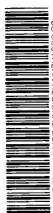


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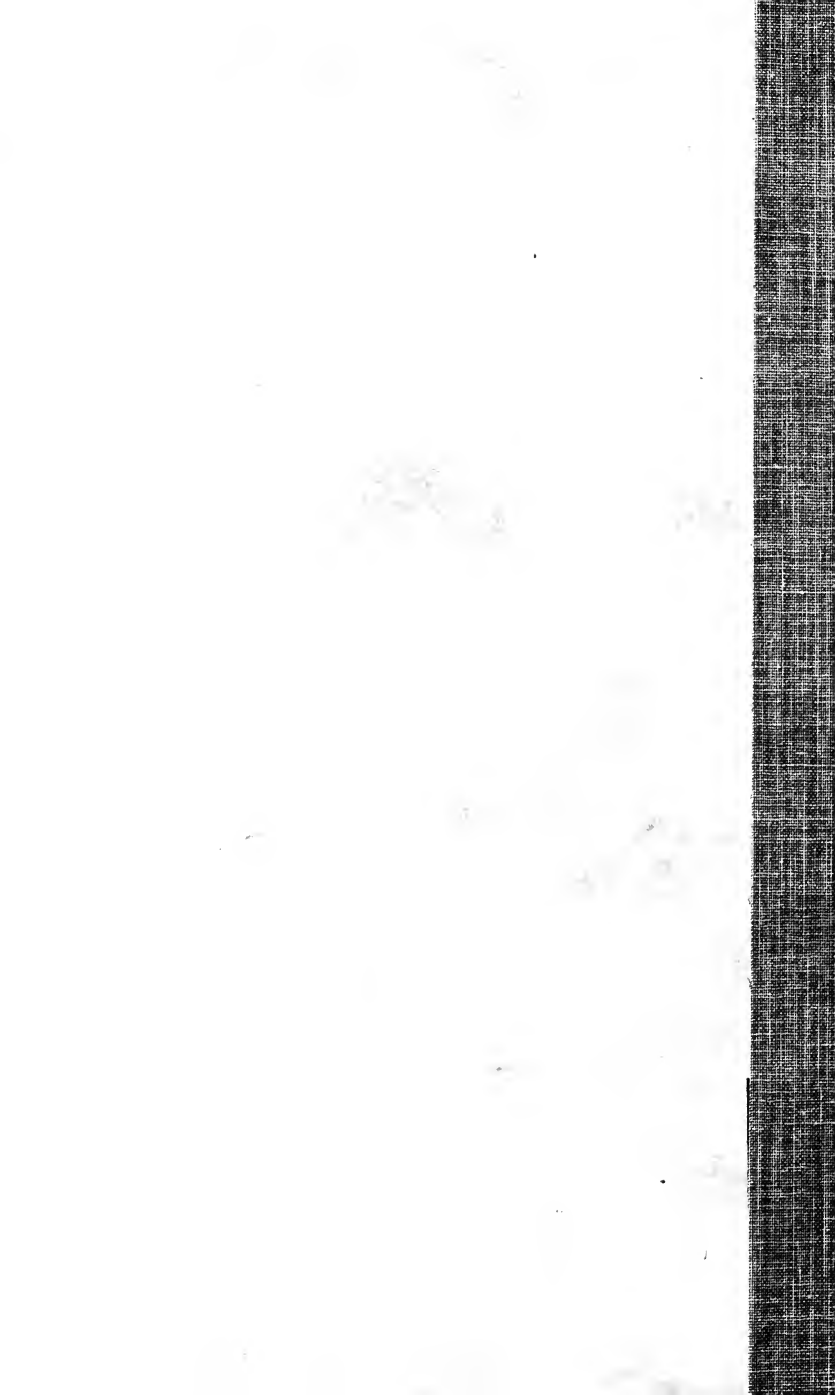


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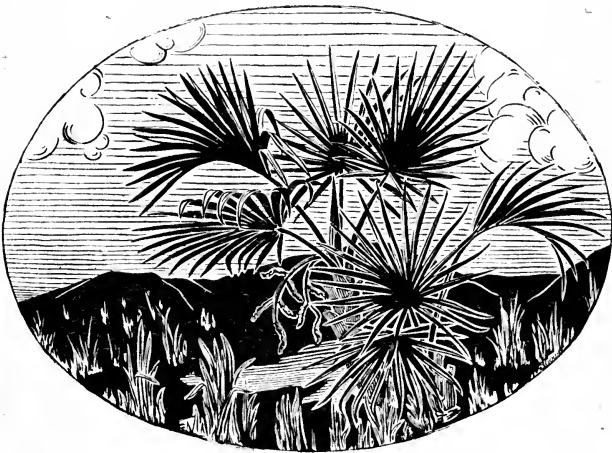
BOTANICAL SURVEY OF SOUTH AFRICA

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OF
NATAL AND ZULULAND

By R. D. AITKEN, B.Sc., and G. W. GALE, B.Sc.



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UNION OF SOUTH AFRICA

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OF

NATAL AND ZULULAND

(With a Sketch Map)

By R. D. AITKEN, B.Sc., and G. W. GALE B.Sc.

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DIVISION OF BOTANY,
PRETORIA, 1st March, 1921.

SIR,

I have the honour to transmit herewith for publication the manuscript of a paper by Messrs. Aitken and Gale, entitled "A Reconnaissance Trip through North-Eastern Zululand," and I have to recommend that the paper be printed as No. 2 of "The Memoirs of the Botanical Survey of South Africa."

The work has been carried out by Messrs. Aitken and Gale under the supervision of Professor J. W. Bews, M.A., D.Sc., of the Natal University College, Pietermaritzburg, and its important and interesting characters are mentioned by Professor Bews in his covering letter.

It is clear from Messrs. Aitken and Gale's paper that further work in this region will repay investigation, and Professor Bews is making arrangements accordingly.

I have the honour to be,
Sir,
Your obedient Servant,

I. B. POLE EVANS,
Director, Botanical Survey of South Africa.

To

The Secretary for Agriculture, Pretoria.

EASTERN AREA.
NATAL UNIVERSITY COLLEGE,
PIETERMARITZBURG, NATAL,
12th November, 1920.

To the Director of the Botanical Survey of the
Union of South Africa, Pretoria.

DEAR DR. POLE EVANS,

I have the honour to transmit to you an account of a recent botanical survey trip made by my assistant, Mr. R. D. Aitken, and one of my senior students, Mr. G. W. Gale, through north-eastern Zululand. The country through which they passed has remained up till now totally unexplored botanically. In spite of the fact that Aitken and Gale's visit was made during the dry season, the report they have made appears to me to be full of interest. It is a great transitional area where sub-tropical conditions give way to tropical, and this report enables us to obtain a very good general idea of the main types of vegetation and their distribution. The discovery of *Raphia* palm in the Kosi Bush, and the information regarding the great abundance of *Hyphaene crinita* in the Ilala Palm Veld or Sand Veld, each affords an excellent illustration of the economic importance of botanical survey work. The list of species brought back—which, of course, does not include all those acutally seen and noted—is a valuable addition to our records. More than a dozen are altogether new to Natal and Zululand. Though it is hoped that further work in this area will be carried out in the near future, the present report is, I think, of sufficient importance to justify its publication as it stands, and I should like to recommend accordingly.

I have the honour to be,
Yours faithfully,

J. W. BEWS,
Botanist in Charge, Eastern Area.

BOTANICAL SURVEY OF NATAL AND ZULULAND.

A RECONNAISSANCE TRIP THROUGH NORTH-EASTERN ZULULAND.

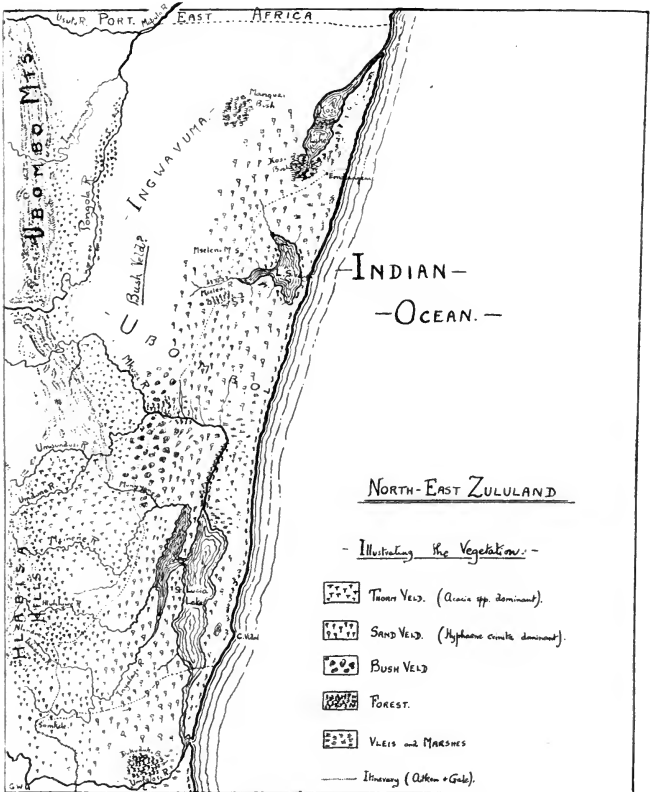
By R. D. AITKEN, M.Sc., and G. W. GALE, B.Sc.

I.—OUTLINE OF ITINERARY.

A JOURNEY was undertaken by us from Somkele, the terminus of the North Coast railway line, to the Ingwavuma District, the most northerly in Zululand. The distance covered was approximately 100 miles north from Somkele. The means of transport was the only one possible in a country unoccupied by white settlers, viz., a wagon and a span of sixteen donkeys. Progress by this means is extremely slow; and more so since the road we followed is not a Government road, consequently receiving no attention from road-parties, and runs for a considerable distance through heavy sandy soil. Add to these circumstances the fact that fodder is unobtainable, and that in consequence considerable time has to be allowed each day for grazing—which in mid-winter and along the road is hard to get and poor in quality—and it will scarcely be surprising that a day's journey rarely exceeds twelve miles.

Commencing on the evening of 30th June from Somkele, we followed the "lower road" (as it is known locally) to Ntondweni Store and Mission Station, 12 miles distant. Eight miles farther on the Hluhluwe River was crossed, beyond which the road branches, one branch running in a north-westerly direction and traversing the hilly country east of Hlabisa Magistracy until it joins the main Government road from Somkele to Nongoma, 12 miles north of the Hlabisa Magistracy. The other branch, which we followed, runs more or less parallel with the coast at some distance (about 17 miles) inland. It crosses the Mzinene River about 16 miles north of the Hluhluwe, after running parallel to its right bank for some distance, the Munywane River (which marks the boundary between the Ubombo and Hlabisa Districts) 4 miles further on, the Mkuzi River 12 miles north of this, below its confluence with the Umsunduzi River, and finally the Mseleni River, which is 72 miles from Somkele. From here the road pursues a northward course, but after crossing the Mseleni (which we reached on 7th July) we left the road and trekked some 3 miles eastwards till we reached the Mseleni Mission Station, the first civilized dwelling seen since leaving Ntondweni, 60 miles to the south. The missionary in charge (Mr. O. E. Witt) entertained us most hospitably, and provided us with pack-donkeys and a guide, which enabled us in a day to travel some 25 miles to the north-east. Here, at Emalangen, which is just south of Kosi Lake and near the sea, we

stayed for two days, during which we paid short visits to the seashore and to the Kosi Bush. From this point we returned to Somkele, by the route we had come, and arrived there on 22nd July. From Somkele one of us travelled on foot to St. Lucia Lake and across it to the seacoast.



Vegetation Map of North-East Zululand.
(Scale : 20 miles to 1 inch.)

II.—TOPOGRAPHY.

(1) *Physical Features.*—The area under survey belongs, geographically, to the "first terrace" or coast-belt of Natal, which widens more and more as one travels northward from the Tugela River owing to the north-easterly trend of the coast-line. It is bounded on the east by the Ubombo Mountains (2500 feet), which are a southward extension of the loftier Lebombo Range of Portuguese East Africa.

The Ubombo Mountains are interrupted at two "poorts"—through the northerly one flows the Pongola or Usutu River, and through the southerly the Mkuzi River. Southwards the Ubombo Range merges into the Hlabisa Hills (1000-1500 feet), and here the country is very broken. From this western boundary, which marks the edge of the "second terrace," the country falls away sharply to the east, although the slope is steeper in the north than it is in the south. Gently undulating country, never more than 500 feet in altitude, is succeeded to the east again by a belt of flat sandy country, some 10 miles wide, in which vleis and bogs are common. Before it reaches the sea, this belt is interrupted by so-called "lakes," which are really lagoons, much larger than but corresponding to the lagoons so common along the Natal coast. The chief of these is St. Lucia Lake, with its westerly inlet "False Bay," 30 miles long and from 8 to 2 miles broad; it tapers sharply at its southern end, which flows into the sea near the north of the Umfolosi River. This lake is fresh in its northern portion, brackish to the south, the tide ascending 10 or 12 miles. North of this lake is Lake Sibayi, which is strictly a lake, as it has no outlet to the ocean—at least, not above ground. North again is Kosi Lake, ill-represented on most of the maps. It really consists of a northerly lagoon, which drains into the ocean by a channel running north, and a southerly lake, into the lower end of which runs a short, but deep and wide, river. During the dry season a marsh separates the lagoon from the lake, but during the wet season their waters are continuous. All along the shore there runs the usual line of sandhills, attaining very considerable height along the narrow strip of land separating St. Lucia from the sea. The beach is generally sandy; east of St. Lucia it is rocky in several places.

The rivers flow from west to east. The longest and largest is the Mkuzi, which rises west of the Ubombo Mountains, and cuts through them; it is joined on its right bank by the Umsunduzi, which flows in a north-easterly direction from the southern end of the Ubombo Mountains. The Mkuzi flows into the north end of St. Lucia Lake, which might be called "the Mkuzi Lagoon." All the other rivers take their rise amongst the hills forming the western boundary of the area under description, and all those between the Mkuzi River and Somkele flow into St. Lucia Lake. The chief of these (from north to south) are the Mzinene, the Hluhluwe, and the Inyalazi. North of the Mkuzi is the Mseleni River, which is short, flowing into Lake Sibayi.

(2) *Soil*.—Where it is not sandy, the soil is everywhere of the compact, hard-baked type, and capable of producing good crops where well cultivated. In the district round the Hluhluwe River it is red in colour, elsewhere not so. In parts it is very stony, particularly along the foot of the Ubombo Mountains. Coastwards the soil is sandy, and north of the Mkuzi every inch of the country, except in a few places along the rivers where red and brown clays are obtained, is covered with deep white sand.

(3) *Climate*.—As in the rest of Natal, rain falls in the summer and not in winter. No figures could be obtained for rainfall, but it is fairly heavy in summer, and there is occasional rain even in winter. Along the strip of seacoast the winter rainfall is so considerable in its amount that the natives reap a small crop of mealies nearly every winter, making two in the year. As the river



Plate I.

Raphia Palm in Kosi Bush.



Plate II.

Drift across the Mkuzi River.

valleys are not deep there are no winter mists. Dew is copious in its fall on most nights. The temperature never falls below freezing-point, except on rare occasions. Frost occurred at Somkele this year, and a native who had lived there all his life stated that he had never seen it before. During summer the heat is excessive, being intensified by the sandy soil; and even in July the days are hot, and the nights exceedingly mild.

III.—VEGETATION.

It was unfortunate that our survey had to be made in mid-winter, as at this time the necessary preliminary of floristic work was extremely limited in extent; only towards the coast and along riverbeds were there any plants in flower, and these probably not representative of the flora as a whole. Nevertheless, the plants which were collected were sufficient to illustrate several suggestive ideas, and to indicate that a more intensive survey at a more suitable season might be of considerable interest from the purely floristic standpoint. None of the trees were in flower, but we are indebted to Dr. T. R. Sim for naming not a few of them from leaf and fruit specimens, and also for naming the ferns and the mosses. As intensive floristic work in any one district was impossible, we attempted to compensate for this by covering as large an area of country as possible with the means and in the time at our disposal. For these two reasons the following account of the vegetation is extensive rather than detailed.

(1) *Thorn Veld*.—Practically the whole of the region under survey which does not possess a sandy soil may be classed as thorn veld. All the country lying along the foot of the Ubombo Mountains, the area drained by the Umsunduzi River, and the Hlabisa Hills are covered with thorn veld. The route which we followed between the Hluhluwe and the Munywane Rivers lies along a boundary line separating the thorn veld on the west from the sand veld (see later) on the east. South of the Hluhluwe the thorn veld extends farther east than the road.

This type of vegetation is well known in Natal, and in Zululand scarcely differs from what it is there. The soil is everywhere of the dry, hard-baked type; the dominant grass is *Anthistiria imberbis* (in Sinde), with numerous species of *Andropogon*, *Eragrostis*, *Sporobolus*; the dominant trees are *Acacia* spp. (*A. horrida*, *A. arabica*, var. *kraussiana* = *A. benthami*), and in moistened places *A. caffra*, while *Sclerocarya caffra* is very common in many places, and also a tree *Euphorbia* (sp. near *ingens*). The trees grow closest together along the country lying just beneath the western mountain boundary and near the river. All the trees found in the open veld are found growing along the rivers, which form bases of colonization from which the trees migrate into the stretches of open country lying between the rivers; consequently the trees grow sparsely scattered in country midway between two rivers, and densely near each river. The natural succession, as Prof. Bews has shown, is towards a thorny scrub, which stage, however, is rarely reached, owing to the effect of grass fires—the grass (*Anthistiria imberbis*) grows to a considerable height everywhere in the thorn veld and burns readily. Scarcely a night during winter but that a grass fire is seen somewhere on the veld, and, as the country is not divided into farms, a single fire may rage for three days before it dies out. In the less populated districts this factor does not operate to the same extent, and it is precisely in

these districts that one finds the climax staged in the thorn veld succession. In places, however, and especially in the valley of the Hluhlwe, the trees are gaining ground; for example, a native, who had lived in that district all his life, pointed to a hillside studded with thorn trees, and volunteered the information that in his childhood there had not been one tree there. In the immediate vicinity of Somkele the thorn trees have been ruthlessly cut down for firewood, and in consequence large Euphorbias [*E. ingens* (?)] have more or less taken their place, and lend a characteristic appearance to the landscape. Historical testimony goes to prove that formerly thorn trees were much more abundant round Somkele than they are to-day.

Along the rivers from Somkele to the Munywane the same type of vegetation occurs: the trees found out in the thorn veld, with an admixture of hygrophilous trees and shrubs which only rarely are found far away from the river-beds. Among the latter are *Phoenix reclinata* (very abundant in places), *Ficus* spp., *Eugenia cordata*, *Erythrina caffra* (in flower), *Vangueria infausta*, *Rauwolfia natalensis*, *Antidesma* sp., *Gardenia* sp., *Zizyphus mucronata*, *Schotia brachypetala*, and *Dombeya* sp. (pro. *rotundifolia*). *Euphorbia tirucalli* was observed along the stream banks, but very rarely far away from them. A vast number of herbs and undershrubs were present, very few in flower, and the majority of those that were proved to be tropical members of the Acanthaceae (*Justicia pulegioides*, *Dicliptera capensis*, *D. clinopodia*, *D.* sp., *Hypoestes verticillaris*, *Phayloopsis parviflora*, *Rubia cordifolia*, *Plumbago zeylanica*, *Adiantum capillus-veneris*, *Dryopteris prolifera*).

(2) "Bush Veld."—North of the Munywane River, which is the northern boundary of the Hlabisa District, we entered a country which differed in several respects from that preceding it, both as regards soil and vegetation. The soil is dry and very sandy; stones are never seen, and there are none of the little spruits common farther south. *Anthistiria imberbis* is replaced by a tufted wiry grass [*Aristida* (?)] and the singly occurring Acacias by a kind of thorny scrub, which probably represents a late stage subsequent upon the pioneer Acacias, which for the most part have been killed out by subsequent species. The clumps of bush are from 20 to 30 feet across and are composed of a large number of species, none of which were in flower, so that the composition of the scrub we cannot tell. Among the trees is *Terminalia sericea*, which is never met with farther south, but becomes more and more common farther north. This "bush veld," as we have termed it, lies between the Munywane and the Mkuzi Rivers. Scattered between the clumps of bush the following plants were observed in flower: *Aloe* spp. (common), *Kalanchoe rotundifolia* (in shade at edge of clumps), *Lessertia brachystachya*, *Iboza galpini*, *Senecio* sp., *Lasiosiphon* sp., *Asparagus* sp., *Gazania longiscapa*.

(3) *Sand Veld* or "*Ilala Veld*."—In the sketch of the topography reference has already been made to this belt of sandy country, some ten miles wide (wider farther north in Tongoland), and running parallel with the coast, but separated from it by the lakes or lagoons. This country is all very flat, although in the Ingwavuma District (which is almost wholly occupied by it) it is hummocky in many places. It is at an elevation only slightly above sea-level, and consequently, though the soil is sandy, drainage is poor, and water (always brackish) can be obtained by digging only a few feet below

the surface. A drop of even a few feet results in the formation of vleis and bogs, which are numerous, especially toward the coast: these are more extensive in summer than in winter, when they frequently dry up almost completely. Sluggish streams, which often fail to find their way to the sea, are also frequent, and along them develops a typical hygrophilous bush.

Typically, the vegetation of the sand veld consists of grassland [*Aristida* (?) dominant—not *Anthistiria*—there are bare patches of sand between the tufts of grass] dotted over with the “ilala” palm, *Hyphaene crinita*. The latter grows in little clumps of four or five, the clumps being separated from each other by fairly regular intervals of from five to six yards (see photo). In many parts of this ilala veld there are no other tree forms to be met with—whereas in other parts a number of trees may be scattered through the veld at distances of from twenty to a hundred yards from each other. These (named roughly in order of relative abundance) are: *Strychnos* sp. (small tree), *Strychnos spinosum*, *S. geradi*, *Eugenia cordata*, *Terminalia sericea*, *Sclerocarya caffra*, *Euphorbia* sp. [*ingens* (?)], *Apodytes dimidiata*, *Podocarpus latifolia*, *Trichilia emetica*, while towards the coast *Phoenix reclinata* and *Strelitzia augusta* become very common, growing in large clumps. All these species migrate into the ilala veld from the bush growing near water-courses; they grow up in the shade of the ilala palms, which they subsequently kill by shading them: *Hyphaene* demands intense sunlight. It seems at first sight somewhat remarkable that a tree like *Eugenia cordata* should be growing several miles away from the nearest water, but it must be remembered that water can be obtained at no very great depth by the roots, even in mid-winter. The critical period in the establishment of such a tree must be at the time when the root system has not yet reached the subterranean water-level, and the sapling depends solely on surface water, which in a sandy soil can never be great in amount. This fact, coupled with the prevalence of veld fires which destroy such saplings, probably accounts for the comparative scarcity of trees in a country where trees, once established, can always obtain water, and are green even in mid-winter and amid such arid surroundings.

In addition to these plants, which depend on this hidden water-supply, there must in spring-time, when the surface soil is moistened, be a vast herbaceous flora which probably would contain many novelties; for wherever one digs into the sand, one finds a mass of bulbs, corms, tubers, rhizomes, and such-like storage organs. Even in winter-time, quite a number of such plants were in flower (several in a dried-up vlei), the list being as follows: *Juncus* sp., *Hebenstreitia comosa*, *Lissochilus clitellifer*, *Hypoxis villosa*, *Jatropha* sp., *Gymnosporia* sp., *Eugenia albanensis*, *Scilla* sp., *Lobelia tomentosa*, *Senecio* sp., *Dicliptera capensis*, *Manulea* sp., *Gazania longiscapa*, *Euphorbia epicyparissias*, *E.* sp. [*genistoides* (?)], *Gerbera ambigua*, *Anthericum* sp., *Convolvulus* sp., *Polygala oppositifolia* var., *Othonna carnosa*, var. *discoidea*, *Anoiganthus brevifolius*, *Cyrtanthus* sp. [*galpini* (?)], *Gladiolus papilio*, *Dianthus* sp., *Helichrysum parviflorum* (very common in places).

The boundary line between the thorn veld and this ilala veld, which runs from north to south, is not very sharp, and indeed *Hyphaene* often extends into the thorn veld, but only where it is fairly open.

The vleis and marshes are filled with a *Cyperus-Erianthus* association (*Cyperus latifolius* and *Erianthus capensis*). Along the streams a typical hygrophilous bush develops, in which *Eugenia cordata* is one of the commonest trees, while conspicuous in the undergrowth is a large fern—*Stenochlaena tenuifolia*. The streams are nowhere very large, but they are numerous, so that there is a considerable amount of this hygrophilous bush, which, however, never extends any distance away from the water.

On the banks of the two largest rivers which flow through the sand veld, viz., the Mkuzi and the Mseleni, there has developed a fairly thick bush, extending a mile or two from each bank. Along the river-banks grow fine specimens of the genus *Ficus*, while away from them grow such trees as *Schotia brachypetala*, *Sclerocarya caffra*, *Terminalia sericea*, *Strychnos spinosum*, *Strychnos gerrardi*, *Combretum* sp., *Voacanga dregei*, *Gymnosporia buxifolia*, *Acacia* spp., and *Trichilia emetica* (commoner in Mseleni Bush), *Euphorbia ingens* (?) (commoner in Mkuzi Bush), and a number of other trees we could not identify. There is not a very rich undergrowth, but lianes and scramblers are fairly common—among the latter is *Euphorbia tirucalli*. Along the right bank of the Mkuzi River, and on the outer edge of the bush lining it, *Acacia xanthophloea* Benth., which is a lofty, rather handsome tree with a sickly-yellow bark, is not uncommon. It is called by Europeans the "fever tree" (Zulu name, umHlosinga), and its presence is popularly supposed to indicate fever localities. There may be some truth in this, as it never grows out in low-lying, clayey soil.

(4) *Lakes*.—The three lakes, St. Lucia, Sibayi, and Kosi, occupy areas which otherwise would be occupied by the sand veld, as the spaces between them are. As regards vegetation, all three are similar. Back from their shores extends a narrow strip of bush, in which *Eugenia cordata* is prominent in the case of St. Lucia, while *Terminalia sericea* is most prominent along the shores of Lake Sibayi. In the marginal belt between water and dry land there occur numerous Cyperaceae, but the dominant plant here is the cosmopolitan *Phragmites communis*, which lines the shores of St. Lucia for many a mile, and extends several hundred yards into the water. There are a very few places along St. Lucia Lake where the Zululand papyrus (*Cyperus papyrus*), which is so plentiful along the Umfolosi River, occurs in quantity.

We did not visit more than the southern end of Kosi Lake, where we found that true forest occurs.

(5) *Forest*.—In the whole of the region under survey, true forest only occurs, so far as we know, in two places, and these both in the far north. Here there is the "Manguzi Bush" of fairly wide extent, which we did not visit, but from which we obtained fruits of the so-called "Mahogany Bean" (*Azelia quanzensis* Welw.), thus indicating that it grows there (in fair abundance, according to report). This tree occurs in Portuguese East Africa (*vide* Sim's "Forest Flora and Forest Resources of Portuguese East Africa"), and its presence here indicates that the forest in northern Zululand is probably distinctly sub-tropical in its composition, far more so than any farther south. This impression was confirmed when we visited the forest which has developed around the southern end of Kosi Lake, through the centre of which runs the Kosi River. There is a great wealth of varied vegetation, no single species being dominant,

including a number of ferns, among which is *Lygodium scandens*. Unfortunately, no floristic work was possible, and consequently no account can be given of the species which occur. In the heart of this forest we made the interesting discovery of a species of *Raphia*, probably near, but not identical with *R. vinifera* (*vide* notes on *Raphia* in the appended list of plants collected).

(6) *Strand Vegetation*.—At the most northerly point of our journey we touched the seacoast. Here the vegetation is no different from that found farther south, illustrating the principle that strand plants are widely distributed. On the belt of shifting sand between the sea and the sand-dunes (here about 50 feet high), we observed *Scaevola lobelia* and *Ipomoea biloba* (*I. pes-caprae*), with *Mesembryanthemum edule* straggling from here right up into the psammophilous bush, which clothed the sand-dunes. In this bush the dominant tree was *Mimusops caffra*, while farther back *Strelitzia augusta* was dominant. *Osteospermum moniliferum* was present, also *Aloe thraskii*, in considerable numbers. Just back of the sand-dune bush we found a few specimens of *Encephalartos*, and plants of the same species occurred within the bush itself, one of them bearing two fine brilliant red female cones. *Asystasia coromandeliana* was very common as an associated plant, while the fern *Polypodium phymatodes* was present in abundance.

Along the seashore we observed fruits of *Barringtonia racemosa* and *Entada scandens*, which had been washed up by the waves, and at one place *Sporobolus pungens* growing on some rocks. Several Algae were collected here, and a large number more from rocks near Lake St. Lucia, which one of us afterwards visited, and where the shore vegetation is essentially similar to that already described.

IV.—LIST OF PLANTS COLLECTED.

In the following list of plants collected there are some thirteen or fourteen species (asterisked) which have not been previously recorded (in Medley Wood's Revised Lists) for Natal and Zululand. In one or two cases the determination of the species is doubtful, and the number may perhaps be reduced to twelve. Of the species thus recorded for the first time, five are recorded for the Cape in the "Flora Capensis," and are probably identical with undetermined species given in Wood's lists.

Forty-four per cent. (38 out of 87) of the total number of species (excluding the Algae) recorded occur also in tropical Africa, which bears out the conclusion arrived at by Prof. Bews in a recent paper that the Natal coast-belt is distinctly sub-tropical in its affinities. In this connection our record of *Raphia*, *Azelia*, *Cajanus*, and *Terminalia*—genera new to Natal, but common in the tropics—is very interesting.

Another point that suggests itself is the connection between the flora of the Natal coast-belt and the flora of the northern Transvaal. That this connection exists is well known, and also that the connection is *not* by way of the Natal midlands, but probably eastward from the northern Transvaal and down into Natal along the border of Portuguese territory. Our trip took us some distance along this "line of invasion," and we met with *Dombeya pulchra*, *Iboza galpini*, and the well-known *Terminalia sericea*—all species which are not known in Natal proper, but which are common enough in the Transvaal. It

may be that what we have called "bush veld" in our report really does represent an outlier of the *Transvaal bush veld*; *Terminalia sericea* and *Combretum* sp. both occur in it, and *Aloe* spp. are common between the clumps. If this hypothesis is correct, one would expect to find this bush veld formation extending northwards from the Mkuzi, and occupying the country between the thorn veld on the west and the sand veld (in which also *Terminalia* is common) on the east. Our itinerary took us to the east of this route, through the sand veld, and therefore the hypothesis suggested still requires to be put to the test.

The prefixed numbers in the following list are our collecting numbers. Species asterisked are those not recorded in Medley Wood's lists. Localities are given with each species.

1.—FLOWERING PLANTS.

POLYGONACEAE.

- (53) *Oxygonum dregeanum* Meisn.—Old mealie-field, E. Ingwavuma, 100 ft.

AMARANTACEAE.

- (22) *Gomphrena globosa* Linn.—Old garden, N. Hlabisa, 400 ft.
(10) Undetermined species.—Old mealie-field, L. Sibayi, E. Ingwavuma, 150 ft.

CARYOPHYLLACEAE.

- (34) *Dianthus* sp.—Open sandy veld coastwards, E. Ingwavuma, 100 ft.

CAPPARIDACEAE.

- (29) *Niebuhrria (Maerua) rosmarinoides* Sond.—Near Euphorbia clump, Somkele, Hlabisa, 500 ft.
(50) *Cadaba natalensis* Sond.—Liane over Euphorbia clump, Somkele, Hlabisa, 500 ft.
(28) *Capparis guenzii* Sond.—Liane over Euphorbia clump, Somkele, Hlabisa, 500 ft.

CRASSULACEAE.

- (42) *Kalanchoe rotundifolia* Harv.—Common in shade near bushes, Hlabisa and Ubombo, 500-300 ft.

LEGUMINOSEAE.

- * (1) *Lessertia brachystachya* DC.—Open veld, S. Ubombo, 400 ft. Recorded in "Flora Capensis" for Cape Colony, but not in Wood's lists for Natal.
* (21) *Cajanus indicus* Spreng.—Edge of old mealie-field, Ubombo, 300 ft. A monotypic genus, not recorded in "Flora Capensis" for South Africa. According to the "Flora of Tropical Africa," it is met with and cultivated everywhere in the tropics, yielding edible pea-like seeds. Whether cultivated in Zululand we cannot say, but the locality in which we found it suggests that it is. Whether it is or no, it at least can be, and therefore may prove to be of some economic importance.
(68) *Schotia brachypetala* Sond.—Leaves only. Dominant tree in Mkuzi Bush, Ubombo, 300 ft.

POLYGALACEAE.

- * (31) *Polygala oppositifolia* Linn., var. nov.(?).—Open sandy veld coastwards, E. Ingwavuma, 100 ft.

EUPHORBIACEAE.

- (33) *Euphorbia epicyparissias* E. Mey.—Open sandy veld coastwards, E. Ingwavuma, 100 ft.
 *(32) *Euphorbia* sp. (near *genistoides* Hiern.).—Open sandy veld coastwards, E. Ingwavuma, 100 ft. *E. genistoides* is not given in Wood's lists; Cape in "Flora Capensis."
 (17) *Jatropha* sp.—Leaves only. Herb in ilala veld, N. Ubombo, 300 ft.
 (64) *Antidesma* sp.—Leaves only. Tree in bed of Muniwane River, S. Ubombo, 400 ft.

CELASTRACEAE.

- (23) & (24) *Gymnosporia buxifolia* Linn. (Zulu, isiHlango).—Common near bush, Hlabisa to Ubombo, 800 ft.-200 ft.
 (54) *Gymnosporia* sp.—Leaves only. Near edge of bush, E. Ingwavuma, 100 ft.
 (16) *Gymnosporia* sp.—Leaves only. Common in ilala veld, N. Ubombo, 300 ft.

TILIACEAE.

- (20) *Corchorus trilocularis* Linn.—Old mealie-field. Ubombo, 300 ft.

STERCULIACEAE.

- (80) *Dombeya* sp. (prob. *rotundifolia* Harv.).—Leaves only. Bed of Muniwane, S. Ubombo, 400 ft.
 *(83) *Dombeya pulchra* N. E. Br.—Leaves and fruit only. Near thorn-clumps, Hlabisa, 800 ft.

THYMELEACEAE.

- (60) *Gnidia microcephala* Meisn.—Open sandy veld coastwards, E. Ingwavuma, 100 ft.

COMBRETACEAE.

- *(79) *Terminalia sericea* Burch. (Zulu, iNkonono).—Leaves only. Ubombo and Ingwavuma Districts only, 400-200 ft.
 (87) *Combretum* sp.—Leaves and fruit only. Mkuzi Bush and in bush veld, Ubombo, 400-300 ft.

MYRTACEAE.

- (69) *Eugenia albanensis* Sond.—Leaves only. Common in ilala veld, N. Ubombo, 300 ft.

ONAGRACEAE.

- (57) *Jussiaea* sp. (prob. *repens* Linn.).—Marsh near L. Sibayi, E. Ingwavuma, 150 ft.

CERATOPHYLLACEAE.

- (84) *Ceratophyllum* sp.—Leaves only. In L. Sibayi and in Kosi R., E. Ingwavuma, 150 ft.

PLUMBAGINACEAE.

- (12) *Plumbago zeylanica* Linn.—Bed of Muniwane, S. Ubombo, 400 ft.

SAPOTACEAE.

- (74) *Mimusops caffra* E. Mey. (Zulu, Mapisi).—Leaves and fruit only. Dominant in sand-dune bush, coast, E. Ingwavuma.

APOCYNACEAE.

- (5) *Carissa arduina* Linn.—Margin of bush, shores of Sibayi, E. Ingwavuma, 150 ft.
 (2) *Acocanthera spectabilis* Hook. f.—Climber over clumps of bush, S. Ubombo, 400 ft.
 (88) *Rauwolfia natalensis* Sond.—Along bed of Munywane, S. Ubombo, 400 ft.
 (72) *Voacanga dregei* E. Mey.—Leaves and fruit only. Mkuzi Bush, common, Ubombo, 300 ft.

CONVOLVULACEAE.

- (85) *Ipomoea albivenia* D. Don.—Fruit only. Climber in Kosi Bush, E. Ingwavuma, 100 ft.

LABIATAE.

- * (49) *Iboza galpini* N. E. Br. (Zulu, iBozane).—Bush veld, S. Ubombo, 400 ft. (used medicinally by natives).
 (48) Undetermined species.—Common along bed of Munywane, N. Hlabisa, 400 ft.

SOLANACEAE.

- (30) *Lycium* sp. (prob. *pendulinum* Miers.).—Near Euphorbia clump, Somkele, Hlabisa, 500 ft.

SCROPHULARIACEAE.

- (61) *Manulea* sp.—Open sandy veld coastwards, E. Ingwavuma, 100 ft.
 (40) *Hebenstreitia comosa* Hochst.—Open sandy veld coastwards, E. Ingwavuma, 100 ft.
 (47) *Striga orobanchoides* Benth.—Parasitic on roots of *Euphorbia ingens* (?), S. Ubombo, 400 ft.

ACANTHACEAE.

- (26) *Phayloopsis parviflora* Willd.—Bed of spruit, Hlabisa, 500 ft.
 (36) *Asystasia coromandeliana* Nees.—Common in sand-dune bush, coast, E. Ingwavuma.
 (13) *Hypoestes verticillaris* R. Br.—Bed of Munywane, S. Ubombo, 400 ft.
 (15) *Justicia pulegioides* E. Mey.—Bed of Munywane, S. Ubombo, 400 ft.
 *(19) *Dicliptera capensis* Nees.—Roadside, open veld, S. Ubombo, 400 ft. (Cape, in "Flora Capensis").
 (25) *Dicliptera clinopodia* Nees.—Common along spruits, Hlabisa, 400 ft.
 (14) *Dicliptera* sp.—Bed of Munywane R., S. Ubombo, 400 ft.
 (7) Undetermined species.—Margin of bush, shores of L. Sibayi, E. Ingwavuma, 150 ft.

RUBIACEAE.

- (37) *Tricalysia (Kraussia) lanceolata* Sond.—Kosi Bush, E. Ingwavuma, 100 ft.
 (65) *Gardenia* sp.—Leaves only. Tree in bed of Munywane, S. Ubombo, 400 ft.

- (67) *Vangueria infausta* Burch.—Leaves only, galls on them. River valleys, Hlabisa, 400 ft.
 (6) *Galopina circaeorides* Thunb.—Margin of bush, shores of L. Sibayi, E. Ingwavuma, 150 ft.
 (27) *Rubia cordifolia* Linn.—Scrambler over undergrowth, spruits, Hlabisa, 500 ft.

CAMPANULACEAE.

- *(35) *Lobelia tomentosa* Linn.—Open sandy country and near bush, E. Ingwavuma, 100 ft.

COMPOSITAE.

- (52) *Mikania capensis* DC.—Scrambler in Kosi Bush, E. Ingwavuma, 100 ft.
 *(55) *Helichrysum obvallatum* DC.—Old mealie-field near coast, E. Ingwavuma, 100 ft. May be identical with one of several undetermined species of *Helichrysum* recorded by Medley Wood.
 (56) *Helichrysum parviflorum* Less. (Zulu, isiQoqo).—Common in open sandy veld coastwards, E. Ingwavuma, and also near L. St. Lucia, 100 ft.
 (46) *Senecio* sp.—Scrambler in bush along Mseleni R., N. Ubombo, 200 ft.
 (18) *Senecio* sp.—Bush veld north of Munywane, S. Ubombo, 400 ft.
 (59) *Senecio* sp.—Open sandy veld coastwards, E. Ingwavuma, 100 ft.
 (8) & (9) *Osteospermum moniliferum* Linn.—Sand-dune bush, E. Ingwavuma and near St. Lucia Lake.
 (45) *Othonna carnosa* Less., var. *discoidea* Oliv.—Open sandy veld coastwards, E. Ingwavuma, 100 ft.
 (62) *Gerbera ambigua* Sch. Bip.—Open sandy veld coastwards, 100 ft.

PALMAE.

- *(82) *Raphia* sp. [*vinifera* (?) Beauv.].—Leaves and fruits only. This palm occurs only in one locality, in the Kosi Bush, on the west side of the Kosi River. Here it is plentiful and well established, growing to a height of 80 feet or so. It undoubtedly belongs to the genus *Raphia*, the fruit being covered with regular rows of scales. The key to the species in the "Flora of Tropical Africa" depends on the number of stamens in the flower, which we did not obtain. But the vegetative and fruit characters bring it under *Raphia vinifera*, except that the fruit scales are *not* green, nor slightly fimbriate along the margin, as in the description given of the species. So that either this palm is a variety of *R. vinifera*, or it may be a new species of the genus.

These palms have not been exploited commercially, although the fibre produced from them would be valuable. The natives do not use the fibre (either through ignorance of its value, or because they prefer the ilala palm for weaving fibres), but the mid-ribs of the leaves, which near the base are as thick as a man's arm, are cut into lengths and used for fencing and for building rafts. We crossed the Kosi River in a raft made entirely of this material.

The palms grow in damp marshy soil (in which the natives grow rice), and are not very easy of access. Nevertheless, they are only some ten miles distant from the Maputa Store (native trading station), and there is no reason why, if the fibre is of use, natives should not be hired to cut and carry it to the store, whence it could be transported to railhead in wagons which are continually going down to Somkele *empty* in order to bring up trade goods.

LILACEAE.

- (86) *Dracaena hookeriana* K. Koch.—Fruit only. Kosi Bush, E. Ingwavuma, 100 ft.

AMARYLLIDACEAE.

- (43) *Anoiganthus brevifolius* Baker.—Dried up vlei near coast, E. Ingwavuma, 100 ft.
 (44) *Cyrtanthus* sp. (near *galpini* Baker).—Open sandy country coastwards, E. Ingwavuma, 100 ft.

IRIDACEAE.

- (4) *Lapeyrousia* sp. [*cruenta* (?) Baker].—Pretty blue flower, common near bush right on the coast.
 (58) *Gladiolus papilio* Hook. f.—Dried-up vlei near coast, E. Ingwavuma, 100 ft.
 (51) *Gladiolus* sp.—Near coast (E. Ingwavuma), right on shore, St. Lucia.
 (41) Undetermined species.—Dried-up vlei near coast, E. Ingwavuma, 100 ft.

ORCHIDACEAE.

- *(38) *Eulophia speciosa* (Sold.) Bolus.—Kosi Bush, E. Ingwavuma, 100 ft.
 (39) *Lissochilus clitellifer* Rech. —Open sandy veld coastwards, Ubombo and Ingwavuma, 200-100 ft.

CYCADACEAE.

- (63) *Encephalartos* sp.—Right on coast and in sand-dune bush, E. Ingwavuma.

2.—FERNS.

POLYPODIACEAE.

- (70) *Druopteris prolifera* (Retz.) C. Chr.—Hluhluwe River, Hlabisa, 500 ft.
 (77) *Dryopteris sylvatica* Pappe and Rawson.—Vegetative only, Kosi Bush, E. Ingwavuma, 100 ft.
 (78) *Druopteris* sp.—Swamp adjoining L. Sibayi, S. Ingwavuma, 150 ft.
 (76) *Nephrolepis biserrata* (Sw.) Schott.—Kosi Bush, E. Ingwavuma, 100 ft.
 (73) *Stenochlaena tenuifolia* (Desv.) Moore.—Vegetative only. In hygrophilous bush near coast from St. Lucia Lake to E. Ingwavuma, where our specimen was collected, 100 ft.
 (71) *Adiantum capillus-veneris* Linn.—Bed of spruit, Hlabisa, 500 ft.
 (75) *Polypodium phymatodes* Linn.—Sand-dune bush, E. Ingwavuma.
 (78) Undetermined species.—Vegetative only. Kosi Bush, E. Ingwavuma, 100 ft.

SCHIZAEACEAE.

- (3) *Lygodium scandens* (Linn.) Sw.—Kosi Bush, near river, E. Ingwavuma, 100 ft.

3.—MOSSSES.

- **Amblystegium riparium* (Linn.) Br. Em., var. *rivulare*.—Covering dead tree-trunks lying half in the water, Kosi River, E. Ingwavuma, 100 ft.
Ptychomitrium crispatum Horns.—Growing in shore bush, E. Ingwavuma, sea-level.
Bryum canariensiforme Dixon.—Vegetative only. Kosi Bush, E. Ingwavuma, 100 ft.

4.—ALGAE.

Some 40 spp. of *Brown, Red, and Green Algae* were collected on the rocks at low tide, both at Emalangeni (E. Ingwavuma) and near St. Lucia Lake. The names of these have not yet been determined.



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