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EDITOR

DANIEL TREMBLY MACDOUGAL

Director of the Laboratories



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REPORT ON CUBAN EXPLORATION.

(Presented October 20, 1903, and ordered printed.)

TO THE SCIENTIFIC DIRECTORS.

Gentlemen: By permission of Mr. D. O. Mills, President of the Board of Managers, I visited the island of Cuba during parts of August and September, for the purpose of continuing the botanical survey begun in March, at which time I made observations and collections in the provinces of Matanzas and Havana, assisted by Mrs. Britton and by Mr. J. A. Shafer, custodian of Botany at the Carnegie Museum of Pittsburg, Pennsylvania, while at the same time the Province of Santiago was being explored by Professors Underwood and Earle: after my return, the work was carried on during April by Mr. Shafer in the provinces of Havana and Pinar del Rio.

I left New York on August 23 accompanied by Mrs. Britton, and by Mr. Percy Wilson, my Administrative Assistant, proceeding by rail to Tampa, Florida, where a day's waiting for a steamer to Havana enabled us to make an interesting collection of museum and herbarium specimens and a few living plants, specimens of 88 different species being there secured on August 25. A half-day's delay between trains at Jacksonville, on the morning of the 24th enabled us to collect a basketful of living plants and museum material. Reaching Havana on August 27, we proceeded the same day to Matanzas, and the work of exploration was taken up in the vicinity of that city the next morning and continued there and at Cardenas until September 2, traversing much of the same ground as was studied in March, for the especial purposes

of obtaining fruits and seeds of plants found only in flower during the previous visit and of observing the summer vegetation in relation to that of the spring.

The region about Sagua la grande, in the Province of Santa Clara was explored from September 2 to September 7 and this was the most easterly point reached on the trip. A very interesting flora was found here, and specimens were taken of about one hundred species not seen by us in the vicinity of Matanzas.

Returning to Matanzas, three days were spent in examining some ground not previously visited by us. We reached Havana on September 11, and devoted two days to a study of the plants in the Botanical Garden of the University under the guidance of Professor M. Gomez de la Maza, who kindly permitted us to bring from there a considerable number of seeds, bulbs and cuttings of plants desirable for our conservatory collections together with some museum and herbarium specimens. While at Havana a visit was made to the hills about Rincon, a few miles south of the city and specimens were there obtained of a few species not elsewhere seen by us.

Altogether, specimens were obtained on the trip of 611 species. The exploration work of the past year has laid the foundation for a botanical survey of Cuba, and the results obtained fully justify its continuance as opportunity is afforded.

Respectfully submitted,

N. L. BRITTON,

Director-in-Chief.

REPORT OF A BOTANICAL EXPEDITION TO THE ISLAND OF DOMINICA, B. W. I.

TO DR. N. L. BRITTON, DIRECTOR IN CHIEF :

I beg leave herewith to submit an account of my botanical expedition to the island of Dominica, British West Indies, during the past summer.

Accompanied by Mrs. Lloyd, I left New York by the steamer Caribbee, June 13. The detention of the boat at various points

of call made it possible to go ashore at St. Thomas, St. Croix and Guadeloupe, *en route*, and in this way it was possible to get a glimpse at the vegetation of these islands. St. Thomas and the adjacent archipelago are distinctly xerophytic, as also is St. Croix, as compared with the more southerly of the Leeward,

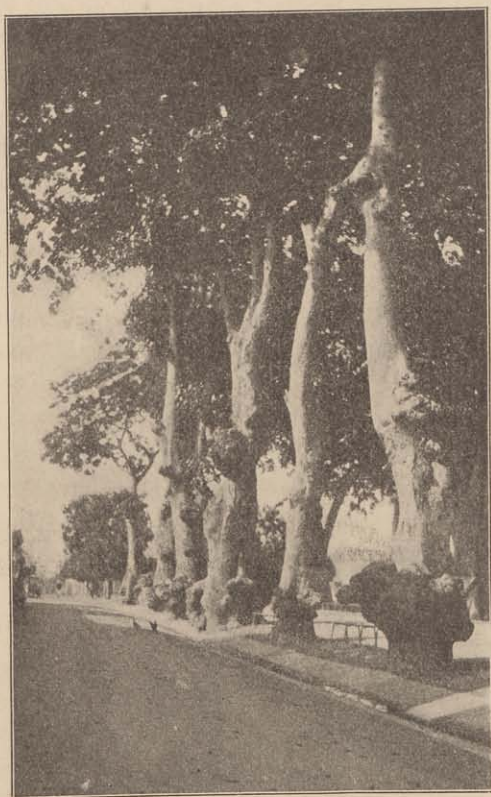


FIG. 22. Avenue of "Sablier" trees, or Sandbox trees (*Hura crepitans*) in Point à Pitre, Guadeloupe.

and of the Windward Islands. This is distinctly indicated by the prevalence of cacti and the viviparous agave or century plant which are found farther south only in those limited areas in the various islands where lessened rainfall coupled with peculiarities of the soil, produces desert or dry savannah conditions. Nevis, and the southern part of St. Kitts, reproduce these

conditions, which, as I shall show, are found only over a very circumscribed area in Dominica. Guadeloupe, on the other hand, is an island which, on account of its extent, rainfall and varied topography, presents a most inviting appearance—one which foretells that rich vegetation of the tropics which it is a great privilege for every botanist to see. I would suggest that this island offers a splendid field for collection and study, and I am sure, from the hearty reception we received at the hands of the government official at Basse Terre, M. Hubert Ancelin, that every encouragement would be received to carry on such investigation. At Point a Pitre, is to be seen a double row of fine sablier or sandbox trees (Fig. 22.)

Our arrival at Roseau, the chief town of Dominica, at 12:30 a. m., June 23, in the pitchy blackness of the tropical midnight, gave us little opportunity to do more than grope for quarters. On the following day, an exception to the rule in being free from rain, we took an opportunity to visit the region in the southerly end of the island known as Soufrière, the crater of an immense extinct volcano. The whole basin, which opens on the west to the sea, constitutes the plantation of Mr. Jabez Bellott, to whose courtesy and hospitality both at this time, and on a subsequent and more prolonged visit, I am greatly indebted. On this occasion we visited chiefly the vicinity of the hot sulphur springs which are to be found some distance up the side of the mountain to the east of the village of Soufrière. Here we made some collections, including specimens of the algae which thrive in the hot waters of the springs.

The following day Mrs. Lloyd and I visited the Botanical Station and Garden, and made ourselves acquainted with Mr. Joseph Jones, the director, to whose courtesy I had already been kindly recommended by Sir Daniel Morris. Roseau can boast of a very delightful and useful botanical station, the product of Mr. Jones' efficient administration. From Mr. Jones I received many valuable suggestions for my work in the island. For this, and for his generosity in sending living plants to me for our collections, and for many other courtesies, I wish to express my thanks.

H. H. H. H. H.

A few more days were spent in getting some knowledge of ways and means, and in reconnaissance in the vicinity of Roseau, which lies at the mouth of the Roseau valley, at the head of which, on a "flat" at some 1,500 feet altitude lies the scattered native village of Laudat, which was the center of our work of the ten days from June 29 to July 10.

The flats on which Laudat is situated, lie at the base of one



FIG. 23. Papaw tree (*Carica Papaya*) in a garden, Soufrière.

of the chief mountains of the island, Mont Micotrin, otherwise known as the Lake Mountain, or by the creoles of the region as Mont Macaque. I ascended this peak, which has an altitude of about 3,000 feet, on June 30, in the company of Matson Rolle, a most intelligent and efficient guide, upon whom I learned to depend with every confidence.

On this day I received my first real lessons in two directions—in tropical vegetation and in tropical meteorology. The climb was a steep one, first through high forest with an abundant ground and epiphytic vegetation. Here, for the first time, I saw the wonderful “blue fern,” a coarse but peculiarly colored “filmy” fern eight to twelve inches high. This species grows on the ground in dark, moist situations, and is perhaps the most striking single plant I have seen in Dominica. The color is an opaque, dark blue-green, suggestive of certain copper compounds, which, however, is seen only by reflected light. With transmitted light one sees but a rich, dark chlorophyll green. When the plant is dried the blue is lost, and is replaced by a dirty green.

On the higher steeps one climbs on a slippery clay, densely set with tree ferns, and a various shrubby and herbaceous vegetation which, on a rainy day, offers a redundancy of proof that there are many adaptations in tropical plants for holding water. It is here in the cool cloud-swept region that one finds, in greatest abundance, the beautiful filmy ferns growing in almost every situation. The most abundant tree fern of this locality is known locally as “fougere piquant,” so called on account of its armature of sharp black prickles. These are, on older plants, usually hidden by a growth of liverworts, mosses, and filmy ferns, with the result that one often seizes hold of what appears to be a kindly support for the weary climber, with the obvious result.

On nearing the summit one meets a tangle of shrubbery and small trees that form a dense tangle on which one must climb to reach the summit. These mosses, liverworts, filmies and numerous small epiphytes completely clothe the stems and branches of the larger growth. And here, at least in the summer season, it rains almost continuously.

On July 2 we returned to Roseau to meet Sir Daniel Morris, who made a brief visit to the island on that day. On the day following, I called on His Honor Mr. H. Hesketh Bell, the Administrator of Dominica, who very kindly gave me further suggestions for the survey of the island. On this occasion Mr. Bell offered to add to the collections of the New York Botanical Garden a col-

lection of Dominican woods especially prepared to illustrate their grain features. The offer was accepted by you, and I was informed by Mr. Bell before leaving Roseau that the collection is now being made under his direction, and will be received in due



FIG. 24. Clump of "Roseau" grass (*Arundo* sp.) near Roseau.

time. This gentleman, I may add, has been very gracious in extending his hospitality to Mrs. Lloyd and myself.

Returning to Laudat on July 4, after seeing the American colors at the masthead over the Consulate, I continued my work there till July 10, a period of almost incessant rain. It was entirely impossible to dry papers except over glowing charcoal in a small "coal pot." This occupied from four to six hours

daily, and was done entirely by Mrs. Lloyd in the constricted quarters of a small cabin. Without her help at this time and during the summer, I could not have preserved the collections. During these few days, I visited the Fresh Water Lake, near the divide between the windward and leeward slopes of the island, and thought, erroneously I believe, to be a crater lake; and the Boiling Lake, of which no doubt obtains as to its real character. It was here that two persons recently lost their lives from poisoning by the gas which emanated from the cauldron. Matson Rolle, my guide, was the third member of the party; by no fault of his, however, did the accident occur. The vegetation of the huge crater, in which this lake and other geysers and hot-springs are found, is composed chiefly of grasses, sedges, *Lycopodium cernuum* (or a closely related species), with a large admixture of smaller species.

After our return to Roseau, I went for a several days' visit to the Soufrière region. Here I collected at Morne Rouge, P'tit Colibri, Palmiste, along the shore to Scott's Head, known locally by the more picturesque name of Cachacrou, and on the steep southern slopes between this promontory and Morne Rouge. I was enabled to cover so much territory wholly because of Mr. Jabez Bellot's kindness in furnishing horses, and accompanying me personally most of the time, in addition to giving me the hospitality of his house.

The strand vegetation at this point, namely Soufrière, is, as I later found, typical for the whole island. The beach is of coarse gravel, steep and narrow. The only strand vegetation is a narrow strip above tide composed of a row of *Coccolobis uvifera*, "sea-grape," trees with scarcely any additional plants. At points on the windward coast, in the bays, a species of *Terminalia* is an additional sometimes abundant element. Here, however, sandy beaches may be found, when also lianas (Leguminosae and Convolvulaceae), including the tropical, circumterrestrial *Ipomoea pes-caprae*, form a more varied aspect. At best, however, the strand flora is by no means rich.

On July 22, after a few days spent in visiting the plantations of Dr. H. A. Alford Nicholls, Mr. James F. Johnson and Mr.

George Johnson, in or near the Roseau Valley, I went to Hampstead, on the invitation of Mr. James Collins Macintyre, the owner of the estate by that name. To reach Hampstead I took passage in the convenient coasting steamer 'Yare' to Portsmouth, a small town on the shores of the most extended alluvial area in Dominica, and devoted to cane cultivation. From Portsmouth one travels to Hampstead by pony.

Although my opportunities here were curtailed by an attack of 'fever' — so known generically, there being no need, apparently, of a specific denomination—I was enabled to lay in a goodly number of plants, good fortune which is due entirely to the keen interest in and full appreciation of my mission by Mr. Macintyre. He placed at my disposal intelligent and experienced guides, while Mrs. Macintyre provided me with other necessities.

Hampstead lies on the northeast of Dominica, and from there can be seen a long reach of gradually sloping country extending from the coast to Mt. Diablotin (4,747 feet), the highest peak. This country is deeply cut by ravines, and is by no means the easy country to traverse that it seems, though still much easier than most of the island. July 23 was spent botanizing up one of these streams with the hope of reaching the foot of Diablotin. This, however, it was impossible to do for lack of time. The strand flora at Hampstead was examined carefully in the company of my host. The next day, July 24, I was forced to suspend operations on account of fever, and submit to the commands of Mrs. Macintyre. On the 25th I was forced by illness to return to Roseau, which was the more to be regretted because Mr. Macintyre had planned, for my benefit, a three days' collecting trip to Mt. Diablotin, in his company, which of course, I was unfortunately compelled to give up.

After several days' inaction, Mrs. Lloyd and I went to Rosalie, an estate belonging to Messrs. James F. and George S. Johnson. Through the kindness of these genial gentlemen we had the comforts of a large, cool house, and many expressions of hospitality in other ways; and it was due largely to this circumstance that I recovered from the attack of fever. This was, however, only one of many occasions on which Mr. James F. Johnson showed his

generosity, and I wish to express my hearty thanks to him, to Mrs. Johnson, and to his brother, Mr. George Johnson, for their unfailing interest and generosity.

While at Rosalie, which lies on the windward coast, opposite Roseau, I was able to take a run up the Rosalie Valley to the divide, which I had reached from Laudat, so that in this way I traversed the diameter of the island from Roseau to Rosalie. In addition to this I made only very brief excursions in the immediate vicinity. I was, however, able to examine with some care the strand vegetation here, and see, at close quarters, the very striking modelling of the vegetation on the windward exposures due to the constant and severe action of the prevailing wind. The forms taken by the forest cover are almost grotesque, as *e. g.* when the winds sweep up a steep narrow valley and at its head spread out in various directions against the mountain slopes above. In looking at these wind-swept areas the impression received is of a low dense brushy vegetation, lying closely appressed to the ground, whereas it is really a forest, the cover of which is thus molded.

While at Rosalie we experienced the hurricane of the night of August 8-9, which did severe damage in Martinique, and by no means little destruction in Dominica. We suffered no especial discomfort, although much damage was done on this, and much more on neighboring estates to the south.

We returned to Roseau on August 10, and for several days I did only a little work in the immediate vicinity of Roseau, since it was anticipated that the steamer on which we were to return to New York might call at any hour. Telegraphic communication from Dominica was destroyed, and we were in total ignorance of the outside world.

On the 14th and 15th I made an excursion into the interior of the island to the region of the Trois Pitons, along a road, recently improved by the government, the Imperial Road. I went as far as "Sylvania" the estate of the Administrator, Mr. Bell. From this point I got again into deep forest, and here I found that many trees as well as great numbers of branches had been blown down by the hurricane. This gave me a splendid chance to

collect specimens of many species of trees which otherwise I had missed.

On August 18, having received news of the movements of the steamer, we took the opportunity made by its further delay, to visit Martinique and St. Lucia. It was, of course, a rare ex-

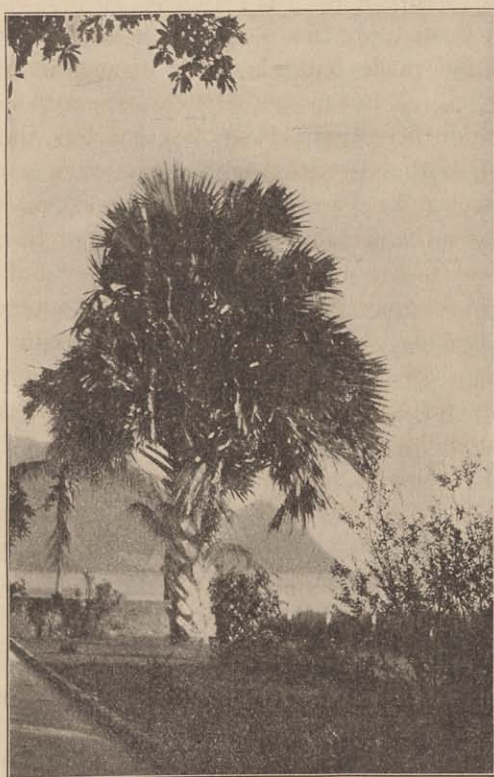


FIG. 25. Talipot Palm (*Corypha umbraculifera*) in the Library Garden at Roseau.
This palm dies after flowering.

perience to see the results of the lamentable destruction of St. Pierre. We were especially interested, moreover, in noticing the signs of a new vegetation on the slopes of Mont Pelée, and I would here suggest the great value of taking an early opportunity to study the incipient growths of this region. Such an opportunity is rare, and should by all means be pursued.

At St. Lucia, with only a very brief period of daylight, we were able only to visit the Botanical Station, under the guidance of a very courteous resident of that island, Mr. Arnott, and Mr. R. C. Mallet, whose kind offer to escort me to the Agricultural School, and a large sugar estate, I was unable to accept for lack of time. We returned to Roseau on August 21, and the following day I went, on Mr. James C. Macintyre's invitation, to Batalie, an estate twelve miles north of Roseau on the leeward. Batalie lies adjacent to the Grand Savannah, where, on account of a light rainfall * and shallow soil, grassy desert conditions prevail. The vegetation, in addition to the wiry grasses, and other low herbs, consists of scattered small trees, including a species of the *Mimosoideae* with delicately fragrant, pink flowers which scent the air. Cacti are also to be found.

I was met at Batalie by Mr. T. H. Shillingford of Colihaut, where I was entertained at his residence. With his help I found suitable guides to help me in carrying out an ascent of Mt. Diablotin, for which peak I started on the following day, the 24th, leaving Colihaut by canoe at 5 a. m., and reaching, from Du Blanc, a convenient point at the foot of the mountain in the afternoon. Here we made "ajupa" — that is, built a lean-to of saplings. The natives make such an affair quickly with no other tool than a cutlass. They bind the parts together with lianas, floor it with saplings laid side by side, and wall, roof and carpet it with palm leaves. One realizes the richness of the tropical forest when he sees the generosity with which palms are cut down and used thus; and even more so, when one sees a 60-foot cabbage palm felled, and the terminal bud cut out to be sold at a market ten miles away, whence it must be "headed," † for the paltry sum of eight cents (fourpence, English). This circumstance casts a side light as well upon economic conditions in Dominica.

The following day, in a pouring rain, we started for the sum-

* The precipitation at Batalie has varied, during the years from 1890 to 1902, from 80.05 inches to 35.78 inches annually, the average for 12 years being 59.51, the lowest for any part of Dominica.

† Carried on the head.

mit which, after much cutting, we reached in four hours. As we were surrounded by clouds, we could not get a glimpse of the surrounding country. I made a good haul of plants, however, including many ferns I had not seen before. Starting downward at about 10 a. m. we reached the ajupa at 12. Packing up, we proceeded rapidly down to the coast, and from Du Blanc I went by canoe to Roseau, landing there at 8 p. m., the last half hour's journey in a violent thunder storm. This closed my work on Dominica. I collected in all about 2,000 specimens, representing over 900 species. In addition to this, I obtained a good stock of material for my studies in the embryology of the Rubiaceae, and some additional embryological and anatomical material. I brought back also a number of examples of Carib and native workmanship consisting of baskets and of ropes of various species of Mahaut.

On my return, I had the great pleasure of meeting Dr. H. A. Alford Nicholls, just returned from Canada, who has done so much, as the successor of the late Dr. Imray, in furthering the agricultural interests of Dominica. Dr. Nicholls generously expressed his willingness to aid the New York Botanical Garden in any way possible to him, and for this I extended informal thanks.

A few days later, after receiving many evidences of hospitality and good will from our friends at Roseau, we sailed by the steamer "Parima," reaching New York on September 7.

FRANCIS E. LLOYD.

REPORT ON EXPLORATION IN HAYTI.*

DR. N. L. BRITTON, DIRECTOR-IN-CHIEF.

Dear Sir: I submit herewith a report upon my recent visit to the Republic of Hayti, for the purpose of securing seeds and living plants, and herbarium and museum material. The trip occupied the interval between the 25th of July and the 13th of September, inclusive. I was accompanied by Harry F. Baker, as assistant.

* This work was made possible by assistance kindly given by Mr. Geo. H. Perkins and by Mr. J. S. Schiff. — N. L. B.

We left New York on the steamship "Athos," of the Atlas Line, arriving at Cap Haïtien on the 30th, where we were met by Mr. A. E. Cassé, upon the arrival of the steamer. His reception was most cordial, and he made us feel at once at home. We remained with him at the Cape until the following Saturday, the guests of his friend, Mr. Dévè, a gentleman long resident in Hayti, and to whom I am much indebted, not only for his kindly hospitality, but for many courteous acts which made the stay at the Cape most pleasant.

On Saturday morning, August 1, we left early by private motor boat for Les Plantations d'Haïti, located at Bayeux, along the coast about eighteen miles west of Cap Haïtien. This plantation is owned by Mr. F. Herrmann, of Brussels, Belgium, a gentleman in sympathy with the object of our expedition. It was with the permission and concurrence of Mr. Herrmann, that we were invited to be the guests of the plantation by Mr. Cassé during our stay. Mr. Cassé is the horticultural director, and it is due to his able management that the estate has assumed, in the short space of a little over two years, the advanced condition it now presents. Nearly one thousand acres are embraced in the plantation, which is largely given over to the cultivation of cocoa and rubber, with bananas freely planted for immediate and temporary shade.

Mr. Cassé, personally, did everything in his power to further our plans. He is imbued with the true scientific spirit, and was thoroughly in sympathy with our desires and aims. Horses and mules, without the best of which nothing can be accomplished, laborers and guides were obtained for us, and upon many of the journeys he personally conducted our party, giving us the advantage of his intimate knowledge of the country and its people. The motor boat, previously referred to, was placed at my disposal. At the plantation everything was done for us that comfort could suggest, and I feel that much of the success of the expedition was due to his active participation in it.

The region visited is, I believe, the least accessible in the republic. It embraces a portion of the mountainous country on the northern side of the island, a region rarely visited by white

men, with the exception of the French priests and a few stray Syrians who penetrate into these mountains for the purposes of trade. It is one vast mass of mountains, range after range following each other in endless succession, their general trend being that of the length of the island. The altitude of the highest peak visited was about 3,500 feet. The sides of the mountains are very steep, in some cases nearly perpendicular. The valleys are, in consequence, deep and narrow, and the roads, if they may be dignified by such a title, are circuitous in the extreme, zigzagging along the mountain sides and around the bases of hills, so



FIG. 26. Market at Pilate, a village in the mountains.

that to attain a given distance in a straight line generally requires covering a distance three times as great. The mountains are for the most part heavily timbered, and in many cases along the north coast run right down into the sea.

Through many of the valleys, rivers and streams rush, constantly fed and augmented by many brooks which drain the steep

mountain sides, but, strange to say, waterfalls are rather scarce, but few having been seen by our party. Our visit was made during the dry season, so that many of the smaller streams were indicated by dry river beds only, and some of the rivers had but a small volume of water. I was informed, however, that during the wet season, from October to January, these become veritable torrents which are impassable. I can readily understand this, for the banks, by their undermined and stony condition, give ample evidence of the passage of vast quantities of water at some time.

I have before referred to the roads, but they cannot be called such in our acceptation of the term. In the low lands near the coast, and in the neighborhood of some of the villages and cities, they may attain to the dignity of a road, but the so-called roads in the mountains, many of them, are terrible, and can only be traversed on horseback. These trails, for such they are, zigzag along steep mountain sides, and along ridges with precipitous sides on either hand, where a misstep on the part of the horse would be fatal. The surface is extremely uneven, large boulders, loose stones, slippery clay banks with corrugated furrowed surfaces, and mud sloughs are everywhere, these difficulties frequently occurring in the steepest parts of the trail. To add to the difficulties of travel, all streams must be forded, as there are no bridges. At the time of our visit this was not a severe performance, though sometimes a tedious one, from the frequency of its repetition. I remember in one instance fording the same stream sixteen times in a short ride of twelve miles.

The republic has a population estimated at about 1,300,000. Of these about 90,000 are in Port-au-Prince and Cap Haïtien, leaving about 1,210,000 for the smaller towns and the mountains. It is truly called the black republic, for one rarely sees mulattoes. The white man, of course, is in a very small minority, and it was rather a unique experience, this traveling in a country where the negro is the dominant factor, and where the white man is dependent on him for protection of life and limb. This protection is necessary for safe travel, as they are suspicious of foreigners, and especially of Americans, and can only be secured with proper credentials. In the first place, entrance to the country

can only be obtained by means of a passport properly viséed by the Haytian Consul-General in New York. After securing entrance to the land, little could be accomplished in the interior without letters of recommendation. Mr. Geffrard Cesvet, the Consul-General here, kindly gave me before departure a letter of



FIG. 27. Low woodland near the coast, showing the effect of wind upon the trees.

this nature to Gen. Turenne Jean-Gilles, governor of the departments of the north and northwest, setting forth the purposes of the expedition. Immediately upon arrival at Cap Haitien I pre-

sented this letter to the general, accompanied by Dr. Livingston, the American Consul, who did everything during our stay to facilitate our plans. This general gave me other letters to the generals in the various divisions under his control. These letters procured for us every consideration and facility during the journeys in the mountains. We were under military protection everywhere in the region controlled by General Jean-Gilles. But once did we get out of his domain ; this was at Marmelade, and it was here we met with the only threatened trouble. We had no letters of introduction, and unfortunately had even left our passports at the plantation. We were received with great suspicion by the general in charge, and coldly treated. In fact, we met with a decided rebuff, and it was only by putting on a bold front and showing him we had no fear that we escaped difficulty. The mass of the people in the mountains are good-natured and child-like, and feared us rather than we them.

These mountain people are generous, and will freely give what they have, but their accommodations, both in the matter of food and sleeping arrangements, are hardly such as would be acceptable to the white man, even though willing to rough it. If it were not for the priest to be found in every village, I fear the lot of the white sojourner there would be a hard one. These priests are educated Frenchmen, have comfortable homes, and their living is of the best the land affords. Through the kindness of the priest at Port Margot, a good friend of Mr. Cassé, we were furnished with letters of introduction to these priests in the interior, and right heartily were we welcomed by them. We and our pack train and servants, making usually six or seven men and as many animals, were received by them ; we were entertained as their guests, and upon our departure we were given a God-speed, and an earnest invitation to come again.

This description of the country and its people will make apparent to you some of the difficulties of collecting in Hayti, but to me they were an added zest in exploring a region, the flora of which is so little known. One must be in the saddle all day, repeatedly mounting and dismounting, if he expects to get even a fair representation of the flora. Some days we covered forty

or fifty miles in this way, up and down mountains, and through valleys and across many fords, starting often at four in the morning and not reaching our destination until five or six in the evening. It is hardly necessary to say that we were tired on arrival, ready for supper and an early bed.

The diversified character of the country has given rise to an equally diversified flora. Along the shore the usual strand flora is found, conspicuous among the plants here being the sea-grape

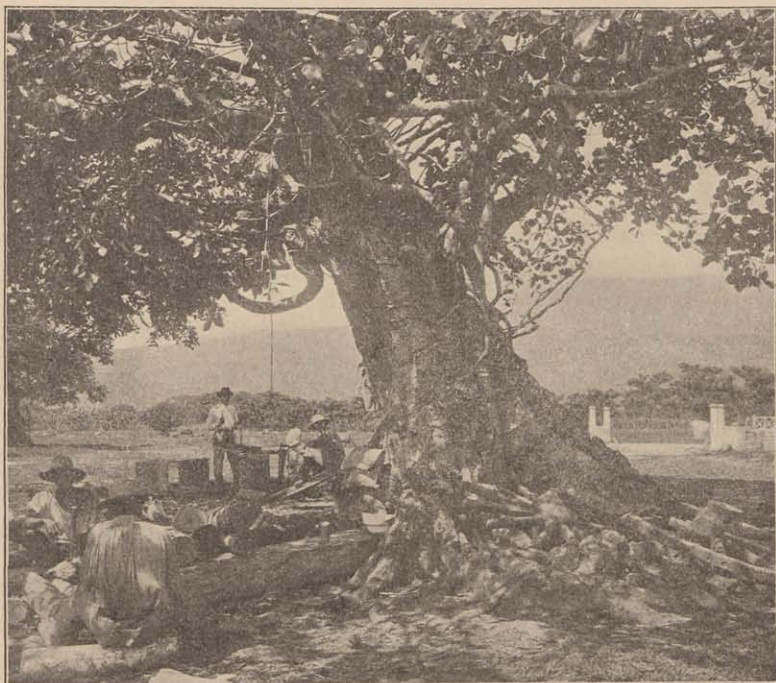


FIG. 28. A *Clusia* growing on a *Ficus*, which it has all but destroyed.

(*Coccolobis Uvifera*), *Ipomoea Pes-caprae*, the mangrove (*Rhizophora Mangle*), a species of *Hymenocallis*, and many other sea-side plants. Back of this belt comes the tract of low woodland which gradually merges into the low hills. A species of *Clusia*, several of *Ficus*, logwood, and many others are here common.

But as we ascended the mountains the flora changed rapidly, and the whole vegetation took on a different aspect. At a

height of about 2,000 feet tree-ferns began to make their appearance, and a few scattering filmy ferns, but it was not until an elevation of about 3,500 feet was attained that tree-ferns and ferns in general became plentiful. At this elevation the mountains are covered with clouds in the afternoon, and everything is dripping with moisture in the ravines, the home of the filmy ferns, hepatics and many mosses.

The most marked change in the character of the vegetation occurred at Marmelade, at an elevation of about 3,000 feet. At this place we first saw the pine forest, which, I was informed, covers thousands of acres in the interior. To come suddenly upon this region, after one had been riding for many hours through a tropical vegetation, was quite startling. It was hard to realize that one was still in a tropical land. In the scattered growth of the trees, the appearance of this pine forest much resembled the pineland of our own southern states, but here the pines cover the mountain sides, and the landscape does not present the flat character that becomes so monotonous in the southern pineland of our country. The undergrowth, at least the portion visited by us at Marmelade, was extremely dense, and travel through it was a tiresome and tedious process. This undergrowth is made up largely of small trees and shrubs. Conspicuous among these were many melastomads and woody composites; and a species of agave, unfortunately out of flower at the time of our visit, was common. Living plants of this agave were successfully transported and are now doing well in our collections.

The air at Marmelade is quite different, being much cooler and more bracing than that of the lowlands. The lower temperature here also permits of the growing of potatoes, excellent specimens of which we sampled. Other vegetables of a temperate climate are likewise raised, as are also peaches.

I was particularly impressed with the agricultural possibilities of the country. Coffee and cocoa are grown to a considerable extent, but much more could be done in this line. Delicious bananas are found everywhere, but only enough are grown for home consumption. Not one is exported, although there are

thousands of acres of lowland adapted to the cultivation of this fruit which finds so ready a sale in the New York market, distant less than 1,300 miles, and nearly twenty-four hours nearer than is Jamaica, from which so much fruit is exported. An added



FIG. 29. Pinewoods at Marmelade, showing the thick character of the undergrowth.

inducement to engage in agriculture is the cheapness of labor, laborers being procurable for 20 cents a day, and as many of them as are desired. At present only slow steamers touch at Haytian

ports on the north side, requiring five or six days to cover the distance, but fast steamers must soon follow the establishment of fruit culture on a large scale. Sugar cane is grown in considerable quantity, but much of it is transformed into rum, or tafia, a poor quality of rum, and much indulged in by the poorer people. Some rice is cultivated, and many of the tropical fruits, such as the mango, orange, avocado pear, bread-fruit and limes are grown to some extent, or occur in a half wild condition.

I believe the only serious attempt by a white man at agriculture in the country on a large scale is at Bayeux, and the experiment is being watched with considerable interest by others. Of course the inability of the foreigner to acquire title to land must militate against the investment of outside capital, but if that restriction be once removed, Hayti, as an agricultural country, with its natural advantage of position and almost immunity from cyclones, must draw investors and advance rapidly. Many acres of valuable cabinet woods, now going to waste, would be an added inducement.

As a result of the expedition over one thousand numbers for the herbarium, represented by about two thousand specimens, were secured; about fifty packets of seed and one hundred specimens of living plants; a collection of sixty-six species of woods, in trunk sections eighteen inches long and from four to twelve inches in diameter, numbered to correspond to a suite of herbarium specimens made from the trees — a list of the local names under the same numbers was also obtained; and a series of one hundred and forty photographs, depicting some of the features of the island, its vegetation, people and economic conditions. I believe no previous collection of woods has been brought from the island, and the collection of photographs from the interior is perhaps unique. I found botany a neglected science, and few appreciated what we were doing.

The extremely diversified nature of the country must indicate an interesting flora, and one probably rich in endemic species. Only a small portion of the mountains in the north were reached by us, and much more remains to be done even there at some other season of the year, preferably February and March. The

xerophytic region of Gonaïves will yield, I am sure, rich results, and the pineland areas were but touched on their outer fringe; the vast savannah in the center of the island must have its peculiar flora; the hills about the salt lakes in the south, one of them below the level of the sea, are reported to be the home of cacti, and need exploration; the southern coast with its high mountains, some reported to be nine to ten thousand feet high, and with the dry conditions common to the southern side of the island, still remain unknown; and the continuation of this last region in the long narrow peninsula which extends far to the westward, surrounded with a sea atmosphere, cannot but yield rich results. These are but features open to exploration in the Republic of Hayti. The whole of the sister Republic of Santa Domingo, the interior of which is reported to be even less known than is that of Hayti, remains, at least to the botanist, a terra incognita, and awaits the explorer. I trust it may be possible to continue our explorations in this island, which, I feel sure, will yield more new material than any of the other islands of the West Indies, not only from the fact of the extreme diversity of its surface, but also because, botanically, it is a virgin field.

Respectfully submitted,

GEORGE V. NASH.

FLORA OF THE SOUTHEASTERN UNITED STATES.

The completion of the great work which Dr. John K. Small, Curator of the Museums and Herbarium of the Garden, has been prosecuting during the last ten years, marks an epoch in the investigation of the wild plants of the southeastern United States. It forms an octavo volume of xii + 1,370 closely printed pages, in which there are descriptions of 6,364 species, 1,494 genera, 236 families and 62 orders, including all the known flowering-plants, ferns, and fern allies of the portion of the United States south of the northern boundaries of North Carolina, Tennessee, Arkansas, and the Indian Territory, as far west as the one hundredth meridian. The specimens which have provided the material for this gigantic study are nearly all included

in the herbarium of the Garden, and in the herbarium of Columbia University deposited at the Garden, and it is safe to say that not less than fifty thousand specimens in all have been examined in the course of the investigation. Many thousand of these have been collected by Dr. Small himself in various parts of the area, so that he has an intimate knowledge of the plants in life as well as in the herbarium. A great many have been cultivated at the Garden, either out doors or under glass, and the work has gone forward simultaneously with the building up of the Garden collections in all departments.

Dr. Small took up the study of the plants of the Southern States, realizing that the flora of the region was very imperfectly known, and during its progress every opportunity has been taken advantage of to carry on exploration in that field and to secure for the Garden collections specimens obtained by all botanical collectors who have visited the region; much material has also been contributed by resident botanists in the south. Several hundred species new to science, many of them of great botanical interest, have been disclosed. The descriptions of many others have been made more accurate than those furnished by preceding writers and more satisfactory generic limits have in many cases been established, so that the work is a grand contribution to science.

Both Dr. Small and the Garden are to be congratulated on the successful completion of this important work, which must remain for many years as the standard text-book upon the flora of the southeastern United States.

N. L. BRITTON.

NOTES, NEWS AND COMMENT.

Mr. L. Cockayne, of Christ Church, New Zealand, one of the most valued correspondents of the Garden, who has contributed to our collections in many ways, has recently been awarded the degree of Doctor of Philosophy, *honoris causa*, by the University of Munich.

Sir Daniel Morris, Imperial Commissioner of Agriculture for

the West Indies addressed the Botanical Convention at the Museum on Wednesday, October 21, on the subject of "The Cultivation and History of Sugar Cane." Sugar cane is perhaps the most important economic plant of the tropics, and the methods of improvement and standardization of selected varieties were explained at length by the speaker. The discussion is of added interest because of the marked success which has attended the efforts of the Department of Agriculture for the British West Indies in the development of methods of treatment adapted to present conditions. Sugar cane is unknown in the wild state, but has been disseminated westward from India.

A number of accessions have been made during the past month to the palm collection. Two specimens of the large California palm, *Neowashingtonia robusta*, were presented by Mr. C. M. Hyde. These are very fine plants, the largest of this species in the collection. From Miss Geraldyn Redmond have been received four palms, one of them an excellent specimen of the date palm, *Phoenix dactylifera*. A large specimen of *Acanthorhiza aculeata* was presented by Miss Mary S. Ames. This plant, in its tub, stands about twenty feet high. The large and peculiar spines on its trunk give it an unusual appearance. The largest plant received was one of *Cocos plumosa* which was acquired by exchange with the Department of Parks, Borough of Manhattan. This is a magnificent palm, measuring about fifty feet from the base of its trunk, where it has a diameter of about two feet, to the apex of the uppermost leaf. It was planted out in the conservatory at Central Park, but becoming too large for that structure, was offered to the Garden. The problem of moving it was a complicated one, owing to its being planted out, but this was satisfactorily solved, and the palm now occupies a commanding position in the large palm house.

Dr. J. K. Small, curator of the museums, is making some explorations and collections in southern Florida, with headquarters at Miami, Florida.

The total precipitation in the Garden during October, 1903 amounted to 8.98 inches. Of this 6.87 fell in 24 hours ending at 11 a. m. on the 9th.

Maximum temperatures of 76° on the 3d, 74° on the 5th, 70° on the 14th, 69.5° on the 20th and 72° on the 31st were recorded: also minima of 37.5° on the 1st, 50.5° on the 10th, 38° on the 19th, 30.5° on the 19th and 32.5° on the 29th. The latest frost in the spring of this year occurred on May 2, and as may be seen from the above the earliest autumnal frost was on October 19, thus giving a theoretical growing season of 170 days. The period between frosts in 1902 was 168 days.

The Hallock soil thermograph was readjusted and installed to record temperatures at a depth of 6 inches in the soil, on October 2. The soil at the above depth has varied between 60.8 (16° C.) on the above date and 40 (4.5° C.) on the 27th.

ACCESSIONS.

PLANTS.

6 plants for the conservatories. (By exchange with the Department of Parks, Borough of the Bronx.)

39 plants from Dominica. (Secured by Prof. F. E. Lloyd.)

30 plants for the herbaceous grounds. (Collected by Dr. N. L. Britton, at Sparrow bush, N. Y.)

6 plants of *Musa textilis*. (By exchange with the Bureau of Plant Industry, Washington.)

77 plants, succulents, for the conservatories. (By exchange with Dr. J. N. Rose, National Museum.)

217 succulents for the conservatories. (By exchange with Mr. F. Weinberg.)

34 plants for the herbaceous grounds. (Collected by Dr. J. K. Small in Pennsylvania.)

4 plants for the conservatories. (Given by Mr. C. DeKalb, Mohave, Cal.)

81 plants for the conservatories. (By exchange with Messrs. Siebrecht & Sons.)

7 plants for the conservatories. (By exchange with Mr. Adam Müller.)

4 plants from the Aleutian Islands. (Given by Dr. A. Hollick.)

81 plants for the conservatories. (Collected by Mr. George V. Nash in Hayti.)

10 plants for the conservatories. (Collected by Dr. N. L. Britton at Tampa, Fla.)

32 plants from Cuba. (Collected by Dr. N. L. Britton.)

68 plants for the conservatories. (Secured by Dr. N. L. Britton from the Botanic Garden at Havana, Cuba.)

2 plants for the conservatories. (Collected by Mr. J. A. Shafer in Cuba.)

1 orchid from Porto Rico. (Collected by Prof. F. S. Earle.)

238 plants from Jamaica. (Secured by Prof. L. M. Underwood.)

16 plants for the conservatories. (Given by Mr. Walter Hunnewell.)

3 plants for the conservatories. (Given by Miss Mary T. Bryce.)

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