

## BRITISH MUSEUM EAST AFRICA EXPEDITION.

PROGRESS IN THE YEAR 1926.

By F. W. H. MIGEOD, Leader, September 1925–December 1926.

PRACTICALLY the only object of the expedition was the excavation of the dinosaur remains at Tendaguru in Tanganyika Territory. Digging had been done here by the Germans for about six years before the outbreak of war, and many fine specimens had been obtained. Then for ten years the ground lay derelict, until early in 1924 the British Museum sent out an expedition in charge of Mr. W. E. Cutler to resume work there. Mr. Cutler unfortunately died on the 30th August, 1925, from the effects of malaria, and work was almost entirely suspended until I arrived at Tendaguru in the middle of November of the same year to take his place.

During the twelve months under review an investigation was made of thirteen different sites round Tendaguru hill, none being more than a mile distant in a straight line, though of course usually much further by the bush paths; in addition some prospecting was done further afield,



F. W. H. MIGEOD.  
Leader, British Museum East Africa Expedition,  
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but in view of the possibility of the work of the expedition in this locality continuing for more than one year, I decided to make an intensive study of the immediate neighbourhood first. All these thirteen diggings except one proved productive to at least some extent, and the single one which yielded no remains was not without value, since it afforded an idea of the limit

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of the productive strata. Of these diggings the larger number yielded bones associated together, those with scatter and unrelated bones being comparatively few. Altogether the excavated material represented about thirty dinosaurs of several different species; in addition a few fossil molluscs were met with.

It was only necessary to walk about the country in the neighbourhood of Tendaguru after the grass had been burnt in the dry season to see clearly how vast is this graveyard of dinosaurs. Denudation in the course of ages has removed the many strata of rock which had been piled up on the remains, and once again these bones lie close to the surface. Most of the damage to them has been done in quite recent years through the penetration of the roots of vegetation. At the present day the bone-bearing strata lie at an average level of 650–750 ft. above the sea. Fragments of bone on the surface commonly, though by no means always, give an indication of the position of other bones. The stratum, however, is not always an indication that bones may be found there, for the dinosaurs which I collected lay in several different kinds of ground—in clays of more than one kind, some stratified and some much contorted, in loose sand and in hard sand-rock.

Tendaguru hill itself, rising like an island with steep scarped sides above the surrounding country, stands on the edge of a deeply furrowed plateau at the point where it dominates the valley of the Mbemkuru river five miles distant in a westerly direction. To the north, east and south some few miles distant are still higher plateaus. Tendaguru hill, therefore, represents a partially worn-down portion of these hills—a small surviving isolated fragment. On its top, a height of about 850 ft. above sea-level, there is a thin layer of smooth river gravel. This small wooded hill stands conspicuously alone in a large area of level wooded country. The ground all around is much broken with deep water-courses, which are not seen until actually encountered and, except during rain, are always dry. There are no villages near, only scattered farms, and the vegetation is the savannah type of forest.

To the west and north flows the Mbemkuru (Fig. 4), a small river which is dry most of the year, and to which there is a fall of about 500 ft. from the average level of the bone-bearing strata. The presumption is that this depth has been scoured out and the present river is but the small remnant of a mightier one which originally flowed at a much higher level and met the sea to the south of Tendaguru instead of to the

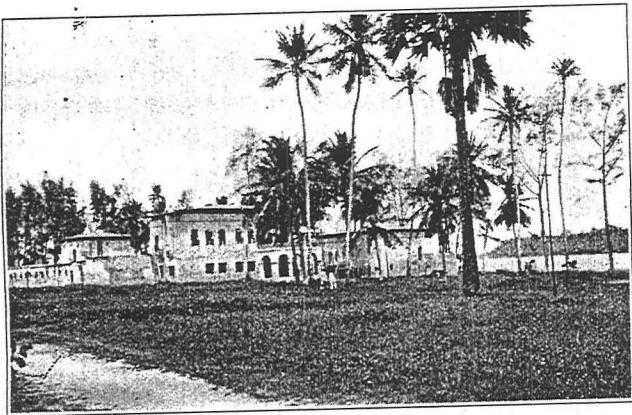


FIG. 1.—LINDI,  
THE OLD FORT.



FIG. 2.—LINDI,  
THE HARBOUR.

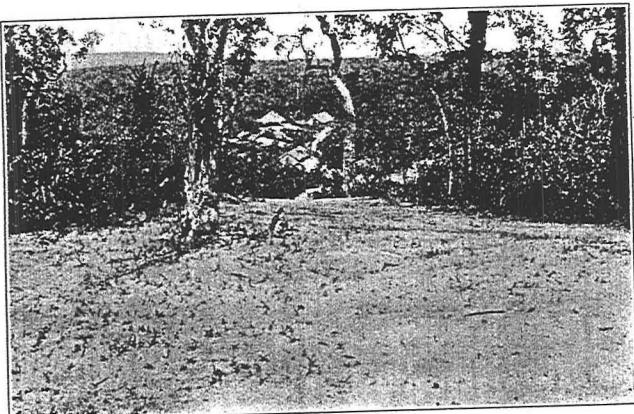


FIG. 3.  
BRITISH MUSEUM  
VILLAGE, FROM  
TENDAGURU  
HILL.

north as at present. The numerous ridges that run down in its direction from Tendaguru hill are bone-bearing on the top only. If any bones are found in the intervening ravines they have been weathered out above and have fallen down. In only one of these ravines did I find fossil shells; they were at the 630 ft. level.

When I arrived at Tendaguru there was nothing to indicate which was the best place to continue my predecessor's work, and no information to be gleaned. I therefore began on a site which I called M 1 (Fig. 5), where Mr. Cutler had begun some work and where there were a great number of German ditches. This site (715 ft. level) yielded first a small dinosaur, which has been unpacked in the Museum, and near it one of very great size. The relative bulk of the skeletons may be gauged by the fact that the former packed into nine light head-loads for transport to Lindi, and the latter required eighty carriers in all to take it down. Some idea of the size of the latter when living may be formed from the fact that the scapulae measure 48 inches long and 28 inches across at the widest part. The larger part of the body had lain on a bank, but an ancient stream, now no more, had disturbed the remains on the one side, some of the bones showing plainly the action of the water. Mixed with the bones on this side were numerous pebbles, two being found jammed tightly under a rib, causing it to bend out of its true curve. The upper limb bones, pelvis, and dorsal vertebrae had apparently not been touched by the stream, though the vertebral processes had all been much broken up. These vertebrae dwindle in size from over a foot to no more than an inch in diameter.

The next site (645 ft. level) M 2 (Fig. 6), at which I worked at the same time as the previous one—in fact usually about three diggings were kept going together—lay about a mile off. Here a space about 88 ft. by 64 ft. was dug out, and the bones lay so thickly that it was difficult to walk among them. None of the bones at this site was of outstanding size, and, though they bore evidence of disturbance, many lay in proper association with one another. The biggest were a femur of 55 inches and a humerus of 40 inches in length, and several others were not much smaller. At the other end of the scale was a pair of femora 14 inches in length, which were those of a young one; and there were fragments of others equally small. An interesting feature was the varying states of preservation of the bones, even in those of the same skeleton. Some were in excellent condition with the breaks sharp and clean; others, on the

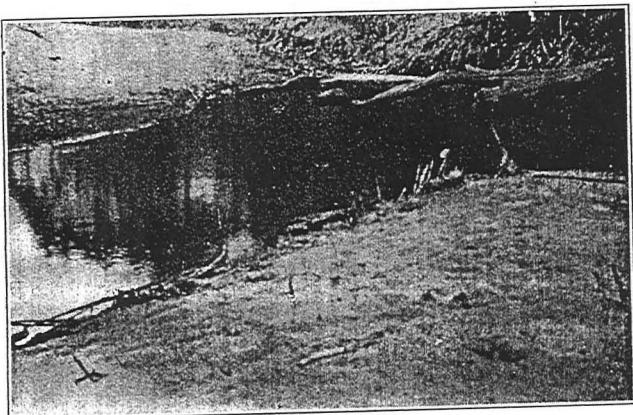


FIG. 4.  
MBEMKURU  
RIVER IN  
DRY SEASON.

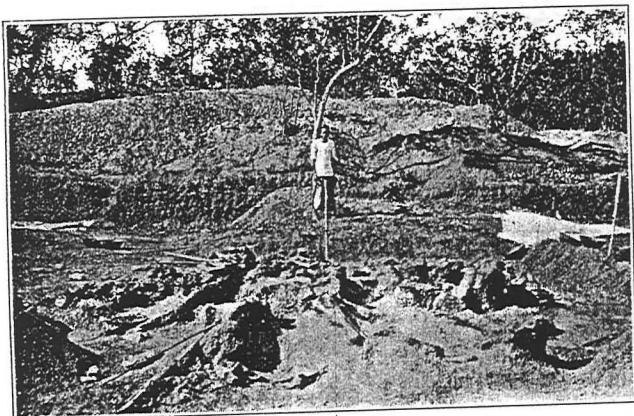


FIG. 5.—SITE M 1.



FIG. 6.—SITE M 2.

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other hand, were highly crystallized, and yet others had lime deposits on the upper surfaces, while some were very decomposed. Other features were, that some of the bones seemed to have been fractured in life, and to have healed with a bad set, and others had apparently been broken at or immediately after death and while the muscles were still operative. This site gave one the impression of having been a pool in the bed of a river which flowed only during part of the year. We may figure to ourselves a region suffering a process of desiccation such as is going on in lands bordering on the southern Sahara at the present day, and coming on again in the Tendaguru region also though less advanced. All living things flocked to the remaining pools of water for vegetation to eat and such water to drink as was left in the bed of a dried-up river; and here they perished when the water dried up. A subsequent good rainy season could not help them as all was over. Sand swept over and covered their remains, and the brief annual flow of the river in subsequent years buried them completely. At M 2 site the bones were principally embedded in a matrix of soft sandstone or even loose clean white sand; at M 1, on the other hand, the deposit was a grey clay.

Site M 3 (745 ft.), at a long distance from M 2, produced a femur, in poor condition, 7 ft. long, with a small humerus close to it and, besides other very bad bones which were not removed, at a little distance lay a very big vertebra in good condition; here the deposit was sand.

Close to M 3 was M 4 (765 ft.), where a small femur, 12 inches long, and a corresponding humerus were found, together with damaged and scattered bones of larger animals which have not been removed.

Site M 5 (Fig. 7) (635 ft.), on the north side of Tendaguru hill, was a hillside working. It promised well at first with the discovery of a short line of small vertebræ, but all subsequent bones were mere fragments, and, as the deposit was one of much-contorted clays, it was abandoned.

Site M 6 (700 ft.), on the west side of Tendaguru hill, only produced many scattered and unassociated bones in sand and clay, and it was here that numerous belemnites were found, indicating that to this side of the hill a salt-water estuary had reached.

M 7 (Fig. 8) (740 ft.) is a cutting into Tendaguru hill itself, and is one of promise. The products were interesting, and work is still going on there. I had from the first been desirous of digging into Tendaguru hill, standing as it does on the top



FIG. 7.—SITE M 5.



FIG. 8.—SITE M 7.



FIG. 9.—SITE M 8.

of the deposits, and for the additional reason that if cut into deeply the bones found might have escaped the destructive action of present-day root penetration. Two bone levels were exposed at a vertical difference of about three feet. The upper level yielded the bones of one or more very large dinosaurs : a femur measuring 67 inches in such a good state of preservation that it was plastered whole, when it weighed nearly 4 cwt. ; a humerus about 5 ft. long with the ends incomplete was another find on this level, besides ribs, vertebræ, etc. The stratum was greenish-grey clay. This clay rested on a bed of sand, and here at the meeting of the two strata, or slightly embedded in the soft sandstone stratum below, other bones of an apparently different species of dinosaur were found.

M 8 (Fig. 9) (755 ft.) site yielded a fairly complete skeleton which may have run to nearly 40 ft. in length but of slender build. The femur was 51 inches, scapula 44½ inches, and the humerus 33 inches in length, and most of the bones lay in their proper relative positions. The tail, which was intact, was about 15 ft. in length ; for about 11 ft. it lay straight out, but between the 11 ft. point and the body it had been pressed down about two feet into the ground. It was not completely severed, but the vertebræ nearest the pelvis were hanging vertically. There were two or three at the bottom, and one or two nearly vertical again connecting with the unbroken part of the tail. It was as if at death or shortly after some other huge dinosaur had set its foot on the root of the tail in passing and pressed that part of it down into the mud. The fore-part of the body was on a slightly lower level than the hind-part, and the head and neck, which were displaced, were in a position suggesting that it had died in drinking or trying to drink water. The displacement of the bones would be readily accounted for had they lain in running water while the main body of the skeleton lay on dry land or at least in mud. In the circumstances several masses of mixed bones had to be plastered, my hope being that the skull would be found therein, as a small portion seemed to indicate. This skeleton lay as a whole in a reddish-brown clay rather darker than laterite, and enclosing the bones was a green matrix, which did not exist apart from the bones.

Of the remaining five sites, four of them near one another and north of Tendaguru hill, M 9 (710 ft.) and M 10 (690 ft.) yielded nothing of particular interest, and at M 11 (710 ft.) were found only a few decomposed fragments of bones and a claw.

M 12 yielded part of a small animal, and M 13, the last excavation made before I left, which lay some distance to the south, yielded a single femur in very good condition, and nothing else.

The bones are not all in perfect condition, and, whilst for purposes of study it was necessary when dealing with associated bones to collect every fragment, the number of skeletons or parts of skeletons suitable for show purposes was small. On the whole, the majority of the groups of bones excavated were associated with one another and were not drift bones.

It was not possible to do much in other branches of natural history, but a collection was made of the plants in the immediate vicinity of Tendaguru, and a few fishes from the Mbemkuru river were also preserved, and at Lindi some fossils and sea-shells were collected and an initial exploration was made of a large series of caves.

A few general notes on the field work may be of interest. It has not hitherto been the usual practice in excavation work to continue throughout the year, but going out, as I did, shortly before the rainy season, I decided not to break off the work, and the results were quite satisfactory. The rainfall was not excessive, and even an occasional flooding of a working party did not delay progress for more than half a day, as the parts that could not be drained were soon baled out. For this reason I established continuous work, and so doubled the possible output for the year, and, further, retained the trained diggers.

There is as yet no made road suitable for loaded motor-lorries from Tendaguru to its port Lindi, though two light cars did on one occasion in the middle of the dry season succeed in getting through. Hence the bones have to be carried down by the labourers of the expedition, who take it in turns to go, a much safer method than motor transport on a bad road. As far as possible the bones were packed in single head-loads of about half a cwt. each, and all empty kerosene or petrol cases were bought up in Lindi for the purpose. Since these boxes were not strong enough to stand transport by steamer, big packing cases were made at Lindi, and into each of them, made exactly to fit, three kerosene boxes were dropped. There was, therefore, no repacking of the smaller bones necessary. The larger bones travelled down made up into bundles with grass and bamboos and tied on to long poles; and on arrival packing cases were made as necessary for them. About every three

months, depending on the very irregular steamship service to Lindi, a consignment went home. By sending the bones down in the smallest possible packages transport was greatly facilitated.

I was generally able to get all the labour I needed, and found a maximum of forty men sufficient for all purposes, including transport, these being distributed in parties of ten men or less in one place. Their output was about the maximum I was able permanently to deal with. Having been accustomed to the more intelligent natives of West Africa, I found the East African natives somewhat trying. The enormous difference in brain-power is, of course, not apparent to Europeans who only know East Africa. The labourers were drawn from several tribes, principally from the WaMuera, WaYao, and WaNgoni. A few of the original men with whom I started settled down to the work well, and were still employed at the end of twelve months. These had become useful and earned more than the standard wage of 18s. (including ration money) a month.

Food was a difficulty, and in the dry season the water supply was a cause of anxiety, but it did not entirely give out. The country could produce plenty of food if only it were grown, but the local population is inert. Everything, therefore, had to be bought from the Indian traders at Lindi and carried up to Tendaguru. Even fowls, eggs, etc., could seldom be obtained, and only from considerable distances. Some chiefs had conceived the idea that it would please the Administration if they were unhelpful to non-official Europeans and refused to sell them food; and I may add that none of those in the neighbourhood of Tendaguru was ever helpful in the least degree.

The net result of the first twelve months' work of the expedition since its resumption is that 431 boxes or packages of bones were sent down to the coast, requiring 530 carriers to take them.

The European staff consisted of Major T. Deacon and myself. Major Deacon followed me out and was stationed most of the year at Lindi to supervise shipments, etc. On my departure back to England, I left the work at Tendaguru in the hands of Mr. G. W. Parlett and Mr. W. Kershaw, who joined the expedition locally, and left instructions with them as to the continuance of the digging until the arrival of my successor.