Victoria Falls, November 15, 1919. The country about Victoria Falls is very rich in tree forms and in grass, but very few of these are in flower or fruit. Although the rains have not yet started and we are now at the end of one of the worst drought seasons in many years, many of the trees have pushed out their foliage and some are in flower and have set fruit. Even now many of these trees are suffering from drought. This is especially true of Brachystegia and Afzelia. Only a few lilies are in bloom at the falls. S.P.I. 49167 (see V^1-7) is one of the prominent small shrubs of this section. It has a very strong flavor of wild cherry. The skin is bitter and the seed does not free readily from the pulp. There are two types here, one shown in Herb. 405 and one in Herb. 406.

S.P.I. 49214, Ricinidendron rautenenii, known as the mungonga, or manketti nut. The nut is used for food and for oil and the pulp for food also. (See Herb. 417 and V^1-2½.

S.P.I. 49238, Ipomoea sp., Herb. 383. A strong growing woody vine, flowers in clusters, purple or light-purple in color.

S.P.I. 49255, a large undetermined tree similar to Brachystegia. See Herb. 414. Has a large flat pod.

S.P.I. 49229, Brachystegia randii, Herb. 390, an unusually fine tree.

S.P.I. 49230, Burkea africana, Herb. 389, known as Rhodesian ash, one of the most important trees of this section.

S.P.I. 49226, Adansonia digitata, Herb. 416 and V^1-5.

S.P.I. 49228, Baikiaea plurijuga, or Rhodesian teak, a very large tree. See Herb. 387.

S.P.I. 49243, Pseudolachnostylus sp., a very peculiar fruit, one which dehisces in an unusual way and which is covered with a sweet, sticky outer covering.

S.P.I. 49240, Ochna sp., a beautiful tree, one of the most attractive

ornamentals in this section. See Herb. 385.

S.P.I. 49259, a small tree with the odor of black pepper. See Herb. 411.

S.P.I. 49233, Copaiva (Copaifera) coleasperma, a brown seed with a papery red cover in a one-seeded pod. One of the most effective shade trees of this section.

November 15, 1919. Victoria Falls.

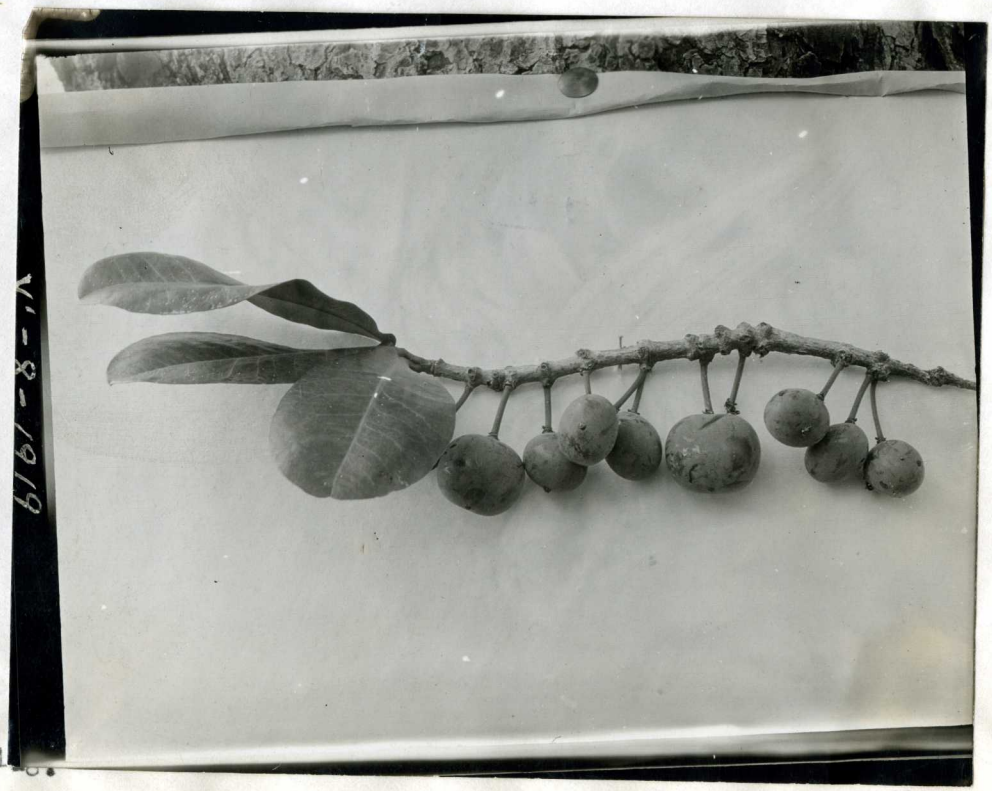
S.P.I. 49241, Pahudia (afzelia) quanzensis, Herb. 323, known as Rhodesian mahogany. A very fine shade and timber tree.

S.P.I. 49253, a peculiar woody vine with seed resembling those of the maple but attached by the tip of the wing.

S.P.I. 49162, Bahinia sp. A large tree with dry almost solid pod. See Herb. 407.

S.P.I. 49170, Touneata madagascarensis, a tree of medium size with long narrow sugar-bearing pod, Herb. 409 and 431.

S.P.I. 49169, Garcinia livingstonii, V^1-8 photograph half size, shows heavy branch with fruits and heavy waxy leaves similar to those of magnolia.



V^1-8.

V^1-9. Similar to V^1-8.

November 17, 1919.

S.P.I. 49239, Mimusops zeyheri, a fruit tree. See Herb. 425. Fruits are relished especially by the baboons and are fairly good when ripe.

S.P.I. 49164, Markhamia, a small seed-bearing pod with large wings. Herb. 384.

S.P.I. 49171, Undetermined. A woody wait-a-bit vine. Grows near the rain forest and on Knife Edge. Has large pod 3-4 inches in length.

S.P.I. 49245, Terminalia sp. See Herb. 422.

S.P.I. 49254, Leioptyx congoensis.

S.P.I. 49244, Pterocarpus sp.

S.P.I. 49172, Herb. 423, Grewia sp. A small tree, yellow flower and bead-like fruits, used by the natives in making nobkerries and walking sticks.

S.P.I. 49173, Urgenia altissima, very large bulb and tall spike of greenish flowers which appear without leaves. This is one of the most abundant bulb plants in the dry area about Victoria Falls.

S.P.I. 49235, Diospyrus sp. Fruits one to one and a half inches in diameter, covered with brown hairs on the surface. See Herb. 391.

S.P.I. 49165, Oplismenus africanus capensis. A grass quite abundant in Palm Canyon, where it grows in damp shady locations. Herb. 410. May do well in Florida.

S.P.I. 49163, Luffa cylindrica, 6-7 inches long. Grown in the garden at Victoria Falls.

S.P.I. 49166, Pavetta sp. A woody vine with white flowers and black fruit. See Herb. 224. It is said the natives boil and eat the fruits.

S.P.I. 49246, Tetraphleura sp. See Herb. 430. This is similar to S.P.I. 49216. Large, four-seeded pods. One of the abundant trees of East Africa.

S.P.I. 49224, acacia. A very large tree. Grows adjacent to the water courses and has heavy pod like Acacia robusta. See Herb. 426.

S.P.I. 49225, a large acacia similar to the one just mentioned, but with wait-a-bit spines and very red and gummy bark. See Herb. 427.

S.P.I. 49236, Diospyrus sp., a small tree with an unusually heavy load of fruit. No fruits were secured, since as soon as these are ripe they are eaten by the birds.

S.P.I. 49250, Ximenia americana. Similar to 49167, but it is later and a larger variety. Herb. 405.

The following seeds were sent to me by Mr. C. W. Malley, Cape entomologist, and were secured from C. Stark and Company, Ltd., Mowbray, Capetown:

S.P.I. 49159, Phaseolus aureus, a green monghi.

S.P.I. 49157, Melilotus indica, Cape stink klaver.

S.P.I. 49156, Medicago sativa, Cape lucerne.

S.P.I. 49158, Phalaris minor, Cape canary seed.

S.P.I. 49149, Chaetochloa italica, Boer manna, or millet.

S.P.I. 49155, Hordeum vulgare trifurcatum, Nepal or beardless barley-wheat (probably our hulless barley).

S.P.I. 49154, Hordeum vulgare pallidum , Cape 6-rowed barley.

S.P,I. 49150, Citrullus vulgaris, Stark's mammouth white Kafir melon.

S.P.I. 49153, Cucurbita maxima, Fraserdale, improved Boer pumpkin.

S.P.I. 49151, Citrullus vulgaris, tsama melon.

S.P.I. 49152, Citrullus vulgaris, monketan melon.

S.P.I. 49256, Buphane disticha, a fire lily. Small bulbs were sent to the Department. It is shown in photographs T^{1}-10 and R^{1}-12.

Note.-- The rain forest at Victoria Falls is very narrow and the following transect was made on Wednesday, November 12 at noon:

1. Edge of the cliff to the inner edge of the cliff, 10 yards. Humidity and temperature 74-73.
2. Tree ferns and orchids, rain forest, first 6 yards, humidity and temperature 74-76. The next 30 yards 71-78.
3. Palms and slight spray, 25 yards, 72-81.
4. Fig, Ximenia, etc., 70 yards, 72-84. The last 20 yards of this 72-84.
5. Tall lilies and burnt-over area, 25 yards, 72-84.
6. Grassland with acacia and mopane, morula, etc., type of dry forest, 75 yards, 72-84.

Th spray is continuous, but does not affect the vegetation to any great extent, except just at the edge of the falls, although in periods of high wind the moisture is carried much further.

November 18, 1919. Left Victoria Falls for Kafue at 6:30 a.m. Passed over the canyon on the train, from which point a fine view can be secured, either of the hotel or of the fall. We passed on through open, dry forest to Livingston, elevation 2977 feet.

There is a great dry forest at Livingstone and on beyond. There are almost no large trees and no large patches of grass. Occasionally there is a small amount of crop grown by the native method. Corn is just coming up. In this method trees are not removed before corn is planted. Grass huts occur in places with open cultivated fields. Low bush and trees occur. This is a remarkable area of pod-bearing trees, mostly leguminous but many others. It is not an acacia forest. It is Burkea mopane, Brachystegia, Murula, etc., etc.

No change occurs on to Zimba. Portions of this country looks very much like that seen just before reaching Stansbury.

Bowwood, 4137 feet elevation. Proteas are very abundant here in open short scrub, but most often the trees are taller. The ant hills are very large. For some miles the country is more open until Kaloma is reached. Here there are taller grasses and many trees and there are fine, park-like areas. The natives here wear a characteristic dress, a small flap of goat hide in the front and in the rear.

The country is a little more open. In the low places trees are limited to termite hills. In the open dry savanna small trees are ten feet high and there are Cymbopogon grasses. Back further a protea similar to Abyssinica and a fig with large yellow fruits occur. Much of the tree growth is quite dense and similar to the denser portions at Salisbury.

Tara .

Choma. Elevation 4307 feet. Mahoba was sold here. It is an excellent fruit, sweet and of good flavor. When fully ripe this fruit has a flavor resembling somewhat that of bumblebee honey. Has a good hard outer cover and is rather full of seeds. Four occur in each fruit.

The country is still dry forest with some grass.

We arrived in Kafue shortly after midnight, November 19-20, 1919.

There are four chief fruits ripe here at the present time and by the natives they are regarded in the following order, the best fruit being mentioned first:

S.P.I. 49466, Uapaca sansibarica (see W^1-12 and X^1-2). This fruit is known as masuko or mahobohobo, especially further south the latter name is used. It is also called nassigou. It is a brown fruit, 1 to 1½ inches in diameter, with four 3-5 ribbed white seeds. The flavor is very sweet and reminds one of bumblebee honey. Rather persimmon-like when not fully ripe. The pulp is soft and has an elegant tropical flavor. This is the favorite fruit of the natives. It occurs in bunches on trees with rather thick stems and leaves as large as Magnolia grandiflora. When over-ripe it is almost sickishly sweet.

The next fruit in the opinion of the native is S.P.I. 49586 (see X^1-8) Herb. 435, Diospyrus senegalensis, known as Inkulu, or inchamje. The fruit is about one inch in diameter, has 1-5 seeds, usually 3-4. It is a persimmon and very much like our fruit in some respects. It has a much heavier skin. It is very sweet when ripe but has a good deal of tannin when not thoroughly ripe. For photograph of tree see W^1-11.

S.P.I. 49587,(see photograph X^1-7) is a superior variety of the one above,--D. senegalensis. A longer fruit and somewhat larger and of a better flavor.

The third fruit in the opinion of the natives is S.P.I. 49462 (Z^1-7), which is the same as S.P.I. 49169, Garcinia, known by the natives as munkonga or monkononga, a conical tree with evergreen deep-green leaves, the fruit growing out from relatively large stems. The fruit is very tart and unusually good. This fruit I prefer to any of the others.

The fourth fruit is Ximenia americana,of which three numbers are sent in, S.P.I. Nos. 49603, see Herb. 405 and 406, and C-2. This is known as

impingi . It is one of the best fruits, but valued largely because of the nut or seed, which is eaten either fresh, or dried and pounted to produce an excellent oil, which is the principal cooking or salad oil of the natives in Lake Nyassa region. It is prized much more than peanut oil since it has a good flavor and a nice "smell".

S.P.I. 49604 and 49467 are practically the same fruit, but a larger type. The first number was sent in with a large amount of the pulp left on the seeds. See Z^1-8 for a photograph of this type. This fruit when not quite ripe has a very strong odor of wild cherry and at no time is it a thoroughly good fruit to eat. It is most valuable because of the oil produced from its seeds.

The fifth fruit would certainly be placed first by any white man, 49608, Canthium lanceflorum. Known to the whites as a fruit tree or plum, to the natives as malulu (among the Chinyanja). The fruit is developed with the blossom end drawn far to one side. It is a bright green when not ripe and later turns to brown when ripe. The trees are not tall,--6@10 feet and more abundant on thinner soil or in old fields. It has a very odd flavor at first, being somewhat spicy. For photographs of this type see B^2-3 and $C^2$1-. The native boy said this was inferior to the persimmon, but J. G. Hotchkiss of Kafue states that it is the best fruit of this section.

Note.-- On the evening of the 20th we were stationed in the yard of the hotel grounds, living in a grass hut. The yard has a hard smooth surface, no grass. Over this surface there seemed to be no holes. The day before we had a heavy rain and the soil was packed down. Just at sundown after completing photographs of some fruits I noticed small termites coming out of a very small hole in the ground. They did not run away but merely moved about the opening, about evenly distributed, forming a fringe about 1-3 inches across around the hole. Then another hole was noticed, and a differnat termite

much smaller doing the same thing, and still another and larger type also boring out of a hole and performing in the same way. Suddenly you realize that the ground is alive with these small biological springs, from which there flows a never-ending stream, varying in color from white to yellow and brown. Myriads of these animals form groups which do not merge with each other, each group fringing its hole. The ground becomes covered in all directions. In the center of the group a strange creater appears at the mouth of the hole. It comes to the surface, looks about and backs in again, this is repeated again and again and you discover the same thing is happening at all the holes at about the same time. At first it seems that the hole is too small to allow them to escape. But almost before you have had time to puzzle out this problem, one of them pushes free of the hole, dragging behind it a long white ribbon two or three times the length of the body. This ribbon is bent and compressed as the insect drags itself free of the hole, then it at once spreads out into four delicate wings and the termite mounts into the air. Almost simultaneously others start. There are small ones and large ones and they crowd each other as they come pouring from these holes. They rush out with all possible haste and from every hole there is now pouring forth a stream which passes, not as it did before, out over the ground, but now directly up into the air, almost as a stream would leave a jet. They are all sizes, from 1-1½ inches long, the larger ones, and the smaller half an inch or less; that is, counting the wing length. The air is swarming with them.

From the grass at the side there has hopped out large green and yellow frogs about the size of the large American toad, and another type much smaller and gray in color. These animals are in a great state of excitement. They hop up to the first hole and very rapidly lap up the winged termites as they appear above the ground. The large yellow frog works fast, seventeen termites every half minute with one stop to replace one which did not go down straight.

as you look about you find frogs and toads everywhere and each at work in the same way. The rapidity with which they are consuming these termites seems to indicate that the time is short.

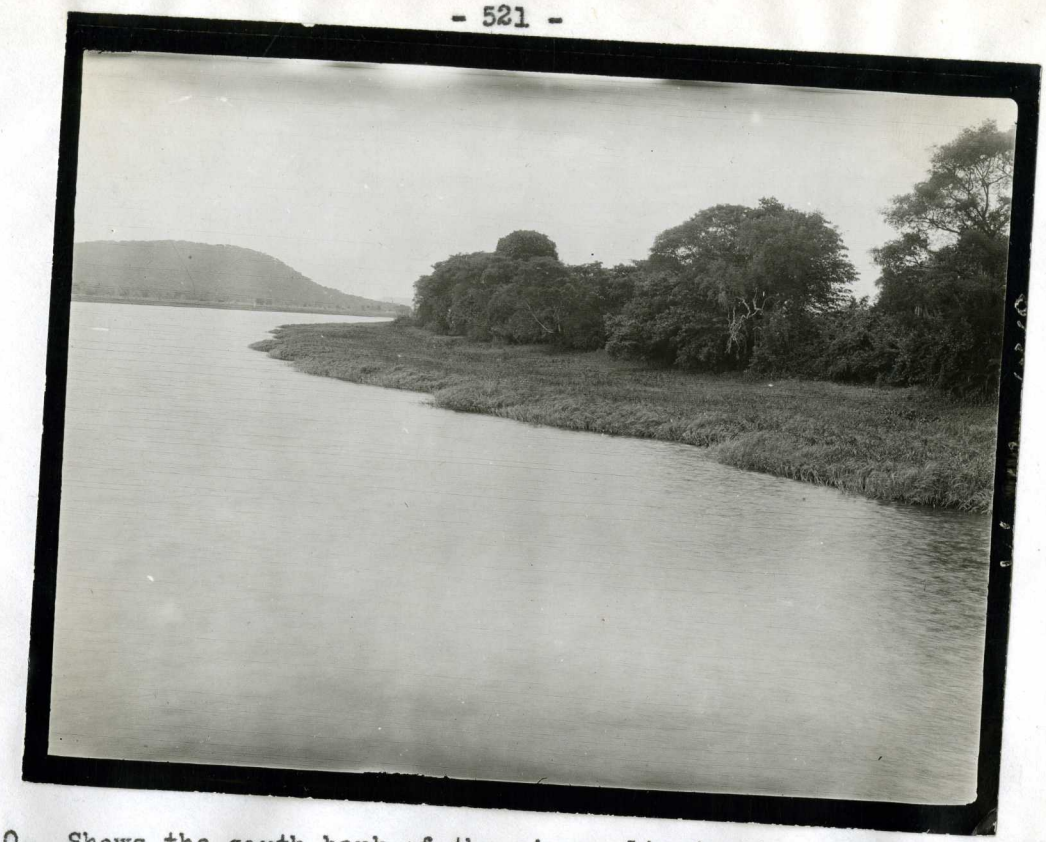
Then you become conscious of a singing or whizzing in the air and discover that in the fading twilight the air is filled with hundreds and hundreds of swifts or swallows. A perfect swarm of these birds dart across the mass of flying termites. Attention to any one of the termites shows how sure is the direction and catch of these swifts. It is exceptional now for a termite to remain in the air for any length of time. After a short flight of ten or twenty feet, the termite disappears in the path of one of these birds.

In the tropics there is only a short period of time between sundown and dark, and all of this transpired in a very few minutes, probably not over two or three, and the swifts now all disappeared as suddenly as they came, for they seem unwilling to risk darkness on the wing. At about the same time, however, bats appear, not as numerous as the swifts but fully as industrious and continue to feed on the termites.

No amount of destruction seems to be effective in reducing these wonderful little creatures, however. After a very short flight the termite falls to the ground, the beautiful wings fall off and it starts a nest. There may be a million in the colonies where only a dozen existed before.

The following day the soil surface in the whole region was covered with the delicate wings of this insect.

The following photographs were taken at or near Kafue.



V1-10. Shows the south bank of the river, lined with coarse grasses, tree vegetation in the background, also scattered tree growth.

V1-11. The country just south of the Kafue. Vegetation largely Cymbopogon, a few scattered trees, also a few palms, chiefly Borassus. Trees mostly Combretum and adacia. Anthills here are large and one is shown in the foreground of the picture. It is about 10 feet high.

V[1]-12. The Kafue River with padlike rosettes, waterlilies in the foreground, watergrasses, tall grass, low grass, and wooded hills in the background.

W[1]-1. The north bank of the Kafue. Water grass (Pennisetum), Polygonum-like plants and Typha, also grass savanna in the distance.

W1-2. The railroad bridge across the Kafue, 13 spans. This is absolutely the only rail connection between Central Africa and South Africa. The bridge is not high enough. Sud banks against the bridge.

W1-3. Another view of the bridge.

W1-4. A general view near the Kafue River. Shows palms, papyrus, Combretum, the hills in the background well covered with trees.

W1-5. Tree savanna along the north bank of the river. Typical tree-grass country.

As you pass back from the river trees become larger and the grass