THE EVERGLADES

OTHER ESSAYS RELATING TO SOUTHERN FLORIDA

By JOHN GIFFORD

THE EVERGLADES

AND

Other Essays Relating

TO

Southern Florida

BY

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the
"FATHER OF THE EVERGLADE DRAINAGE PROJECT"

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PREFACE.

I have been writing on the subject of the Everglades and South Florida in general since 1904 in various magazines. Requests for this literature have come to me from time to time and in ever-increasing number until my reprints are exhausted. It is impossible to answer all the letters which come to me requesting information in reference to this region. Friends have suggested many times that I collect some of these articles into book form. This I have attempted to do in the following volume. I am well aware that as a book it has many shortcomings and, owing to the fact that it contains articles hastily written at odd times and for different purposes, there is considerable repetition and perhaps even contradiction. If, however, it succeeds in arousing interest in this great Everglade drainage project and offers helpful suggestions to newcomers, its mission will have been fulfilled, and its author and publisher will be satisfied. I wish to thank the various magazines for permission to copy these articles and the Everglade Land Sales Company for assuming the burden of publication.

JOHN GIFFORD.

Coconut Grove, Florida, 1911.

ARCACHON—ON THE BAY OF BISCAY. A GREAT RESORT WHICH DEVELOPED AFTER THE RECLAMATION OF THE LANDES OF FRANCE, CORRESPONDING TO MIAMI, ON BISCAYNE BAY, WHICH WILL DEVELOP IN A SIMILAR WAY WHEN THE EVERGLADES ARE DRAINED.

MIAMI, ON BISCAYNE BAY.

From Conservation, 1909.

The Everglades AND Southern Florida

CHAPTER I.

THE EVERGLADES OF FLORIDA AND THE LANDES OF FRANCE.

URING a recent visit to the great work of reclamation now in progress in the Everglades of Florida, I was impressed with its resemblance in many respects to the great work the French have accomplished in the Landes of France, and with the fact that ex-Governor Broward, after many trials and tribulations, is succeeding, just as did the French engineers after similar troubles. This also applies to the work of Enrico Dalgas in the reclamation of the Heathland of Denmark.

The drainage of the Everglades is now well under way, and almost every unprejudiced person who visits this work becomes an enthusiastic convert. Just as the French engineers practically added a new province to France, Broward has been instrumental in promoting a work which will convert a vast, useless waste into what promises to be the most productive part of Florida, if not the most productive area of land of equal size in the whole United States of America. This drainage is being done at the insignificant cost of about $1 per acre; and when done the land will be ready at once for the plow and for the production of tender crops, the like of which cannot be produced elsewhere in the United States, and at a time when the rest of the country is frost-bound. This is no small area; it is many miles in extent, and is capable of yielding, at small outlay, enormous crops of the most delicate tropical products, as well as Northern

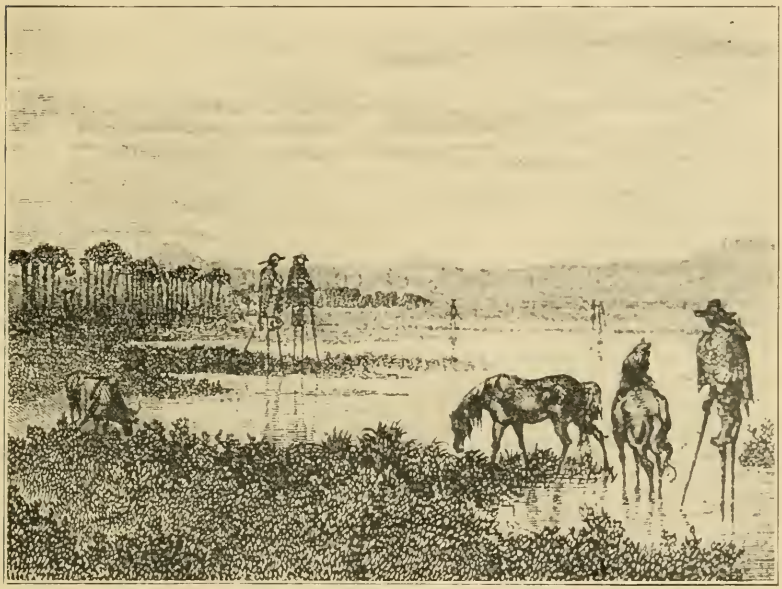
vegetables, in midwinter. A visit to this region, even at this time (May, 1909), at the very beginning of the work, since it is a colossal task, will convince the most skeptical person that this is no idle dream or wild land scheme, but a feasible, practical piece of good business. After inspecting this work, one naturally wonders why it was not done long ago. It is not a complex engineering problem; it is merely a matter of digging, so that

NATIVES OF THE LANDES OF FRANCE. A REGION RECLAIMED BY DRAINAGE.

the water in this great Everglade basin can flow into the sea. Behind the giant maws of these dredges which, when they work day and night, are literally eating their way through rock, mud

and sand at the rate of a mile a month per dredge, there are left broad, navigable canals, which are comparable only to those of Holland, and which will afford miles of placid water courses, avenues of traffic for the products of the land, and a never-ending source of enjoyment to pleasure craft.

In the case of the Everglades, the exit of the water to the sea is prevented by a limestone rim. In the case of the Landes it was due to a bank of wind-blown sand, which clogged all outlets to the sea. The resemblance of the two conditions is much closer than is at first apparent, since this very rock rim was



A SCENE IN THE LANDES OF FRANCE BEFORE RECLAMATION. THE NATIVES WALK ABOUT ON STILTS. (PHOTO OF AN ILLUSTRATION IN AN OLD FRENCH GEOGRAPHY.)

once, no doubt, limestone sand blown in by the wind and later hardened into rock. I think geologists now generally recognize that this rocky rim is of eolian formation. The main difference between the two propositions is that, in the case of the Landes, it was silicious sand, which did not harden into rock, but re-

mained mobile, shifting back and forth with every caprice of the wind, while, in the case of the Everglades rim, it was limestone sand, which soon hardened into solid limestone rock. As in sand dunes, the wind laminations show in the rock like leaves in a book, recording forever the character of its formation. Some distance up the Coast, in the great pineapple district of Eden and Jensen, the obstructing dune consists of silicious sand. Southward the rim is not pure limestone in every instance but a calcareous sandstone, that is, granules of silicious sand cemented together with lime.

Before further describing the Everglades, let me quote from my notes made a few years ago, while visiting the Landes of France. Not only are the physical conditions similar, but there was the same opposition at the start. As in the case of the Everglades, the work in France was pushed by the personal initiative and persistency of one or two men, and the method of securing the funds for the purpose was very much the same. In the early part of the last century (before 1857), the condition of the flat, triangular plain known as the Landes, which is roughly bounded by the Bay of Biscay, the River Adour and the River Garonne, and the Medoc, was, in brief, as follows: There were miles of marshy, almost treeless wastes, covered mainly with a low growth of herbage. It was wet, unhealthy and sparsely inhabited. The few people who lived there depended upon their flocks. The accompanying picture shows a native of the Landes standing upon stilts, watching his sheep. He is dressed in a heavy sheepskin paletot. By standing on stilts, these shepherds can easily see their sheep in the bushes and grass, and can easily follow them through wet and marshy regions. Their spare time is spent in knitting stockings. The condition of the Landes is due to the immense sand dunes, which arrayed themselves along the shore of the Bay of Biscay. They moved inland, covered villages and occluded inlets. Bremontier tells of a dune which advanced in a violent tempest at the rate of two feet in three hours. The damage done by these moving sands so increased that the government officials studied the work and devised and executed plans; and now, thanks to De Villers, Chambrelent and

Bremontier, the pioneer workers, the Dunes and Landes are covered with a beautiful growth of the maritime pine. The region is now a famous health resort, combining the beauties and pleasures of the seashore with those of a well-managed pine forest, which extends almost to the edge of the ocean.

There are evidences that originally the Dunes were fixed naturally by forests. These forests were destroyed by vandals, and all attempts to stop these menacing mountains of sand failed. In 1778 a talented engineer, Baron Charlevoix de Villers, was sent to Arcachon for the purpose of forming a military post. He saw at once the necessity of fixing the sand, and was, according to Grandjean, the first to establish the fact that the way to fix the Dunes is by means of plantations of pine. He met with troubles in his work, and was finally sent back to the Island of Santo Domingo.

In 1784, Bremontier began the work, and it is said that, by using the results of De Villers' labors, he finally succeeded in fixing the moving sand.

The fixation of the Dunes rendered possible the work of M. Chambrelent, which was the reclamation of the Landes by drainage and plantings. It is a unique example of personal initiative. M. Chambrelent, a young engineer in the Department of Bridges and Roads, in 1837, was sent to the Gironde to study the drainage of 800,000 hectares of land in the districts of Gascony and the Landes. His conclusions were not accepted, so he bought some land and put in effect the measures he advocated. In 1855, the results of his experiments were submitted to an international jury. The jury was so favorably impressed that it recommended the application of Chambrelent's plans for the entire region, and in 1857 a law was passed requiring the Communes to do this work. The Communes paid for it by selling a part of this land, which increased in value after the completion of the work. This region was 100 meters above sea level, flat and sandy. It was underlain with a hard-pan called "alios." In summer it was a bed of burning sand, in winter in a state of constant inundation, while between the two was a period of pestilence. The country was characterized by sterility and insalubrity.

TAPPING A PINE FOR RESIN IN THE LANDES OF FRANCE. NOTE THE CUPS TO CATCH THE PITCH.

A complete system of drain ditches was dug and the seeds of pine were sown. In 1865 all works of drainage were complete. By the fixation of the Dunes and the drainage of the Landes 650,000 hectares of land were made productive. Formerly, if one wished to buy land he mounted a hill and called in a loud voice; the land over which his voice carried was worth 25 francs. "A man," says Grandjean, "was forced to take some of this sand for a debt. He became a millionaire later by selling it in small parcels." The first summers, the visitors lived in the resin-gatherers' cabins; now every luxury is afforded the 200,000 tourists who come there every year. In the Landes a man could buy a farm for a few francs, but it required over two acres to support one sheep. In less than a century the population sextupled, while that of a large part of the rest of the country either remained stationary or decreased. The fecundity of the French in places where there is plenty of room and opportunity is proverbial, as in Canada; it is even so in the Landes, which, on being reclaimed, was equivalent to a new province or colony.

All along the East Coast of Florida there are dunes of snow-white sand covered with scrub pines and palmettoes. This fine, white, silicious sand, although naturally sterile, is excellent for the growth of pineapples in regions where there is sufficient warmth. Mile after mile of this sand along the line of the railroad between the Everglades and the sea is used in the cultivation of pineapples, which are fed a balanced ration of fertilizer, just as cows are fed a balanced ration of feed for the production of high-grade milk.

The great Everglades basin, extending from Lake Okeechobee to Miami and westward to the Gulf of Mexico, contains 3,000,000 acres, more or less. The whole cultivated area of the State of Florida is estimated at only about a million acres. The Everglades are larger than Porto Rico or Jamaica and as big as Rhode Island and Delaware combined. This great area is mainly confined by dunes of sand and ridges of limestone rock. These ridges, like fingers, project into the Everglades and are usually covered with pine. Between these ridges are small glades on the edge of the main or "big glade." The accepted definition

of a glade is a narrow strip of grassy land between forests. Glade refers to a grassy area. The big glade is all or "ever" glade. In this way, no doubt, the term of Everglade originated. Here and there in the Everglades are islands covered with rich jungle or hammock hardwood growth. On these islands the Seminoles clear small areas, where they raise their crops.

We visited the Everglades from Fort Lauderdale. It was after a long period of heavy rains, and the mosquitoes were bad in the pine woods. We ascended the New River, a beautiful,

INDIAN FAMILY IN CANOES ON MIAMI RIVER.

winding stream, generally deep, but very deep in places, one spot having a depth of eighty-five feet. The banks were quite low and sandy and lined with moss-draped cypress, oak, maple, magnolia, coco-plum, pond-apple, etc. After a short ride we reached the beginning of the drainage work—one long canal ran northwestward, with the dredge Everglades, another due westward, with the dredge Okeechobee, at work. These canals will run about twenty miles out into the Glades and will be met by a canal running north and south from Lake Okeechobee to a point about

twenty miles west of Miami. The dredge Miami is now at work at the head of the Miami River; another dredge is at work on the West Coast, opening the old Disston Canal into Lake Okeechobee.

As these canals are finished, dams are made to hold back the water to facilitate dredging, showing rather a surprising amount of fall and how effective these canals will prove in discharging the floods of water from this big area. I understand

A CYPRESS ISLAND IN THE EVERGLADES.

that the Government will permit the level of Lake Okeechobee to be lowered only four feet, since a federal appropriation has been made to dredge the Kissimmee River, which empties into the northern part of the lake.

There were no mosquitoes in the Everglades during our visit, and crops already growing on the land, owned by eager settlers, show what can be done on land only partially drained.

Western capitalists mainly have bought this land; the money from the sales is doing the work, and the further it progresses the more the land will bring and the more eager people will be to get hold of it. The Board of Internal Improvement is wisely holding back much of the land from sale, knowing full well that as time goes on it will increase in value and thus yield ample funds for the continuation of this important work. In many cases the state has sold only the alternate sections.

There are agents at work selling this land in every State in the Union. Men of wealth and influence are behind this project. If any one doubts its feasibility, he should come to Florida and see with his own eyes. Much praise is due ex-Governor Broward for his work in this line, and in the years to come he will shine forth as the governor who really did something to add to the productivity and worth of his State. The man who makes two blades of grass grow where only one grew before is the proverbial public benefactor; but the man who, by his energy and foresight inaugurates a movement to render 3,000,000 acres of waste land highly productive deserves endless commendation in this day, when we talk so much about the conservation of nature's resources. Mr. Broward is a masterful promoter; the keynote of his campaign was drainage; he worked at it incessantly while in office, and he has been working at it ever since, and has made good.

We must not forget that this reclamation is in a land of perpetual summer in the only part of the mainland of the United States which is truly tropical, and where the productive capacity of the land is many times greater than in northern climes; where not only a greater quantity, but a much greater variety of crops can be produced than elsewhere in this country.

This may be far-fetched, but I can picture in my mind's eye long avenues of Eucalyptus, Australian pine and royal palms along these canals; great masses of Hibiscus, Allamanda, Oleander, Bouganvillea, Poinciana, and countless other resplendent ornamentals around thousands of neat homes surrounded by fields of peppers, tomatoes, eggplants, celery, onions, okra, arrowroot, tobacco, etc.; also, no doubt, orange and grapefruit groves,

as well as choice mangoes, avocadoes, and other tropical fruits. The canals filled with boats will lead to Miami and Biscayne Bay, the Arcachon and Biscay of Florida.

The land of the moccasin, alligator and Seminole will see a great transformation in a very short time—it does not take long in a tropical country, especially on land where there is no forest to clear.

It is more than a drainage scheme, since by means of dams and locks the water table may be kept at all times just where it is needed for irrigation purposes. The land is level, fertile, and free from alkali and other injurious minerals. The canals serve the triple purpose of drainage, irrigation and transportation.

The soil is usually a black muck, in places several feet in thickness; under this is usually a layer of marl; under the marl, sand, and under the sand, limestone rock. There is considerable mineral matter mixed with this muck, and, although it will shrink some, I doubt if the shrinkage will ever prove a serious drawback. By the application of lime, the cultivation of legumes, etc., this soil can be kept at a maximum state of fertility, so that five acres would be ample for the support of an ordinary family.

The water of the Everglades is usually heavily charged with lime, which is deposited on the surface of everything in a fine, flocculent state during the period of overflow. This deposit, added to the muck, no doubt, contributes much to the quality of the soil. There are deposited also the shells of many fresh-water mollusks. In short, with the fertile, easily worked soil, an abundance of water for irrigation, a tropical, healthful climate, canals for transportation purposes, all within easy access, by both water and land, to our great northern markets, there is a combination of favorable conditions which probably cannot be equaled elsewhere in the whole world.

And lo! the poor Seminole; what of him? At best, he is merely a renegade; and the time will soon come when he will have to put on pants and go to work on the land, join his relatives in Oklahoma, or die from the effects of too much bad whisky.

The following is a fitting tribute to the work of Broward from the *Atlanta Georgian:*

"Napoleon B. Broward, the beloved Florida statesman, whose untimely death took place a few days ago, was the apostle of reclaiming Southern swamp lands—a pioneer in the work of saving the great inundated tracts to the productive resources of the South.

"It was the dream of his life to do this for his State—to change the hundreds of square miles of the Everglades from a dreary waste of bog and morass to gardens teeming with fruits and vegetables—to make two useful plants grow where none grew before.

"It was a dream worthy the best quality of constructive statesmanship. He not only dreamed this dream, but he set about to put it into reality. He took it and his plan for its realization before the people of his State.

"He met with cries that the builder always meets—'It can't be done. Drain the Everglades? Absurd!'

"But the people had faith in him and his policies and they won. He was elected governor and secured the necessary legislative enactments to put his plan of draining the Everglades into operation.

"It has been a success. Its effect is the same as if some great fertile island were gradually rising out of the ocean to add itself to Florida's riches. It is an ever-increasing source of income direct to the State and a source of additional thousands of inhabitants and additional millions of invested capital.

"In anticipation of its progress, land now under water and a few years ago worse than worthless is now selling for prices that are remarkable under the circumstances.

"Broward was a pioneer in a movement that is going to mean much for every Southern State. In the South there are 87,000 square miles of swamp lands. In Georgia alone there are 4,210 square miles or 2,694,400 acres. Making these lost acres serve the use of man and the good of civilization is a worthy task. Broward, the pioneer, has pointed the way. Let the leaders in every Southern State follow it."

CHAPTER II.

SOUTHERN FLORIDA.

NOTES ON THE FOREST CONDITIONS OF THE SOUTHERNMOST PART OF THIS REMARKABLE PENINSULA.

CCORDING to the report of the Biological Survey of the United States Department of Agriculture, there are three regions in the United States which belong to the Tropical Zone. One is in Southern Texas close to the mouth of the Rio Grande, another is along the Colorado River in Arizona and California, and the other in Southern Florida.

The first two are hot and arid, the other is humid and pleasant throughout the major portion of the year. The southernmost part of Florida can rightfully claim, therefore, the distinction of being the only humid or truly tropical part of the mainland of the United States—the only tropical part of this country which can be reached by rail. Early geographers arbitrarily made the frigid zones and torrid zone the same number of degrees and then divided the balance of degrees left over between the two temperate zones. The lines called the tropics of Capricorn and Cancer, although of course perfectly straight on the map, are really very crooked and very difficult to definitely locate. Some claim that the frost line is the limit; if this be so no part of Florida is in the tropics, since frost has occurred, in spots at least, throughout the whole peninsula. The best guide is the character of the vegetation, and wherever the coco palm, avocado, mango, pineapple, and hundreds of other strictly or characteristically tropical plants flourish and fruit without protection, the region is truly tropical.

The territory referred to in this article is unique in another

respect. It is the only region of coral formation in the United States. These two peculiarities combine to render it a region of extreme interest to foresters and botanists. Here is field for research for many years to come, where many phases of plant ecology may be studied to better advantage than elsewhere on the continent. One can pass through all the climatic zones from the boreal to the tropical in going from the region of the proposed Appalachian Park to Biscayne Bay in a little more than twenty-four hours. Were the roads all good, it would be little more than a pleasant automobile trip.

The part of Florida to which this article refers lies between the Everglades and the Florida Strait, and includes the territory around Miami, and southward to Cape Sable, including many coral keys, mangrove islands, and wooded islands in the Everglades.

The vegetation of this district from a forestry standpoint may be divided into three distinct types—the hammock, the pineland, and the mangrove swamp. It is, of course, impossible in so short a space to give more than a superficial description of these types.

The hammock is undoubtedly the climax forest. It represents the type that the rest would in time become were it not for fire, flood and other detrimental and retarding influences.

The hammock is a tropical jungle, consisting of species of trees characteristic of the Antillean Flora. Most of these species produce a vigorous coppice, and the ground is covered with a rich black mold resulting from the leaves and detritus of these hardwoods. It is in the hammock where one finds mastic, crabwood, satin-leaf, gumbo-limbo, princewood, whitewood, manchineel, and many other rare and in many instances valuable woods.

This hammock may be found in patches in the pineland, on islands in the Everglades, and on the keys north of Bahia Honda. Strange to say, the southernmost keys are like the pineland of the mainland in character. Sand Key, seven miles to the southwest of Key West, is the southernmost point in the United States. Although all the keys north of Bahia Honda were once

covered with a dense tropical growth, much of it has been cut for pineapple clearings. In many places, especially on Key Largo, it is still in virgin condition. Wherever these keys are above tidewater, the growth is hammock; when subject to overflow, it is mangrove swamp. Some keys are all hammock; others are all mangrove, and others have hammock centers fringed with mangrove.

For half a century the timber on these keys has been cut, allowed to dry, and is then burnt. In the ashes a fine crop is produced, and fertilizers have never been used. The fact that pineapple patches are very combustible has caused these natives to burn cautiously. In referring to the vegetation of these keys, I cannot refrain from quoting the following from an article by the botanist Curtiss in "Garden and Forest," volume I, page 279:

"A person who is acquainted only with the vegetation of more northern states, or with that of Northern Florida in traversing these keys, will find scarcely a tree or herb identical with, or even resembling those with which he has been acquainted. He may hear familiar names in use by the inhabitants, such as cherry and cedar, but on examination he will find the species thus designated to be entirely different from those which he has known by such names before. The curiosity is piqued at every step by some unfamiliar and interesting form of vegetation, and if the tourist be accompanied by one of the inhabitants he will learn much of the popular lore regarding names and uses, for these people are remarkably intelligent in regard to the vegetable and animal life of the region they inhabit. It will be found that almost all the adult inhabitants come from the Bahamas, that nearly all the trees and other plants are common to those islands, and, in short, that these islands have much more in common with the Lesser Antilles than with the Florida mainland.

"A tour of the Florida Keys reveals nature and society under such peculiar conditions that any one who has never visited this insular region may rest assured that there remains in store for him at least one source of novel and enjoyable experience, though he may have traversed the mainland of the United States from Maine to California. As regards conformation and

soil, the inhabitants and their pursuits, the surrounding waters and the marine life they support, these coral islands differ essentially from all other portions of our vast country; but in no particular do they present so striking a dissimilarity as in the vegetation which covers them."

In spite of the mosquitoes these keys are charming places, especially Elliott's, which is bounded on one side by the waters of Biscayne Bay and on the other by the straits of Florida. They are protected from storms by a chain of coral reefs. Near at hand are the famous Sea Gardens.

The pineland, although less rich and luxuriant in growth, is also peculiarly interesting. The rocky ridges or reefs, with sandy swales in between, are covered with pine and palmetto. The pine, strange to say, seems to shun the sandy swales. The sand of these swales is underlain usually with a reddish calcareous clay, resulting from the disintegration of the coral rock. This rock may be found in all stages of disintegration. In the swales the palmetto is most luxuriant, and no doubt the absence of the pines in these places is due to this fact. The regeneration of these pines, in spite of fire and rock, is generally good. The pines grow right on the rock, the roots penetrate its crevices, and the tree is anchored to such extent that when it upturns the rock sometimes upturns with it.

On the keys the soil is crumbled coral, and coral sand. On the mainland it is a limestone as soft in places as chalk and as hard in others as flint. In places it seems stratified or in plates and lifts out in good flat building stones, which harden on exposure; in others it is jagged, honeycombed, and filled with potholes and pockets; in others it is coquina-like in character, and in others has an oölitic structure.

The pine is Cuban pine (*Pinus Elliottii*). It does not yield resin satisfactorily, and is therefore not tapped. The wood is often so heavy that it sinks in water, and on the whole is one of the meanest woods on earth to work with. The heart or light wood is durable, but it warps to such extent and is so hard when dry that it is cut, hauled to the mill, sawed into boards, and used for constructive purposes just as soon as possible.

It is almost impossible to drive a nail into the dry wood without splitting it, and in order to saw it one must flood the tools with kerosene to prevent gumming. Mechanics shun it, although many people use it because of its cheapness. The sapwood soon rots and leaves a heavy, durable heart, which is in great demand for posts, ties, poles and fuel. Much of it is used in burning the coral rock into lime, and much of it is burnt up in the clearing simply to get rid of it. The "log-rolling" stage is still on in this district. In many cases it is blasted down with dynamite and then burnt; in others it is "deadened" and then burnt standing. It would probably pay to distill this wood, since it could be secured cheaply and would yield large quantities of tar.

Fire sweeps over these pine regions frequently. The pine needles, grass and palmettoes burn like tinder. The dry pine bark and rotten sapwood hold fire like punk. Fire gets down in the crevices of the rock, so that it is next to impossible to extinguish it. The effect of fire on this rock is peculiar. It becomes a potent geological agent. It converts the rock into lime, which slakes when wet by rain or dew. In burning piles of brush, rocks are often thrown into the heap to check the flames or prevent the wind from blowing sparks. These rocks are burnt with the wood and crumble into soil.

This rock crumbles into soil in the presence of decomposing organic matter. By the use of velvet beans, dynamite, and hard grubbing by Bahaman darkies, the roughest, most hopeless looking rock-bed may be converted into productive soil.

There ought to be considerable nitrogen present in this soil, since the ground is often covered with thirty or more species of creeping legumes. There must be potash somewhere, since the palmetto ash is extremely rich. Few things will grow, however, in this rock without the help of fertilizer. Plant-food materials may be there, but they are not available. The rock is usually wet, even in the driest times. In fact, under the limestone ridge there are channels of water running from the Everglades and bubbling out in the form of springs along the shores of Biscayne Bay.

All this pineland would in time become hammock, no doubt, were it not for forest fires. One can find all stages between the true hammock type and the pineland. Where pineland has been protected from fire, it becomes hammock-like in character.

The type of forest called mangrove consists in places of pure red mangrove, the great land-former, but gradually merges into forest similar to hammock. The vegetation of the mangrove swamp consists of those species which can stand a salt-water bath occasionally. They are located on mud lands which are being gradually wrested from the sea. The red mangrove is chief among those plants which can thrive in salt water. With it, however, are often associated the coco palm, the seeds of which float in, become covered with wet seaweed, and then sprout and grow together with buttonwood, black mangrove, sea grape, and others. There are hundreds of thousands of acres of land in which mangrove predominates. Fringing these mud lands are often sand beaches. In the course of time, when this land becomes high and dry by the continued deposit of vegetable detritus, other trees, such as grow in the hammock, gain a foothold and spread.

Back of the rock ridge, which stretches along the coast from the region of Miami southward, is that vast territory called the Everglades. The extension of tree growth on the Everglades has been restrained by an excess of fresh water. With drainage the hammock islands will quickly extend. A very large proportion of the tropical hammock trees of South Florida are berry producers. Such seeds are quickly disseminated by birds and other animals. In the Everglades there are hammock islands, on some of which the Seminole Indians live. This Everglade region, it is claimed, contains 3,760,000 acres. Since ten acres or less is sufficient for the support of a family in this climate, there is room for 376,000 families. The whole cultivated area of Florida is estimated at 1,000,000 acres. It is interesting to compare the size of this wild territory with other parts of the world. For instance, the Everglades cover 5,875 square miles; Porto Rico, 3,550 square miles; Rhode Island, 1,250 square miles; Delaware, 2,050 square miles; Jamaica, 4,207 square miles.

When this area is once properly reclaimed there will be little of it which can not be cultivated. The complete drainage of these Everglades is not only being seriously considered, but is actually in progress. The following on the "Drainage of the Everglades" is from a recent issue of *Success,* by J. E. Ingraham, one of the vice-presidents of the Florida East Coast Railroad:

"There are great agricultural possibilities in the Florida Everglades. Though they are yet merely an expansive waste of swamp and lake and jungle, I venture to predict that they will be the location of hundreds of fertile farms within ten years, and will by degrees develop into one of the most productive tracts of land in the world. The barrier to the utilization of the Everglades has been, of course, the water which covers the greater part of them to a depth of from one to six feet; but it has been found entirely practicable to drain off the water. Work to this end has already been begun and is being pushed rapidly. When it is completed a tract of land one hundred and sixty miles long and sixty wide will have been opened to cultivation. The size of this region is not as important as the remarkable productivity of the soil. The latter is not only absolutely virgin, but has been fertilized by animal and vegetable life through many centuries. I am confident that its crops will lift Florida to a place among the leading agricultural states.

"The project of draining the Everglades attracted the attention of Henry B. Plant in the early nineties, but he was by no means sure that the scheme was feasible, so I, acting under his direction, undertook an expedition through the region. Despite its proximity to centers of population, it was then for the first time thoroughly explored by white men. Ours was virtually a voyage of discovery. We paddled our light boats on lakes and camped on islands that, I have good reason to believe, had never before been visited by any human beings but Seminole Indians, and by these but rarely. We underwent so many hardships that some of our party were compelled to turn back, but our efforts were not in vain, for we ascertained the important fact that the Everglades, along the whole 160 miles of the eastern side, are

rimmed by a rock ledge. We furthermore learned that all of the lakes are several feet above sea level, and we decided that there was nothing whatever to prevent the water of the lakes from flowing into the ocean and leaving the land drained if vents could be made in this long ledge of rock. The chief question before us pertained to the practicability of cutting through the ledge in various places, and dredging out outlets into the Atlantic, which is not more than two or three miles away at numerous points.

"Experiment proved that this work would present no great difficulties. It was merely a matter of a great deal of digging. Henry M. Flagler took up the project, and it is being carried out by his lieutenants. We are not only making artificial outlets through the rock, but are also, by ditching and dredging, turning large bodies of water into rivers and creeks which flow to the ocean. The work has progressed far enough to enable me to predict confidently the opening in Florida, within a very few years, of a great tract of land of almost unprecedented fertility."

When one considers what the Bermudas yield, with only twenty square miles of rocky land, the possibilities of this great Southern tropical peninsula seem almost limitless. The whole region is one of great interest, and although one of the first to be explored and partly settled it has remained dormant until lately. Settlement is difficult, but gradually obstacles are being overcome, and when competition in transportation facilities develops, the boom will be on in earnest.

This region of perpetual summer is also the natural gateway to the West Indies, and the great peninsula of Florida, like a huge finger, directs the way to fertile regions beyond, awaiting American capital and enterprise.

CHAPTER III.

TREES AS AN AID TO DRAINAGE.

LL trees, in fact all kinds of vegetation, transpire. Although a large part of the body of all plants is water (96 per cent in plants like the banana), a still larger quantity is absorbed by the roots and is again discharged by the leaves into the air. This passage of water into the air from the leaf surface of the plant is called transpiration. Water absorbed by the roots contains the nutrient substances of the soil. There is thus a current of water from soil to air through vegetation which is known, botanically, as the transpiration current. This keeps the plant turgid. When evaporation from the leaves is in excess of the supply from the roots, or in other words, when there is no transpiration current, due to an insufficiency of water, the tender parts of the plant wilt. The cells of the tender rootlets of plants not only absorb this watery solution but have a selective power in choosing from the many mineral substances contained in the moisture of the soil, the kinds and quantities needed for the use of the plant. If even one necessary element is absent the plant dies of starvation. These substances are left in the plant for the manufacture of wood and fruit, while the water which has served as the vehicle of transmission evaporates from the leaf surface of the tree. The actual source of the power of this great transpiration force is still unknown. It is a mighty pump that will lift enormous quantities of water from the roots through the wood to the topmost branches of a tree two hundred and fifty feet in height. In fact, every tree is a natural pump with many valves. The power that does the pumping is simply another one of the great problems in plant life which remain

to be solved. The leafage is a broad surface spread out to the sun and air. In addition there are numerous stomata (air-pores) which increase the porousness and promote evaporation of moisture from the surface. These air-pores or stomata open and close to suit the needs of the plant. The leaves and green twigs are then the special organs of transpiration.

The water evaporated in the five months from June to November from an oak standing perfectly free and apart and having about 700,000 leaves has been estimated at 111,225 kilograms. This is equivalent to about a quarter of a million pounds of water.

A clover plant has been found to give off in one day twice its weight of water. A crop of hay on one acre producing two tons has been found to use during its growing season more than six hundred tons or wagon loads of water.

Storer in a chapter in his work on agriculture on "Trees as Pumping Engines" quotes that a single oak in Germany in about five months transpired 264,000 pounds of water, or about eight and one-third times the amount that fell in rain on the surface it occupied. He mentions another oak tree that transpired 4,400 pounds of water in a single summer's day.

Some trees transpire more than others, and, of course, in a climate of continuous summer, transpiration throughout the year is enormous. Rapidity of growth is determined by the amount of moisture available. The amount transpired depends upon the supply of water, the rate of growth and the condition of the atmosphere. Given then a wet soil, a fast growing tree, such as a cedrela or eucalytpus or any one of a hundred or more fast growing tropical trees, with a dry, windy atmosphere, and you will have a pump working quietly and constantly that would rival a windmill.

In a parliamentary paper relating to Natal is the following statement: "Clumps of eucalyptus planted in undrained swamp lands at elevations up to 4,000 feet have been known to completely dry up the space within reach of their roots."

I have heard it said that in India eucalyptus trees were planted along an irrigation ditch. These trees robbed the ditch

of so much water that they were cut down. The region around San Paulo delle Tre Fontane, it is claimed, was drained and rid of pestilential fevers by the planting of eucalyptus. Along the Mediterranean shore I have found the belief prevalent that eucalyptus plantations keep off fever. Müller speaks of the cajeput tree (*Melaleuca leucodendron*) as the "anti-malarial tree." Many attributed this effect to emanations of oil from the leaves. It is a "poor lie that is devoid of all truth" and it is a poor popular belief that is not based on some shadow of fact or reason.

I think the modern development of medical science proving the causes and manner of transmission of tropical fevers explains it all.

In order to contract malaria or yellow fever one must be bitten by an infected mosquito. The notion that these fevers are carried by miasmatic emanations from swamp lands no longer holds.

To keep off fevers either one of two things is necessary—remove all mosquitoes that are infected or remove or segregate all people that can infect the mosquito.

The mosquito does not travel far. He must have water to breed in. Undrained land furnishes the breeding place. In the Roman Campagna the water was held in pockets and the land was difficult to drain by ditches. Trees were planted. They drained the land, the mosquito was left without a breeding place and without him, or rather her, since the female does the mischief, the fever was not transmitted.

The eucalyptus has been singled out as the great genus for this purpose, but there are other trees of quite as much value, which I shall mention later.

Eucalyptus rostrata, the red gum, is a favorite because it grows on moist ground with a clay subsoil. It will grow on land subject to fresh water inundations for a considerable time. In Mauritius it resisted hurricanes better than other species. It yields a heavy wood, which is highly esteemed in Australia.

Eucalyptus resinifera, the red mahogany gum, has proved best for the tropics. It is not, however, such a rapid grower. It yields a good timber, but has an unfortunate common name. It

should not be called mahogany, because it does not belong in the same class with this time-tried prince of timbers. It should not be called gum because the term gum to many minds carries with it little to recommend it.

In Cuba I found a eucalypt growing with magical rapidity. It was the fastest growing eucalypt I have ever seen in the tropics. An expert of the Department of Agriculture, Washington, D. C., diagnosed it to be *Eucalyptus crebra*, the narrow leaved iron-bark tree of New South Wales and Queensland. I am not sure that he is right, but if he is this species is the one to plant in Western Cuba. In our excitement over the eucalyptus, some of the many species of which are good for certain special districts, such as Southern California and Mexico, we have overlooked other Australian and American trees which are quite their equals, if not in many instances by far their superiors.

We have many species of the order *Myrtaceae*, to which the eucalyptus belongs, so similar to eucalyptus that the novice could not tell the difference. For instance, the rose apple or pomerosa and many other species of the genus *Eugenia* and allied genera, which have large seeds, grow very rapidly, and yield fruit as well as wood.

Any quick-growing tree such as the cedrela or cigar-box cedar will pump just as much, if not more, water than the eucalyptus. The Australian pine is a fine tree for swamp lands. It is storm fast, grows very quickly, in fact faster than any eucalyptus in Florida, and yields a fine, hard wood.

Melaleuca leucodendron, the cajeput tree of India, which yields the cajeput oil of commerce, is, according to Baron V. Mueller, a great tree for swamp lands. He thus speaks of it: "It can with great advantage be utilized for such areas for subduing malarial vapors in salt swamps where no eucalyptus will live." I have it growing successfully on the bay shore here in Florida. We have all noticed how the roots of trees will run to an old well and then form in great hair masses down its sides to the water below; we have all noticed how the roots of quick growing trees such as the poplars and willows will go long distances to a tile drain and fill it completely with hundreds of

rootlets; and we have all noticed how the roots of some trees will run out and under a pavement so persistently that they crack and ruin it. The rootlets are merely doing their part—hunting for moisture, so that the tree can hold up its head, and hunting for mineral food which is dilutely dissolved in the water which it drinks. When the earth fails to yield sufficient moisture and in consequence sufficient plant-food held in solution the tree begins to die at the top first—a condition called stagheadedness, which is the beginning of the end. In the selection of soils, look up and not down. The height of the timber is usually a good measure of the soil's depth and fertility. On an old homestead in this region there was a well cut from the solid rock. By the side of this well a wild rubber grew. The well was long ago abandoned and is now almost filled by its hose-like roots.

In conclusion let me say that the greatest function of the forest, aside from yielding materials useful to man, is soil betterment. It holds the soil in place against the erosive action of wind and water, but what is more important, the roots penetrate to the deeper layers of the soil, absorb the mineral substances and then deposit them again on the surface in the form of detritus, which soon becomes humus. Thus the surface soil is being constantly fed, thus the mineral ingredients of the soil are conserved and thus the wornout fields and ruinate lands of the tropics may be rejuvenated and rendered virgin. This deposit on the surface gradually raises the level and thus helps also in the process of drainage.

ON THE BEACH AT CAPE FLORIDA. (PHOTO BY HOMER SAINT-GAUDENS.)

COCO-PALM GROVE OR "COCAL" ON ONE OF THE KEYS.
(PHOTO BY FLORIDA PHOTOGRAPHIC CONCERN.)

From the Garden Magazine, November, 1910.

CHAPTER IV.

THE COCO PALM.

T IS so much better to call this tree the "coco palm" than the "cocoanut palm tree." There seems also no reason for spelling coconut with *a* in it. The source of this word is probably not known, but when no other source is plausible, ancient Greek or Latin is sought, and a possible origin is guessed at, for instance the Greek *kokkus,* a berry. As another instance the natives of the Bahamas are called "Conchs," apparently because they are fond of the shellfish called conch, from the Latin *concha,* a shell. It more than likely comes from a very old English word similarly spelled, meaning a "beach thief," or "beachcomber."

The use of an *a* in the word simply helps to confound it with cacao, coca, and a few other plant names with similar spelling. The Spanish call it *coco,* and the German *kokos-palme.* The generic name is *Cocos,* the specific name *nucifera,* and when Linnaeus called it nuciferous, or nut-bearing, he perpetuated in its name its most striking quality. The use of the word "perpetuated" is good, since *Cocos nucifera* is one of the few plant names which have not been changed a dozen or more times by ardent botanists.

From the standpoint of utility, the coco palm leads the procession in the tree world. As to beauty, that depends altogether on the character of your art education. I have heard both the royal palm and coco palm likened to huge feather dusters set on end over the landscape. This much is certain—a coral strand without coco palms would look like Father Time without his whiskers.

In spite of the fact that the fruits of the royal palm are only used for pigfeed, this tree is more stately and aristocratic than the coco palm. It is perfectly straight, smooth, and columnar and well fitted for avenues leading up to Southern mansions. The coco palm, on the other hand, is plebeian. It bends accommodatingly at the start, and has pronounced ridges where the massive leaves have fallen away, which give the monkey-like pickaninny a good toehold.

It is a fitting shade to the hut of a fisherman, for with a long-handled sponge hook he can pull down at any time a green nut which yields a cool, sweet, fresh, invigorating drink from nature's own distillery. Strange to say, this liquid is under pressure and, although there is not the decided "pop" which is always looked for in the case of a soft drink, there is a good active "squirt" indicating that the water is fresh and the nut sound. Inside, under the shell, which in this stage is just beginning to harden, there is a layer of soft nutritious jelly.

The white meat of the ripe nut is used for candy, feed for animals, and, when ground very fine, makes a cream which is delicious on fruits, etc. I have seen chickens, goats, dogs, pigs, and pickaninnies all feeding in the same yard at the same time on the white meat of the coconut.

The coco palm is a queer tree—it seems to love the winds and salt of the seashore; yet some scientist has tried to prove that its home is inland on a high plateau in South America.

It has been pictured in times past as a perfect adaptation to the seashore. What the date is to the desert, the coco palm is to the strand. The hard shell of the nut is filled with a rich oily meat which floats high. The germ is protected and well supplied with nutriment for the days of its youth. On the outside of the shell there is a pad of fiber which protects it when it falls to the hard coral strand. The nut will not break when it falls; it bounds and rolls like a ball down the incline into the sea, and floats and floats and floats till washed on some muddy shore which the coral polyps, the waves, and the mangrove trees have been many a year in making. Then it is gradually covered with sand and seaweed by wind and wave. Soon the tree springs from

one of the three eyes in the end of the nut. The leaves are at first simple, and in youth the tree needs shade, which it gets naturally from the bushes on the shore. Soon it throws out great compound leaves of woody texture, some of which are fully fifteen feet in length. Think of leaves fifteen feet long! In a few years, seldom under five, it bears a bunch of nuts, followed by other bunches in all stages of growth.

Then the mangrove island is fit for human habitation, fit for the home of some smoky colored, semi-nude sea-islander, who from this palm can garner all the necessities and a few of the luxuries of life. With the fish in the sea by the shore, and the turtles that lie and lay on the beach, starvation is not possible. Man's ultimate wants are shelter, food, and drink. The coco palm supplies them all, with more besides.

The Negro who lives in the shade of this useful tree has also fortunately developed a thick skull-shell, covered with a mat of tow. And well so, since the fall of a coconut from a sixty-foot palm is nigh like a ball from the cannon's mouth. A single fruit of the double coconut of the Seychelle Islands weighs from forty to fifty pounds. Our common coconut when green will weigh at least five pounds. Over in Brazil men wear bucklers of wood to protect themselves from the fall of the balls of Brazil-nuts. These actually plant themselves when they hit the soft, moist earth of the jungle.

Still there are scientists at work who have proved, to their own satisfaction at least, that the coconut does not float far, that it soon loses its vitality when soaked in salt water, that it rarely sprouts when washed upon the beach, and that it has been distributed completely round the globe mainly by the hand of man.

The waves wash the tree half over, break over it with great fury and bang great booms against it in times of storm, but it lives on and bears on in spite of abuse. Dig it up carefully and pet it with fertilizer, and it will more than likely turn yellow and die. Cut off its tough fibrous roots to the stub, and cut off its leaves, then stick it in the ground as you would plant a fence-post, and it will very likely live.

In Porto Rico the water of the green coconut is relished by everybody. It is almost a national beverage, and a wholesome germ-free beverage it is—absolutely free from chemical adulteration and ptomaine poisoning. All through the day and late at night in Porto Rican cities may be heard the welcome call of the *coco-de-aqua* vender.

In some parts of the East the fruit stalks are cut while green and tender, and the stub is attached to a light bamboo trough. Several flower-stalks may be thus treated and several little troughs may be led to one spot where there is a receptacle in the form of a big gourd or calabash awaiting the liquid which oozes out and trickles down to form a cider or toddy.

Could one imagine a state more seraphic to the minds of many men than a hut closely surrounded by coco plams with bamboo conduits leading this cidery juice slowly, but continuously, into a receptacle on the kitchen table?

From the outside of the nut comes the husk or coir which is used for cordage and woven into tough matting for church aisles, office floors, etc.

The oil which is expressed from the copra, or dried meat of the nut, enters into butter, soap, etc.

The hard shells are carved and used for utensils of various kinds.

The trunk wood is poor and hard on tools. It is used, nevertheless, because it is cheap and answers the purpose, although, of course, a fine full-bearing coco palm is never cut for its wood. It is called "porcupine wood" because it has hard bundles of tissue in it which, when cut on the slant, appear like spines in the wood. The heart is spongy, but the outer layer, although rough, is tough and durable.

A coco palm usually bears a terrific weight of fruit, and bears it continuously, but if it fails the native hacks it or drives iron into it or cuts deep notches into the trunk, which at the same time facilitate climbing, and lo! it bears—bears because its vegetative activity has been restrained, and, like every other creature on earth, it strives all the more to perpetuate its kind.

Among the leaves around the stem there is a natural cloth, to

be sure not woven with warp and woof, but of such a nature that primitive man could have easily taken the hint. I don't know whether this cloth is ever used for wearing apparel or not, certainly not in the majority of even remote regions where gunny sacks are plentiful.

There are those who grow passionately fond of the coco palm, especially when grouped by the shimmering particolored sea of the tropics. There is nothing sorrowful about them; in the breeze they never emit a whining tune as do the pines, but a

A CAMPHOR TREE.

lusty clattering and banging. I heard an old sailor once say that he wanted to be buried in the shade of a coco palm by the shore.

But like all good things on earth it has its tormentors. In parts of the West Indies it has fallen a prey to a fungous blight. Strong efforts are being used to check its spread, and close watch should be kept to prevent it from entering Florida from Cuba, since in south Florida there are many coco palms, and many acres of land where they can be successfully planted.

PICKING SAPODILLAS. (PHOTO BY PROF. JOHN CRAIG.)

A LIME TREE ON ELLIOTT'S KEY GROWING IN THE CORAL ROCK.
(PHOTO BY PROF. JOHN CRAIG.)

From The Garden Magazine, September, 1910.

CHAPTER V.

THE LIME AND SAPODILLA, COMMONLY CALLED "SOURS AND DILLIES."

VISIT a conch farmer on the Florida Keys and the conversation will soon drift to the condition of his "sours and dillies."

The "sours" or limes were planted long ago mainly for their acid juice which was cherished by seafaring folk to combat scurvy, while "dillies," the short for sapodillas, were grown because they have always been held in high esteem by the natives, both black and white, of the Florida Keys and the Bahama Islands.

The buccaneerish taint in my blood got the upper hand when I bought a farm on the Keys, well stocked with limes, sapodillas, and coco palms, and a sloop which I named The Dilly. Since then my interest in sours and dillies has grown, in spite of devastating storms, tricky commission men, and long droughts.

These two fruits grow together on the Keys among lime rocks of coral origin, where soil is often so scarce that on some acres, which one could easily select without wandering far, a man would have to scrape with a spoon for a whole day to get a barrow load. The rocks stick up as though the bones of mother earth were dry and bare, without skin or flesh of any kind.

In the crevices of the rock there is some soil, and from the porous rock itself the plant must derive nourishment. At any rate, the lime tree produces sour limes, and the sapodilla tree sweet sapodillas, in great abundance.

If one plows this soil he must use dynamite, and all weeding is done with a machete or a sailor's sheathknife.

In a moist season the little lime, hardly more than a seedling, is planted in a rock crevice or pot-hole. If the ocean keeps its place and the weeds are kept in check, the lime tree will thrive and in three years will blossom and fruit—a fruit with a delicious refreshing aroma which puts the lemon to shame. The lemon is a coarse, thick-skinned, rough, raggy and acrid product compared with the lime. School children in Boston eat limes pickled in salt-water, at recess. The lime is a naturally refined and delicate acid fruit.

The lime is a spiny, semi-wild crop, although a spineless variety from Trinidad is being tried. It stands no frost and will not flourish if too carefully tended. No fertilizer except a little half-rotted seaweed, and no cultivation except a couple of weedings a year, are needed. Heavy crops of fruit are produced almost every summer, often with a light winter crop, and the limes from the Keys are especially cherished because, unlike mainland limes, they will carry long distances without deterioration.

The lime is thin-skinned, full of juice in proportion to rag, of a delicate inimitable aroma, and once a lime-convert the epicure forever after spurns the lemon.

There is little trouble in getting them picked in spite of the mosquitoes and their needle-like thorns.

The lime is in active demand because there is an unquenchable desire—the awful thirst which besets the American people in the summer time. Great pyramids of limes may be seen at almost every soda fountain where limeades are in vogue or at the club where the gin-rickey holds sway. A whole lime for a glass with the thin aromatic rind thrown in is the rule. For that reason big limes are not wanted, and then, limes are usually bought by the barrel and sold by the dozen.

My crop last year on about four acres of land amounted to two hundred and some barrels. A flour barrel is the standard and holds about one hundred and twenty-five dozen limes. They netted me on the average $3.50 a barrel. They probably retailed at twenty cents a dozen, costing the consumer about

twenty-five dollars a barrel—a fair instance of the abysmal gulf between the consumer and producer.

Limejuice has other uses than assuaging thirst. In the form of citric acid it is extensively used in manufacturing establishments.

A little lime juice put in the water in which meat is boiled renders it more tender and palatable.

Added to desserts, other fruits, jams, etc., it brings out their peculiar flavors and removes flatness.

It offsets hardness in water.

With salt it will clean brass and remove stains from the hands.

It improves and whitens boiled rice and sago. It is a soothing application to irritations caused by insect bites. It is better than vinegar as a salad dressing. It makes a cleansing toothwash diluted with water. It is good for the liver, useful in fevers, and they say a little limejuice in the water you drink is sure death to the typhoid bacillus!

And so I manage my lime plantation—a kind of *laissez-faire* system—but it pays a good interest. A new-comer would hardly notice it in passing. A colored man called Parson Jones, otherwise known as the Sultan of Cæsar's Creek, has an eye on it. Every month or so I meet him in town, but his good wife, who picks limes also, has not been away from home for three years. Three or four times a year when we want to bathe in the briny parti-colored waters of the Keys or seek plunder on beachcombing expeditions along the shores, I drop in to look over my plantation and pick some green coconuts for the refreshing liquid which they contain. My only concern is in summer, awaiting returns from shipments. Sometimes the sales are disappointing, especially in the region of New York, if a ship has arrived with a cargo of "sours," each wrapped in brown paper, from the island of Santo Domingo.

My sapodillas were planted because they yield a very sweet fruit and stand firm in the teeth of the gale. The trees are so dense and sturdy that they form a wind-shield and storm-break. Good dillies have a local sale of a penny each. Some are

smooth, light brown, with a pink blush on one side, but many resemble a rusty-coat apple. The colored gentry will invest in this luxury even when grits are low in the larder. And the raccoons are so fond of them that ripe dillies on the trees are seldom found.

But there is a future to the dilly beyond all this. The gum or milky juice of the tree is the basis of chewing-gum, and although the world at large may not be cognizant of this impending calamity, and although even the conservation commission has not considered it, we are on the verge of a chewing-gum famine. The price of this gum, called chicle, has risen, the quantity given in a cake of gum has been reduced to the severest minimum, and adulteration has reached its maximum. Still the demand is beyond the supply.

The man who plants limes, with sapodillas for a wind-break, is actually, but perhaps unwittingly and indirectly, furnishing important ingredients for two articles not destined to uplift mankind—the gin-rickey and chewing-gum.

In addition to yielding a sweet fruit and a valuable gum, the wood of the sapodilla tree is probably as near everlasting as wood can be, in fact it outlasts many metals. Lintels of zapote, or sapodilla wood, in the ruins of Mexico are still hard and sound, having endured many centuries, probably 3,000 years.

In a few years, no doubt, there will be many chicle plantations, under the control of companies inducing the unwary to part with their coin on the promise of great future returns, as in the case of rubber.

Even now chicle figures in American stock reports, and American chicle is bought and sold in Wall Street by the side of stock of other great corporations.

A PAPAW TREE FULL OF FRUIT.

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CHAPTER VI.

THE BANANA AND THE PAPAW.

NEVER cease to marvel at the banana and the papaw. Statisticians who have predicted a famine from the increase of population without a corresponding increase in the production of breadstuffs have neglected one potent factor—the banana.

The papaw or papaya is another succulent, quick-growing, prolific tropical fruit-producer, belonging in the same class of marvels with the banana, but is not related to it.

The banana has been the cause of the formation of steamship lines to the tropics; it has caused the building of railroads within the tropics; it has figured conspicuously in Spanish-American politics, and even the dreaded Black Hand is known to many as "the Society of the Banana." We are now importing $12,000,000 worth of bananas annually.

The banana is marvelous because of its prolific nature, yet it forms no seeds, and the great bunch of foodstuff when not used by man or other animals simply rots, and the stalk which produced it dies to give space to another to repeat the performance.

With me the banana is a favorite crop. I dig a deep hole in moist soil or muck. Into this hole I empty my waste basket containing old letters, newspapers, returned manuscripts, etc.; also the kitchen barrel containing tin cans and other stuff that the chickens will not eat; then I throw in sweepings, rakings, old fertilizer bags, old iron, useless wood, bottles, and trash of any and every kind. On top of this I put a good forkful of stable manure and then some sand or muck. Then the banana root, often no bigger than your two fists, dry and lifeless-looking, after having been kicked about in the sun for a few days,

waiting for planting time, is stuck into the ground and covered with a few inches of dirt.

In three months, if the weather is good, you may sit in the grateful shade of this big green-leaved plant. I almost called it a tree, because its stalk is as big as a man's leg and its foliage may be several feet above your head, but according to the definitions a tree must have a central *woody* axis, and to the banana there is no woody texture; it is all as soft as a cabbage and is usually completely consumed in a short time when left to chickens.

Within a year a bunch of fruit is produced which a man can hardly carry—a bunch so big that it often bends the plant to the ground unless propped by forked sticks. As soon as the bunch and stalk are cut, up shoots another and another. A dozen or more suckers are at the same time produced so that more and more may be planted. What an active chemical laboratory this plant is to form so much leaf and stalk and fruit from soil and atmosphere in less than a year!

It is a sight seldom forgotten to see picturesque Indians in Central America working in banana plantations where the plants have met to form a forest-like canopy. In Mexico there are young coffee trees in the shade of these banana plants. I have seen the semi-nude Karif women of British Honduras meet the ship far from shore with their dugouts loaded to the gunwales with bananas.

But the most marvelous kind of banana culture may be seen in the Bahamas, on the Island of Eleuthera. Here there are deep holes called "banana holes" some of which are fifty or sixty or more feet in depth. At the bottom of these holes is moist rich earth. They are just like deep dry wells. A banana root is planted in a basket of soil, which is lowered with a rope to the bottom. The root sprouts and the stem shoots up like magic till it reaches the top of the hole. Then the foliage spreads out in the sunshine like flowers in a vase. There it grows and forms its bunch protected from the wind in the cool moist recesses of the hole. The bunch is formed at the surface of the ground, so that the enterprising native has but to pull it over

with boat or sponge hook, sever it from the stalk with his machete, and walk proudly home with a week's provender for himself and family on his head—a fitting illustration of man's mastery over nature.

Little wonder that the native of the tropics is a lover of leisure; little wonder that he rests content in his palm-thatched hut amid his beloved bananas.

A good papaw will bear a hundred or more melon-like fruits, a fruit to the axil of each leaf, ripe at the bottom and in all stages of development up to the bloom. The staminate and pistillate flowers are usually on separate plants, and the fruit varies a great deal in quality.

The fruit contains a large quantity of black, peppery seeds which may be removed *en masse*, as in the case of the cantaloup. A good papaw, cold and treated with sugar and lime-juice, is relished by many people on a par with a muskmelon. The seeds are usually scattered in the midst of rubbish during the rainy season. As soon as the plants begin to bloom, all but one or two staminate plants are destroyed. In the course of a few months one may begin to pick papaws every day or so.

Of course some people have to learn to like them, but one lady that I know, of good habits, will steal this fruit when buying and begging fail. She has for the papaw the same irresistible longing that the negro has for the watermelon.

Next in wonder to the prolific nature of this fruit is the marvelous fact that it contains a natural food-digester, a ferment now famous the world over as a medicine. Under various patent names it enters into the lists of many drug firms. By means of it men have already accumulated fortunes—not the producer, but the manufacturer and peddler who invent appealing names and have them patented.

I have before me a sample bottle containing one hundred pills for twenty-five cents. It is marked "Physician's sample. Our own preparation of the digestive juice of *Carica papaya* with willow charcoal." It is also marked a sure cure for dyspepsia or indigestion. I have often wondered where all this juice comes from. I have traveled in many parts of the tropics,

but have never seen or heard of anybody collecting it, and the plant will not grow north of the frost line.

How fortunate the dweller in the tropics! If his meat is tough he can wrap it in papaw leaves over night and it will be tender in the morning. If his meal has disagreed with him, he can step into his back yard and pick and eat a papaw for dessert.

Both bananas and papaws, however, are picked when full, but still green. This must be done to save them from the rats and birds. The tropical planter has bananas to roast and bananas to fry, sweet bananas and acid bananas, big bananas and little bananas, yellow bananas and red bananas—in fact, varieties galore.

If his bananas are slow to ripen, he can hurry the process by putting the bunch in a barrel and filling the barrel with warm air and smoke. This is easily done by turning the barrel upside down, hanging the bunch to a nail in the bottom which is now the top, and building a small fire in the hole in the earth under it.

In a native school in India I have been told the pupils are fed almost exclusively on bananas. Bananas must be had at all times in proper condition. So they have a trench in the earth arranged in such a way that they can fill it with bananas, warm air, and smoke at any time and thus hasten the process of ripening.

The banana has been in a way the emancipator of the tropics. In many instances it has led the native out of thraldom. In many places from which bananas are not shipped he must work in the fields at a small recompense. At banana ports he can usually receive a cash payment for every full bunch. With bananas to eat and bananas to sell, the copper-colored native can rest in his home-made hammock, thump his home-made guitar, and smoke his home-made cigar with only one worry, and that is that he might at any time be forced to serve in the army of either the *de facto* or *de jure* government, for the cause of liberty. Even so he knows that the folks at home can live on the bananas and papaws and other fruits and vegetables growing in a semi-wild state around his bungalow.

CHAPTER VII.

WHAT WILL GROW IN THE EVERGLADES.

O MANY plants will grow in the Everglades when drainage is complete that a book and not one or two articles would have to be written to cover the subject and do it justice. The growing of things is, of course, the purpose of all reclamation, and upon this alone depends the future value of the land. *This Everglade land when drained, owing to its favorable location, will produce a greater variety of crops than any other land in the United States of America.* We know of many things which have been successfully grown on the edge of the Everglades already, but think of the hundreds of useful plants now growing in other parts of the world which have yet to be introduced and tested!

Let me say at the start that this Everglade drainage question is no question at all; it is a question only in the minds of doubting Thomases, who are prejudiced, who are ignorant or who are born knockers and who belittle every project in which they have no hand and out of which they can make no rake-off. We need not go to Europe for examples of successful works of a similar nature. The Dutch in fact would smile at such a project. They are making farm lands out of such places as Biscayne Bay. They reclaim places below the level of the sea. They pump the water out. Look over the great irrigation projects of our West, or better still the banked lands of the Mississippi Valley where huge and costly levees hold our mightiest river in check. The overflow of Okeechobee is insignificant compared with the floodwaters of the great river which drains a third of this whole country.

The first product for our consideration on Everglade soils

should be forage. Few countries can be highly and wholly successful in an agricultural way without being able to raise sufficient food for farm animals of all kinds. Aside from the expense of feeding these animals on hay and grain brought from a distance, they are necessary for the maintenance of soil fertility and the conversion of roughage into manure, which is an expensive and to some extent an imported article. Enough vegetables are wasted to feed many pigs. The fertilizer bill is the main item of expense.

In the West alfalfa means corn, alfalfa and corn mean hogs and cattle and horses; these in turn mean fertility, money, prosperity and happiness.

There seems to me to be only one great work in this world; all other aims are subsidiary to it; it is the production of happy and prosperous homes. Every man who honestly works to that end is a benefactor to mankind. The men who reclaim waste land, the men who introduce valuable plants from foreign lands, the men who by selection improve varieties and increase productiveness, the men who devise means for combating plant diseases, in fact the men who in any way increase the productivity of the soil in proportion to the labor expended thereon are doing a great work for all time. They may be long forgotten, but the effects of their labors will roll down the ages for all time to come. All other movements are insignificant compared with the one great movement of producing the largest amount of food and shelter for our people with the minimum amount of labor outlay.

In the matter of forage for animal feed, velvet beans, cowpeas, beggarweed and grasses and other legumes are already common. The Indians have successfully grown corn for many years on islands in the Everglades, and the green corn dance has always been to them an important event. In places in the Everglades where vegetables have been recently grown there are oats waist high with good heavy heads, having sprung from seed in the manure used for fertilizer or from oats, accidentally scattered by the horses while eating their mess. There is no stronger hay than oats cured in the milk, and in the land where

I was bred farmers all said that animals fed on fodder of this kind needed no grain. And why should oats not thrive? The winter climate of Florida is not unlike the summer climate of Northern regions where oats are abundantly produced.

The soil has never been inoculated with the bacteroid of red clover, yet in places red clover may be seen in full flower, having sprung from the seed from baled hay. This same baled hay brings in many weeds from the North, and the Canada thistle and other noxious weeds may be already seen in the vegetable patches on the Glades.

STATE CANAL IN THE EVERGLADES, FOR DRAINAGE, IRRIGATION AND TRANSPORTATION.

Remove the water from the Glades, plant forage crops, keep animals, convert all roughage and waste products into manure and the agricultural future of this whole region will be assured for all time to come. Farming seldom succeeds without manure, work and sense. The maintenance of soil fertility and the con-

trol of plant diseases are the two main agricultural problems throughout the world.

It does not make any difference where you live, says Gleanings in *Bee Culture,* alfalfa can be made to grow all the way from Maine to Florida. Here are the directions boiled down from the *Ohio Farmer,* written by Willis O. Wing, the great authority on the subject of alfalfa:

"Please do not make a mystery of alfalfa-growing any longer. It is such a simple matter that one can write all the rules needed in small space. Here they are: Drain the water out; let the air into the soil; fill the land with lime if nature did not do it; get humus into it—stable manure or some vegetable matter to rot and promote the life of bacteria there. Put in plenty of phosphorus. Sow good seed, with a little inoculated soil. Lime brings afalfa. Alfalfa brings corn. Corn brings money, homes, pianos and education for farm boys."

As to the production of vegetables nothing need be said, since it is hard to name a common garden variety which will not thrive on the glades.

As to the production of rice, sugarcane and tobacco the prospects are not so bright for the *small* farmer. They will no doubt all grow well in the Everglades region. In the case of rice considerable capital is necessary in order to compete with Texas and Louisiana, where machinery has materially lessened the cost of production. There is a large rice eating population throughout the world, and although the price may be low the demand is unlimited.

The development of sugar estates requires much capital, but the system of sugar production may change. Experiments along this line are now in progress in Cuba. The plan is to shred the cane, drying it and baling it with the sugar in it. In this form it is shipped to northern refineries. Thus handled they are able to get more sugar out of it and the bagasse which is left is fit for the manufacture of a coarse grade of paper. If this new system proves successful one farmer or at most half a dozen farmers could afford the necessary machinery and raise

cane profitably even if there is not a big sugar factory in the vicinity.

Tobacco will no doubt grow in the Everglades, but I have never seen it tried to any extent. It is quite possible that it might be successful and yield a leaf of superior quality or something out of the ordinary like the Perique of Louisiana.

Cotton may also prove a valuable crop. The climate surely suits it and I have seen it growing elsewhere on soils of a similar nature.

Bananas may be successfully grown. The Cavendish variety seems best suited for the purpose. There need never be starvation in a region where bananas will grow. It is certainly one of the most wonderful food producers of the world. It has been grown successfully and of delicious flavor on the edge of the glades for years. It continually produces food from the same root and after the bunch is cut the chickens will completely consume the succulent stem and leaves.

The Everglades will grow many of the vegetables and forage crops of the North in midwinter, and in addition a long list of tropical trees, fruits and vegetables which cannot be grown elsewhere in our country, some of which are well known, but many kinds have yet to be tested. In another article I will mention some of the most promising of these, since in addition to food many of these tropical plants yield medicines, gums, perfumes, dyes, tanning materials, cabinet woods, etc., of more or less value to mankind.

All that part of Florida south of Ft. Lauderdale is tropical and has a tropical flora. It is the only part of the United States where the mango, avocado, sapodilla, anonas, etc., thrive and although many of these tropical fruits ripen in the summer time, they may be preserved no doubt into midwinter by cold storage.

The territory toward Cape Sable (Lower Glades) is still a wild and unreclaimed region. Its development has just begun, although its possibilities may be unlimited. The whole country needs people and capital, coupled with active enterprise. The tide is moving Southward and it is human nature to follow the crowd. Some will not stay and some will not succeed. Home-

sickness has killed more soldiers than bullets. Some people cannot cut loose from old associations and are not fitted for the life of pioneers. Others love it and are stimulated and improved by it. Only a certain percèntage can succeed at agriculture, anyway, anywhere, since although it is the most important, it is at the same time the most intricate of all professions. One must also have foresight and business ability to fight against soulless transportation companies and tricky middlemen. If one cannot prosper in agriculture in Southern Florida, there is little hope elsewhere in this line.

The newcomer cannot freeze to death, and unless hampered by illness and dire misfortune he cannot starve, because wild in the woods is comptie or coontie, a plant which yields a starch equal in quality to sago. This still serves people in remote districts and was at one time the mainstay of the settler. The waters teem with fish, and poultry thrives.

Although in the beginning there may be isolation and discomfiture, the man who works can make a living and a home such as cannot be made elsewhere in the United States in the same length of time and with the same amount of capital.

One thing is certain, if one is in search of a tropical climate and a place to grow tropical crops, he will settle in Southern Florida or go out of the United States, and if he goes out of the United States he will have to face conditions and people with which he is not familiar, and to which he can never become wholly reconciled and there will always lurk in him a desire to return to his country and his kind.

CHAPTER VIII.

VALUABLE TREES FOR THE EVERGLADES.

N THE following article I shall mention a few trees specially worthy of cultivation and certain to succeed on Everglade soil when drainage has sufficiently progressed to lower the water table three or four feet below the surface level. Some of these trees will stand submergence for a short time. Even grapefruit or pomelo will stand submergence in two or three feet of water for a period of a couple of weeks without apparent injury.

The following opinions are based entirely on my own experiences and observations. These are based on ten years of experience in the tropics, especially in Southern Florida, and fifteen years of experience as a forester.

Bamboo (*Bambos vulgaris*) is very abundant along mucky water courses in the West Indies, where it forms stately groves or thickets. Although there is not a fortune in growing bamboo it is highly ornamental and the poles are very useful on the farm. It is sure to become a great favorite for Everglade planting. The Government is now experimenting, and in a short time we may be able to select varieties especially fitted for fish poles, furniture, etc. Bamboo throws a dense shade and is fine as a shelter and forage for poultry.

Of the palm family the royal palm (*Roystonea regia*) and the coco palm (*Cocos nucifera*) are of first importance. The royal palm is native to Southern Florida. It loves a moist, mucky soil. It is a majestic tree for avenue or roadside planting. Its berries for pigfeed are equal to corn.

Although the coco palm is a lover of the seashore, it will

grow on moist soil several miles inland. Just how far it is difficult to say, but I have seen it growing in the West Indies ten miles from the coast. This tree and its many products are too well known to need description. It is sufficient to say that it is considered by many authorities to be, on the whole, the most useful member of the plant world. A home in the tropics, at least near the seashore, seems incomplete without it. Many nuts were planted years ago on our sandbeaches, and although many did sprout and grow, thousands were lost because the young, tender leaves of the germinating nut were devoured by rabbits.

Australia pine or beefwood (*Casuarina equisetifolia*) is second to none as a quick hardwood producer in mucky soil or in saline land along the coast. In my opinion *it is superior to any eucalypt that I know of for the production of hardwood lumber.*

Very few of the eucalypts produce first-class sawlogs in a short length of time. The eucalypt is not a sawlog proposition. I am upheld in this statement by Bulletin No. 61, Agricultural Experiment station, Tucson, Arizona: "It is not very likely that eucalyptus culture will ever prove a success as a *sawlog proposition* in any part of Arizona." I think I can safely say the same for this part of Florida. It is a pole, sleeper and fuel proposition and a California proposition. There is no reason why we should ever concern ourselves about fuel anyway. There is no danger of freezing to death in this part of Florida. The limbage alone will be sufficient; there will always be a lot of waste lumber, and then the coal supply of the Eastern United States is by no means exhausted. Plant for fine timber or other valuable products. The fuel question will take care of itself in the tropics.

We have several native trees belonging to the same family as the eucalyptus, and they are apparently quite as good. The rose-apple or pomerosa belongs to this family and is a magical fuel wood producer on the edge of streams in Cuba. It looks just like a eucalypt and yields an abundance of edible fruits. This tree would succeed on Everglade muck. I am growing

another tree similar to the eucalyptus on muck soil. It is the cajeput of India. It is a beautiful tree, of very quick growth and yields the cajeput oil of commerce. This oil is used in India for rheumatism and I believe is the basis of some massage creams and hair oils.

My choice of all the softwood trees, which produce fine timber, are easily propagated from cuttings, free from disease, and grow with great rapidity, is three or four species of the genus *Cedrela*—the commonest of which is *Cedrela odorata* or Cuban cigar-box wood. The wood of this tree is worth more than mahogany; in fact, much of the so-called mahogany in the market belongs to this genus and is not true mahogany.

In the spring of the year stick a cutting, twelve inches long, of *Cedrela odorata,* Cuban cedar, *Cedrela toona,* the red cedar of Australia, or *Cedrela Brasiliensis,* the acajou of Brazil, in moist muck land and in six weeks it will have shoots on it six feet high. I have specimens growing at the rate of more than one foot a month. The trees resemble walnut trees and lead as softwood timber producers for tropical regions.

Were I engaged tomorrow to plant a tract of land in trees for lumber on the Everglades I would plant Australian pine for hardwood and Cuban cedar for softwood.

For quick growing, valuable shade trees I would like to recommend the Spanish laurel (*Ficus nitida*) and the Sacred Bo tree of India (*Ficus religiosa*). The wood of these trees is no good but they afford a fine shade, are very decorative and grow very quickly.

I think all the trees mentioned above will hold up in bad winds. On mucky soil one must select trees that do not blow over easily. That is a fault of the eucalyptus in this region. It probably would not happen if the tree could get deep rootage.

Another good shade tree for mucky soil is *Thespesia populnea,* called in Cuba the Florida mahoe (*majagua de Florida*). although not a native of Florida. It bears a beautiful flower and is easily reproduced from cuttings. A brother to this tree, called "maga" in Porto Rico, is one of the most beautiful trees

I have ever seen. I have not been able to get seeds or cuttings for Florida, but I hope to some day.

Speaking of fuel wood above, I think we have the best fuel wood producer in the world. It is the Florida buttonwood (*Conocarpus erecta*). This tree grows on the seashore. The wood gives out a great deal of heat and produces very little smoke. *It will now bring twice the price of any other fuel wood in Key West or Nassau.*

The sapodilla is a great favorite of mine. It grows especially in the hammock, but will, I think, grow well anywhere in the glades when drainage is complete. It is stormfast and tough, it produces a wood that is everlasting, a fruit that is good and salable locally, and a gum called chicle, which is in great demand in the manufacture of chewing gum. In fact, we are on the verge of a chewing gum famine, owing to the scarcity of this gum.

The mastic is a fine native hardwood.

Princewood is also a good wood. Its bark is a splendid tonic, containing quinine or a similar drug. It is worth while to plant a tree or two of this just to have a fine, unadulterated tonic near at hand.

In addition we have mahogany and Jamaica dogwood, well known native woods of excellent quality and in demand locally. Mahogany is ordinarily regarded as the "king of all hardwoods." I have sent samples of our mahogany, here called madeira, to England and France and experts there pronounced it of first quality for the manufacture of solid furniture. This grows wild on islands just south of the Everglades.

We have other woods of great value too numerous to mention in one article. In addition to the plants I have already mentioned, there are, of course, many tropical fruit trees and many ornamental shrubs and vines.

CHAPTER IX.

SOME COMMON FLORIDA PLANTS.

HAVE often been asked to recommend plants which will make good hedges for South Florida. For this purpose I know nothing better than Carissa or Natal Plum. There are supposed to be two species of Carissa in Florida—grandiflora and arduina, but I can see no difference. This bush is always a rich dark green. It has vicious thorns; it bears a sweet scented white flower and red plum-like fruit. It is easily reproduced by layering and may be grown from seed. It is best always to propagate from a heavy bearing plant, since it seems that all strains are not the same in this respect. When cooked the fruit makes a sauce hardly distinguishable from cranberry. The sauce is improved by the addition of a few chopped raisins. This plant bears throughout the year, and the sauce is welcome at almost every meal. I believe this fruit can be successfully dried or evaporated, as are dates, figs, raisins, prunes, etc. The home of this bush is South Africa, where it is effectively used for hedges. It seems to be perfectly adapted to Florida conditions.

Another good hedge plant is the lime. This yields the well-known "sour" of commerce which will in time no doubt replace the lemon. For good limes there is a growing demand and after one has become accustomed to using them he ever after spurns the lemon. No home in the tropics is complete without a few lime trees.

The same may be said of the guava, sometimes referred to as the "apple of Florida." The guava grows with little care,

fruits heavily and is perhaps the greatest of all jelly fruits. The ripe fruit has a smell which is at first detested by the newcomer, quite in contrast to the aromatic lime, but one usually learns to relish it, after a time, out of hand. Guava jelly brings many dollars to Florida and I know several small jelly factory owners who ship their products to every State in the Union and to England as well.

The Surinam cherry is a handsome bush. It yields an abundance of rich red cherries which are relished on a par with northern cherries by many people. It is of course in no way related to the true cherry of the North, and it has a slight resinous flavor, but it is a good substitute.

Around every home there should be many pigeon pea bushes. This is the cajan bush of India and Africa, now common throughout the tropics of the world. The peas are worth fifteen cents a quart. They make the famous pigeon pea or Congo pea soup. The negroes cook them green. They shade the ground, improve the soil, keep down weeds and deposit a rich leaf-mold over the surface of the ground. I plant them in my grove. Chickens, quail and doves are fond of the peas and they flourish in the shade, scratching for bugs and the peas which fall.

The Castor bean grows well in Florida and ought to be an extensive industry. There is good demand for the oil, and the pumice from the seeds is a fine fertilizer.

All of the above have been introduced into this State but are now perfectly at home here. Among our native plants we have many yet to try and to improve under careful cultivation.

Some time ago my attention was attracted to a little pea-like plant growing by the roadside. It reminded me of the white clover of the North and like the famous camomile grows the faster the more it is trod upon. I am testing it and think it will make a fine lawn plant. In looking up its name I find it belongs to the Indigo genus, Indigofera mineata, and this reminds me of the fact that indigo was once extensively grown in Florida before the days of aniline dyes and synthetic chemists.

In patches out in the Everglades there are many pond-ap-

ples. The pond-apple is the Florida representative of the great Anona family which includes many delicious fruits. Some people eat the pond-apple and I think I have seen it on sale in Mexican markets. The wood of the pond-apple is almost as light as cork, and may be used in place of cork for net floats, etc.

The pond-apple may prove a good stock on which to bud the famous Cherimolia, Rollinia, Uvaria and other choice, but little known, fruits of this order.

Nothing is commoner on islands in the Everglades than the Coco-plum. This is a beautiful small tree yielding a fruit which makes a fine preserve. There is great variation in the quality of the fruit. In many cases it is mostly one big seed but I have seen some that were large and meaty and well worthy of cultivation and improvement. It is not very distantly related to the peach, apricot, etc., being of the same family, and might be useful as a hardy stock for budding something of greater merit.

We have a wild West Indian cherry fruiting in our hammocks which might be useful also as a stock for budding purposes.

I have used above the word "hammock," the term applied in South Florida to a dense hardwood jungle. This is not the same word as "hummock," or the same as "hammock," a swinging bed, but is probably a word of local Indian origin, spelled in early times "hamak."

I will conclude this chapter with a few words in reference to the humble coontie or comptie, a little plant which grows wild everywhere in the pine woods, avoiding the wet places. The root of this plant kept the early settlers supplied with starch for bread, as well as the Indians before them. It was the main industry of this country in the early days. The starch from the root is still in demand. It is a sago. From it easily digested and nutritious biscuits can be made. In the wild state the plant contains prussic acid and is poisonous and for that reason is never molested except by man and the comptie fly, a beautiful insect which is immune to its deadly juice. Fire does not injure it, in fact helps to scatter the seeds, since the heat opens the cone-like head which holds them.

Cassava also grows like a weed in Florida. From its root a starch is made. If further treated this starch becomes the tapioca of commerce.

With its sunshine and its moisture, with its host of useful native and introduced plants, with its black mucky soils and light sandy soils, with its vast beds of phosphate holding great stores of the most precious of all plant foods, phosphorus, with its long coast line and canals and harbors to come, it seems to me that all this great State lacks is people with capital and energy to furnish fun and feed for millions.

CHAPTER X.

VINES FOR EVERGLADE PLANTING.

N THE development of a home in a tropical country there is no group of plants which give as much gratification as do the vines. They grow quickly, they afford shade in a short time, they occupy but small space, in fact space which would otherwise not be utilized, and in addition many vines yield products which are quite equal in value to other crops of forest and field.

They are in a peculiar way attractive, and to many people far more attractive than bushes and trees.

They gracefully cover unsightly places and clamber into nooks and corners, covering with a rich green fences and outbuildings and at times are a delight beyond expression when in the acme of their bloom. A poultry wire fence covered with vine is usually a more effective screen than a solid board fence and although the effect of complete seclusion is secured the air can filter through.

In the old world, where space is scarce, even fruit trees, such as figs, peaches, apples, lemons, etc., are grown on trellises. In this case the fruit is larger, brighter in color and of better flavor because of the abundance of light and free circulation of air which this form of culture provides. I have just received a postcard from a friend summering on the Austrian side of the Lake of Garda, showing lemons growing on trellises. The writer says: "I am sending this to you because I doubt if anywhere except here on the Lake of Garda lemons are trained against walls between pillars in this way. There is a lattice overhead and I suppose they can cover them in winter if necessary."

Suppose one owns only a small lot and builds in such a way that he has a central court or patio and suppose over this patio he builds a lattice and on this lattice he trains grapefruit or lime or orange, he would have an attraction that would afford himself and his family comfort, but above all it would be a sight which would hold a Northern visitor spellbound.

I know a man who owns a little one-story wooden house, covered with paper for a roof. This was hot in summer and he could not afford tiles or shingles. He built over it one foot or more from the roof a light lattice frame. He planted a quick-growing vine and now his house is actually roofed with a mantle of green. It acts like the double roofs so common in the Southwest. Between his house and the sun there is not only this roof of green but a current of air. It furnishes a nesting place for the birds and cuts out the bare, cheap look of a paper roof.

It would be impossible in so short a space to treat of all the vines which grow in South Florida, because they are legion, but some, in addition to being beautiful in leafage and flower, bear fruits of more or less value.

Probably few visitors to Florida realize that the vanilla vine is native, that it grows wild in our hammocks. It is slightly different from the vanilla of Mexico and South America and is almost leafless. It hangs pendant from branches like long slender green snakes. It was for a long time considered by botanists of the same species as the Mexican. In Small's Botany of the Southeastern United States it is called *Vanilla planifolia*. "In forests, peninsular Florida and tropical America, also widely cultivated." It is an orchid and might some day be profitably grown for the aromatic pods it yields.

The yam is a quick growing vine. Yams form one of the staple foods of many tropical peoples, especially in the East. The yam vine forms a root similar to a sweet potato but many times as large. I have seen a party of ten at dinner served with one-half a yam. There are many kinds of yams. They grow like mad in rich mucky soil and in addition to the shade afforded yield a food almost equal to a white potato.

That strange fruit called the ceriman is really a vine. In its native state it grows high into the trees. It has big leaves with natural holes in them and produces a flower something like a big calla lily and a fruit the shape of an ear of corn. Its scientific name is *Monstera deliciosa.*

The passion vine is too well known to need description. It yields a fruit called the granidilla in tropical America.

The black pepper of commerce is a vine. Also rattan is a climbing palm and who knows but that both of these may grow in South Florida?

Some time ago over in the Bahamas I saw a man planting vines in the hammock for rubber. Several vines yield rubber of commercial importance. We have one native rubber vine, *Rhabdadenia biflora* (same as *Echites paludosa*), and the one which has been planted in the West Indies for rubber is *Cryptostegio grandiflora.*

Pereskia aculeata, the lemon vine—the Barbadoes' gooseberry—has already grown to be a favorite in South Florida. It belongs to the cactus family and produces an edible fruit.

Think of the gourds which yield such useful utensils. The chayote, a vegetable vine from Mexico, has fruited in Florida, but has never become popular.

Then there is the grape, some variety of which will no doubt do well here. One good scuppernong will cover an arbor a quarter of an acre in extent in the course of time. The Key grape is already common and wild grapes are abundant.

There are many morning glory vines in Florida. They are usually treated as weeds. One of our morning glory vines yields jalap, a famous medicine. Many are highly ornamental and furnish in addition honey for bees when other bee food is scarce.

The velvet bean and other vines of the family grow very rapidly and yield an abundance of beans and fodder.

We have one little vine—very delicate—holding tight to stone walls, soon covering the stone completely with a growth of dark green. It is *Ficus repens.* I heard a man once say that he wanted a stone house just to be able to have this vine

on it. Strange to say it is a *Ficus,* the same genus to which the fig, the common rubber trees and the great banyans of India belong.

And then there is a host of highly ornamental vines that one must learn to know before appreciation is possible—such as the night-blooming cereus, bignonias, christmas vine, jasmines, solanums, chalice flower, clematis, woodbine, Virginia creeper, roses, allamanda, antigonon, bougainvillea, tacomas, etc., etc., all of which enliven the landscape and render the barest weather-beaten, tumble-down shack a thing of beauty and a joy forever.

IN THE MIDST OF THE HAMMOCK ON KEY LARGO. IT IS IN THIS REGION THAT THE LARGEST MAHOGANY OF THE KEYS IS LOCATED. KEY LARGO IS THE LARGEST AND HIGHEST OF THE KEYS. THE PHOTO SHOWS THE LINE OF THE NEW RAILROAD TO KEY WEST. (PHOTO BY FLORIDA PHOTOGRAPHIC CONCERN, FORT PIERCE, FLA.)

From Woodcraft, August, 1909.

CHAPTER XI.

MAHOGANY IN SOUTH FLORIDA AND THE WEST INDIES.

EFORE describing mahogany wood let me quote some statistics as to the quantity imported into this country and the value of the import. I don't know how reliable these statistics are. They are furnished by the Government and are probably approximately correct.

In 1908 41,678,000 feet of mahogany were imported into this country. Its value is given as $2,566,954, an average of $61.56 a thousand feet. This represents the price actually paid for it laid down in our ports, two-thirds to Atlantic and one-third to Gulf ports. Central America, Mexico and the West Indies furnished 65.5 per cent, South America 2.2 per cent, Africa 13.8 per cent, Asia 0.40 per cent, and 18.1 per cent came through Europe, mostly from England.

Mexico, Nicaragua, British and Spanish Honduras, Cuba and Santo Domingo furnish the bulk of the mahogany used in this country, and some which reaches us through Europe may have come originally from one of these places.

The value of mahogany from tropical America was $51.75, of that from Africa $51.13, of that from South America $52.79, all about the same, while that which came through Europe was worth twice as much, $105.78 per thousand, and that from Asia $88.63 per thousand. The great difference in the price is probably due to the fact that the wood was of special, selected quality.

Mahogany and other cabinet woods are often shipped to England and then reshipped. Only a hundred miles across the

Straits of Florida is the island of Andros in the Bahamas, a British possession. The same kind of mahogany is produced there that grows on our Florida Keys and near Cape Sable. This Andros mahogany has been shipped to England from time to time and I have no doubt that some of it crosses the ocean again to New York.

It easily may be seen from the above figures that up to the time the retailer gets hold of it, mahogany is not an expensive wood. It makes a great difference in this world whether one is buying or selling, and the difference between the price the consumer pays and the price the producer gets is very wide, especially on products of the soil. In many cases I have no doubt that there is fully $50 worth of hard human labor in almost every thousand feet of mahogany landed in American ports. There is small profit in it at this price.

Mahogany is usually scattered in a tropical forest and is often transported with the greatest difficulty over rough roads or no roads with the crudest kind of vehicles and other apparatus to the nearest shipping point. Some small logs are often carried by pack mules over slippery and precipitous trails, while the transportation of a log for a mile or more on the heads of three or four negroes is not uncommon.

One reads statements of the fabulous prices paid for mahogany. No doubt at times special logs will bring a high figure, but for years I have endeavored to trace every such statement to its source and I have found them all unreliable, exaggerated, or out and out figments of the imagination. Four or five months ago a popular American magazine published the statement, under the heading of "Notes," that two mahogany logs had sold in Liverpool for $1,500. I wrote to the magazine and it claimed it took the note from a newspaper. I wrote to the newspaper and it said it found the statement in a book on timber published in 1870.

Logs sometimes bring high prices, but I think it is safe to assume that it happens rarely. A large part of the tree is usually left in the woods anyway and if the wood had such value it would pay to make a special trip to the spot just to get the stump.

It will be seen from the statistics quoted above that 34.5 per cent of our mahogany comes from South America, Africa, Asia and through Europe. Just what trees yield this wood I am, of course, unable to say. I am also, I think, quite safe in saying that nobody knows. There is a whole lot of wood which sells for mahogany, which looks like mahogany, and which brings just as much money as mahogany and may be just as good, but it is not all mahogany from a botanical standpoint. Nobody can tell the species of tree that yields a tropical timber by merely looking at the log. Without leaf, flower or fruit, or even bark, the naming of the tree which yielded the timber is simply the purest kind of guesswork.

English tramp ships are running to all parts of the world. They pick up here and there small lots of anything marketable. A mahogany log, using the term "mahogany" in a commercial and not a botanical sense, on the wharf of an English port may come from one of many places and may be the product of a tree which looks no more like the mahogany tree than a peach resembles an apple. Mahogany in a commercial sense applies to any wood that will sell under that head; in a botanical sense it applies only to *Swietenia mahagoni*. I have heard of expert mahogany dealers in England, and I presume we have the same in the United States, who can, as it were, look right through a mahogany log, tell to a surety the kind of grain it will yield and the country which grew it. There is not the man living who from the appearance of the log or the finished wood can tell whether it came from Honduras, Mexico, the Bahamas, Cuba, Santo Domingo, Asia or Africa. It is very much the same with coffees. Java, Mocha and Rio are very often picked from the same tree. Some time ago I sent a sample of Florida mahogany in the form of a block two inches square to a mahogany dealer. He wrote back that the sample "evidently came from a tree five inches in diameter. Please send sample from a tree two feet in diameter." I don't believe the man is living who can tell from a block of wood two inches square without sapwood or bark whether it came from a tree five inches or five feet in diameter or whether it came from the top of a large tree or from a

limb. The sample above referred to came from the heart of a large branch which had been reserved for boat timber. Close to a tropical seashore the limbs are usually much bent by the prevailing winds, but the wood is of very good quality and especially fine for boat construction.

The wood of the mahogany tree, in fact of every tree that I know of, varies very much, depending upon the conditions under which the tree grew. It must be borne in mind that the mahogany tree, although it cannot stand frost, will grow under other very adverse conditions. It will grow on hot coral rock on the Keys of Florida. Sometimes it is so close to the sea that its foliage is sprinkled with ocean spray. It will grow in parts of the West Indies where there is hardly a drop of rain for over six months at a time, and it will grow on steep mountain sides high up in crevices of the rock. In such places where the growth is slow, the wood is heavy and rich in color and grain. In warm, tropical valleys where there is an abundant and constant supply of moisture and where the tree is actually intoxicated with the very richness of the soil, its growth is rapid and the wood is light and of less value. In Florida it usually grows in hardwood thickets called "hammocks."

Some say that much of the mahogany on the market is really *Cedrela* or Spanish cedar. This may be so, since Spanish cedar from a tree which grows very slowly is hardly distinguishable from the wood of a mahogany tree which has grown quickly. Spanish cedar and mahogany trees are closely related, although they do not look alike. The mahogany looks something like a live oak, while the *Cedrela* or Spanish cedar looks like a *pecan*. From my own observations in the American tropics (Mexico, Honduras, Cuba and the Bahamas—there is no mahogany in Porto Rico) mahogany logs are cut for shipment at Atlantic and Gulf ports from the mahogany tree *Swietenia mahagoni*.

Color is perhaps the first quality in wood which attracts attention. We have in the tropics white, red, yellow and black woods—the same as in races. Many tropical woods are dark in color, in fact I think dark colors predominate, especially reds and browns. Mahogany is usually a rich reddish brown not

unlike the color of the skin of a good healthy red Indian. According to an official color scale, 25 parts red, 64 black and 11 orange produce the shade called "acajou;" 85 of black to 15 of orange "mahogany," and 83 of black, 4 of red and 13 of orange form "mahogany brown."

There are floors in parts of the tropics made of plank cut from the log by hand and from such woods that the colors alternate red, white and black. I believe that a good, rich, reddish brown is a normal color at least for the tropics. In the races pure white is just as abnormal as jet black. At any rate a reddish brown color is a good characteristic. There are more bay horses than any other color, and in Spanish America they say, "A tired red horse is a dead horse," meaning, of course, that a red horse is so tough that he never gets tired. In my own experience red poultry and red pigs do better in the tropics than those of other colors. The tips of very tender foliage are usually red. This is especially so in the tropics, but is not uncommon in the North, as with roses, Virginia creeper, etc. There is a red liquid in the outer cells of the plant which probably serves the purpose of screening out the actinic rays of the sun.

Unless one has strong race prejudice, and one usually gets over that if he lives in the tropics long, a rich, healthy, brownish red complexion is the handsomest of all. Of course mahogany wood varies in color, but reddish brown is the standard. It must not be dull but full of luster. In some cases when finished it has a satiny look which adds much to its beauty. Its color should be a rich red, darkening with age. In some woods this luster reaches a stage called "fire." Cape walnut, called also cannibal stinkwood, for instance, according to Stone, "exhibits much 'fire' or phosphorescent luster." Mahogany is cold to the touch. Birdseye mahogany is not uncommon and is produced by scars due to sap-suckers. In the Bahama Islands the mahogany is often badly ringed by sap-sucker holes.

We look upon mahogany as a cabinet wood. In the countries where it grows it is used for every purpose that a wood can be put to, not excepting fuel. It makes excellent shingles

and was once used for this purpose in Jamaica. I believe that defective trees, limbage, etc., might still be profitably used for this purpose. A house shingled with mahogany would be handsome without paint or stain. It would surely last as long as any wood and might not cost much more than first-class cypress. Shingle billets could be easily carried from the forest on the heads of negroes. Although often used for floors it becomes very slippery.

It is a combination of useful qualities with beauty which has made mahogany famous. Its popularity is founded upon true worth. It is heavy, very hard, close-grained, very durable and takes a fine polish. It seldom warps, cracks or shrinks under trying conditions if properly seasoned. Many tropical woods crack badly when taken north, but mahogany stands all climates and lasts well under water if kept constantly wet. It is seldom attacked by wood-eating insects, but is invaded by wood-boring crustaceans if left too long on the seashore. It is mostly all heartwood. It usually has only a thin yellow zone of sapwood. Its only fault is the fact that it is hard to work. The annual rings which ordinarily make the grain of wood are often very indistinct in mahogany. In many cases they are not "annual" at all. Several rings or additions of wood may occur in a year. Many times what appear at first sight to be rings in tropical woods are merely bands of color.

Mahogany must dry a little in order to float well. Sometimes the trees are girdled on the stump, some time before cutting, and sometimes they are left to dry in the shade of the forest. In case one wants a fine grade of wood for boat building, "mud seasoning" is good. Thus buried in mud a slow osmotic seasoning takes place which produces a wood of very superior grade. The wood has no special taste or smell. It colors water red.

It was the first tropical cabinet wood used in Europe and for two centuries has had unabated popularity. It has figured more or less in literature but never more conspicuously than in the following short and charming ballad by Thackeray:

"Christmas is here;
Winds whistle shrill,
Icy and chill,
Little we care:
Little we fear
Weather without,
Sheltered about
The mahogany tree.

Once on the boughs
Birds of rare plume
Sang in its bloom;
Night birds are we:
Here we carouse,
Singing like them,
Perched round the stem
Of the jolly old tree."

The mahogany tree is strictly tropical. It can endure only a small amount of frost. Tropical Florida, south of Lake Okeechobee, is its Northern limit. It grows in the Bermudas, which are farther North, but owing to the position of these islands in the ocean, separated from the mainland by the warm water of the Gulf Stream, their climate is tropical.

It is of course a waste of time and money to try to grow mahogany in Northern regions. I mention this because I have received requests for seeds or young plants from Northern people. Although frost-tender, it is otherwise a hardy tree. It grows in all kinds of soils high in the mountains and so close to the seashore that it is sometimes killed by floods of salt water during severe storms. During a hurricane in Florida in the fall of 1906, mahogany trees a foot in diameter on the Keys were killed by the salt water which poured over all the lower portions of these islands.

In speaking of its hardiness, Rea, a surveyor of the British War Department, says: "The tree is of comparatively rapid growth, reaching maturity in about 200 years, the trunk exceed-

ing 40 to 50 feet in length and 6 to 12 feet in diameter. It is very handsome, with enormous branches of solid timber; and rather strangely, when it springs from low levels and rich soil the wood is most inferior, being poor in color, soft and spongy, and consequently almost valueless.

"That, however, which has been grown without nourishment on high levels, save what it derives from the atmosphere, is hard, figured, densely close in texture, as well as rich and deep in color, all qualifications which enhance its worth. It is also a curious fact that the tree does not seem to have any partiality, as it will flourish in low, marshy ground, or in a deep alluvial soil, or even on rocks to all appearance barren of earth; in fact wherever the seeds chance to drop. Its development is more rapid in the shade than in the open."

The above corresponds with my own observations, although I have never seen mahogany trees 12 feet in diameter. There are trees now standing on Key Largo, Florida, from 4 to 5 feet in diameter and I have seen trees in Cuba 9 feet in diameter. Many of these tropical trees are heavily buttressed and only carry such size a short distance up the stem. Such trees are often cut ten feet from the ground. Mr. Rea lived for four years in St. Lucia and his observations are probably correct.

Mahogany seldom grows alone in pure stand except perhaps in small clumps here and there scattered among a great variety of other trees. It seems quite able to hold its own and abandoned clearings usually show many young mahogany trees. The fact that it endures some shade permits it to grow where many other trees would never start.

In the forest it grows, of course, taller than in the open, but it nevertheless likes to spread as does the beech. Some mahogany trees which have been left for shade in pastures in the West Indies, especially in Jamaica, are truly magnificent in their spread, having a stately and sturdy look defying even the fierceness of tropical gales. Strange to say there is no mahogany in Porto Rico. I have heard of one or two trees on the island, but in the unsettled Luquillo Forest, now a federal reservation, I could not find a single tree. It grows in the island of Culebra,

only a short distance to the eastward, and in abundance in Santo Domingo, only a short distance to the westward.

It is hard to believe that it could have been completely exterminated on the island. I believe such must have been the case, however, since place names often give one a clue to the character of the primeval woods. For instance, there is a place called "Mangler Caoba Laguna Soroco y Grande." Mangler refers to mangrove, caoba to mahogany, and I presume mahogany once grew on the edge of the mangrove swamp or on islands in the swamp just as it does on the south coast of Cuba, Florida Keys and in the Bahamas. Although Cuba and Santo Domingo have been settled for about the same length of time, they have never had the population of Porto Rico. The scarcity of Spanish cedar on the island tends to strengthen the belief that both of these trees have been practically exterminated.

The mahogany is a prolific seed bearer and will grow in almost all locations with sufficient warmth and moisture. It is these qualities which enable it to hold its own in the majority of places where it grows. Browne in his "Trees of America," published in 1857, describes the tree fairly well as follows: "The *Swietenia mahagoni* is one of the most beautiful among intertropical trees. Its trunk is often 40 feet in height and 6 feet in diameter, and it divides into so many massy arms, and throws the shade of its glossy foliage over so great an extent of surface that few more magnificent objects are to be met with in the vegetable world. Its summit is wide and spreading, subevergreen, and adorned with abruptly pinnate, shining leaves. The flowers, which are produced in handsome spikes not unlike those of the lilac, are whitish, sometimes reddish or saffron color and are succeeded by fruit or capsules of an oval form about the size of a turkey's egg. The fruit ripens in early summer, bursts into five parts, and discloses its winged seeds, which are soon after dispersed by the winds; some falling into the crevices of rocks, strike root, then creeping out on the surface, seek other chinks or crevices, re-enter, and swell to such a size and strength that at length the rocks are forced asunder, to admit the deeper penetration of the roots and in this manner, in process of time,

increase to large trees." The flower is not conspicuous but the large brown hard capsule incites curiosity. It splits in five segments from the under side and the seeds, which are winged like maple seeds, flutter to the ground. On the Florida Keys these ripen in midwinter.

How the tree can get a foothold on some of these coral islands is wonderful. The rock is hard and hot at times and the soil is so scant in some places that I believe it would be difficult to scrape together a wagon load on an acre. Mahogany may be easily grown from seed and the young plants may be easily transplanted. Last winter was a great seed year (1908-09). Trees ten feet in height were full of seed. In places on the Florida Keys one could collect seeds enough in a few hours to plant hundreds of acres. It is a common saying that trees fruit heavily a year or so after a severe hurricane.

The State of Florida is now engaged in draining the Everglades. If this project is successful, and I can see no reason why it should not be, a large amount of land will be reclaimed and although much of this land will be too valuable for tree planting, there will, no doubt, be many acres better fitted for forest trees than for field crops. This land would probably produce mahogany to perfection. Some trees should be planted for shade at any rate. The mahogany trees frequently grow on islands in the mangrove swamps.

Florida mahogany has been shipped to New York. The trade did not like it, in fact they found all kinds of fault with it. The logs were too small, which was due to the fact that the big logs were too heavy to handle. They claim it had black specks in it, but Honduras mahogany often has gray specks in it. In truth Florida Key mahogany is just like the Andros Island product. If we were to ship it to Liverpool and then reship it to New York it would sell no doubt to better advantage. Andros Island is only about fifty miles away and very similar in almost every respect to the Florida Keys.

In speaking of Andros mahogany Rea says: "It grows to a large size but is generally cut to small dimensions owing to the want of proper roads and other means of conveyance. It is

principally used for bedsteads, etc., and the crooked trees and branches for ship timber. It is a fine, hard, close-grained, moderately heavy wood, of a fine rich color, equal to that of Spanish mahogany, although probably too hard to be well adapted for the purposes to which the latter is usually applied." The above description applies exactly to the Florida variety.

It is commonly thought that hard, heavy woods grow slowly. This is not always the case. The northern black locust is a hard, heavy wood, but it grows very quickly. The same is so of some species of eucalyptus. On the other hand some soft light cedars grow very slowly. Mahogany is usually considered a slow grower.

If one counts the rings of a tropical tree and allows a ring to a year, as is common in the North, he is very apt to get fooled. He should first of all make sure that they are rings and not merely bands of color and then make sure that the tree in that special locality makes only one ring a year. Whenever a tree drops its leaves growth stops and a ring is formed. When a tree is rooted in a rich moist soil in a warm climate, it has no struggle except against its neighbors. It seems to do very much as it pleases.

In a paper read before the British Association for the Advancement of Science on "Foliar Periodicity in Ceylon" by Herbert Wright there is the following statement: "In studying the behavior of our deciduous trees, the most usual conclusion is that no law and order prevails and any tree drops its leaves how and when it chooses. There are, however, certain features which point to a climatic response, and others which indicate that the personal or internal forces are the chief agencies at work."

It seems strange to speak of the "personal" forces of trees, nevertheless the study of trees in the tropics, which is biological headquarters, leads one to the conclusion that they have, to say the least, many idiosyncrasies. Some trees will drop their leaves before and after the rainy season, some during the wet weather, some will throw out new leaves at certain seasons of the year regardless of the weather, and so on with similar peculiarities in

reference to flowering and fruiting. I have never seen a mahogany tree drop its leaves all at once unless when injured by flood or fire. Its foliage always looks the same. Sometimes it may be a little greener and there may be more young shoots at one time than at another, but its growth, judging from the appearance of its leaves, is practically continuous.

"When M. de Charnay visited Palenque in 1859 he had the eastern side of the palace cleared of its dense vegetation in order to get a good photograph; and when he revisited the spot in 1881 he found a sturdy growth of young mahogany, the age of which he knew did not exceed twenty-two years. Instead of making a ring once a year, as in our sluggish and temperate zone, these trees had made rings at the rate of about one in a month; their trunks were already more than two feet in diameter; judging from this rate of growth the biggest giant in the place need not have been more than two hundred years old, if as much." (The Discovery of America, Fiske, Vol. I, page 156.) The rings indicated that those trees were over two hundred and fifty years old, while in reality they were not over twenty-two and possibly younger.

In Vera Cruz wires are run from one tree to another on which the vanilla vine is grown. The vanilla vine grows wild in the hammocks of South Florida. It has never been developed commercially, but it resembles very closely the vanilla of Mexico. The mahogany tree is a favorite for this purpose. Cook, in his report on "Shade in Coffee Culture," thus speaks of mahogany: "It has been used for shade in cacao plantations in the Island of Guadeloupe, and according to Guerin, is preferable to *Erythrina Indica,* since it resists parasites, and the wood is valuable after thirty or forty years."

In Trinidad the planting of mahogany under forest conditions has been advocated by Superintendent Hart of the Botanical Gardens, who finds that under favorable conditions the annual average increase of thickness in the trunk is about one inch, and even in trees sixty years old or over is about nine-tenths of an inch. American mahogany has been successfully planted

in India. Even in Africa the mahogany forests are under the control of foresters.

A. H. Unwin, Forester, Benin City, West Africa, estimates that there are about 400 trees and 1,200 logs per square mile. This is less than one tree to the acre. In this region the mahogany is big, with large buttress-like roots, so that the tree is cut from platforms 10 to 15 feet from the ground. The ground is so soft and trees scattered to such extent that the logs after being squared are pulled by man power on rough rollers to the nearest stream. The timber is then rafted to the coast.

An important part of the forester's work in the Benin region is the planting and raising of seedlings to be planted to replace the trees cut. According to the old rule twenty seedlings are allowed for each tree felled.

A group of young trees is made near and around the stump of the old tree and seedlings are also put in along the hauling roads. In this way a future growth is assured. In three years one of the plants has attained a height of 20 feet and the average is even 15 feet. There is also a diameter limit but the figures are not given by Unwin.

The firms working these lands pay a royalty and export duty which is sufficient to pay the cost of the Forestry Service.

I once had the pleasure of traveling on the steamship Sokoto now running from Halifax to Mexico. She was formerly in the West African trade, oil nuts, mahogany, etc., and her officers told how the naked natives propelled these logs through the breakers to where they could be reached by the ship's launch. All this labor after dragging the logs from the forest to the shore by man power alone, then the long journey to England and perhaps to America, is evidence of the labor required to supply the market with this valuable wood from regions where men do the work of oxen and machines.

I have a sample of African mahogany secured in a woodworking establishment in Ottawa, Canada. It seems so light and soft and dull in color that I can hardly imagine how it could pass for mahogany.

In case any enterprising person desires to grow mahogany I would suggest that any of the following trees be planted with it at the same time, since the returns would be quicker. The planting of the following on suitable soil in a favorable location would no doubt in time yield handsome returns. Since mahogany endures some shade the mixture would be an advantage.

Cedrela toona—The "toon tree" of India and the "red cedar" of Australia. Wood light, soft, red, very rapid growth, a very valuable wood used for furniture, carvings, boxes, canoes, shingles, etc.

Cedrela odorata—"Cedro hembra," "Cuban cigar-box cedar" or "Spanish cedar." Wood similar to the above. Highly odorous and supposed to keep insects out of cigars.

Cedrela Brasiliensis—"Acajou." Wood soft, fragrant, red, easily worked. Trees of this species planted in Dr. Franceschi's garden in Santa Barbara, Cal., have grown with great rapidity.

Gaurea trichilioides, called "Gauraguao" in Porto Rico. This species closely resembles the above mentioned trees but the wood is not fragrant.

When the countries of the American tropics get over the revolution habit, when trunk lines of railroads get established and freight rates decrease, and when wood gets scarcer and of more value, there will be stronger incentive toward the proper utilization and regeneration of these tropical forests. There will be more careful exploitation with the future in view and not merely the utilization of a product which nature has given us. We are in the habit of looking too much to the Government to do things. In consequence they are never done. If on the average one man in every ten owns and properly cares for ten acres of timber land, there will never be any danger of a timber famine. It is up to the Government, however, to arrange conditions of protection, taxation and even transportation in such a way that private parties may feel safe in such an enterprise. The main function of government is to afford protection to property and life and to hold in check the greed of great corporations so that individual incentive, initiative and industrial activity may

have full encouragement and progress without interruption or onerous restrictions.

But when one tries such a commendable enterprise in the land of the mahogany tree he usually comes into sudden contact with high taxation, with sole concessions granted to other parties, thievery, incendiarism, shipping fees, brokerage, graft, high freight rates, dishonest commission agents, local uprisings and a host of other difficulties which the producer has to struggle against before his product reaches the consumer. There is the producer who with the help of nature makes the product at a small profit and there is the consumer who uses it, is glad to get it and pays high for it, but between the two is always a group who by hook or crook usually carry off the lion's share of the spoil.

Mahogany is quite common in Florida south of Biscayne Bay and the Everglades. Much of this territory extending southward to Cape Sable is little known. There is an area as big as the State of Delaware in a condition of pristine wildness. It is usually marked the Big Mangrove swamp on the maps and is not unlike the big Zapata swamp on the south coast of Cuba.

When I use the term "swamp" I mean it in the Southern sense, namely, a low, wet, but wooded area. Here and there in these swamps are slightly elevated portions or islands. On these islands there is usually a rich hammock growth. In these hammocks mahogany is common, in fact in one place it predominates to such extent that the place is called "Madeira Hammock" or "Island."

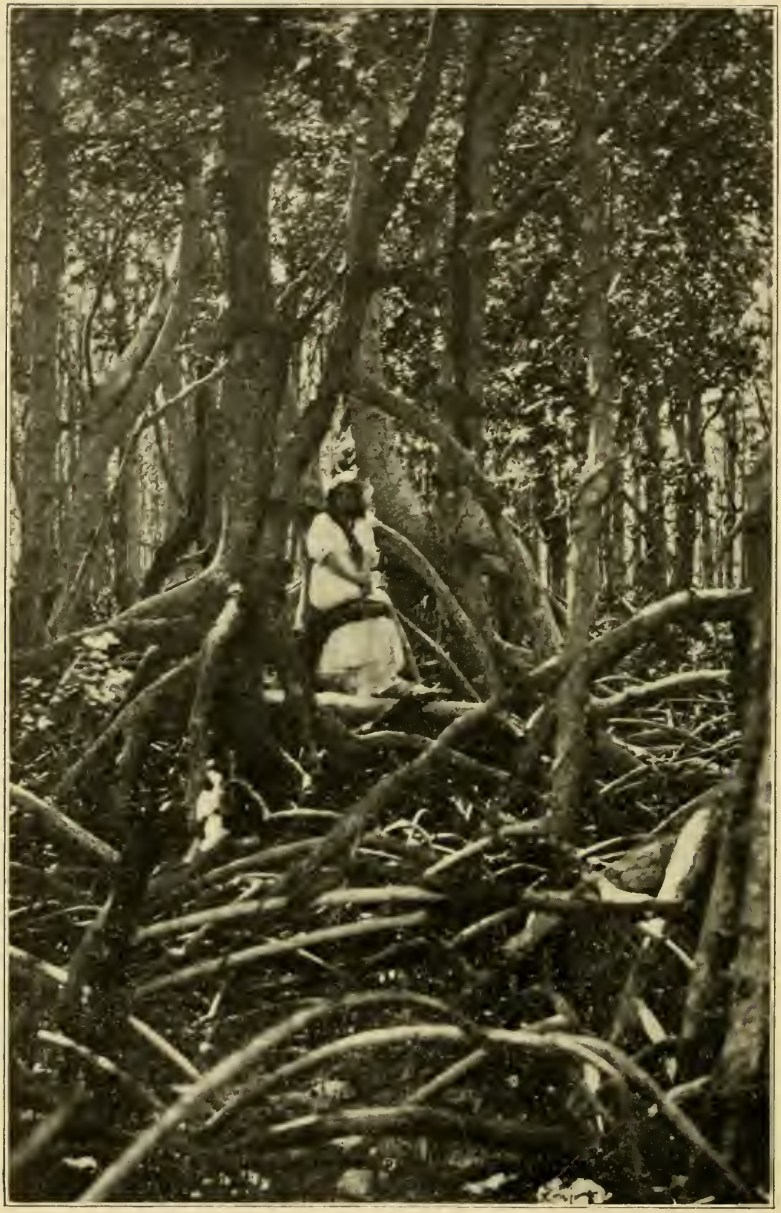
Forest land in tropical Florida may be divided into pineland, hammock and mangrove swamp. There are hammock islands in the Everglades, there are patches of hammock here and there in the pine woods, and some of the Florida Keys are covered or were originally covered with a heavy hammock growth. The hammock in this part of Florida consists almost entirely of trees of the Antillean flora, trees which grow here and are native here, but many of them do not reach their optimal growth in this section. This part of Florida corresponds very closely with the Bahama Islands.

The presence of hammock growth here and there may be explained in two or three ways. The hammock may be the climax forest. Suppose we have a bare parcel of land; suppose the various forces of nature scatter seeds over this area; suppose there are no retarding influences of any kind such as flood or fire or insect invasion, this land would according to some authorities become in time and remain a hammock growth.

If fire swept over the territory, it would soon be covered with nothing but pines and a few other trees able to withstand some fire. If floods of fresh water covered it frequently, it would remain a saw-grass country with perhaps clumps of cypress, saw palmetto and a few other trees here and there. If floods of salt water covered it, it would become a mangrove swamp. It is true that hammock growth is gradually working into the pine land and into the mangrove swamp, but I lean to the opinion that the soil where the hammock grows is richer—richer at the start mainly because of the nature of the rock which disintegrates to make the soil.

In many parts of the tropics there is a so-called limestone which, when it disintegrates, yields a poor soil. This is in truth not a limestone but a sandstone, the sand being cemented together with a little lime. Wherever a pure limestone disintegrates it yields a rich, reddish soil on which hammock grows. When a calcareous sandstone disintegrates it yields a poor soil on which the Caribbean pine predominates. A limestone soil is usually good. Grain and fodder from such soil is rich in bonemaking ingredients and in turn the people of such soils are usually big-boned and rugged.

When I said above that the land in South Florida between the Florida East Coast Railroad and Cape Sable is unexplored, I meant that it had never been surveyed and properly mapped. The islands are indefinitely marked and the water courses are merely indicated by dotted lines. Men have been all through it over and over again. Some new travelers go into the region now and then, and when they look around and see no human beings or signs of human beings they conclude that they are discoverers



IN THE MANGROVE SWAMP. THIS TREE GROWS IN SALT WATER AND IS A GREAT CONSOLIDATOR OF MUDDY SHORES AND A PROTECTION IN TIMES OF STORM. (PHOTO BY HOMER SAINT-GAUDENS.)

walking on land where the foot of white man has never trod before. But plume hunters, prospectors, scientists, etc., have been there.

It will be a long time before mahogany is exhausted in this region owing to the unsettled nature of the country and its inaccessibility. The drainage of the Everglades may some day lower the level of the water throughout this whole region. Even if it lowers it only a few inches it will increase to a great extent the area where mahogany can grow.

Over in the Bahama Islands, what we call the hammock is usually referred to as "bush" or "scrub." This land is the "provision land" where the bulk of the crops is grown. Here the terms bush and scrub are applied, very much as in Africa and Australia, to forests of considerable size, especially when there is a thick undergrowth.

The Bahamas belong to Great Britain and there is mahogany on almost every island, but the largest quantity is on the largest and least settled island of Andros. These people have made good use of this mahogany at home in furniture and boat construction. Labor is cheap there, but if the negroes continue to emigrate to Florida as fast as during the past winter it will soon be scarce.

Mahogany is seldom shipped north from Florida or the Bahamas because it is worth at home as much as it would bring in Northern markets. There is no mahogany in Porto Rico, and there is very little in Jamaica, so that Cuba and Santo Domingo are the two islands which have the most of it and which ship the bulk of all the West Indian mahogany in the market.

I have been over a large part of Cuba several times and I believe Cuba has very little timber of any kind to spare. There are great areas devoid of timber. One hears of vast tracts of virgin timber, but they usually dwindle in size and density the closer one comes to them. The Spanish and American ideas as to quantities of timber are often at variance. I know of no place where forestry is more needed. Cuba exports mahogany and imports yellow pine. She practically trades mahogany for yellow pine.

Cuba is not all a tropical land of luxuriant vegetation. There are miles after miles of pine-covered sand land in Pinar del Rio. The time is practically at hand when Cuba can use every stick of timber she cuts right at home. With a population of over 2,000,000 and a strong emigration from Spain there is necessity for conserving all available timber. The houses of the well-to-do are now mostly made of brick, stone and tile, while the natives depend almost entirely on poles and palm thatch for building material.

Santo Domingo is therefore left as the main source of West Indian mahogany for the future. In this beautiful island is concentrated all that is good and bad in the West Indies. It has the highest mountains, the deepest valleys and the richest soil and vegetation of the Antilles. It was the first place to be settled in this continent, the last to be developed. It is here that mahogany is most abundant and of fine quality. The land is rich in minerals, with a fine climate, or in fact many climates, with a thin population, with some poor pine land, but much of it is rich soil and as virgin in appearance as when Columbus landed. It consists of the famous Haitian Republic and the Republic of Dominica. Conditions in this island are by no means as bad as painted, and even Haiti, the Black Republic, has not been as complete and dismal a failure as is often represented.

Some very valuable timber concessions have been granted by the Haitian Government within the past few years. The following quoted from the New York *Sun* corresponds exactly with what I have heard from travelers who have visited the interior of the Black Republic:

"That the country is sadly misgoverned by her politicians there seems, however, no reason to doubt. On the other hand Haiti pays the interest on her bonds, encourages education by liberal grants, protects foreigners, and of late has welcomed the exploitation of her natural resources by American, English and German capital. The hospitality of the country people, their sterling honesty and natural kindliness, are vouched for by all travelers who have disregarded the ogrelike reputation of the

people and penetrated the interior. In the cities the stranger can always look to his consulate for protection. In short, Haiti is not as black as it has been painted, but we would not venture to predict that the feuds of her politicians will not ultimately compel intervention for the general good and the interests of other nations."

I have never visited the interior of either Haiti or the Republic of Dominica, but judging from what I have seen merely from the coast towns and in sailing along its shores, it is one of the most beautiful and varied spots of earth. Both Haiti, now a republic in control of negroes, once a French colony, French being still the common language, and the Republic of Dominica, once a Spanish possession, now independent with the United States Government in charge of its custom houses and with Spanish the common language, have had the most checkered history possible to imagine.

I think the time is near at hand when there will be established a West Indian trunk line of railroad. The people of Florida are beginning to realize this when they see trainload after trainload of Cuban pineapples pass their doors. The Florida East Coast Railroad will soon be completed to Key West. If the car ferry from Key West to Havana is successful, sugar and other products will come direct from the plantations along the Cuban lines to our Northern markets without breaking cargoes. A trunk line of railroad now runs to the eastern end of the island. Another short car ferry would reach Haiti. By using lines already constructed Haiti and the Dominican Republic could be tapped at slight expense. By making another car ferry to Mayaguez, Porto Rico, and using the railroad already in operation to San Juan, this West Indian trunk line would be complete. When this happens, and I can see no reason why it should not happen, many fine forests of rich tropical woods will become available and will be shipped direct by rail into this country. Owing to the lack of roads, etc., it is impossible to get much of this timber to the coast. Even in the Dominican Republic, where timber is still comparatively plentiful, it costs $30

per thousand or thereabouts to deliver mahogany at the ship's side.

The largest portion of the Dominican and the Haitian republics is covered with forest. According to an official report there are over 6,000,000 acres of hardwoods in Santo Domingo, among which mahogany ranks first, and mahogany from this island ranks first in quality.

Santo Domingo has broad, high plateaus with cool climate where it is claimed wheat, oats, rye, apples, pears and strawberries thrive. Loma Tina, 9,420 feet above sea level, is the highest peak in the West Indies. There are large quantities of Spanish cedar, also pine and "sabina," sabina being the Spanish name for our Florida pencil cedar. The silva of Santo Domingo is undoubtedly richer than that of any other West Indian island. These forests yield gums, resins, medicines, etc., and I have been told that cinchona, the tree from which quinine is made, grows in the mountains. Our vice consul from Puerto Plata writes as follows in reference to the hardwoods of Santo Domingo:

"Those chiefly exported are cedar, mahogany, lignum vitae, lancewood, fustic, greenheart and mora. The largest diameters procurable are, in cedar, 60 inches; mahogany, 35 inches, and in lignum vitae, 10 inches. On the northern side of the island quantities of large timber can be procured about 10 miles from the railroad. It is expensive to draw out the wood. There are no roads, and paths have to be cleared through the forests. The people usually drag the logs with bulls, but the more intelligent use two large wheels on an axle, on which they hang the timber. Roads could be made in the woods for wagons, but as this would be expensive it would all depend on the extent of the enterprise.

"In some sections there are rivers on which the logs may be floated, but one has to wait for a freshet, which often delays three years. The facilities and price of getting out the wood depends entirely on the location. Where one owns the trees, the medium cost of felling, squaring, hauling from forest, railroad freight, and delivering alongside ship is about $30, Ameri-

can money, per 1,000 feet (mahogany or cedar). Trees can be bought standing at from 25 cents to $1 per tree, depending on the size, condition and location. It is preferable to purchase the right to fell over an extent of land, first going over same to estimate the amount of timber that can be gotten out, or one can buy it at the rate of $5 per 1,000 feet.

"A foreigner who attends to his own business is perfectly safe, both in life and property. The only inconvenience that would be experienced is that his laborers will leave him when a disturbance is going on in the district where he may be working, to avoid being impressed either in the government or revolutionists' ranks. After this danger is past they will return to their work. For this kind of work, laborers can be procured at $1, American, per day. The price of labor is higher in this class, for it is considered harder than the ordinary run and as requiring more skill."

Some time ago I sent a sample of Florida mahogany to Herbert Stone, a wood expert and an officer of the Association of Economic Biologists. Aside from his scientific knowledge of the subject Mr. Stone has operated a business in Birmingham, England, in which many varieties of wood were handled. The following is his reply in reference to the sample sent. The sample was cut from a tree on Elliott's Key, Florida. The tree grew close to the sea, in fact was killed by a severe storm in October, 1906:

"The piece of mahogany is most interesting and valuable. It is precisely the same as the specimen I have, named Caoba, except as regards depth of color."

The specimen he refers to marked Caoba is described in Stone's "Timbers of Commerce." This specimen came from Mexico and is a type specimen received from the Royal Gardens, Kew, being one of the series of Mexican woods exhibited at the Paris Exposition of 1900 by the Mexican Government. The specimen was marked, "Caoba: Nombre Scientifico, *Swietenia mahagoni.*" The alternative common name given is "Bois d'Acajou à Meubles," seeming to indicate according to the French view that this wood is especially fitted for furniture construction.

A COOL TILE-COVERED BUNGALOW IN SOUTHERN FLORIDA—COMBINATION WOOD AND STONE WITH LOTS OF WINDOW SPACE.

A SHINGLED BUNGALOW, SOUTHERN FLORIDA.

CHAPTER XII.

BUNGALOW CONSTRUCTION IN SOUTH FLORIDA.

INCE coming to Florida, almost ten years ago, I have been designing and building bungalows. During this period there has hardly been a time when I have not been altering an old one or planning or building a new. All the while I have been striving to produce something perfectly adapted to the environment. Long before I could finish one I would discover changes that would cheapen the cost of construction or add beauty or comfort to the structure. I disregarded all precedent, had difficulties with mechanics who would persistently do things the old way until finally I found myself doing most of the work with the help of a couple of negroes, who were willing workers but who could neither see straight nor saw straight.

In this part of Florida we sometimes begin at the beginning by cutting the trees and hauling the logs to the mill. The soil is lime rock, some of it loose, but much of it solid. This is good building material and by blasting, a lot of it may be secured on a small space for house walls, fence walls and roads in the process of clearing the land. The holes when filled with trash and rakings are fine for bananas and papaws. By building a kiln of wood and the proper kind of rock a fairly good quality of lime may be secured at a very low figure. With wood, stone, lime, sand and water all off the very lot you are building on, the house becomes in truth a product of the land.

The next step is to buy a galvanized iron pipe and a cheap pitcher pump. A twenty-foot length of pipe and sometimes much less is ample. A coupling is put on the end of the pipe. One edge of this coupling is filed or pounded sharp and opened over the beak of an anvil for a cutting surface. By churning this

pipe up and down through the soft, white rock with the help of a little water two men in a few hours can have a pump in good working order—pump, pipe and labor not costing more than a ten-dollar bill.

A pile of planed lumber, costing about $22 per thousand, a case of dynamite, with caps and fuse, and with plenty of lime and water, all is in readiness for business. I find it pays to mix some

A FAVORITE TYPE OF HOUSE IN THE TOBACCO DISTRICT OF WEST CUBA, WHERE CLIMATIC CONDITIONS, VEGETATION, ETC., ARE SIMILAR TO SOUTH FLORIDA.

cement in the mortar and cement is now so cheap that the increase in cost is slight. The center of a thick lime-mortar wall does not harden for a long time. A little cement therefore helps to stiffen it. By building low of rock and timber and by giving the main lines of the structure the right proportions and sharp outlines to produce contrast, the house appears to grow out of the land and when surrounded by vines and shrubbery becomes in fact part and parcel of it.

The natural conditions to be considered are long, dry periods, continuous sunshine for months, very heavy rains and strong winds at times, which drive water in a fine spray through the smallest chink.

This calls for tight, cool, solid, low structures. I should add also that the well water is hard and cisterns are necessary, so that the roof must be of a material that will not taint or discolor or render impure the water.

Although a forester by profession, I do not believe that the

A CUBAN "BOHIO"—A HOUSE BUILT MAINLY OF PALM THATCH.

earth rotates upon a wooden axis, and I realize also that wood has been used in the past for many purposes merely because of its abundance and cheapness. It is, however, in the end an expensive constructive material if we consider the cost of paint and repairs, the danger from fire and the tribute we pay to fire and insurance companies.

The appearance of it is, however, good and although rock in this section is as cheap at the start, even considering the low price of lumber, many prefer the effects gained by a combination of both.

I have used cement blocks, concrete, paper roofing, corrugated iron, shingles, tile, etc. I have even used old barrel staves, cut in half, for shingles. When one lives near the shore there is a possibility of collecting a lot of valuable drift lumber. I have captured ash, mahogany and Spanish cedar logs adrift in the bay. The tile in my hearth came from the floor of the engine room of a wrecked steamer. The wrecks often yield brass hinges, etc., which are difficult to get in any other way. The enterprising beachcomber can usually find many useful articles along the

TYPE OF BUNGALOW SUITED TO THE CLIMATE OF SOUTH FLORIDA.

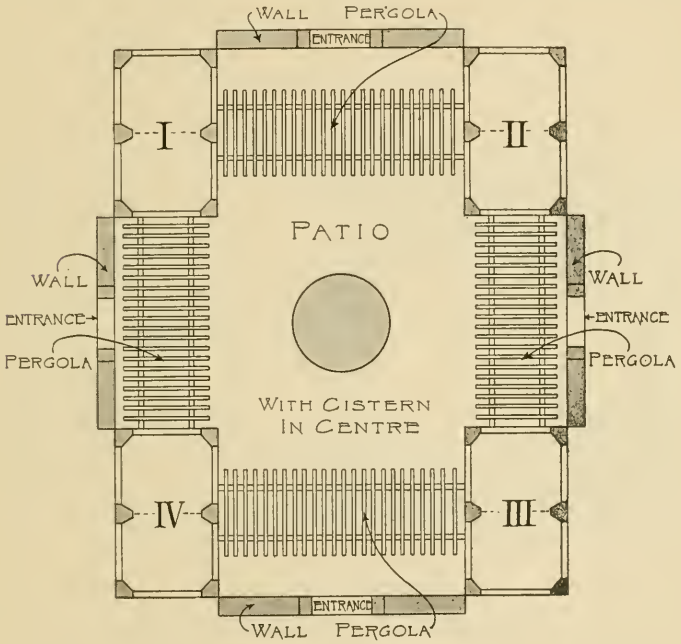
shore and the waste of lumber on the beaches is enormous, since it is soon riddled with holes and rendered useless by borers of various kinds.

Since the roof is half the building, let me dispose of it first. Paper roofing or felt roofing is not very durable, it taints the water and looks cheap at best. Few people desire it as a permanent roof cover, although if carefully put on and frequently

painted, it is tight and lasts longer than one would expect under the trying conditions of the tropics.

We have no snow, of course, and steep roofs are therefore unnecessary; in fact the roofs I have built have grown flatter until I have now reached the flat roof stage. A flat roof is easier to build, requires less material and in heavy rains and high winds much of the water blows off instead of into the house.

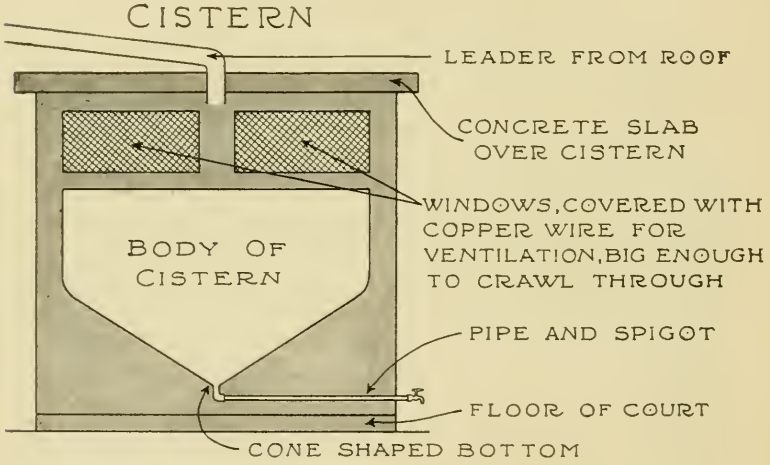
Shingles taint the water, curl up and open up in the hot sun so that the rain beats in and insects find a fine harbor under



them. Corrugated iron is hot and noisy, although extensively used everywhere in the tropics, because it is cheap and quickly put on. It is tight and yields good water. Covered with concrete it forms a fine roof. Tiles are beautiful and cool, but they are seldom tight and since they are usually elevated on strips a couple of inches above the boards of the roof they form a fine harbor for rats and other vermin. If every crack is cemented

an enterprising tropical rat will work at a tile till he loosens it. In time he will succeed in pulling out cement enough to squeeze through. Then he has lovely quarters. He could not be safer from intrusion.

I no longer build large houses. I have adopted instead the unit system on the bookcase plan. Each unit measures twelve by twenty-two or thereabouts. These can be built around a central court in any number to suit the size of your family, your lot and your bank account. These may be connected by "blow-ways" or "dog trots" or "pergolas" or "galleries" or "porches." I was working toward this plan when I struck the following

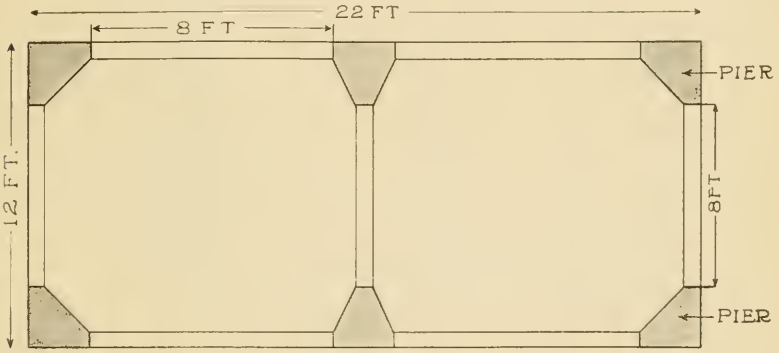


in an article on Chinese art in the International Encyclopedia: "A Chinaman's house, if he is a rich man, is a group of small one-story buildings interspersed with gardens, all within a bounding wall."

That fills my bill exactly, and I am neither Chinese nor rich. The cost of a unit is about $200 and each unit ought to be rentable almost anywhere at $5 per month. Suppose one owns only a small lot. Place a unit on each corner. Connect the units with pergolas and close the spaces open to the street with an attractive wall. In the center one would have a spacious patio.

In the patio is the place for the cistern, which should be built above ground. If above ground the water may be completely drawn off at any time by means of a spigot. The bottom of the cistern should be cone-shaped, with the apex down, from which the pipe leading to the spigot should start. In that way every speck of sediment may be drawn off at any time.

In the tropics the cistern should be screened and well ventilated. It is cooler above ground than below it. Pump water is always warm in cool weather. If the cistern material is slightly porous all the better. The evaporation will cool the water like a Spanish olla and on the basis of the iceless refrigerator. It is necessary to screen out the mosquitoes since cisterns are their favorite breeding places.



The flat roofs are fine places for solar heaters. A flat tank on the roof into which water may be pumped by hand with a small force pump in a sunshiny climate yields fine, warm water for bathing if covered with glass sash.

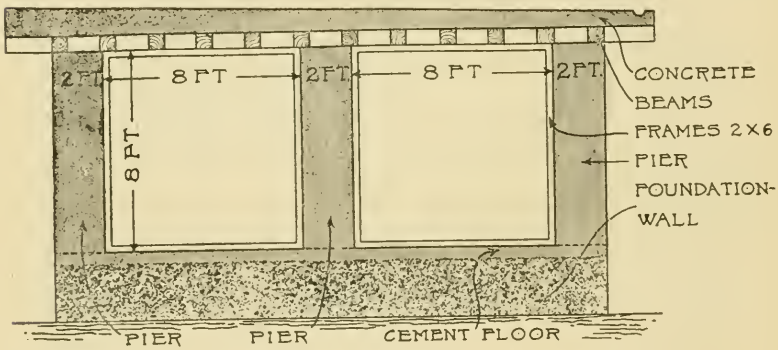
The following is a brief discription of how I build a unit house: I lay up a narrow wall of rough stone (12x22 feet), a foot or more above the ground. I usually build against boards and pile in mortar and rock. This enclosure I fill with rock, which is packed and pounded down solid. Over the surface of this I lay a cement floor.

On the cement floor I set up frames of 2x6-inch stuff, each frame 8x8 feet, two frames on each side and one at each end.

This leaves room for three piers on each side. These piers are triangular in shape, showing two feet on each face on the outside. They are constructed of concrete, one part cement, two sand and four blasted rock. This mixture is thrown in a wet state inside of rough pier forms.

By making these piers triangular they are strong; it gives a fine space inside for hanging a mirror or picture or for shelves and it avoids sharp corners in the house. The tops of the 8x8 frames serve as a plate on which the roof beams rest. They rest also on the tops of the piers.

All roofs in the tropics should have a good overhang. In early times on this coast houses were built with practically no

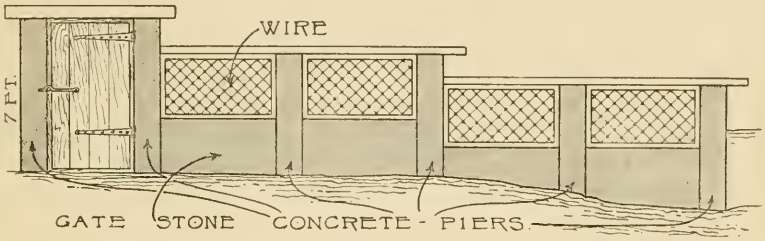


eaves. They saved lumber and felt safer in times of storm. Eaves throw the water from the house and shade the walls, thus rendering the house much cooler, since the secret of keeping cool in the tropics is keeping in the shade and in good ventilation.

On top of the roof-beams I lay corrugated iron. Boards may be used instead between the beams and afterwards removed. On this I lay four inches of concrete reinforced with poultry fencing, barbed wire or common galvanized wire of any kind. A rim of cement serves for a gutter and the slope is left to one corner or to the middle of one side. Thus iron gutters are dispensed with. This roof forms a pleasant mirador and a second story may be put on in the same way if the owner desires.

The main part is complete—the finish is easy. A Tropical house should have many openings so as to be all-porch in hot weather and yet tight as a drum in times of storm. Tongue and groove stuff shingled on the outside is good. I use narrow shingles (three-inch) and put one nail in each shingle. A small shingle when it contracts makes a smaller crack than a wider one and if only one nail is used it is less apt to split in the process of expansion and contraction. I prefer shingles and up-and-down boarding to clapboards, since then the rain drips or runs down with the grain of the wood. Good copper screening is necessary, but glass is often dispensed with, solid board shutters being often used.

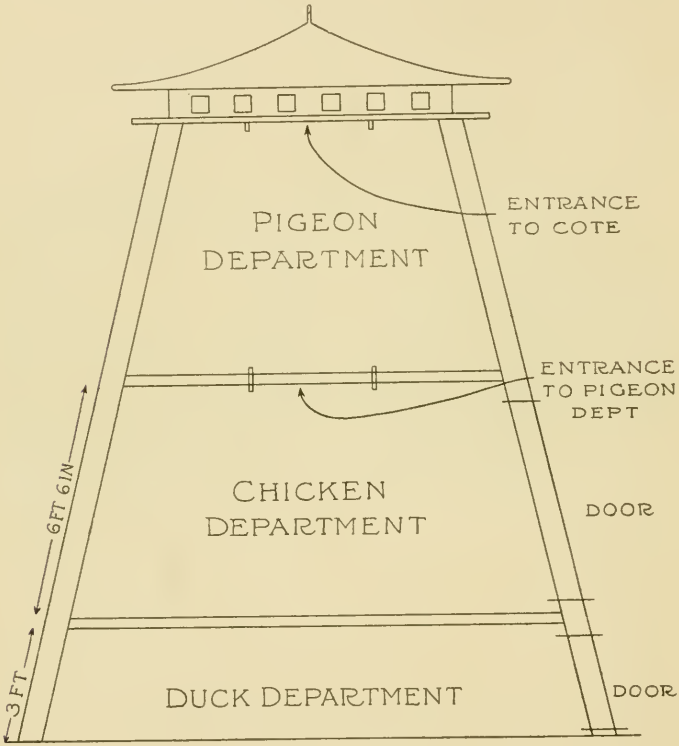
Such a building is cool and cheap. It has no large timbers in it. It is anchored to the ground by stone pillars and a solid



slab of a roof. One of the corner piers may be made hollow for a chimney, and a fireplace is pleasant since there comes a time in almost all tropical countries when a fireplace fire is grateful.

Such a house looks plain and solid—Assyrian or Zuni-like in character—quite in contrast to many of our ornate, gingerbread carpenteresque constructions, but the shubbery in the patio and the vine-covered pergolas and fences with many shades of leaf and flower give it all variety necessary. These units may be connected with a fence and the following I have found to be very good and not very expensive: Put up posts ten or twelve feet apart, five or six feet high and one foot square, built in a form of the same kind of concrete mentioned above. Connect these with a wall two or three feet high. Run

a 4x4 railing along the top of the posts and fill the space with poultry wire. This is "horse high, pig tight and bull strong," and is at the same time attractive and fine for vines. These unit houses cannot properly be called bungalows, since a bungalow is supposed to be a low, flat, rambling, wooden structure, often with a thatched roof in the East Indies, but the term in America



now covers a multitude of sins. One of these unit houses I have built for a garage, but prefer to call it an "autola." One unit may be used for a kitchen and lavatory. In case the baby is cross or some one snores it is easy to relegate them to the units in the farthest corner of the patio. In conclusion let me add that no place, however small, is complete without a place

for animals of various kinds, the houses for which may be built in the same way around a central court. Then, too, many people are fond of pigeons. I have built a dove cote twenty feet in the air on top of four posts put slantwise in the ground. Two feet from the ground I have built a floor of boards which serves as a roof for the ducks and a floor for the hens. Six or eight feet higher up I have built another board floor, which serves as a roof for the chickens and floor space for pigeons. The whole is enclosed in netting. The pigeon house has a hole in the center underneath so that they can enter their department from below and thus be safe from intruding hawks.

A UNIT HOUSE IN PROCESS OF CONSTRUCTION. CONCRETE ROOF AND CONCRETE FLOORS. THIS HOUSE CONSISTS OF THREE UNITS JOINED TOGETHER ON A TRIANGULAR LOT. VIEW FROM SOUTHWEST.
(PHOTO BY KAUFMAN, MIAMI, FLA.)

SAME HOUSE—VIEW FROM NORTHWEST.

CHAPTER XIII.

THE EVERGLADES OF FLORIDA.

OUTH of Lake Okeechobee, reputed to be the largest body of fresh water wholly within the confines of the United States except, of course, Lake Michigan, is a large tract of marsh land, called the Everglades. A glade is usually defined as a grassy opening, strip or lane, between growths of trees. There are many such little glades between the long pine-covered ridges which jut out into what the natives designate the main or Big Glades. This is, no doubt, the meaning of the word Everglades, the term *ever* signifying *all,* or wholly glade or grassy, with few islands—in short, mile after mile of low grass morass.

This territory is all south of latitude 27°, the same latitude as the valleys of the Nile and Ganges, and is the only part of the mainland of the United States with a tropical or Antillean flora, for although a part of Texas is also below this same parallel, the land is more or less arid, and there is no great body of warm water to the northwestward to temper the cold winds from that quarter. We may safely say, therefore, that the Everglade region is the only part of the mainland of the United States which is truly humid tropical, the only place where tropical crops can be successfully produced without irrigation, although irrigation is desirable in almost all tropical countries.

The warm trade winds reach us from the West Indies, so that climatically and botanically we are in the same class with Western Cuba and the Bahamas, and, although it is a little cooler here in winter, it is all the better, since cool weather, up to a certain point, of course, produces quality in fruits and

vegetables—that is, richness of flavor combined with firmness, permitting shipments long distances.

The Everglade region is over three million acres in extent, fully as large as Porto Rico or Jamaica. From the center of Lake Okeechobee to Miami is at least a hundred miles, and southward to the shore of the Bay of Florida is fifty more.

Although there are patches of sand and marl and rock, the soil of the Everglades is mostly black muck, the result of ages of decomposition of vegetable matter. Reclaimed muck lands throughout the world usually have great productivity, and, therefore, high value. The fact that these muck lands are in a region where tropical fruits and tropical staple crops, such as sugar cane, as well as Northern vegetables, grow in midwinter, gives this region an added value over muck lands elsewhere. I spoke above of "Northern vegetables," but we must not forget that the original home of many of these was in the Southland.

This vast area of mud sloughs is usually completely inundated for several months of the year. It is a weary waste of saw-grass, through which neither walking nor boating is satisfactory. Remove the water, burn off the saw-grass, and the aspect soon changes. The cool breezes sweep over it; it is a broad, level prairie; other grasses and wild flowers appear. With teams plowing and cattle pasturing, it would look not unlike the low countries of Europe, which the enterprising Dutch have wrested from the sea, nor unlike the prairies of Louisiana which our own people have reclaimed by holding the mighty Mississippi in its course. Although the whole body of the Everglades is considerably above sea level (Lake Okeechobee 23 feet), the water could not escape to the sea, because of sand dunes and a rock rim around the edges. This rock rim, although usually called limestone, is in reality in many sections a calcareous sandstone, and was once no doubt mobile. It was blown in by the wind in the form of a dune and afterwards hardened into rock called Miami oölite. These dunes, just as has happened in other parts of the world, notably the Landes of France, choked up the rivers, caused inundation, and this in turn caused the formation of muck and bottled up a great mass of

fertility for future use. Before this dune hardened many streams succeeded in working holes through it, and this explains many of the subterranean channels to the bay and ocean. This dune formation and wind origin of limestone ridges is no fairy tale. Go to Eleuthera, in the Bahamas, and other places of a like nature, and you will see it in all stages.

It is worthy of note in passing that just to the west of the Everglades are great deposits of phosphate, the remains of sea animals, rich in phosphorus, the scarcest and most precious of plant foods, in fact, also animal foods, since foods deficient in it are deficient in bone-making qualities. One-third of the world's phosphate supply is here in Florida, and in time the fertility of the great agricultural soils of the world will be measured by the amount of phosphorus available. It is more than likely that phosphate beds will be found in the Everglades.

On the south the Everglade region is bounded by a little-known section, usually marked on the map the Big Mangrove Swamp. Much of this section has never been surveyed, and less is really known about it than is known of Angola or Quintana Roo. On the maps the stream courses are usually marked with dotted lines. Some maps show White Water Bay as a big sheet of water; others don't show it at all. In this region there is considerable hardwood, even mahogany, locally known as madeira. It is so common in one place that it furnishes the name "Madeira Hammock." This madeira is the true mahogany, *Swietenia Mahagoni*, and samples which I sent to London experts were pronounced first class for solid furniture and appeared identical in character with a specimen of mahogany, or *Caoba*, which was sent by the government of Mexico to the Paris Exposition.

On the northwestern edge of the Everglades is the Big Cypress Swamp, one of the largest and finest bodies of cypress timber left in the South.

The drainage work now under way and certain to be completed within a short time, since the work is in charge of a competent engineer, and the contract has been let to a Baltimore firm accustomed to handling such big enterprises, is being paid

for by the sale of lands. The question of drainage resolves itself into two factors, all a matter of digging through mud and rock, opening the outlets to the sea and lowering the level of Lake Okeechobee. For example, suppose we have one big plate representing the Everglades as a whole. Inside this plate on the edge to one side is another very much smaller plate, representing Lake Okeechobee. Flowing into the small plate is a large quantity of water from another watershed. The small or Okeechobee plate spills over and in the course of time the Everglade plate spills over its rim into the sea. I have seen the water rise at the south end of the Glades without any rain or signs of rain. But it had rained up the State and filled to overflowing the Okeechobee plate. Of course, there are local rains which come quickly and heavily; in fact, there are rains called "glade rains." In the summer I have seen it day after day raining on the Glades, while the bay shore was suffering from drought. What passes away through underground channels and what passes away through evaporation and transpiration is probably quite equal to the precipitation, and I have always believed that if the excess from Okeechobee could be disposed of, floods would be seldom and of slight duration in the Everglades. The rivers which run into the sea are narrow and clogged with rocky bottoms. Two or three streams of considerable size disappear on the edge of the Glades and appear again in the form of big springs on the edge of Biscayne Bay.

There were attempts at drainage in times past, but they did little good. To be sure, they lowered the water a little and increased the zone dry enough for cultivation around the edge and permitted earlier cropping, but these attempts were like nibbles at a big project which had to be complete throughout and on a large scale in order to be effective.

The late Napoleon Broward, with the eye of a practical man, knew good land when he saw it, and knew also that water would run down hill. Used to pulling wrecks off reefs, he came to conclusions quickly and intuitively. When some insisted that it would take fifteen years of rainfall observations, several years of careful topographical surveying and the reports of

several expensive and conflicting experts to determine the feasibility of his scheme, he was abashed, but not discouraged. He replied: "I will be dead by that time. The State will be poor and the money thus expended would buy a couple of dredges. We can sell some land to build dredges and if my friends will hold the knockers in check, we can soon make a convincing ocular demonstration." Corporate interests which had lost their grip

A SCENE IN THE PINE LAND ON THE MAINLAND. THE PINES (P. CARIBAEA) IN THE BACKGROUND. THE ROAD IS CONSTRUCTED OF LIME-ROCK, ALSO THE FENCE. THE ROCK WAS TORN FROM THE CLEARING ON THE LEFT BY GRUBBING AND BLASTING. (PHOTO BY PROF. JOHN CRAIG.)

on these lands, of course, opposed him out of sheer bitterness, but there were also hundreds of knockers, strange to say, among home people, who had nothing to lose and everything to gain, and who talked it down by the hour on the street corners to every newcomer. I remember visiting the Everglades with one of the first groups of newcomers from New Mexico. They had heard so many stories that they were skeptical. Instead of being

disheartened at the sight of so much water, coming from a land of drought and desert, they enthused over it, and without exception bought, and most of them have bought and sold several times since.

To Broward the credit is due. He was to Florida what Bremontier and Chambrelent were to France and Dalgas to Denmark.

SCENE IN EGYPT, WHICH IS IN THE SAME LATITUDE AS SOUTH FLORIDA, WHERE FLAT ROOFS NOT ONLY PREVAIL, BUT WHERE THEY ARE USED AS MUCH AS ANY ROOM IN THE DWELLING.

Broward possessed to a striking degree the three qualities that make good manhood and citizenship—he was honest, he had a lot of good common sense, and he had also the sense of humor. Above all, he had common sense—the sense of proportions—good judgment or the ability to do the right thing in the right way and at the right time. He worked against jealous and greedy corporations, rival politicians and a host of born knockers, but he fought a good fight, and Florida owes more to

Broward than to any other man. In Arcachon, in the Landes of France, there is a statue of Bremontier, the man who added a new province to that Republic by the reclamation of swamp land. Soon there will be, probably in Jacksonville, a monument to Broward, the man who was the maker of South Florida.

I have called this the greatest conservation project in the United States because at the cost of about one dollar, an acre of land capable of producing net two hundred dollars' worth of vegetables annually is actually formed out of the useless mud sloughs. The saw-grass can be quickly burnt and the land is ready for the plow, with plenty of water for irrigation purposes, if it is necessary. Compare this with the cost of any of our irrigation projects. Think of buying a farm and paying for it with the first year's crop! Land dry enough to crop rents now at ten dollars per acre.

The Chattahoochie Canal is practically done. This leads from Okeechobee to the Gulf. A dredge is working southward from Okeechobee on the main canal toward Miami. Another is working northward from Miami, and two are at work back of Fort Lauderdale, well out into the Glades.

These are all fine, large canals and of great usefulness for transportation as soon as the dams are replaced by locks. Dams are now necessary to hold back the water to float the dredges.

What will grow in the Everglades is a hard question to answer. It would be easier to tell what will not grow there. Under the head of fruits there are about fifty kinds which grow in this region; add to this list almost all the vegetables grown in the tropics and the North; add to this many staples and forage crops; many bushes and vines and three hundred or more useful native and introduced trees.

As the water goes down there is left over the Glades a deposit of lime. This is mostly precipitated lime, which goes to form marl. Mixed with it are the shells of fresh-water mollusks, and in some places tons of dead fish. During the past summer I saw pool after pool filled with dying and putrefying fish, emitting an unbearable stench. Around these pools were hundreds of birds, buzzards, herons and crackles, all eating their

fill from these charnel pits, and fighting and screaming over the booty. When the land is all drained these spots will have magical fertility.

That the Everglades will be drained within about a couple of years seems certain, and that people are coming here is already evident. Although houses to rent are scarce and board in the tourist season high, it is the land for the poor man. The climate is fine—fully as good as any Mediterranean, Caribbean or Californian climate. Wood is cheap for fuel and house construction. A rustic bungalow can be cheaply made and a pipe churned into the ground to a depth of fifteen feet or less yields an abundance of water. There is plenty of rock for roads, fences and house construction. The surrounding waters are famous for fish of many varieties. The inland canal route from Jacksonville to Key West is done. There will be miles of inland canals, and there is bay after bay along the shore.

In Southern California the hand of man has produced a highly developed and attractive region with no resources except vim and climate. Obstacles were met on every hand. In Southern Florida we have the resources, but the vim has been lacking. We have been reposing since the Seminole war. It is not laziness. We have been indulging our love of leisure. But it is this grappling with nature which develops the latent forces within the man. The coming age is to be an age of conquest, the conquest of nature, the reclamation of swamp lands and the irrigation of deserts.

PINEAPPLE FIELD, SOUTHERN FLORIDA.

From the Garden Magazine for January, 1911.

CHAPTER XIV.

THE PROBLEM OF GROWING PINEAPPLES FOR MARKET.

A FEW years ago the pineapple was extensively cultivated on the coral keys of Florida. The natives cut the forest, burnt the wood and debris on the ground and planted "pines" in the ashes. I protested against this method because it destroyed the humus, and ordered all wood and brush burnt in piles on my land. My man, a Bahaman negro, well versed in the pineapple business, insisted that the land must be "hot" for pines, that they needed the ashes, and that if the burning was done in a moist time only the surface rubbish would be destroyed. Time proved that he was right. These pineapple fields were weeded once or twice a year, no fertilizer was applied, but a heavy yield was secured in spite of the sparseness of the soil and the crude nature of cultivation.

But what a mess it was at harvest time! They commenced to break pines in early summer. The plants were full of spines and more than waist high. Canvas mittens were necessary. It was usually hot and the mosquitoes were a pest beyond description. The negroes toted the pines to the boat in baskets on their heads, over rough rocks along narrow, well-worn paths. There is uncut land left on these keys and a railroad is now in operation in a part of this region, but the pineapple business is practically dead. With a field of pines and a patch of limes and wrecking on the side these Key people were once well-to-do and their lands were valuable.

Further up the State along the East Coast there is a long stretch of sand dune country. It was covered with a sparse

growth of pine trees and the soil was naturally sterile. A balanced ration of fertilizer was applied by the pineapple growers and immense crops were produced, a few acres yielding a fine income. Of late, returns have been small and many growers have quit the business. Over in the Bahama Islands it is the same story.

In Cuba there is a lot of soil especially adapted to pineapple culture. An owner of a young citrus grove plants pineapples between the trees and thus receives a quick return. The Cuban people are fond of the pineapple or "la piña" as they call it. It is ground fine, sweetened and mixed with cracked ice. It is sold in this form at all refreshment stands and is certainly one of the most refreshing drinks imaginable on a hot day. If served throughout the United States in this way it would soon become popular. This would increase the consumption of this fruit to an enormous extent.

One hears complaints of small returns on pines even in Cuba. In fact it looks like a case of overproduction. The pineapple is well known in the North, is largely canned and relished by everybody. We import twelve million dollars' worth of bananas every year, but the pineapple, coming only at a special season and not having the filling food value of the banana, is at a disadvantage. The pineapple suffers severely in the process of transportation. It is usually picked too green. A pine is at its best when it ripens on the plant. A ripe pine may be located in the patch by the fragrance which spreads far and wide. A rat may have eaten one side but you will find the other side very delicious.

Good drainage seems essential to the pineapple and it is no doubt for this reason that it does so well in sandy soil. In the Hawaiian Islands they grow pines on a stiff soil, the favorite variety being the smooth Cayenne.

The pineapple is a strictly tropical fruit needing lots of warmth, and, although it will grow on sterile, sandy soil, it must be carefully and abundantly fed with fertilizer. The food it needs is rich—such as cottonseed meal, unleached tobacco dust and dried blood and bone.

Although the pineapple is referred to as a semi air-plant, since it belongs with a group of epiphytes, it must have something more than air to live on. Water often stands in little pockets at the base of the leaves. In this are often the dead bodies of insects and it is quite likely that the plant secures some sustenance in this way. It is a very shallow rooter and the roots must have air. I have known pineapples to actually sucker themselves out of the ground and have found them resting very loosely in the fluffy humus which covers the rocks on the Florida Keys. Although I have no means of positively knowing, I believe Florida produces one and one-half million crates of pines a year. Cuba probably exceeds this amount, also the Bahama Islands. This places the pine in the front rank with other staple fruits.

The Red Spanish is the chief commercial variety. It multiplies well, is hardier and ships better than any other sort known to the writer. The Porto Rico is a close second.

The pineapple is not seriously troubled by disease and in spite of the small returns it is still a favorite crop with many small farmers. It is easily reproduced from slips and suckers. Now and then a fertile seed is produced. Pines may be grown from rattoons which spring from the root, suckers which grow on the stem higher up, slips which grow at the base of the fruit, crown slips which grow at the base of the crown, and from the crown itself. In this district slips from the base of the fruit are ordinarily used. The bottom of the slip should be cut smooth with a sharp knife and the stem trimmed. There is less danger of a trouble called "tangle root."

Canning factories use many pines, but many go to waste that could be easily converted into commercial alcohol. It is one of the fruits which does not lend itself to wine manufacture but would probably yield a good cordial. The pineapple, it is claimed, contains a ferment similar to the ferment in the papaw which aids digestion. In the East the fiber of the leaf is extensively used for cloth manufacture. This cloth is as delicate and beautiful as silk. The fiber is used for nets, thread for sewing, etc., and although very fine it is strong. I have often wondered why an extensive industry in this line has not developed in the West

Indies. A pineapple field in dry weather, like a field of cane, is very combustible.

The scientific name of the pineapple is now *Ananas ananas,* which is also a common Spanish name for the plant although piña is much more frequently used. I have often thought that ananas would be a better common name for it than pineapple. It is, of course, nothing like an apple and was so called probably because it faintly resembles in shape the pine cone. We are calling grapefruit, pomelo; alligator pear, avocado; why not call the pineapple ananas?

It appears from present conditions that in pineapple culture, in spite of the duty, Western Cuba has the advantage. When solid trainloads of pines sweep by from Cuba over the Florida East Coast Railway, and when his returns come in, the Florida pineapple grower realizes that he has a competitor to the south of him and that he lives at a way station on a West Indian trunk line.

THE SUNDERSHA MANGO, ONE OF THE LATEST TO RIPEN.
(PHOTO BY KAUFMAN.)

From the Garden Magazine, February, 1911.

CHAPTER XV.

THE MANGO, THE BEST OF ALL THE TROPICAL FRUITS.

OME call the mango "the apple of the tropics." It is more; it is the apple, peach and pear combined. The novice in eating the old common seedling sorts meets with difficulties. Such an experience is sure to prejudice him against mangoes forever. These old-time sorts have the smell and taste of turpentine and a tough cottony fiber around their big seeds which completely fills the crevices between the teeth, making business for the dental profession. It is mushy, slippery and hard to hold. The juice stains the clothing. One smells and feels and looks as though he had been the victim of a yellow paint accident. After eating such a fruit for the sake of three or four tablespoonfuls of pulp, one must take a bath and then retire to some shady nook for the rest of the day to pick his teeth. But some of the improved sorts which sell locally at twenty-five cents each are quite otherwise. The skin peels off easily, the aroma is pleasant, there is no fiber, the seed is small, the fruit weighs twenty or more ounces and the creamy, delicious peach-like pulp melts in your mouth. I have never tasted a mangosteen, which, according to the books, holds the world's record for goodness, but of all the fruits I know, temperate and tropical, two or three varieties of mangoes lead in my estimation.

South Florida is making rapid strides in mango culture. Many varieties have been introduced from all parts of the tropics, both by the Government and enterprising growers. Many choice

seedlings are just coming into fruit and our budders are learning the trick.

I have always contended that a Florida seedling mango will become the commercial mango of the future. None of the choice imported sorts fill the bill perfectly. There is usually some defect, such as shy bearing, poor carrying qualities, or lack of resistance against pests. If the Government had imported a large quantity of seeds of all the best varieties of mangoes the world affords ten years ago, we would now have several new varieties of local origin which would exactly fill the bill for home needs and shipment North. It is possible that we have it anyway in the form of a seedling Mulgoba, bearing this year for the first time; it is too early to say. But this tree bears fruits of a large size, of very beautiful coloring; hard, rather thick skin; no fiber; small flat seed and delicious flavor. It remains to be seen whether it is a shy bearer or not. This is the fault of many of these high-grade mangoes. It is possible that this difficulty may be remedied by root-pruning, girdling, or by proper fertilizing.

I have a little book on the mango written by Woodrow of India, the man who sent Mulgoba plants to Florida in 1889, in which over eighty varieties of mangoes are listed and this is probably not more than half of the varieties now known, many of which are of recent origin and many of which are no good.

For instance, the Alphonse, Alphoos or Alfoss is highly prized. Higgins thus describes it: "This is one of the most noted of the India mangoes. Size, medium to large; color, greenish yellow on the unexposed side and running to yellow on the exposed side, which is overlaid with light red; peeling qualities excellent; texture excellent, may be readily eaten with a spoon; flavor unique, with a peculiar mingling of acidity and sweetness in the bright colored fruit." In looking over Woodrow's list, on the other hand, one runs up against all kinds of Alphonses. For instance:

Afonza of Goa; Alphonze, Kirkee, "the keeping qualities of this fruit are excellent and it is generally admitted the best of all

mangoes. *The name is applied in the markets to many distinct sorts of greatly varied merit.*" (The italics are mine.) Kola-Alphonse; Kagdi-Alphonse, Bombay; Surawini Alphonse, Bombay. In fact, it seems that whenever they found a really good mango, they called it Alphonse.

The Mulgoba, Cambodiana and a long yellowish kind from Burmah are my favorites. There is a little mango in Florida about the size of a peach, yellow in color, with a beautiful pink blush on one side. It has a thin skin, no fiber and delicious flavor. It is commonly called the "peach mango" and was raised from seed sent from Jamaica. For home use one would hardly wish for a more perfect fruit.

The Khatkia, according to Woodrow, is meant to be sucked, while others such as Fernandino II. of Goa is a cooking mango of special value. It should be stated to the credit of the mango that good apple pies can be made from the green fruit. The merits of the many kinds is a fruitful topic of discussion among mango cranks. Conclusions are not warranted as yet. It takes time to settle such questions. Some of the old timers with perverted taste settle it by saying that the common turpentine mango is good enough for anybody.

The mango belongs to a disreputable family, the Spondiaceæ or sumac family. It is probably the most respectable of all its relations. It is represented in Florida by a poison tree (*Metopium Metopium*) commonly called hog plum, poisonwood, bumwood and doctor gum. It includes the cashew nut (*Anacardium occidentale*), the jobo, pronounced hobo, and should be spelled the same way (*Spondias lutea*), the famous pepper tree (*Schinus molle*) so common in California, and the cassava (*Manihot Manihot*).

In spite of the highly poisonous nature of many plants of this family, the mango is very wholesome although I have heard of one or two cases of "mango rash" due presumably to the excessive eating of this fruit. Negroes in many parts of the tropics practically quit work during mango season, devoting themselves assiduously to making the best of a good thing while it lasts.

The mango is a beautiful, broad-spreading shade tree. Its rounded crown and dense foliage form a perfect shelter from the sun. It has a dark green leaf larger than, but similar in shape to that of the peach. It is never leafless. The young leaves are a beautiful pinkish red. The tree grows to be very large and groups of such trees around the homestead are striking features of many tropical landscapes.

The flowers are small but profuse and a dry winter season is favorable to a good crop. Some of the common mangoes bear heavily almost every year, the branches bending to the ground with the weight of fruit. In planting the seed it is best to remove the outer covering or case by carefully cutting the margin with a sharp knife. The seed may contain two or three embryos, so that is is often possible to secure two or even three trees from a single seed. It is a promising fruit for South Florida and, although it bears in the summer when peaches and other Northern fruits are in the market, it will sell on its merits; and besides there is the probability of keeping it in cold storage till winter, when the tourists come with plenty of money and good appetites for the fruits of the land. By this means, too, the railroads and commission men may be prevented from robbing the owner of the fruits of his toil. Ten years in the future Florida mangoes will be famous. Many local varieties will be developed and perfected and become as well and as favorably known as is the Florida standard grapefruit or pomelo The same prediction applies to the avocado or alligator pear.

A RUBBER TREE IN FLORIDA.

APPENDIX

A LIST OF THE TREES OF SOUTH FLORIDA, NATIVE AND INTRODUCED.

The following list is of course by no means complete. Florida is a land of many flowers, fruits and forests. It is difficult at times to distinguish between a shrub and a tree. New trees are being introduced into this country almost every day, and of the great number of tropical trees in the world there are many which have never been tried and which will probably grow here as well, if not better, than in their native land.

WEST INDIAN ALMOND TREES BENT BY THE WIND.

ORDER CYCADACEAE. CYCAS FAMILY.

Cycas revoluta. **Sago Palm.**

To this same order belongs our common coontie or comptie (Zamia Floridana), a valuable starch-yielding plant, which might be used to advantage in the manufacture of grain alcohol.

ORDER PINACEAE. PINE FAMILY.

Pinus clausa. **Sand Pine.**

Coast of East Florida on sand dunes.

Pinus Caribaea. **Cuban Pine.**

The common timber pine of South Florida. Grows also in West Indies and Central America. Also called Pinus Elliottii—Slash Pine. This pine and the Longleaf or Yellow Pine yield the naval stores of our South. It is generally believed that resin will not run satisfactorily in Tropical Florida. The wood resists sea worms better than any of our native pines.

ORDER JUNIPERACEAE. JUNIPER FAMILY.

Taxodium distichum. **Bald Cypress.**

A valuable timber tree.

Taxodium imbricarium. **Pond Cypress.**

A species recently named by Harper.

AN AVENUE OF THE WEST INDIAN ALMOND, A FAVORITE SHADE TREE IN THE WEST INDIES. NOT SIMILAR TO NOR RELATED TO THE ALMOND OF COMMERCE.

Thuja occidentalis. **Arborvitae.**

Various cultivated varieties of this tree commonly planted for shade and ornament. Probably does not extend naturally southward further than the mountains of North Carolina.

Sabina Virginiana. **Red Cedar.**

The word "sabina," corresponding to the English savin, is a better name than the old name Juniperus. Sabina is the common name of the following species in Cuba and Santo Domingo.

Sabina Barbadensis. **Pencil Cedar.**

Formerly called Juniperus Barbadensis.

The famous pencil cedar of Florida. Some years ago forests of cedar and live oak were reserved in Florida and elsewhere on the coast to insure a future supply of these valuable timbers for our navy. These were, of course, abandoned when steel replaced wood for this purpose. These, however, were our first national reserves.

Other conifers in cultivation are:

Araucaria excelsa. **Norfolk Island Pine.**

Cedrus Deodara. **Deodar Cedar.**

According to Reasoner, this tree succeeds everywhere in the South. It is very similar to the cedar of Lebanon and the Atlas cedar.

PANDANACEAE. PANDANUS FAMILY.

Pandanus utilis. **Screw Pine.**

A MAHOGANY TREE IN THE BAHAMAS.

ORDER POACEAE. GRASS FAMILY.

Bambos spp. **Bamboo.**

Several species are growing here and the government has started a bamboo farm at Brooksville, Florida. Bambos vulgaris is abundant along water courses in the West Indies, forming stately groves. Since it loves moist stream banks it will, no doubt, be a great favorite

for Everglade planting. It throws a heavy shade and is a fine protective cover for poultry and social birds.

ORDER ARECACEAE. PALM FAMILY.

Thrinax Floridana
Thrinax microcarpa
Thrinax Keyensis
Cocothrinax jucunda
Sabal palmetto
Serenoa arborescens
} Palmettoes

The leaves of these palmettoes are highly valued in some countries for thatch, also for mats, baskets, etc. The leaves of the "Pond Thatch" in the Bahamas last longer than shingles. Thrinax Keyensis is good for this purpose. When timber gets scarcer, they will be more extensively used, just as straw is used on even expensive buildings in Holland.

THE LIVE OAK.

PALMS.

Pseudophoenix Sargentii. **Sargent Palm.**

Southern Keys and the Bahamas. Resembles the date palm. Getting very scarce.

Roystonea regia. **Royal Palm.**

This majestic tree reaches its optimal growth in Cuba, of which country it is emblematic; it adorns the Cuban two-cent postage stamp and coat-of-arms and its rich berries fatten many swine for their Christmas festivities. Extensively planted in South Florida and appears to be indigenous in several patches in the neighborhood of the Everglades.

Cocos nucifera. **Coco Palm.**

One of the most beautiful and useful members of the plant world, yielding food, drink and shelter to many primitive peoples of the world. This tree grows in sandy soil along the seashores of tropical Florida and although most of the nuts were planted by the

SEMINOLE INDIANS COMING TO TOWN
WITH VENISON AND SKINS.

hand of man, undoubtedly some have sprung from seeds which have washed ashore and been buried in seaweed and sand on the beach. The original home of the coco palm is probably not known and since it grows as well in South Florida as elsewhere, it deserves to be listed at least as a naturalized member of our silva. Rabbits are fond of the young sprouts. They must be protected in youth.

Phoenix dactylifera. **Date Palm.**

Phoenix Canariensis. **The Canary Island Date Palm.**

Washingtonia filamentosa. **Fanleaf Palm.**

MUSCAEAE. BANANA FAMILY.

The banana is, by some people, called a tree because of its size, but according to the accepted definition of a tree, the stem must be woody in nature.

CASAURINACEAE. BEEFWOOD FAMILY.

Casuarina equisetifolia.

A tree of the East Indies and Australia, but now common throughout the tropics. Grows close to the sea, and has been used in the fixation of moving dunes along the seashore. It is usually called Australian Pine, but a patch of them on Biscayne Bay is known as the "cedars." The tree has become naturalized in South Florida and young trees of this species are growing here and there on the shore, the seeds of which have no doubt been washed ashore. It is a valuable addition to the silva of the State of Florida. Should be extensively planted for timber. It withstands the gales and yields a wood like oak.

JUGLANDACEAE. WALNUT FAMILY.

Hicoria pecan. **Pecan.**

The king of nuts extensively cultivated in improved form in North Florida. Both the words "hickory" and "pecan" are probably of Indian origin. It is quite probable that some Spanish tree names such as "Ucare" are corruptions of hickory since hickory has been extensively used by West Indian peoples for barrel and hogshead hoops.

The pecan grows well in Florida, but apparently does not flourish south of central part of the State.

MYRICACEAE. BAYBERRY FAMILY.

Morella cerifera. **Wax Myrtle.**

SALICACEAE. WILLOW FAMILY.

Salix longipes. **Long Stalk Willow.**

FAGACEAE. BEECH FAMILY.

Quercus Virginiana. **Live Oak.**

Excellent timber tree, common in Florida, also Mexico, Cuba and Central America. These sturdy, broadspreading live oaks draped with Florida moss form a very characteristic feature of the Florida landscape.

Quercus myrtifolia. **Myrtle Leaved Oak.**

ARTOCARPACEAE. MULBERRY FAMILY.

Morus rubra. **Red Mulberry.**

Common throughout the State.

Morus nigra. **Black Mulberry.**

Commonly planted for its large, black, juicy fruits. Probably originally came from Persia.

Morus alba. **White Mulberry.**

From China. Introduced mainly for silk-worm food.

Broussonetia papyrifera. **Paper Mulberry.**

From Japan. Common throughout the State.

Ficus aurea. **Golden Fig.**

South Florida and the West Indies. A striking weed tree in the forest. Grows first on limbs of other trees, throws down aerial roots to the ground and finally chokes and kills the tree upon which it started.

ALEURITES TRILOBA — THE CANDLE-NUT. HAS FRUITED IN SOUTH FLORIDA AND IS A VALUABLE TREE.

Ficus populnea. **Poplarleaf Fig.**

South Florida and the West Indies. Easily propagated from cuttings and might prove a satisfactory shade tree for South Florida.

Ficus carica. **The Fig.**

Cultivated throughout the South for its fruits.

Ficus nitida. **Spanish Laurel.**

A beautiful shade tree in Nassau and Key West. Also common in Cuba. A very satisfactory tree for roadside planting.

Ficus religiosa. **Sacred Bo of India.**

Growing in favor as a shade tree in Tropical Florida. Very common avenue shade tree in Cuba.

Ficus altissima. **East Indian Rubber.**

Makes excellent growth in Southern Florida.

Ficus glomerata. **Cluster Fig.**

Of India. Grows well and bears well in Southern Florida.

Artocarpus integrifolia. **The Jack Fruit.**

This tree, similar to the Bread Fruit, has fruited in South Florida.

ULMACEAE. ELM FAMILY.

Trema Floridana.

A MASTIC TREE IN THE HAMMOCK.
(PHOTO BY DR. R. M. HARPER.)

POLYGONACEAE. BUCKWHEAT FAMILY.

Coccolobis uvifera. **Sea Grape.**

Common on the seashore of Southern Florida, also West Indian

Coccolobis laurifolia. **Pigeon Plum.**

South Florida and West Indies. A fine tree in the hammocks of Southern Florida. (A hammock is a rich hardwood jungle. It is probably an old Indian word and the old spelling "hamak" is sometimes still used.)

ALLIONIACEAE. FOUR-O'CLOCK FAMILY.

Pisonia obtusata. — Blolly.

Sea beaches and shores of brackish lagoons. Tropical Florida.

ANONACEAE. CUSTARD APPLE FAMILY.

Anona glabra. — Custard or Pond-Apple.
Anona squamosa. — Sugar Apple or Sweet Sop.
Anona muricata. — Sour Sop.
Anona reticulata. — Custard Apple, called also Bullocks's, Heart or Corazon.
Anona cherimolia. — Cherimoyer.

The fruit of the latter is very highly prized in Spanish-American countries. It can be budded on our native Pond-apple. The wood of Pond-apple is very light and useful for net floats and stoppers in place of cork. Canangium odoratum of this order, a few of which have been planted in South Florida, yields the famous ilang-ilang perfume. To this order belong several important genera, such as Uvaria and Rollinia, which yield valuable fruits.

MAGNOLIACEAE. MAGNOLIA FAMILY.

Magnolia glauca. — Magnolia or Sweet Bay.

A beautiful tree which should be more extensively planted. Grows well on Everglade soil.

CAPPARIDACEAE. CAPER FAMILY.

Capparis Jamaicensis. — Florida Caper.

MORINGACEAE. HORSERADISH TREE FAMILY.

Moringa moringa. — Horseradish Tree.

The root of this tree, finely scraped, is eaten as horseradish. The Oil of Ben, used by perfumers, is extracted from the seeds of this tree.

AMYGDALACEAE. PLUM FAMILY.

Chrysobalanus Icaca. — Coco-plum.
Amygdalus Persica. — Peach.
Laurocerasus sphaerocarpa. — West India Cherry.
Eriobotrya Japonica. — Loquat.

LEGUMINOSEAE. BEAN FAMILY.

Pithecolobium unguis-cati. — Florida Cat's Claw.
Pithecolobium dulce. — Gaumachil.

One of the fastest-growing trees ever introduced into Florida. It grows five feet in height per year, on rocky land. Grows well in regions of very slight rainfall. The pulp of the pod is eaten by the poorer classes of Mexico. Pods are a good feed for cattle, and the bark contains twenty-five per cent tannin and is therefore extensively used for tanning purposes in regions where it is plentiful.

Pithecolobium saman. **Rain Tree or Guango.**

Similar to the above.

Pithecolobium Gaudeloupense. **Goatbush.**

This is a native bush, but sometimes reaches tree proportions. It is valuable because it is the first hardwood leguminous shrub to appear in the pine woods. It enriches the soil by its litter and paves the way for other hardwoods. It marks the beginning of the transition from pinewoods to hammock conditions.

Albizzia Julibrissin.

A favorite shade tree in the Southeastern United States.

Albizzia Lebbek. **Siris or Lebbek Tree.**

Called Woman's Tongue in Nassau.

Lyoiloma latisiliqua. **Wild Tamarind.**

Common in places on the Keys. Wood, heavy, hard, tough, close-grained, rich brown, tinged with red.

Vachellia Farnesiana. **Yellow Opoponax.**

Called also Popinac. The flowers are used for perfume.

Leucaena glanca.

Mimosa spp.

Dalbergia Sissoo. **Sissoo Tree of India.**

It is a species of this same genus that yields one variety of "Rosewood."

Tamarindus Indica. **Tamarind.**

Ceratonia siliqua. **St. John's Bread or Carob.**

Haematoxylon Campechianum **Logwood.**

Grows well on dry, rocky ridges.

Cassia fistula. **Shower of Gold.**

A favorite ornamental tree.

Delonix regia. **Poinciana Tree.**

A favorite shade tree.

Ichthyomethia piscipula. **Jamaica Dogwood.**

A common and very valuable timber tree for South Florida. Might be used to advantage as a shade and ornamental. Grows quickly, has an abundance of pea-like flowers in clusters which honey bees are fond of. As the name indicates, it is a fish poison. The bark and twigs are bruised and lowered in a basket into the water. A poison is dissolved which stupefies fish that comes near it. They float to the surface and are easily captured. This tree grows well from seeds and its propagation should be encouraged.

Bauhinia spp.

Several species, beautiful, ornamental small trees.

Cajan cajan. **Pigeon Pea.**

Makes a small but useful tree. Poultry are fond of its seeds and its leaves enrich the soil.

Erythrina arborea.

A CEDRELA TREE—GROWN FROM A CUTTING. RATE OF GROWTH TO DATE, TWO FEET PER MONTH.

ZYGOPHYLLACEAE. CALTROP FAMILY.

Guaiacum sanctum. **Lignum Vitae.**

Very hard, slow-growing wood.

RUTACEAE. RUE FAMILY.

Fagara fagara. **Wild Lime.**

Fagara flava. **Yellow wood.**

Valued for timber in the Bahamas. Good for plane stocks, tool handles and furniture.

Fagara clava-Herculis. **Prickly Ash.**

Fagara coriacea.

Amyris elemifera. **Torchwood.**

Wood heavy, hard, strong, close-grained; very resinous, very durable; light orange in color.

Amyris maritima.

Amyris balsamifera.

Citrus vulgaris. **Bitter Sweet Orange.**

Citrus aurantium. **Sweet Orange.**

Citrus limonium. **Lemon.**

Citrus limetta. **Lime.**

Citrus medica. **Citron.**

Citrus decumanna. **Grapefruit, Pomelo, or Shaddock.**

Citrus nobilis. **Tangerine.**

Citrus Japonica. **Kumquat.**

SIMARUBACEAE. QUASSIA FAMILY.

Simarouba glauca. **Paradise Tree.**

South Florida and West Indies. A pretty, quick-growing tree in the hammocks. Would make a handsome avenue tree.

Bursera simaruba. **Gumbo-Limbo.**

South Florida and West Indies. Grows easily from a cutting or large limb stuck in the ground, frequently used in this way for live fence posts. Grows very quickly and has a very striking, bronzy red trunk, with papery bark. The term gumbo-limbo is probably a negro corruption of the term gum-elemi. Called "gamolimie" in the Bahamas, which is probably a corruption of gum-elemi.

MELIACEAE. MAHOGANY FAMILY.

Melia azedarach. **China Berry.**

Called also "Lilaila." In the northern part of the State and along the Gulf Coast a variety of this tree, umbraculiformis or "Umbrella China Tree," or "Texas Umbrella Tree," is the favorite tree for shade and ornament. Although a native of Persia, is now naturalized in the Southern United States.

Swietenia mahagoni. **Mahogany.**

Called also madeira, the latter word being simply the Spanish for "wood." Common on the Keys and parts of the southern mainland. The king of all woods. Something ought to be done to encourage the perpetuation of this, our choicest native hardwood, in the only part of the mainland of the United States where it can possibly grow.

A RUBBER TREE KILLING A COCO PALM. WILD RUBBER TREES ARE PERNICIOUS WEEDS. THE SEED IS DROPPED BY A BIRD IN THE FORK OF THE TRUNK OR IN THE CREVICE OF THE BARK. IT SPROUTS, ITS ROOTS RUN DOWN THE TRUNK TO THE GROUND. IN TIME IT CHOKES TO DEATH THE TREE WHICH SUPPORTED IT IN YOUTH.

Cedrela Sinensis.
Cedrela toona.

The toon tree of India, called Red Cedar in Queensland.

Cedrela odorata. **Spanish Cedar.**

EUPHORBIACEAE. SPURGE FAMILY.

Drypetes lateriflora. — **Florida Plum.**

Also called "white-wood." South Florida and West Indies.

Drypetes Keyensis. — **Guiana Plum.**

Also called "white-wood." South Florida and West Indies.

Gymnanthes lucida. — **Crabwood.**

Southern Florida and West Indies. Some say this wood is poisonous. It is, however, a very pretty wood and is often used in the manufacture of canes, paper-knives and similar articles.

Ricinus communis. — **Castor Oil Tree.**

Attains the size of a small tree in South Florida. Valuable plant. Oil is very useful, seed pumice is a valuable fertilizer and the plant is not exhaustive to the soil.

Hura crepitans. — **Sand Box Tree.**

Aleurites triloba. — **Candlenut Tree.**

Hippomane mancinella. — **Manchineel.**

Southern Florida and the West Indies. A tree to be shy of; fortunately not common on the mainland. Poisonous to the touch to many people, producing a distressing dermatitis worse than poison ivy. It is called "guao" in Cuba, and I have known persons who have handled it without knowing suffer agonies with face and hands a solid mass of large blisters. It has a small fruit of pleasant appearance which might be eaten by children with dire results.

SPONDIACEAE. SUMAC FAMILY.

Metopium metopium. — **Poison Wood.**

Very common in Southern Florida. Poisonous, and when bruised exudes a gum which blackens the trunk of the tree. One of the first trees to come up after hammock land has been cut and burnt.

Mangifera Indica. — **Mango.**

Extensively planted in the southern countries, producing an abundance of choice fruits, some of the recent imported and improved varieties ranking with the choicest of our fruits. At the same time a valuable shade and ornamental tree.

Anacardium occidentale. — **Cashew Apple. Cashew Nut.**

Spondias dulcis. — **Otahaite Apple.**

Spondias lutea. — **Hog Plum Jobo.**

Spondias purpurea. — **Scarlet or Spanish Plum.**

Schinus molle. — **Pepper Tree.**

Manihot manihot. — **Cassava.**

Phyllanthus (Cicca) distichus. — **Gooseberry Tree.**

AQUIFOLIACEAE. HOLLY FAMILY.

Ilex Cassene. — Dahoon.

CELASTRACEAE. STAFF TREE FAMILY.

Gyminda Grisebachii. — False Boxwood.
Schafferia frutescens. — Boxwood or Yellow Wood.

ACERACEAE. MAPLE FAMILY.

Acer rubrium. — Red Maple.

SAPINDACEAE. SOAP BERRY FAMILY.

Sapindus saponaria. — Soap Berry.
Exothea paniculata. — Inkwood Ironwood.

Wood very hard and heavy. Used for tool handles, etc.

Hyperlate trifoliata. — White Ironwood.

Wood used in shipbuilding in Bahamas. Berries edible.

Cupania glabra.
Blighia sapida.

Formerly known as Cupania edulis, is the Akee of Africa and Jamaica. This tree has fruited at the Sub-Tropical Gardens. The white covering of the seeds is a wholesome vegetable; the rest of the fruit is poisonous, so that great care must be exercised in using it.

Melicocca bijuga. — Genip.

Pulp edible. Nuts in Venezuela are roasted and eaten like chestnuts.

FRANGULIACEAE. BUCKTHORN FAMILY.

Rhamnidium ferreum. — Black Ironwood.
Colubrina reclinata. — Nakedwood.
Reynosia latifolia. — Darling Plum.

Fruit edible.

MALVACEAE. MALLOW FAMILY.

Hibiscus tiliaceus. — Mahoe.
Thespesia populnea.

This tree is called "majagua de Florida" in Cuba.

Gossypium religiosum. — Tree Cotton.
Ceiba pentandra. — Silk Cotton Tree.

CANELLACEAE. WILD CINNAMON FAMILY.

Canella Winteriana. — Cinnamon Bark or White Wood.

CLUSIACEAE. BALSAM TREE FAMILY.

Clusia flava.
Mammea Americana. — Mammee Apple.

PAPAYACEAE. PAPAW FAMILY.

Carica papaya. **Papaw.**

BIXACEAE. BIXA FAMILY.

Bixa Orellana. **Annatta.**

A small tree yielding an orange-colored dye, used for butter color.

PROTEACEAE. PROTEA FAMILY.

Grevillea robusta. **Sheoak from Australia.**

FAMILY LAURACEAE. LAUREL FAMILY.

Persea, aquacate, avocado, avocato, alligator pear, butter pear, midshipman's butter, palta, etc.

A salad fruit. A species, P. sylvestris, grows wild in Cuba. Practically naturalized in South Florida. Extensively cultivated for home consumption and shipment North. Several improved varieties propagated by budding.

Persea borbonia. **Red Bay.**

Common throughout Florida. Called sometimes "Florida mahogany," but should never be confounded with the true mahogany which grows on the Keys.

Persea pubescens. **Swamp Bay.**

The term "bay" sometimes applied to trees may come from the French *baie,* meaning berry; it may have to do with the color of the wood, although the word *bay* in this sense is usually only applied to horses and in the case of "bay-wood" sometimes applied to mahogany; *bay* may refer to the "Bay Islands" in the Gulf of Honduras, a great mahogany center.

Ocotea Catesbyana. **Lancewood.**

A very valuable wood.

Misantica triandra.

One tree 18 inches in diameter and a few small ones found by Miss Olivia Rodham in the Brickell Hammock, near Miami. Identified by C. S. Sargent. Broad-topped, handsome tree, native to Cuba.

Cinnamomum camphora. **Camphor Tree.**

Grows well throughout the State. Well-established plantations of this tree in the proper locations would probably in time bring large returns.

According to a recent report citrus groves with camphor planted here and there are not infested with white-fly.

Cinnamomum cassia. **Chinese Cinnamon.**

A magnificent shelter tree, very dense and of quick growth. Will grow throughout the State.

Laurus nobilis. **Apollo's Laurel.**

A SCENE IN HOLLAND. ONLY A FEW YEARS AGO THIS SPOT WAS COVERED WITH NAVIGABLE SALT WATER.

PUNICACEAE. POMEGRANATE FAMILY.

Punica granatam. — **Pomegranate.**

TERMINALIACEAE. WHITE MANGROVE FAMILY.

Conocarpus erecta. — **Buttonwood.**

Southern Florida. Chiefly along salt shores. Highly prized for fuel. The best fuel I know of, since it makes great heat and almost no smoke.

Bucida buceras. — **Black Olive Tree.**

Keys and West Indies.

Laguncularia racemosa. — **White Mangrove or Buttonwood.**

South Florida and West Indies. Muddy shores, common.

Terminalia cattappa. — **West Indian Almond.**

Common West Indian shade tree.

MYRTACEAE. MYRTLE FAMILY.

Eugenia buxifolia. — **Gurgeon Stopper. Spanish Stopper.**

South Florida and West Indies.

Eugenia monticola. — **Stopper. White Stopper.**

Southern Florida.

Eugenia Garberi. — **Garber Stopper.**

South Florida and West Indies.

Eugenia procera. — **Red Stopper.**

Keys.

Eugenia jambos. — **Rose-Apple.**

A common introduced species; although a native of India it is naturalized in the West Indies. *Eugenia Micheli* is the much-prized Surinam Cherry in Dade County.

Eugenia longipes.

There are many species of Eugenia in South America which yield valuable fruits.

Anamomis dichotoma. — **Naked Stopper.**

South Florida.

Chytraculia chytraculia. — **Stopper.**

South Florida and West Indies.

Psidium guajava. — **Common Guava.**

Probably the greatest of all jelly-producing fruits. Common throughout Florida.

Eucalyptus spp.

Many claim that the right species of the many kinds are the most promising of all trees for planting in Florida, because of their great rapidity of growth and aid to drainage, since they suck up in the

process of transpiration many times the amount of water which falls upon the surface of their foliage in the form of rain.

The following kinds have been highly recommended for trial:

E. meliodora, E. viminatis, E. citraodora, E. robusta, E. rostrata, E. crebra, E. corynocalyx, E. resinifera.

Melaleuca leucodendron. **The Cajeput Tree.**

Grows well in Florida and yields Cajeput oil.

RHIZOPHORACEAE. RED MANGROVE FAMILY.

Rhizophora mangle. **Red Mangrove.**

South Florida and the West Indies. A wonderful tree, grows in salt water and of great value in consolidating muddy shores; it has been called the "Land Former." Deserves to be protected because of the protection it affords to exposed shores in times of storm. Plantations on the Keys in the shelter of mangroves suffered little damage in the great storm of the fall of 1906, while those exposed to the fury of the waves bearing floating wreckage were ruined. Seeds of this tree have been sent to the Hawaiian Islands to be planted for this purpose, and when the mangrove takes hold along the line of the railroad to Key West it will safely protect it against the severest storms.

THEOPHRASTACEAE. JACQUINIA FAMILY.

Jacquinia Keyensis. **Joewood.**

According to Nash, in the Bahamas the bark is mixed with lime, placed in a bag and put in the water to stupefy fish.

ARDISIACEAE. MYRSINE FAMILY.

Icaoroea paniculata. **Marlberry Cherry.**

SAPOTACEAE. SAPODILLA FAMILY.

Chrysophyllum oliviforme. **Satin-Leaf.**

Southern Florida. Highly prized as an ornamental tree because of the bright golden color on the under side of its leaves. To this same genus belongs the beautiful "Cainito" or Star-apple, a fruit relished by peoples of the West Indies. It might be possible to bud the Star-apple on the native Satin-leaf.

Mimusops Sieberi. **Wild Dilly.**

Keys.

Sapota zapotillo. **Sapodilla.**

Naturalized on the Keys, where it is a common fruit. Planted also on the mainland. A tree hard to start, but hardy when started, yields an everlasting wood and a gum called Chicle.

Sideroxylum mastichodendron. **Mastic.**

Valuable forest tree of Southern Florida. Grows to be large and is quite common, shedding an abundance of yellow fruits which are

edible in case one likes the flavor. Mastic would probably make a satisfactory shade tree.

Dipholis salicifolia. Bustic or Cassada.

Southern Florida and West Indies.

Lucuma Rivicoa var angusttifolia. Ties, or Egg Fruit.

Chrysophyllum cainito. Star-Apple

A fruit highly relished in the West Indies.

Lucuma mammosa. Mammee Sapota.

EBENACEAE. PERSIMMON OR EBONY FAMILY.

Diospyros kaki. Japanese Persimmon.

Diospyros Virginiana. Persimmon.

Throughout Florida. There is a curious mix-up in names in connection with the persimmon and the sapodilla just mentioned above. The black persimmon of Texas and Northern Mexico is called "Chapote," which is a slight modification of the name Sapota. The Spanish for sapodilla is Nispero, the name of the European Medlar. From Nispero comes the term Naseberry, a name frequently applied to the Sapodilla in the British West Indies. Both words, Persimmon and Sapota, are probably of Indian origin, the one North American and the other South American.

OLEACEAE. OLIVE FAMILY.

Olea Europea. Olive.

Grows luxuriantly in South Florida but does not fruit. There was the same difficulty with it in Southern California. With proper treatment it might yield a valuable crop for this region.

APOCYNACEAE. DOGBANE FAMILY.

Nerium oleander. Oleander.

A beautiful ornamental but poisonous. According to report on the subject by the Arizona Experiment Station, the physiological effects are similar to those of digitalis, and if enough poison is obtained the patient is sure to die. Fifteen to thirty grains of the leaves will kill a horse, ten to twenty grains a cow, and from one to five grains a sheep.

Plumieria rubra. Frangipani.

A fine ornamental.

EHRETIACEAE. EHRETIA FAMILY.

Cordia Sebastina. Geiger Tree.

Bourreria Havanensis. Strong Bark.

Bark used in making tea in the Bahamas.

VERBENACEAE. VERBENA FAMILY.

Citharexylum villosum. Fiddlewood.

South Florida. One must not assume from both the scientific and common names that this wood is good for fiddles; quite otherwise.

because the wood is heavy and exceedingly hard. Both names are supposed to be mistakes, or rather the common name is a corruption of the French "fidele," meaning true or strong, and the scientific name is merely a translation of the common name. On the other hand, one softer and lighter wooded member of this genus might have been used for this purpose. Bello gives the common name "palo de guitara" to *C. quadrangulare* in Porto Rico, and Cook says the natives make their guitars of this wood.

Avicenna nitida. **Black Mangrove.**

Very valuable tree, like the red mangrove, for consolidating muddy shores.

BIGNONIACEAE. BIGNONIA FAMILY.

Crescentia cujete. **Calabash.**

Crescentia ovata. **Black Calabash.**

OLACACEAE. XIMENIA FAMILY.

Ximenia Americana. **Purging Nut.**

Called also Mountain Plum, in Jamaica. Fruit eaten.

RUBIACEAE. MADDER FAMILY.

Exostema Caribaeum. **Princewood.**

Bark a tonic. Would probably make a useful bitters.

Coffea Arabica. **Coffee.**

Coffee has fruited in South Florida.

Genipa clusiifolia. **Seven-Year Apple.**

Fruit eaten.

Guettarda elliptica.

Guettarda scabra. **Nakedwood.**

Psychotria undata.

In addition to the above mentioned trees, I have seen two specimens of Kigelia pinata, the Sausage Tree of Africa; Cecropia peltata, the Trumpet Tree; Castilloa elastica, the Mexican rubber tree; Manihot Glaziovii, Ceara rubber; one specimen of the true banyan, Ficus Indica, a Covillea from Madagascar, and others not sufficiently tried to be worthy of record until they grow older.