *Feldmarschall*, placing them in ship's boats alongside, and leaving a demolition party on board, *Helmuth* carried on towards the *Kaiser Wilhelm II*, which with several tugs, lighters, etc., had been removed as far up the creek as possible, but grounding in shallow water she was refloated with some difficulty and returned to the *König*. Commander Ritchie with two officers then embarked in *Goliath's* steam pinnacle and proceeded to the *Kaiser Wilhelm II* where they disabled

her engines, and scuttled the smaller craft (including a floating crane), excepting five lighters which were taken in tow, two alongside and three astern, before their return. The demolition parties under Lieutenant-Commander Patterson were engaged meanwhile with the destruction of *König's* and *Feldmarschall's* engines.

In order to appreciate the situation regarding the events that followed it is necessary to go back and see what was happening outside during this time.

Shortly after 12.00 the senior officer embarked in *Fox's* steam cutter to have a look at the sunken floating dock. White flags were still flying, everything seemed very peaceful, and apparently the only sign of life was an old lady observed driving along the front in a carriage! The dock was seen to be about two fathoms below the surface as they drifted over it on the flood. Whilst examining the alleged hospital ship *Tabora* through glasses, and being on the point of turning back, fire was suddenly opened upon them from both sides of the channel. Lieutenant Corson took the place of the stoker who was badly wounded and kept the fires going, and an able seaman was the next casualty with a bullet through the head. The coxswain was also wounded in the leg but cheerfully carried on with his job. Some protection was afforded by iron plates that had been fitted on each side of the boiler and at the steering position and although these were not entirely bullet-proof the boat managed to reach safety: when the firing started she must have been about abreast of the Signal Station where the white flags remained hoisted throughout. The *Goliath* was ordered to open fire immediately and a few rounds of twelve-inch soon had the Governor's residence in flames.

Now, round about 13.00, the *Helmuth* (alongside *König*) had been ordered by Lieutenant-Commander Patterson to tow the two lifeboats containing prisoners off to the *Duplex*, and to drop Surgeon Holtom who was to inspect the *Tabora* alongside that ship on the way. After leaving the latter and observing that the white flags were still hoisted *Helmuth* came under heavy fire from rifles and machine-guns on the north bank. Lieutenant Orde in command and the coxswain were wounded, as also the seaman who relieved the latter. Her steam pipes were shot through and with steam escaping, speed reduced, and hull riddled with bullets she had difficulty in reaching the *Duplex*. Casualties were only a few wounded, luckily none seriously, and included one of the Germans in the tow astern.

Later, at about 15.30, the *Goliath's* steam pinnace, proceeding very slowly with the five lighters in tow, passed *König* and *Feldmarschall*, and seeing no sign of the demolition party it was thought that they had left in *Helmuth* (no information was available at the time as to what had happened to this party and they and the surgeon had to be left behind when our ships departed). Continuing on, therefore, and hearing heavy firing, Commander Ritchie slipped the three lighters astern to increase his speed, but on sighting the white flags across Ras Makabe decided to regain them. On reaching this decision, however, Surgeon Holtom was seen making towards the pinnace in a small

boat from the *Tabora*, and almost immediately fire was opened on them from all sides—rifles, machine-guns and some heavier type of gun—whereupon Holtom's native crew pulled back to the ship. Sub-Lieutenant Lloyd and two men were hit, the former dangerously. The two lighters abreast afforded welcome protection but caused difficulty in steering and after grounding two or three times had to be cast off. The coxswain was wounded but remained at his post until he collapsed and was relieved by an able seaman, who in turn was relieved by Commander Ritchie. The latter continued steering until the boat was through the narrowest part of the channel, but on receiving his eighth wound was forced to hand over to another seaman. The pinnace was sighted by the ships outside at about 16.30 when *Fox* and *Goliath* opened covering fire and she eventually reached the latter.

The wounded having been embarked in their respective ships the squadron left for Zanzibar before dark, *Fox* towing *Helmuth* and *Goliath* the *Duplex*. The total losses amounted to one man killed, three officers and eleven men wounded, and four officers and eight men missing. The number of prisoners taken was thirty-five, and the object of the operation was achieved.

In the London *Gazette* of the 10th April 1915 the following awards dated the 28th November 1914 were announced:—

Victoria Cross—Commander H. P. Ritchie, R.N.

Distinguished Service Cross—Lieutenant E. R. Corson, R.N.

Conspicuous Gallantry Medal—Leading Seaman T. Gallagher.

Distinguished Service Medal—Leading Stoker Broom.

„ „ „ —Able Seaman G. Upton.

Of these, Commander Ritchie of the *Goliath* is now a Captain (retired); Lieutenant Corson of the *Fox* is now a captain, M.V.O.; Leading Seaman Gallagher was coxswain of the *Fox's* steam cutter; Leading Stoker Broom was also in the *Fox's* steam cutter, and Able Seaman Upton was in the *Goliath's* steam pinnace.

On the 30th November 1914, the *Fox* and *Goliath* bombarded Dar es Salaam, *Helmuth* and *Adjutant* (another tug captured from the Germans) having first swept a channel so that the two former could anchor closer in. The bombardment lasted some two hours, each ship firing at pre-arranged targets. The damage done was not ascertained and the town appeared to be deserted.

Dar es Salaam's next bombardment did not take place until the 22nd August 1916, shortly before it surrendered on the 3rd September 1916. The *Feldmarschall* was eventually taken over by us, whilst the remains of the *Tabora*, *König* and the floating dock are still to be seen at Dar es Salaam as sorry memorials to an almost forgotten yet gallant incident.

Iron Smelting in the Kahama District

By C. C. de Rosemond

THERE is, in the fourth number of *Tanganyika Notes and Records*, for October 1937, an article on "Iron Smelting in Fipa". It may not be a duplication of an interesting account to describe the process of iron smelting as practised by the Warongo in the Kahama District. The two processes appear to differ a good deal. I do not pretend to have made a study of these people but am merely recording some observations and inquiries which I made. They are open to correction.

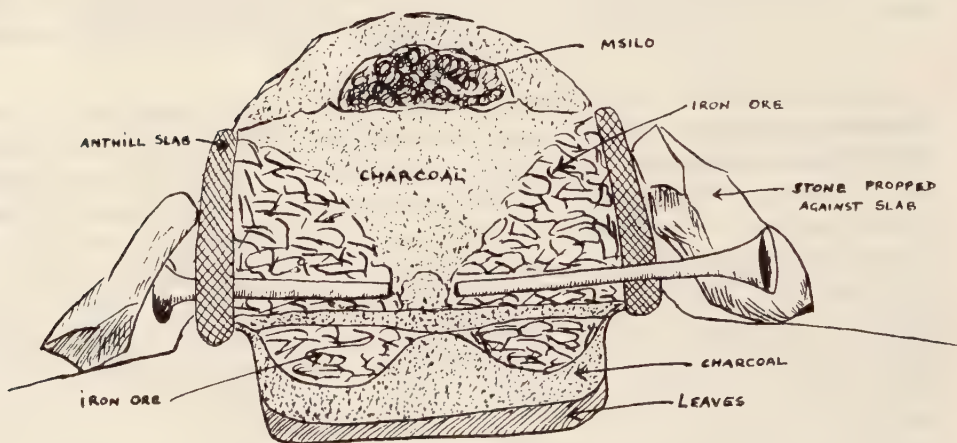
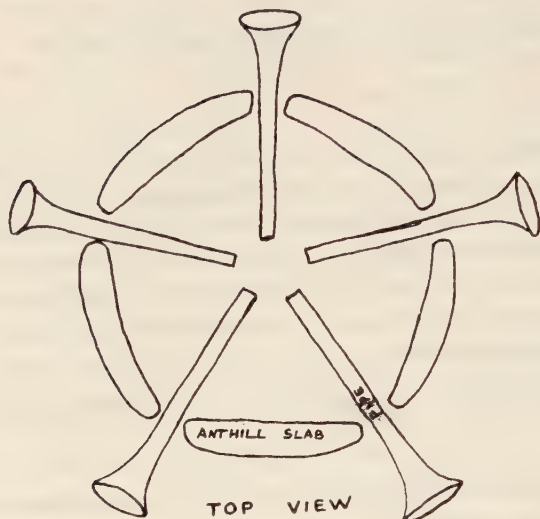
In order to make this account as concise as possible I shall divide it under three headings :—

I.—THE WARONGO : THEIR BELIEFS AND RULES IN CONNECTION WITH THE PROCESS OF SMELTING

Whether the Warongo are members of a clan or are only those men who have been initiated into the art of smelting iron and have the secret of the *dawa** to be used in the process does not appear to have been definitely decided even by the natives.

Personally, I believe the title strictly belongs to men who have been initiated into the knowledge of the secret *dawa* for smelting : I have been told by native smelters and smiths that any man may forge iron but only the Mrongo who has the *dawa* may smelt the ore from which the iron is obtained. These smelters and smiths trace their origin to an area south of Lake Victoria where a large proportion of the people probably followed these occupations owing to the abundance of iron-ore. The area may have become known as that of the Warongo (smelters and smiths) and the name came to be applied generally to the people living there. The present usual application of this term to any native who can forge a hoe from a piece of iron is probably incorrect. A native may smelt and forge iron with the assistance of his grown-up sons; the latter may be perfectly acquainted with the process of smelting but as long as their father has not initiated them into the secret of the *dawa* they will not dare to smelt iron by themselves. The iron worker generally is identified, as in most other native crafts, by special tiny scars on the body and hands. There are also secret formulae to detect impostors.

*The native word *dawa* is used as it is not easily translatable. The meaning usually refers to drugs but may include amulets or any substance used to influence or produce a desired effect on something or somebody.



The *dawa* which consists of several things, powder, roots, etc., is secret and I have naturally not been given any information about it. Its use will be more conveniently indicated when the smelting process is described.

The beliefs and rules in connection with smelting are :—

- (a) Nobody must whistle in the neighbourhood of the furnace while smelting is taking place.
- (b) Nobody but the smelter must build the kiln and handle the coal, ore, fire, etc., during the actual work of placing them in the kiln.
- (c) Smelting takes place in the dry season, and throughout the weeks or months during which his work is to continue, the smelter must not wash his body (only the face and hands) and must not have sexual intercourse with his wife or any other woman.
- (d) If the smelter wants anything done to the kiln or its contents while smelting is in progress a boy who has not reached puberty can help him.
- (e) If, under unavoidable circumstances, an adult man must do something, such as adding charcoal to the furnace, then the smelter will have to purify it with *dawa* (a powder thrown on the fire) so that any unclean influence of the helper may be removed.
- (f) The door of the crude hut which shelters the furnace usually faces the west, seldom the north or south and never the east. I could not find the reason for this but I suspect it may have to do with the direction of the prevalent winds. I got the impression that the Warongo had no real reason to give for this and that it was probably an ingrained custom.
- (g) When an Mrongo stops his smelting work for the season, probably at the beginning of the rains, he forges a last hoe as a present to his wife in recognition of her patience with his dirt and aloofness. If he cannot forge a hoe he gives her the equivalent in smelted iron which she can take to her father or nearest relatives.

In a smelting demonstration which I watched, the Mrongo, a genial expert, worked with his two sons aged approximately thirty-five and twenty-eight years old as his assistants. Both knew the work of smelting and forging perfectly. Only the elder knew the various formula used when employing the *dawa* but what the latter was he had not yet been told by his father. But even if he knew he would apparently not have taken a hand in the building and feeding of the kiln in order not to come under obligation (c) above, which it was more convenient to leave to his elderly father. Forging itself, which is heavy work, has no unpleasant restrictions attached to it and both the sons were good smiths.

II.—TOOLS : MATERIALS USED, ETC.

The iron ore is found on hills where it is picked up or dug for. The stone need not be broken as it is found in pieces; the average pieces used for smelting vary from about the size of a child's hand, palm and fingers extended, and

one inch thick, to double that size. The stone is hard, solid, heavy and of a uniform rusty brown colour.

Charcoal is made from three types of wood : (1) Mbanga, (2) Mkalati and (3) Mgando. Charcoal from these trees used together gives the best mixture but Mgando charcoal can be used with charcoal from either Mbanga or Mkalati alone. Mbanga and Mkalati charcoal are heat producing but if used by themselves the iron smelted is not easily malleable. It comes out of the furnace covered with a crust as of brownish-green sulphur which is probably the agent which affects the iron while it is reheated for forging. Mgando charcoal keeps the smelted iron clean but used by itself it does not develop sufficient caloric to smelt the ore.

The bellows used, as illustrated, are made of wood and goat's skin. They function amazingly well. Sticks are attached to the centre of the goat's skin which by being moved up or down suck in and push out the air in each half of the bellows. As the two halves are worked alternately a continuous jet of air is produced. The man working the bellows can either stand or sit. The pipes are made of clay, by men, and are about two to two and a half feet long, a half to three-quarters of an inch thick, with an internal bore of about two inches.

The sides of the kiln are made of slabs about one foot nine inches wide by two feet high, and three to four inches thick, from a type of termites' nest which crops up like a hump about two to three feet high in miombo bush or in hard rocky clearings.

An ingredient which is said to be essential to the smelting, apparently equal in importance to the ore or the charcoal, is the agglomerate residue from previous smeltings. It consists of lumps made up of half-burnt ore and charcoal all bound by something which may be slag and looks like molten pitch mixed with dust, ashes and vitrified matter. This agglomerate is called *msilo* and it will be convenient to use this word in describing the process.

III.—THE SMELTING PROCESS

Each Mrongo makes his own kiln which is not a difficult piece of work. A low ant-hill is selected and a rough hut without walls built on it as a shelter from the sun. In the centre of the hut a circular hole three and a half to four feet in diameter is dug about one foot deep. Deep down in the middle of the hole the main *dawa* of the lot is buried. To start operations the smelter places in the hole a bedding of shoots with fresh leaves from any of the following trees : Mtungulu, Mubumbu, Mubelebele and Mubula. This is to prevent the *msilo* during the smelting from coming in contact with the earth and adhering to it. Next a layer of charcoal is placed on the leaves so as almost to fill the hole; a small mound is made in the centre and a ridge along the edge of the hole. In the trough formed round the small mound the ore is placed. The slabs of termites' nests are next placed in an upright position round the charcoal with gaps about five to six inches between them. The slabs are leaned



Bellows



Final stage—Kiln ready for lighting

slightly inwards and lengths of broken pipes are placed between their adjoining top corners so as to hold them in a ring. Heavy stones are then propped up against the outside of the slabs at the bottom of which earth is packed all round. More charcoal is placed so as to cover the ore and it is levelled. The pipes are next placed in the gaps between the slabs so that their ends converge round a small circular space about eight inches in diameter in the centre. In this space a large lump of charcoal is placed. The gaps between the slabs are then filled with broken pieces of pipes half burnt and damaged in previous smeltings. Between the pipes and against the inside faces of the slabs ore is then piled; next comes charcoal and the kiln is filled level to its top. To crown the whole a mound of *msilo* is placed surrounded by as much charcoal as can be heaped on. A few live embers have probably been already placed round the large lump of charcoal between the ends of the pipes or else these embers are now pushed down a pipe with a stick. All this must be done by the smelter with the exception that he can be assisted in placing the propping stones against the slabs and the broken pieces of pipes to close the gaps between the slabs. When all is ready the bellows worked by relatives or other helpers start their puffing which lasts for five to six hours.

This is a long period which can, however, be very interesting and well enlivened by the wits all round. First a fair amount of smoke is produced as the fire gradually spreads in the charcoal at the centre of the kiln. Then the smoke almost suddenly vanishes as, with the big puff of a large spirit lamp being set alight, blue flames burst from the top of the kiln which looks like a huge flaming pudding. This is greeted with an exclamation or two and some clapping.

The sound of the bellows is to some extent reminiscent of the muffled sound of the intake and exhaust of Diesel motors in the engineroom of a ship. The up and down movements of the sticks of the bellows and of the arms and bodies of the men, moving like pistons and other parts of machines, completed the impression of mechanical power. They went like twin-cylinder engines, but the amusing part was when one bellows-man would look at another with a challenging expression and start doing energetic variations on the rhythm of his engine. One half of the bellows would thump four or five times faster than the other, then both would give a few simultaneous heavy thumps followed by a staccato beat, and one or two more variations, after which the engine would resume its normal rhythm of intake and exhaust. There was an old man who looked like a cheery chimpanzee and whose name would have meant baboon but for the prefix "Lu" before it. He was a member of the Baswezi sect and apparently an expert drummer. He now and then let himself go on his bellows in the vigorous rhythm of Baswezi drumming. His shoulders and body shook, Toscanini could not look more full of inspiration and vehemence, and then he would end his performance with a broad grin that set everybody laughing.

Meanwhile the smelter went round, heaping on the kiln more *msilo* and charcoal until he considered the time had arrived to stop. The pieces which closed the gaps and the large stone propping up the slabs were then removed. The slabs were pushed slightly inwards and the whole incandescent mass covered with sand and left for the night.

The next morning the slabs were removed, the ashes and live coals scraped off and a low conical pile of *msilo* revealed. This was levered out of the hole while still extremely hot. One of the smiths smashed it into large lumps with a heavy stone. Each lump was then pounded on a flat stone to obtain the smelted iron the main mass of which is in the bottom centre of the large pile of *msilo*. The output in iron of a furnace at one smelting can be anything between the equivalents of five to twenty hoes or twelve to forty-five pounds of iron. After removing the iron the *msilo* was set aside for the next smelting. The iron obtained still contains much charcoal and other molten stuff embedded in it. It is the work of the smith which will remove these impurities; anybody can do this but it is only the higher and secret art of the Mrongo which has produced the metal.

It may be as well to complete this account by mentioning briefly the method of removing the impurities from the smelted iron and forging it. There is here a greater resemblance to the method described in the article referred to at the beginning of this account.

The smelted iron is taken to the smithy which is in another hut with a large stone anvil in the centre. There the iron is heated intensely in a small furnace and when white hot is pounded vigorously with heavy stone hammers. This repeated process has the effect of removing all the impurities and of simultaneously shaping the iron.

Amongst others there is one interesting point of difference between the method of smelting described above and that used in Ufipa. There the slag is allowed to run out of the kiln while smelting is proceeding. I mentioned this to the Warongo and I was told by them that they are aware that this can be done with their own kilns though they know nothing about the Wafipa method of smelting. They know that this leaves the smelted iron cleaner but they do not do it as they say it makes the iron less malleable and more liable to separate in flakes or layers while being forged. I asked whether a demonstration of this method could be given so that I could see the difference in iron produced. The owner of the kiln told me that he could not demonstrate in his kiln consecrated with *dawa* but he could build another. I unfortunately had no time to wait.

Although this industry will undoubtedly be killed in time, by the competition at cheaper rates of imported articles, it seems that its life could still be extended by improvements in the present methods so as to reduce the work done and increase the output. There is now a considerable amount of energy wasted which could be saved.

Biological Brevities

(Continued from page 76, T.N.R., No. 15, June 1943)

By W. Victor Harris

4.—THE STALK-EYED FLIES

IN SHADY PLACES beside streams, among rotting vegetation or around the holes made by boring caterpillars in maize stalks, there are usually a few small flies with what appear to be comparatively well-developed horns. These are the stalk-eyed flies, or Diopsids, whose heads are drawn out on either side into slender stalks on the ends of which are carried the insects' globular eyes. The result is like a range-finder, but there is no evidence to suggest that this is, in fact, the effect of so unique a modification. It presents a pretty problem to those naturalists who would provide a "reason why" for each and all of nature's little *joies d'esprit* with tropical bugs.

Diopsids are restricted to the tropics. Virtually nothing is known of their life history. It has been suggested that they are predatory in habit, and they have well-developed forelegs which are jointed so that they close up like those of the praying mantis, with similar rows of interlocking spines on the surfaces which come together. But against this idea is the fact that their proboscis is of the spongy house-fly type, and not the sharp beak of a blood-sucker. Also, the near relations of the Diopsids are not predators.



The local stalk-eyed flies include *Diopsis mcigenii*, uniformly dark in colour, and *Diopsis pallida* with a bright yellow head and body and contrastingly dark coloured eyes and thorax. In the latter fly the simple middle eye or *ocellus* is conspicuous as a dark spot on top of the head. Altogether there is no lack of optical apparatus here.

5.—THE CITRUS BUTTERFLY

Perhaps the commonest of our larger butterflies is the black and yellow spotted swallowtail *Papilio demodocus*. It is widespread throughout Africa south of the Sahara, and is generally known as the citrus or orange butterfly because its caterpillars are most commonly met with on these hosts. The variety *docusdemo* described from Tabora differs from the typical form in having larger yellow spots on the upper surface, while the black apex of the "cell" of the hind wing is completely enclosed in yellow spots.



The eggs are laid singly on citrus leaves or those of several wild host plants. The caterpillars for the first half of their life are brown and white in colour and, when at rest, bear a striking resemblance to bird droppings; a good example of protective coloration. Later they become green with black- and grey-mottled markings. When alarmed, the caterpillar blows out from the neck just behind the head a pink forked tube, at the same time enlarging the middle segment of the thorax and drawing in the head. This brings into frontal view two eye-spots and a velvet black band, which, together with the waving pink fork, presumably present a frightening aspect, as distinct from the passive defence of the younger caterpillar. The chrysalis is straw coloured, with two horns and unprotected by any cocoon. It is held in position by silk threads at its base and round the middle.

Related swallowtails have the long projecting hind wings which have given rise to the common name for the group. Some are frequent visitors to our gardens but none so regularly as the citrus butterfly.

6.—THE DESERT LOCUST

When certain kinds of grasshoppers get together in large numbers, changing their shape, their feeding habits and their sedentary mode of life, they become locusts. Fortunately, this power is possessed by a limited number of species, and "any sort of grasshopper" cannot become a locust.

Africa suffers periodically from five kinds of locusts, three of which plague Tanganyika—the Desert, the Migratory and the Red locusts—the other two being the Brown locust of South Africa and the Moroccan locust. Each maintains itself in the solitary, or grasshopper stage, in limited favourable areas, but when they develop into the gregarious, or locust stage, they cover wide areas. The desert locust, *Schistocerca gregaria*, occurs in the solitary form throughout the desert country stretching from the Red Sea to the Persian Gulf and into North-Western India. Its last appearance in Tanganyika, from December 1928 to December 1929, was overshadowed by the longer and more widespread outbreaks of the other two kinds. Previously it arrived in 1894-95, 1904-5 and 1914-15, and it looks as if the forthcoming outbreak will restore the decennial sequence.



The swarms of desert locusts reaching Tanganyika have usually been bred in Kenya, but so strong are they in flying that some swarms may come direct from Ethiopia and Northern Somaliland. Young flyers have a distinct red colour and make a compact, high-flying swarm when on the move which, in the distance, resembles a dust devil in red soil country that has lost connection with the ground. As the locusts mature, their colour changes to bright yellow. The habit of flight changes too, the swarms flying lower and altogether more purposeful. Locust swarms can do more damage to crops by their weight, when settled for the night, than they do by feeding.

The desert locust lays its eggs in compact pods of from forty to eighty eggs in the hardest piece of ground available. After fifteen days the hoppers emerge. These young locusts are wingless, and cover the ground in a series of jumps. They are strongly gregarious and "get together" in long narrow bands which move broadside across the country. After forty-five days of alternate eating and hopping they become adult with fully-developed wings.

And now they are ready to fly away, with seven or eight weeks of travel before them ere they are overtaken by family cares. Thus the desert locust manages to have three generations in a year.



When a cycle of swarming is over, the emigrant swarms do not return to the ancestral home, nor do they change to the solitary grasshopper form in the areas which they have over-run. They die out like the waves in an ocean caused by a submarine eruption, which move outwards and cease, and all is quiet until the next explosion.

7.—CHAMELEONS

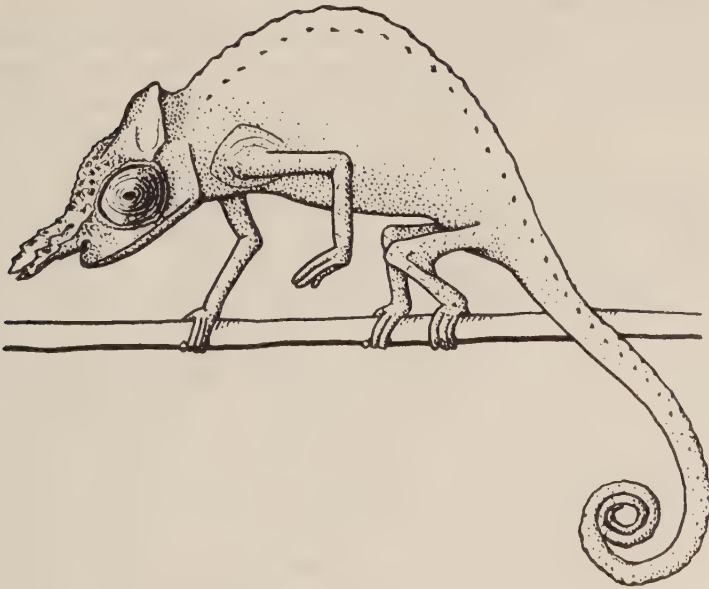
Few countries can equal Tanganyika in its variety of chameleons, a group of reptiles essentially African and Malagasy, though a few species are found as far north as Spain and eastwards of Ceylon and South India. As a group, chameleons escape that dislike that most folk have for reptiles, except in the case of the African, to whom long acquaintance has brought no recognition of their harmlessness. During the mating season male chameleons fight each other, and this is no doubt the reason why the Greeks called them ground lions.

The main physical characteristics of chameleons are their thinness of body, the tail which can twist so firmly on to a support, the five-toed feet divided so that they grip with two toes on one side and three on the other, and the large eyes, like gun turrets, which move independently of each other. Not so obvious, but well worth the necessary patience to observe it in action, is the chameleon's tongue, long and thin, with a sticky tip, and shot out with astonishing rapidity to a length often exceeding that of the chameleon itself. We have chameleons with plain heads, these being the more common, others with single horns like unicorns, and some with two horns and even three. They vary in size from two inches in the highlands, to two feet in the case of *Chameleon melleri* from the tropical forests near Amani and Morogoro.

The most widely-known power of chameleons is that of changing colour in sympathy with their surroundings. This power has been grossly exaggerated, even though we do not all go so far as the Scot who put a chameleon on his kilt and told it "to get on with it". The alterations in body colour which the chameleon can achieve are produced by the movement of dark pigment bodies towards the surface from deep down in the skin, and vice versa. With this pigment deep down, the normal pale colour of the skin prevails, but under the influence of light, cold or annoyance, the dark colours appear. Mountain

forms are generally much browner than the lowland species. Some chameleons have in addition a bright orange pigment in the neck which is exposed when the beast blows out his neck in annoyance, but they use their coloration, on the whole, more for camouflage while stalking, with Job-like patience and slow-motion deliberation, the agile fly or grasshopper marked down for the meal.

Most chameleons lay eggs like lizards. Their food consists of insects, to catch which, the tongue is highly developed as already mentioned. The mechanism by which the tongue is shot out so rapidly and so far is supplied by the long elastic base, which is held in a state of tension like a coiled spring by a bony process like a trip lever. A mass of elastic tissue at the base causes the almost equally rapid recoil. The speed of strike and recoil achieved in the tongue is a great contrast to the leisureliness of the animal's other actions. One point to be noted about the arrangement of the tongue is that it works at one distance only, hence the necessity for calm and careful manoeuvre on the part of the chameleon to get into range before striking.



Unlike lizards, chameleons do not chirp or make those clicking noises with which geckos attract the opposite sex. They can hiss when angry, to add verisimilitude, so to speak, to their other efforts at being frightening. Incidentally, the puffing out of the body under these circumstances is achieved through the lungs being modified into a number of sacs reaching into parts of the body other than the chest.

Chameleons can be kept as pets, but their feeding is troublesome. They are best kept in some sort of enclosure so that the live insects provided for them cannot escape too far. While the giant *Chameleon melleri* will eat elegant grasshoppers (*Zonoceros elegans*) if sufficiently hungry, the common green *Chameleons dilepis* and the smaller upland species all require the smallest grasshoppers and such things as house-flies.

LIST OF FIGURES

- FIG. 1.—The Stalk-eyed Fly (*the natural size is shown by the cross lines*).
FIG. 2.—The Citrus Butterfly (A), with caterpillar (B) and pupa (C). (*Natural size.*)
FIG. 3.—The Desert Locust in flight (A), and its hopper (B). (*Natural size.*)
FIG. 4.—The Two-horned Chameleon from Kilimanjaro. (*Natural size.*)

Earthquake at Songea

By A. W. Wyatt

ALTHOUGH earth tremors are not unknown in Songea, the shock experienced on the 9th October 1942 was of such unusual violence as to cause a certain amount of damage in a few places and a great deal of discussion in the very much wider area over which it was felt. Of past earthquakes experienced at Songea, the *Handbook of Tanganyika* has this to say*: "During May and June, 1919, very severe seismic disturbances were experienced in the south-western portion of the Territory which caused much damage at Songea . . . and seventy-two separate shocks were recorded."

The district of Songea borders the eastern shore of Lake Nyasa and lies between latitude 10° and $11^{\circ} 35'$ south, and longitude $34^{\circ} 35'$ and $36^{\circ} 40'$ east. At its western boundary the country rises very steeply from the lake shore which is 1,668 feet above mean sea level, to the Nyasa scarp, attaining over 6,000 feet at the highest point; embraces the Matengo highlands, which are grasslands between 4,000 and 6,000 feet, and then drops sharply to the wide savanna forest lands and cultivation steppe which form the headwaters of the upper Ruvuma and Ruhuhu rivers at approximately 3,500 feet, falling gently to the headwaters of the Rufiji River.†

The effects of the recent shock were most marked along a line running in an easterly direction from Liuli on the shore of Lake Nyasa towards the massive granite tor of Mbuji in Matengo, and then on across the Matengo highlands in the rough direction of Songea itself. Places any distance off this general line seem to have experienced a less violent shaking. A slight tremor was felt at Lindi, four hundred miles to the east, and at Njombe, one hundred miles to the north-east of Lake Nyasa.

Personal experiences of residents at the places where the quake appeared to be most violent show the powerful and terrifying effect of this disturbance. At Liuli "the grass roofs of our houses jumped up and down for a period of about four minutes, the church bell was also set ringing. The shock was preceded by a low rumble getting nearer that seemed to come from the lake or westerly direction. Between my house and the college is a stream and damage to houses increased with their nearness to the stream. Damage was in the main vertical cracks starting from the top of walls. A few bricks fell and the top of the halves of the east and west walls in my own house tended to lean outwards. Where the couples had pounded up and down during the shock it was necessary to replace the brick. A short projecting wall running

*Page 28.

†For a detailed physiography see "The Geography and Hydrography of the Tanganyika Territory Part of the Ruvuma Basin", by C. Gillman.

out at right-angles from a main west wall broke away. In one room a steel safe had been built into a wall and this wall was cracked all round the safe about eight inches from it right through to the other side. Cement floors were undamaged, and generally walls were only cracked from the top downwards due to the severe vibration of the roof timbers. I had time to walk once or twice round my house and observe the roof movement and the impression I had was of the thatch jumping up and down rapidly. My wireless was working and for some odd reason I felt the most important thing was to turn it off, which I did. Further tremors took place in the night which drove me out of doors. For a night or two most of us slept in the open and there were other tremors. These were all preceded by the rumble which could easily be differentiated from that of thunder and the houses gave a single jerk. I should describe these latter tremors as a series of single convulsive jerks rather than a vibration. I must emphasize the length of the first shock. The roof appeared to jump about for a matter of minutes, not seconds".

Some natives fishing in the shallow waters of the lake shore about twenty miles north of Liuli were knocked off their feet by a huge wave which came rushing in. One of them was swept away in the backwash of water and sand from the beach, which shelves steeply, and was drowned, having evidently become entangled in the ropes of the fishing-net. Other native fishermen commented on the curious behaviour of the lake weather which was noticeable over a period of days before the quake.

At Mango Mission "the earthquake came first in the form of an ordinary tremor which gradually increased in intensity. There was a violent backward and forward jerky movement (south-north) which lasted for about fifty to seventy seconds. Almost immediately afterwards there was a mild tremor and during the earlier part of the night there was about hourly repetition of the milder form of tremor. As the early morning drew on these tremors became less frequent but they continued several times a day and during the night for some time. The rumble of rocks crashing down in the nearby hills during the first severe shock made us think of the Last Day! Tiles of the steeple, church, and dwelling houses tumbling down made us wonder which place was safe. In the garden in a little gully, the earth split open and fairly warm water shot up like a mighty geyser till the whole garden was under water. The buildings north, east and west were extensively damaged, the ceiling being broken away from the walls. Vertical cracks appeared in many walls. We were all very much alarmed and do not want another similar experience".

At Litembo Mission "the first shock came quite suddenly without any warning. Walls began to totter, and the roof jumped up and down, moving, some people say, from eight to ten inches. We noticed how the chimneys shook to and fro several times till eventually they fell to the ground. The air

was filled with dust and nearby buildings were hidden from sight. Immediately after the first shock we heard roaring and thundering from below. Tiles from the roof, bricks and plaster were shaken down in abundance and the walls were cracked. Nearly all the inner walls were split away from the outer ones in the living quarters. In the school house, oblique cracks appeared in all six inner walls running from the corner of the gables down towards the centre of the wall. Walls which had previously been rebuilt suffered most severely. That same evening a number of minor tremors followed, and alarmed us. These were experienced every day for about two or three months”.

At Kigonsera Mission “there were two separate shocks, the first longer and travelling from south-east being followed almost immediately by the second which was heavier and almost twisting. I happened to be in the garden when the tremor began and had the impression that it lasted from fifty seconds to a minute, others thought it was longer. Later on one of us repeated his action of running down a staircase and out of the house after he first noticed the tremor to check the time taken and we came to the conclusion that the shock must have lasted a minute. My first impression out in the garden was the tremendous noise made by the tiles on the roof and I thought the roof must be coming down. I began to run to the house and then felt the tremor on the road which made me very uncertain on my feet so that towards the end I almost staggered. I saw clouds of dust coming from the windows of a room in the upper floor. Another priest sitting in his room, when he became alarmed at the violence of the tremor, tried to get out of the room but was unable to open the door for some moments as it had suddenly become so tightly squeezed in its frame. The shock brought down part of the brick-built ceiling arches and much of the rough cast walls in three rooms. Cracks into which one could easily insert a hand appeared in two inner walls of the top storey which runs north-east to south-west. These cracks run vertically from ceiling to floor and many of the bricks, all burnt, are split in half. The hip side of the roof was loosened from the remainder. In the new house, long cracks appeared in the floor between the flagstones, all running south-east to north-west”.

At Mgazini Mission “there were two major shocks within an interval of barely a minute. The first shock may have lasted some twenty seconds, the second was much longer, I, personally, would say five full minutes”.

At Peramiho “a rumbling thunder, an immediate trembling of the soil, and the great shock occurred. The firm, stony road along which I was walking, shook like the twig of a tree in a strong wind, high waves seemed to be running below the surface from the south-west to the north-east. The rattling of the tiles on the roof and the buildings shaking to and fro as though they were about to collapse made up a terrifying experience. The quake lasted about one minute. About five minutes later there was a second quake lasting

about twenty seconds but not so violent as the first. Many tremors followed during the night and each day afterwards for some eight days. Since then tremors have been constant though less frequent”.

At Songea itself “my first impression was of a loud drumming on the iron roof as though a heavy hailstorm had broken and although this seemed to pass quickly along the roof, there was a curious roaring sound as an accompanying background. A few seconds later another violent drumming began on the roof and, realizing it was an earthquake, I called to my wife in another room and we ran outside the house. We watched the eastern end of the iron roof shaking and heard it making a crackling noise as though it were being twisted violently and rapidly. The ground seemed to heave as though one was standing on deck in a sea. The roar died away towards the east. I then looked at my watch; it was 18.47 hours East African time. Later my wife remarked that at first she thought the noise resembled a large bird flapping about in the roof and she was about to call attention to it. Afterwards it was seen that arches and lintels of doors and windows were cracked and ceilings had become loose or had fallen in”.

The native population was considerably frightened by the earthquake and some slept out in the bush for a few nights afterwards. Generally speaking they attributed it to a manifestation of Divine displeasure, some said because of the evils wrought by the present war. Others considered it the forerunner of some great catastrophe such as the end of the world and began to fast in expectation. Another explanation offered was that the enemy were burrowing below the earth and driving in cars and so destroying the country; and yet another, that the earth was trembling because of a collision between the sun and moon. After a few days of apprehension, however, the explanation that it was a natural phenomenon of no particular significance was generally accepted.

NOTE.—The following observation of shocks was recorded at the Benedictine Mission, Kigonsera. Local time there is approximately one hour behind East African time :—
October 1942 :

- 9th—at 6.00 p.m., local time, ten minutes after main shock another heavy shock, but lighter than the first.
- „ at 6.20 p.m., considerable shock; we still stood outside.
- „ at 9.30 p.m., heavy tremor; all houses emptied again. During the night about six more lighter shocks of varying intensity.
- 10th—at 3.00 a.m., heavy shock; our pupils all ran out again.
- „ at 7.00 a.m., considerable; several weak tremors during day.
- 11th—at 6.00 a.m., weak tremor.
- „ at 7.00 a.m., considerable shock.
- „ at 9.15 a.m., short, but considerable.
- „ at 11.00 a.m., weak.
- „ at 10.05 p.m., heavy tremor, most people out of houses.
- 12th—at 3.00 a.m., considerable, during day several weak tremors.
- 13th—at 7.00 a.m., considerable.
- „ at 4.00 p.m., considerable; several weak tremors during day.
- 14th—at 7.00 a.m., considerable; with much noise underground.
- „ at 9.30 a.m., weak.
- 15th—several weak tremors towards evening.
- 16th—at 7.00 a.m., considerable.

October 1942—*contd.* :

- 17th—at 3.30 a.m., considerable.
- 20th—at 1.30 and 10.30 p.m., weak tremors.
- 21st—at 9.00 and 10.25 a.m., weak.
- 27th—during day several weak, but longer tremors.
- „ at 8.30 a.m., short, heavy shock; several people ran outside.
- 28th—at 9.00 p.m., short, considerable shock.
- 29th—several weak tremors during day.

November 1942 :

- 1st—ca. 3.00 a.m., considerable.
- 13th—ca. 9.00 p.m., considerable.
- 14th—ca. 3.00 a.m., considerable.
- 15th—ca. 10.00 p.m., considerable.
- 16th—at 3.15 a.m., considerable.
- „ at 9.00 p.m., heavy, short shock.
- 17th—at 7.00 a.m., short, considerable shock.
- „ at 11.15 p.m., short, heavy shock.
- 18th—ca. 8.00 a.m., considerable.
- 19th—at 5.15 p.m., considerable.
- 24th—ca. 9.00 and 9.15 p.m., considerable, with much noise.

December 1942 :

- 12th—at 6.20 a.m., considerable.
- 13th—at 4.00 a.m., considerable; several weak tremors.
- „ at 10.15 p.m., heavy shock.
- 15th—ca. 3.20 p.m., considerable.

January 1943 :

- 8th—ca. 8.00 p.m., considerable, long noise.
- 15th—ca. 10.45 p.m., a heavy shock with several weak ones.
- 16th—ca. 1.10 p.m., considerable.
- 25th—ca. 11.55 p.m., considerable tremor.

February 1943 :

- 25th—ca. 4.00 a.m., considerable and long.

March 1943 :

- 7th—shortly before midnight, a very heavy shock; some believe it to have been the heaviest since 9th October 1942.

N.B.—This list is not complete, but most dates have been noted down by two priests independently.

NOTE.—I am indebted to several residents who furnished accounts of the earthquake to assist me in compiling the above résumé, especially Reverend C. E. Sergeant, U.M.C.A., Reverend T. J. McGuire, O.S.B., Reverend Eberhard, O.S.B., Sister Sairis, O.S.B., Reverend X. Hasler, O.S.B., Reverend Odo Braun, O.S.B., and Reverend C. M. Hornung, O.S.B.

EDITORIAL NOTE.—The tremor at Lindi, mentioned in the text, was felt by a large party assembled in the Assistant District Officer's house on the 9th October 1942, at 18.51 hours standard time (three hours ahead of Greenwich). It lasted about half a minute and set the semi-circular brass ash-trays on the tables wobbling. I can only find one reference to an earthquake recorded from Lindi in Krenkel's exhaustive list (*"Die Bruchzonen Ost Afrikas"*, 1922, pages 101 and 135) which is described in connection with the great Tanganyika-Nyasa event of the 13th December 1912. With regard to the attitude of the local natives, Mr. G. D. Popplewell, Assistant District Officer at Songea, wrote a few days after the happening that he received claims for compensation as "many goats had been killed"!—C.G.

The Problem of Controlling Bilharzia Infection

By F. G. Cawston, M.D.

REPORTS from various countries, where efforts have been made to reduce the amount of bilharzia infection, have shown that, although there has been evident lessening of the serious operations commonly associated with the disease in hospitals, the incidence of the infection among the natives has remained largely the same. This is readily explained by the fact that Europeans have as a general rule submitted themselves for a thorough course of treatment, whilst the natives have been relieved of obvious symptoms without continuing treatment until all the parasites have been destroyed, so that they remain carriers of infection and continue to constitute a source of infection to the streams.

One of the great advantages of a complete cure is that the patient not only becomes free of the chance of infecting others and probably somewhat resistant to fresh infection, but learns the need to avoid possible infection and indirectly influences others to avoid the dangers which he himself has experienced and fully realizes.

Education is doing a great deal to lessen the disease among Europeans, and there is an increasing demand for properly-controlled swimming-baths for their children, but it can only have a limited influence among a population which is continually exposed to infected water and which has no opportunity to render that water free from infection before coming in contact with it.

Mass treatment of school-children has been undertaken in some places with varying degrees of success, but the problem is almost insurmountable where babies of a few months are found to be infected, the mother, an Indian or native woman, with little regard for the cleanliness of the pool from which she obtains her water and in which she washes her clothes.

Sufficient attention has not been given to the means whereby water containing parasitic larvæ can be rendered safe for use by forcible disturbance in hydraulic water-raising, notwithstanding the evidence of colonists who have for years supplied their residences with water pumped from an infected stream without succumbing to infection except by indiscreet bathing in the stream itself. On two occasions when asked to make a report on the water supply for a municipality, once in Southern Rhodesia and once in the Transvaal, I have directed attention to the fact that the problem was an engineering one, although on other occasions I have been able to recommend measures coming more under the control of medical men and zoologists.

Bilharzia larvæ are very fragile creatures and lose their tails when shaken in water so that they sink to the bottom. They also die from contact with

relatively cold metal or glass, and survive more than thirty-six hours only if they gain entry into the blood-stream of a human being or some other suitable animal.

Under natural conditions, shallow water may normally be disturbed by crocodiles and hippos, and occasional floods, while streams contain the natural enemies of the parasite's host, such as fresh-water crabs, birds, fish and small mammals. Ruthless removal of primitive bush for extensive cultivation, grass-firing, and over-stocking with goats, have interfered with these forces. Oiling of natural collections of water and other methods of controlling mosquito-breeding have also interfered with bird-life, whilst removal of vegetation from river courses for various reasons has decreased the number of natural enemies to the snails which convey bilharzia infection and which happen to be the very ones which resist unfavourable environment.

Surveys of all available molluscs in any locality are of great scientific importance, but tend to complicate the study of the proper control of bilharzia disease. In their very comprehensive list of molluscs from the Congo, Doctors H. S. Pilsbry and S. Bequaert mention remarkably few as being possible conveyors of disease to either man or stock; and of some thirty to forty different species, which I have received from the Congo, none is a probable carrier.

Although in his report Dr. Alan Mozley illustrates several species from Zanzibar and Dar es Salaam, such as I myself have collected, he rightly emphasizes that *Physopsis* and *Biomphalaria*, popularly known as *Planorbis* and described by Pfeiffer, are the important ones from a human standpoint, and, in Tanganyika Territory, particularly the former.

Planorbis is prevalent over large areas where bilharzia infection does not exist, and is principally concerned with *Schistosomum mansoni* infection, which is not encountered far south, where *Planorbis pfeifferi* abounds on Natal vleis. As a practical measure, therefore, it would seem best to concentrate on the destruction of *Physopsis*.

Bulinus forskalii (Ehrenberg)* has also to be considered, but is remarkably rarely found to be infected on the African continent, in contrast to the role it plays in bilharzia infection in Mauritius. It is somewhat difficult to collect, having a small spiral shell somewhat resembling a small example of *Melanoides tuberculata* Mueller, which is exceedingly common.

The importance of preserving wild life, and the tendency of tropical streams to be overloaded with debris, renders it necessary to give convincing proof of the value of chemicals in river water and stagnant pools before such treatment is widely applied. For example, under the Streatfeild Research Scholarship, I showed that the crushed root of the wild pea, *Ilozana*, affected tadpoles and useful snails more than it did *Physopsis*.

*Also previously described as *Isidora forskalii* (Ehrenberg).—EDITOR, T.N.R.

In some countries bilharzia control is difficult because the snail-host has an operculated shell enabling it to resist drought for long periods of time, but in Africa the problem is simplified because the usual snail-host is easily identified and is readily devoured by domestic duck, or can be collected and destroyed by other means.

Reliable evidence of useful disease-control is now available to show that where the river banks are denuded of vegetation serving as a shelter for natives likely to pollute the banks, and where hand-collecting of the snails has been adopted and the surface soil sprinkled with a two-per cent solution of lime, the number of infected school-children has dropped considerably.

It has not been possible to obtain information revealing any detriment to the rice from the introduction of the domestic duck, and, until such evidence against its extensive use is forthcoming, this useful bird should be relied upon to deal with the ever-present problem of infection in rice-fields. Elsewhere, however, human excreta must be kept away from all moist soil.

All the bilharzia eggs have small spines attached to the shells which serve to keep them attached to surface vegetation or soil until they come into contact with a fresh-water snail; but the eggs perish immediately they become dry. Attention to native sanitation is, therefore, of paramount importance in ridding any locality of bilharzia disease.

NOTES

“Then to this Earthen Bowl”

By R. Bleackley

EVERY ONE is familiar with the *mitungi* and baked earthenware cooking pots in use all over the Territory. At Liwale my attention was first drawn to them when I discovered, in common with many another gardener, that they make excellent flower pots. There the matter rested for some time. Until, in fact, aluminium and pyrex became both rare and fabulous, and the situation on the sufuria front began to look acute. It was then that I made inquiries about the local pottery *fundi*. I had expected an aged crone, a wrinkled haridan, but Zainabu proved to be neither. She is a young married woman of considerable charm and gaiety. Her craft is hereditary; she learnt it from her mother who had it from her grandmother before her. That Zainabu herself excels at it is evident as her fame has spread for miles around. And although other women can, and do, make cooking pots, she is always called in when anything special is required.

As I came to know there are few occupations more pleasant than that of a pottery *fundi*. Her workshop, in this case, consisted of a mat spread under a shady tree. It soon became quite a social centre—Zainabu’s friends would look in for a chat on their way to fetch water, or as a respite from other domestic duties. One and all they brought and parked their children; and, judiciously removed from the grown-ups, there was an ever-increasing cluster of giggling totos delightedly squidgling bits of clay. Thus the *fundi*—her trade is plied in an atmosphere of dappled sunshine and shadow, and to the tune of gossip and light laughter. And, it must be admitted, an occasional bellow from an outraged infant.

Her tools are of the simplest. In addition to a jar of water they consist of a large leaf, a mango stone, a stick with one straight edge, and a rim trimmer—this has to be the width of the finished pot, and a strip of grass torn from a fraying *mkeka* is commonly used. The size of *mitungi* is dependent upon special varieties of clay. That found at Barikiwa is particularly suitable and the village is a potters’ paradise. There a *mtungi* can be made so large that two men are needed to lift it, and it has a *pombe* content of some sixteen gallons. The small *kaango* on the other hand can be made of almost any kind of clay. Two different varieties are found within half-an-hour’s walk of Liwale; one is blackish and very slimy, while the other, a vivid orange, is more gritty to the touch.

To make *kaango* equal quantities of these clays are moistened and kneaded together, with the familiar bread-making motion, for about ten minutes until an even texture is achieved. A lump is then pummelled until it is egg-shaped. It is placed on a leaf to which it sticks so that the whole can be rotated easily on the loose sandy ground without damage to the base of the pot. Clay from the centre of the lump is next scooped to the sides. As soon as she has roughly shaped it with her fingers, the *fundi* smoothens and enlarges it with her mango stone. She dips this frequently in water, and uses an upward spiral movement, turning the pot continuously with her left hand until the thickness of the clay has been reduced and the required size and height reached.

The pot is then roughly smoothed on the outside and is given, with the mango stone, a curve inwards about an inch and a half from the top. Unevennesses in the rim are patched next, and it is smoothed until it is uniformly level and about one-eighth of an inch wide all round. Finally the pot is given its topmost outward bend with a flat stick, the rim is trimmed for the last time and the pot is left in a shaded place to dry. A good pot at this stage is damp to the point of pliability, very elastic and yet stiff enough to retain its shape. Therein lies the art—the whole process looks extremely simple but, believe me, there is more to it than meets the eye! One's first effort is apt to look like a cross between a dumpling and an over-blown sunflower—mine also had an alarming bulge at one side and a depressing tendency to subside when left to itself. All the same with patience and practice it is possible to reach the stage of being able to "pot a bit"—or at least enough for one's own amusement.

Pots are left to dry for four or five hours, by the end of which time their shape is set and they can, with care, be handled. A band of pattern is next marked on. It encircles the pot just above its widest point and is scratched or stamped on with any piece of sharp twig that happens to be lying around. Any one who has examined *mitungi* and *kaango* will know the wide variety of these patterns, how they range from simple strokes and triangles to complicated whorls and curves. But one and all they need a steady and precise hand, and, needless to say, each *fundi* has her specialities. The pot is next turned upside down, the leaf removed and its outside scraped to a uniform thickness throughout. It is then once more put out to dry.

Should a lid be required the procedure is the same as for a pot, except that the finished article is shallower like a soup plate. When its inside is smooth the lid is turned upside down and placed on the bottom of an old *kaango*. Its outside is scraped, a handle fixed, and a thick roly-poly of clay stuck on all round near the edge. This is worked and moulded until it resembles the upturned brim of a hat, and its job is to hold hot charcoal in place so that the finished cooking pot may itself be turned into an oven.

Pots are not fired until they have dried out completely. Building an oven is a scientific operation. First a foundation is laid; it is roughly nine inches high and consists of criss-cross layers of wood. The pots are then placed upon this and more wood is piled around and on top of them. The finished structure is about three feet high and looks like a rabbit hutch; there is, however, nothing haphazard about it—each piece of wood being placed separately and with care so that when it burns it will not fall on and break the pots. Holes filled with tinder and twigs are left at either end. These are lit and the oven burns until the entire structure is reduced to ash. Pots are then carefully removed with sticks, and, to the accompaniment of furious fizzling, water is sloshed over them to harden them. They are then ready for use.

Pots made in this way are fire-proof and watertight. They may be used for boiling, braising or frying and make an excellent substitute for casseroles. Although not, of course, glazed, they can be scoured clean with sand, and the lidded variety makes an invaluable oven on safari. I see no reason why cooking pots of the standard European shape with handles should not be made out of this type of earthenware. The only snag is its extreme brittleness. Although it will resist any amount of heat it will not stand up to rough handling, and chips and breaks easily. Fortunately cooks are familiar with its drawbacks in their own homes, and treat it accordingly. Anyway replacements at fifty cents a time are not exactly ruinous.—*Liware*, 23rd February 1943.

Pan Satyrus (Chimpanzee)

By G. G. Rushby

[With reference to Mr. R. E. Moreau's note on the chimpanzee and the accompanying extract from the *Tanganyika Standard* which appeared in No. 14 of *Tanganyika Notes and Records*, Mr. G. G. Rushby, of the Game Department, has sent us the following interesting account of the appearance and habits of the Lake Tanganyika chimpanzee.]

A CHIMPANZEE Sanctuary was recently made in the Kigoma District which will safeguard the continued existence of these interesting apes in this Territory. The Sanctuary is situated on the shores of Lake Tanganyika, north of Kigoma. It is reached by canoe from Kigoma, and with a fair wind it is about seven hours' sailing or nine hours' paddling.

This home of the chimpanzee is in the mountain range which runs north and south along the eastern side of the Lake, following the shore. The mountains rise almost sheer from the Lake, and in the gorges running down from the mountains are the remnants of West African forests. It is in these strips of evergreen forest that the chimpanzees live, particularly in the dry season. October, November and December are the best months for observing these animals in the Sanctuary.

These chimpanzees, both male and female, differ from the West African species in several distinctive ways. They are darker, although the females have the same russet or arab coloured faces. They have thicker and longer hair, and although I saw several elderly males, none of them was baldheaded, as is usual with the elderly West Coast males. They are bigger and heavier—almost as big and heavy as the lowland gorilla from the French Middle Congo.

Unlike baboons and monkeys, they do not raid crops at all, and in fact they do not even allow these animals into their territory. Their sole natural enemies are leopards and lions. No native has been known to kill one, in fact they hold them in veneration. What the native superstition is concerning chimpanzees in this area I have been unable to discover. In West Central Africa very strong superstition exists and, in one area I knew well, contact between natives and chimpanzees was developed to an extent which would seem fantastic and incredible.

Being more alert and active than gorilla, it is more difficult to observe them closely. They are more arboreal than gorilla, but travel quite well on the ground, though comparatively slowly. Using their feet like a man, they propel themselves along using their arms as crutches; the palms of the hands are not placed on the ground, but only the knuckles.

They live in bands or clans made up of several families. In the evening they build themselves beds or sleeping-platforms in trees, similar to machans. Although the clan will spend the night in one small area, each family builds in a separate tree. The beds vary in size according to the size of the occupant, and it was noticed that in each tree there were never more than two beds large enough for an adult chimpanzee, the rest being of smaller size. They only build in trees which are in leaf, the foliage giving a degree of privacy. The size and position of the beds can readily be seen during the dry season in deciduous trees where they were built in the wet season.

From the foregoing one concludes that the chimpanzee is monogamous. It was also observed that the female has the entire responsibility of caring for and bringing up the very young; but when the young are big enough to move about and fend for themselves they come under the discipline of the older adult males—a discipline which appears to be impartial, strict and effective.

The observation and study of these anthropoid apes living their normal life in natural surroundings is of absorbing interest and in some ways salutary, for one realizes that *Homo sapiens* is more anthropocentric than he thinks. The friendly cheerfulness which exists in the families and clans of the chimpanzee is well worth studying.

They have been known to carry away cloth and small bundles which natives have left in the bush whilst out after wild palm fruit and honey. They have also been known to enter the temporary huts—if unoccupied—which the local

natives build at certain seasons high on the hillside. The locals say the chimpanzees are partial to salt and will steal it from these unoccupied huts.

There is only one authentic case known locally where a chimpanzee has carried off a human being. A native child, a male, was left unattended in one of these temporary hillside huts while the man was out looking for wild palm fruit and the woman had gone to draw water from a stream. During their absence an adult chimpanzee, sex unknown, entered the hut, picked up the child and carried it away. The screams of the child reached the mother who guessed what was happening and rushed yelling towards the chimpanzee which had the child in its arms. It dropped the boy, after biting him in the nose, though whether it bit him from fear or panic or whether it deliberately mutilated him it is impossible to say. The child recovered and except for a badly scarred nose was none the worse for its adventure. He is now a boy of about ten years and lives at Kidihi village which is in the Chimpanzee Sanctuary.

CORRIGENDUM

Tanganyika Notes and Records, No. 15, June 1943 :
"A Contribution to the Study of the Vegetation of
Mpwapwa" : Page 32, line 7 : *For* "Where fires are
inevitable" *read* "Were fires as inevitable".

