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The Savannahs of Guvana

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MEETING OF THE SOCIETY,

January 11, 1906.

J. RUTHERFORD HILL, Esq., Vice-President, in the Chair.

Mr. JAMES FRASER was elected Resident Fellow.

Mr. HARRY SANDERSON was elected Non-Resident Fellow.

The following gentlemen, recommended by the Council, were elected Associates:—

Mr. R. L. HARROW, Royal Botanic Garden, and
Mr. L. STEWART, 28 Rodney Street.

The gift of a collection of Ceylon Ferns from PERICLES JOANNIDES, B.Sc., was intimated.

Dr. R. STEWART MACDOUGALL exhibited a series of specimens illustrating the life-history of *Pinus sylvestris*.

Mr. J. F. JEFFREY gave a short note on Don's original specimen of *Silene alpestris*.

Captain NORMAN, R.N., showed branches of *Pinus* attacked by the Pine-Aphis.

Mr. R. L. HARROW showed a series of Plants in Flower from the Royal Botanic Garden.

Mr. L. STEWART showed *Octoblepharum albidum*—a tropical moss of wide distribution. This was growing in the Royal Botanic Garden with plants sent from the West Indies and also from Liberia.

A series of slides illustrating the growth and appearance of the chief British Forest Trees was shown on behalf of Dr. A. W. BORTHWICK.

H. F. TAGG, F.L.S., gave a communication with photos on the Pioneer Plants of the Volcanic Mud of Tarawera. Grasses

and ferns seemed to be the first forms to settle on the denuded area.

Mr. TAGG also exhibited a Mangrove Seedling.

The following communication was also read :—

THE SAVANNAHS OF GUYANA. By EDUARD ESSED.

If we travel in Guyana from north to south along the rivers, we shall be highly impressed by the luxuriant plant-growth, forming high walls of dense, nearly impenetrable forests, in which the Mangrove—in the lowlands, the *Avicennias*—in the upperlands, are the predominant trees, whilst thorny *Drepanocarpus lunatus* (a papilionaceous plant), *Desmoncus horridus* (a palm), *Paritium elatum* (Malvaceæ), *Pancratium caribæum* (Amaryllidaceæ), as fringes of the forest, are hanging and swaying in the water several metres from the actual river bank.

The same vegetation continues along the numerous fresh-water branches or creeks, but here we find the *Pachira aquatica*, the never-failing *Calladium arborescens* (one of the largest Aroids), the *Euterpe oleracea*, *Manicaria saccifera*, changing the character of the vegetation; whilst arboreal Rubiaceæ, Papilionaceæ, Apocynaceæ, Bignoniaceæ, etc., as so many pillars support the garlands of the tropical forests; the lianes which, very often, tie together the crowns of the trees on both sides of the not more than 30 to 50 feet broad streamlet, form above the water an arch, in which thousands of birds and insects are lulling each other to sleep with their diverse nocturnal tunes, the expressions of their delight in the well-deserved rest after a busy, trying day. If we look on the map of Dutch Guyana by W. L. Loth, we see the geological formation roughly indicated by three different colours. The northern part is a strip of land 50 to 60 km. broad, running from east to west parallel to the sea-shore. This part is purely alluvial, and consists mainly of blue clay, here and there traversed by vertical layers of sea-shells, the deathbed of millions of Molluscs in remote antiquity. Here the vegetation is fairly continuous. The southern part is the hilly and mountainous "hinterland,"

with its Urwälder, for the most part unknown; the middle part, a strip widening from 30 km. in the east to 100 km. in the west, is the flattest part of the diluvium, with only few scattered hillocks—in some regions a merely undulating plain. It is in this part that we find the savannah through the whole breadth of the country,—with the exception of the forest-tracts along the rivers, as said before.

What is the savannah in Guyana? According to the native conception, the savannah is an open tract covered with low plants, a few trees scattered here and there, and surrounded by forest. This conception corresponds very well with the description given by Schomburgk, as seen in Professor Schimper's book on Plant-geography, Part II., page 327: "Forests—I have termed them oases—sometimes miles across, sometimes of less extent, most frequently with a

Vertical section through the soil of the Savannah.

circular outline, rise out of the savannah like islands from the sea," which gives Professor Schimper himself reason to say: "Not a uniform formation, spread over a wide area, but a richly differentiated, undulating, park-like country, in which different forms of woodland and grassland partake, although the latter predominates." This description, however, as well as the native conception, is vague, too vague to give a real impression of the savannah. But there is more about it in Professor Schimper's book; on page 360, Part II., we find again: "It (thorn-woodland) alternates frequently with the savannah, and in this case, as in all dry districts, edaphic influences are in the first place responsible for the change in the character of the vegetation, since savannah prevails on a stiffer soil that is superficially wetted by the rain, whereas woodland occupies a sandy soil that is very permeable to water." Nothing is more beside the truth than this, so far as Guyana is concerned. On the contrary, the soil of the savannah in Guyana consists, as shown in annexed figure, of three different layers, of which the upper one, 1 to

3 feet thick, is totally or mainly coarse quartz sand; the second layer, a mixture of sand and decomposed vegetable matter, called by the natives *blakka doti* or black soil; and the third layer, a more or less loose, reddish clay, a detritus of old laterite rocks: more about this later on. Further on, pages 363 and 364, we read again: "The appearance of a tropical savannah remains always essentially the same, at least in plains. Tall grasses, in many districts exceeding the height of a man, spring up in dense tufts, separated by bare intervals of soil, which is very variable physically as well as chemically, and is frequently coloured red by iron oxide. On high plateaux the grass is shorter, frequently not

Surface View.

taller than in our meadows, and more intermingled with herbaceous perennials and undershrubs. At greater or less distances apart trees appear, usually as stunted, gnarled dwarf-trees, resembling our apple-trees, but occasionally as lofty individuals, which as a rule belong to characteristic species not present in the forest. Besides dicotyledonous trees, palms also occur in savannahs." According to this description the savannah of Guyana, situated but little above sea level, and even for four to six months of the year, sometimes longer, flooded by the creeks and rivers, which have not sufficient capacity to drain the enormous amount of water falling from March to July at least, should present to us tall grasses exceeding the height of a man, in dense tufts, etc. Well, the grasses are there, but never reaching and of course never exceeding the height of a

man; the grasses are there, but seldom in dense tufts; or the grasses are not there, because the savannah is *not always* grassland. Very often, as on the savannahs to the east of the Surinam river, we find only here and there small patches of grass and large parts of the savannah are without a sprig of grass. The description of the savannahs on high plateaux corresponds a little more to the savannahs of Guyana, which, however, are not on high plateaux. For although, according to my opinion, not very much of a European meadow is to be found in the savannahs of Guyana, nothing is more characteristic of them than the scattered trees, stunted, gnarled, dwarf, with occasionally lofty individuals, which belong to species not present in the forest. True is it always that palms occur in the savannah, especially the *Mauritia flexuosa*, perhaps one of the most grandiose palm-trees in the world. It is worth noting here that these scattered dwarf-trees differ again in species from east to west. In the savannahs of the Commewyne river, the stunted *Psidium guajave*, the poisonous *Euphorbia cotinifolia*, and the gregarious *Clibadium surinamense* prevail. In the savannahs of the Surinam river the *Euphorbia cotinifolia* disappears, the *Psidium* and *Clibadium* diminish, whereas the *Melicocca bijuga*, a Sapindaceous plant, and the *Anacardium occidentale* predominate. In the Lara district, however, the *Melicocca* disappears nearly entirely, while the other above-named plants are equally distributed amongst Apocynaceæ, Clusiaceæ, Rubiaceæ, Myrtaceæ, and are there in considerable numbers. On these savannahs we find, but not very often, a curious plant with a delicious fruit, the *Bati-bati*, of which, up till now, the scientific name is not known, and no description could be found in the notes of any one of the few botanists who have visited the Guyanas or studied their flora. Of the western districts I have few recollections; but, so far as I remember, grasses and grass-like Liliaceous plants prevail, Melastomaceæ frequently occur, Cactuses here and there appear on elevations of the undulating soil. If we consider now the descriptions given for savannahs in America, that given by Schomburgk, especially for Guyana, is vague, more metaphorical than satisfactory; the descriptions of the savannahs of Minas Geraes and other parts of Brazil can hardly be said to apply entirely to Guyana. What can

be the reason that we, in the above-mentioned book of Professor Schimper, who undoubtedly collected the most reliable data for his book, do not find what we might expect for Guyana? It is possible that no other reliable data are available than those of Schomburgk, which we saw before are vague and unsatisfactory; and surely it is extremely difficult to give a correct description of this characteristic, tropical association after a short, rather hasty, exploration, perhaps only in one direction. How can one have a true impression of a vegetation which, in every corner, in all directions, keeps both a secret and surprise for us? Nowhere else is the vegetation so varied as in the savannahs: more than half the number of the plant orders in the Guyanas—and there are many—are represented here; every moment we may find a new or scarcely known species, convincing us that, only after a patient and exact exploration, it will be possible to give a satisfactory description of the savannah. For it is difficult to say what the typical character of this association is. Decidedly xerophilous plants are growing alongside pronounced hygrophilous plants, and amongst these, plants of a dubious or tropophilous character. But how to explain that? Well, we have to go back to the formation of the soil and the climatic influences. As seen above, the soil was mainly coarse quartz sand in the upper layer, with loose garden soil and clay underneath. This soil is manifestly permeable, but the layers are not everywhere of the same thickness, and here and there the upper layer alone or both the upper and middle layer disappear, leaving the under layer at the surface. It is evident that we have three distinct conditions before us, which will affect the vegetation. Then again, if we compare the data of the rainfall on Placer de Jong, situated in the savannah region, with the data of the rainfall in Paramaribo, we find for Placer de Jong an average of 2156.4 mm., and for Paramaribo an average of 2226.9 mm.; the highest and lowest in one year for Paramaribo respectively 2754.5 and 1240.1 mm.; for Placer de Jong 2719.5 and 1372.5 mm. It is notorious also that the temperature over the whole country is fairly equal and constant, and the relative humidity on the savannah a little less than in the forests; but the open savannah soil has the full benefit of the immense amount of dew that

settles down during the cold nights in the dry season, where this dew is intercepted by the leaves of the trees in the forests, and but little reaches the soil. There are more factors worth considering: as I said before, the savannahs are inundated during a great part of the year, so that one can travel with great ease in a canoe from one place to another; again, there is practically no month in the year without rain; the driest months, September and October, show a rainfall of 50 mm.

Before finishing this brief account, it is perhaps desirable to say a few words about another peculiar association, known in Dutch Guyana as Bieri-bieri. These Bieri-bieris are only found along the coast. They are of a pronounced xerophilous character, which is brought about by the large amount of salts contained in the soil; for all the land on which we find the Bieri-bieri is at or under sea level, and is therefore flooded by the sea or the rivers at high tide. They correspond nearest to the description of the savannah in lowlands, given by Schimper on pages 363 and 364, to which I referred before. But it is perhaps necessary to add to this description that the grasses are all covered with dense, stiff hairs and provided with sharp, cutting edges—the native indicates them by the general term of Baboonneffie, *i.e.* Baboon knife—and further, that most of them are Gramineæ. Few other plants are scattered through these monotonous grass-plains. But now and then a small group of *Avicennias* or *Rhizophoras*, or *Calladium arborescens* and *Drepanocarpus lunatus*, show the places where shallow pools are formed in which now and then we may meet with one of the Lemnaceæ or Salviniaceæ and stiff, leafless Juncaceæ. Putting all these data together, one might arrive at a conclusion in regard to the character and origin of the savannahs of Guyana. I wish only to show that the last word has still to be said; however, this communication may be a forerunner of what I hope to be able to say about the savannahs, and other points, after my views are enlarged by the guidance which I shall feel so happy to receive from the University of Edinburgh.