CEIBA

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PAUL H ALLEN

Botanist and Plantsman

WILSON POPENOE[1]

Tropical plantsmen —horticulturists, if you prefer that word— are extremely scarce. Taxonomists in the field of tropical American botany are few and far between. Therefore, when a man appears upon the scene who is at one and the same time a devoted plantsman and a competent taxonomist, he is almost unique.

Such a man was Paul H. Allen, whom we have recently lost. To his memory this issue of CEIBA is dedicated, first of all because of what he did for Escuela Agrícola Panamericana, where he and his wife Dorothy spent four years of their active and useful lives, and secondly because his entire career was devoted to the increase of knowledge regarding the natural sciencies in tropical America.

Even before he learned to walk, Paul Allen was crawling on hands and knees about the family garden at Enid, Oklahoma (where he was born 29 August, 1911) looking at plants in the lawn and pulling them up for closer inspection. He was indeed a prime example of the old adage that plantsmen (like poets and artists) are born, not made.

While still a special student of horticulture and botany at the Missouri Botanical Garden, in 1934, he was named to accompany Carroll W. Dodge and Julian Steyermark on a plant collecting expedition to Panama. As anyone could have predicted, he fell in love with the tropics and never again strayed far from the field of tropical plant life.

On returning to St. Louis, he married Dorothy Osdieck, whom he had known since high school days. Dorothy's skill with pen and ink, her artistic talent, and her ability to absorb a working knowledge of botanical science enabled her to illustrate his botanical publications. Thus was formed a team which was equipped to do a remarkable job, reminescent of the work of that great botanist Oakes Ames and his wife Blanche, at Harvard.

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1. Director Emeritus, Escuela Agrícola Panamericana.

In 1936 Paul, with Dorothy, was sent back to Panama —this time in charge of the Missouri Botanical Garden's tropical station, as consulting botanist in the Canal Zone Schools and to continue collecting for the Flora of Panama. He was later named Superintendent of the Canal Zone Experiment Gardens.

Then came the second World War, and botanists, plantsmen and horticulturists were called upon to help with the exploitation of the wild sources of rubber from the forests of tropical America; to obtain Cinchona bark from wild trees in the Andes; and to establish nurseries for growing millions of Cinchona trees to provide quinine for the fighting forces in the South Pacific if the war lasted many years and no satisfactory substitute for quinine could be found.

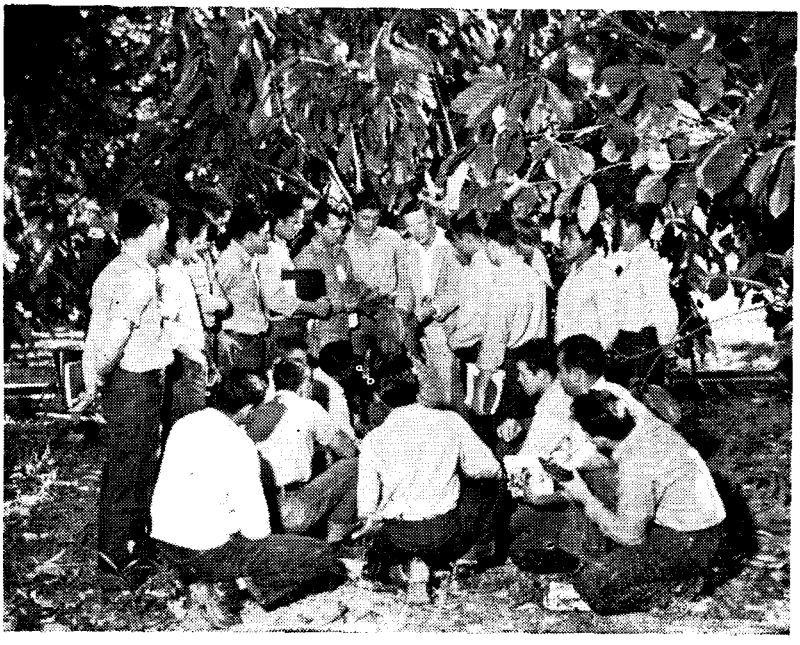
Paul Allen's job was to secure rubber from wild Hevea trees in eastern and southern Colombia — the basins of the Amazon and Orinoco; where he was able to obtain sufficient sheet rubber for the needs of Colombia and some for export.

At the end of the war, Paul and Dorothy returned to Panama to gather further information before proceeding to Cambridge, Massachusetts, to finish a work on the taxonomy of the orchids of Panama. Then back again to the tropics, this time with the Research Department of the United Fruit Company. They lived for several years within reach of the exuberant tropical forests of the Pacific side of Costa Rica, where Paul was in charge of the Company's experiment station for testing the possibilities of tropical timber trees. In addition to this work, he was able to make a comprehensive study of the indigenous timber trees of this region. On this project he displayed an amount of ingenuity, imagination and scientific acumen which has seldom been equalled. The results are set forth in what will probably remain, so far as his published works are concerned, his *Magnum opus,* "The Rain Forests of Golfo Dulce" (Florida University Press, Gainesville, 1956). It was also while in this Costa Rican area that some of Paul's most original observations and outstanding publications were made. He pioneered in the field of orchid pollination. This work encouraged extensive pollination investigations by others, in various parts of the world.

In 1953 he was named Director of the Fairchild Tropical Garden at Miami, Florida, but returned to the tropics in 1954 to spend four years at Escuela Agrícola Panamericana, where he not only taught classes in agriculture, horticulture and economic botany but devoted his spare time to the rapidly growing herbarium of this institution. Founded by Juvenal Valerio when the school was first opened, this had been developed during subsequent years by Louis O. Williams and Paul C. Standley, until it had become the most important collection of Central American plants in tropical America (now numbering upwards of a hundred thousand specimens, which include Paul Allen's private herbarium mainly from Panama and Costa Rica).

One of the last pictures taken of Paul Allen, and perhaps the best, for there is a goood deal of his character in it, and he was not much given to formal dress. It is published through the courtesy of his friend and collegue Walter Hodge, who took it in Trinidad, West Indies, in 1962.

Dorothy Allen says this was Paul's favorite picture of her. At work on a botanical drawing at their home in Honduras



Teaching a class in tropical economic botany, under the cacao trees at Escuela Agricola Panamericana

A good example of the care taken to keep the records straight. This photograph, taken by Paul himself, is marked on the back «Musa acuminata malaccensis **from south of Grik, Malaya. Superior form with pendulous bunches of large fruit».**

«Laelia glauca», one of Dorothy Allen's beautiful botanical illustrations used in her husband's published works

In 1958, the Government of the Republic of El Salvador (whose interest had been aroused by don Francisco de Sola) invited Paul to spend a year in that country, making a survey of their timber resources. The report he hoped to amplify and publish along with a magnificient series of photographs. This, time did not permit him to do.

After completing his survey of the timber resources of El Salvador, Paul returned to the United Fruit Company as Director of Lancetilla Experiment Station, which had been founded in 1926, at Tela, Honduras. Here had been assembled, throughout the years, the most extensive collection of economic plants in tropical America. There are ornamental plants as well — all growing at the upper end of a small valley three miles from the coast, surrounded by luxuriant rain forest. It was here that Paul Standley spent six months collecting native plants and produced (1927) his handsome descriptive *Flora of the Lancetilla Valley*. Standley himself liked this so well he always referred to as his "Bible".

Paul and Dorothy had settled down in a comfortable house on the beach at Tela, and Paul was delighted to be working with experimental plantings of timber trees, now fully grown and mature: the magnificient Asiatic bamboos which had been sent 25 or 30 years earlier by David Fairchild and F. A. McClure: the orchard of mangosteens —said to be the largest in the world— the palm collection, the rubber trees of various species, mainly Hevea, and above all, the Asiatic fruits of which Lancetilla has by far the best collection in the New World.

Lancetilla would have kept Paul and Dorothy happy for many years, but something bigger was in store for them. The United Fruit Company decided to go in for banana breeding on a scale not previously contemplated, and the first step was to bring together from the Far Eastern tropics everything which might be of interest in a breeding program wild species of Musa and all the cultivated varieties which seemed of interest. Thus continued a project which had been undertaken by Otto Reinking, on a more limited scale, back in the late 1920's; now it was proposed to leave no stone unturned.

So Paul was called from his work at Lancetilla to lead a group which would comb tropical southeast Asia for breeding material. Paul's part of the program was collecting rhizomes and a wealth of information, over a period of two years, in the Philippines, Taiwan, North Borneo, Sarawak, Malaya, Singapore, Java and Bali with short stopovers in Thailand, Ceylon and the examination of material in the Herbaria at Florence and Kew. All of this helped to build up the world's largest collection of bananas for the United Fruit Co. plus the largest Far Eastern Reference Genetic Bank as a basis for a

program of breeding —the objectives of which are well set forth in the following letter:

UNITED FRUIT COMPANY

GENERAL OFFICES, 80 FEDERAL STREET

BOSTON 10, MASSACHUSETTS

JESSE E HOBSON
VICE PRESIDENT

September 14, 1959

TO WHOM IT MAY CONCERN:

Subject: United Fruit Company Botanical Exploration of Western Pacific Areas and the East Asian Mainland.

This letter serves as an introduction for Mr. Paul H. Allen, a United Fruit Company scientist, who has been assigned to a botanical exploration of Western Pacific areas and the East Asian mainland with the ultimate purpose of assembling a World Reference Collection of wild and domesticated varieties of bananas. Since the banana is universally assumed to have had its origin in this area, it is logical that it should be selected for principal exploration.

The Department of Research of United Fruit Company is currently undertaking a long-range banana breeding program which has as its objective the combining in one commercial banana variety of all possible desirable qualities such as disease resistance, insect resistance, improved growth habit, better quality fruit, and other favorable characteristics. To accomplish this difficult task it is necessary for our plant breeders and geneticists to have available to them the most complete collection of banana genetic material that can be assembled.

It is our express intent and desire to cooperate in every way with national and local government agencies and with individuals and private institutions to insure the success of this exploration. Specifically, our scientific explorers will be pleased to make available duplicates of plant material collected in each country concerned. Since much of the exploration may be concentrated in isolated, untravelled regions of the several host nations, we hope our scientists' efforts will be of benefit to the countries' botanists and agriculturists.

We feel that all banana producers, large and small, will benefit by the creation of improved banana varieties — especially the creation of banana hybrids resistant to major plant diseases. As our basic scientific studies toward this objective progress, we will publish reports of our research and make them available to all who may be interested.

Any courtesies extended to Mr. Allen in this important scientific enterprise will be greatly appreciated by United Fruit Company.

Sincerely yours,

Jesse E. Hobson

Vice President and
Director of Research

This job of collecting wild and cultivated bananas, if it was to be carried out effectively, called for an unusually wide range of professional qualifications. It was, in fact, almost unique in the history of plant exploration. The man in charge had to be at one and the same time a very competent botanist and a practical horticulturist. How many times have similar explorations failed —not in the field of banana introduction but in many others— because the explorer did

when men went out from Kew, and those somewhat later days when David Fairchild sent men out from Washington. This change was airplane transportation.

On the human side —if it may be called that— were the hardships which one had to face in carrying out such a program as that which Paul Allen, accompanied by his wife Dorothy (who played no small part in contributing to the success of the work) undertook when he left for two years in the Far Eastern tropics. This does not mean that life in the jungles is as terrifying as it is shown in the movies; far from it. But it takes dynamic energy and great perseverance to collect plant material, prepare it for shipment, and get it from the back country to the airplane.

It was a fascinating field, this investigation of bananas, wild and cultivated. The following extract from a letter which Paul wrote the Boston office on 22nd April 1961 gives an idea of just how interesting it was:

"Quite aside from the possibility of finding a seeded Ambon, I can think of a number of problems which can only be solved by a personal visit to Java. *Musa acuminata,* which is our fundamental taxonomic unit, was described as a seedless plant from the island of Amboina. Rumphius' illustration, which I have seen in the Singapore Botanic Garden library, is too diagramatic to give one much to go on, so that we can only speculate as to what he actually saw. Later workers have chosen to assume that he had to deal with a seedless mutant from a wild population, but this is far from proven, and I should think even unlikely, on the basis of our experience with wild Musas to date. If it could be found it would for the first time put the name *acuminata* on a firm footing, and if it does *not* occur, or if the Rumphian plant should prove to be something already described from another area, we would have to fall back on the name *zebrina,* a chance introduction into Europe from Java".

The number of rhizomes collected and shipped was tremendous; the notes covering them were copious, detailed, and well organized; and the photographs were excellent, for Paul was a skilled photographer. In addition to all the planting material sent back to Central America, collections were left in several countries in the Asiatic tropics, for possible use by local plant breeders. All in all, this project was one of the grandest and most successful in the entire history of plant introduction.

So much for his last great project, the banana exploration, which really represents the culmination of his professional career. It is fortunate that he was able to complete the field work, but unfortunate that he did not live to complete his study of the material brought to tropical America, for it is certain that he would have made a valuable contribution to our knowledge of the origin and botany of the cultivated bananas.

Before terminating this brief review of Paul Allen's career, and to stress the breadth of his botanical and horticultural interests, it seems worth while to quote from a few letters which Dorothy has pulled out of the files. It is scarcely necessary to say that Paul's first interest was in the orchids of Central America. On 7 May 1947 he wrote to Oakes Ames at Harvard, "Work continues on the collection of Panama orchids, which seems to be endless, with new species, or extensions of range coming to light on almost every trip. Such slight deviations from the beaten track as the Pearl Islands, and the wet mountain peaks north of El Valle in Coclé province, have recently produced plants of *Cyrtopodium punctatum* and *Polycycnis barbata* both genera previously unrecorded from Panama. Although I have not seen New Guinea, or the mountains of Brazil, I would set the area covered by Costa Rica, Panama and Colombia against any in the world for wealth of species".

Again on the subject of orchids, the following paragraph is quoted from a letter Paul wrote to his colleague Charles Schweinfurth at Harvard on 14 September 1948:

"The other evening I spent several hours entertaining myself with a sort of botanical idiot's delight that sometimes fascinates me, making a chart of the geographical range and relationships of the Panama orchids, and the results were in some ways startling, although along the lines we so often discussed when we were with you there at the Botanical Museum. For example, I find that 108 species are presumed to be endemic to Panama, mostly things known from single collections, and hence somewhat open to question. Also, while 135 species are common to Panama and Costa Rica, only six are common to Panama and Colombia! This at first blush is simply incredible, since it would indicate a profound biological break between Panama and Colombia, territories which on the Darien-Choco boundary share common lands for more than one hundred and twenty five miles. After some consideration, and consultation of my rainfall map of Panama, and charting areas from which collections have been taken, I am slowly coming to the conclusion that parts of Panama which would be likeliest to have a Choco-type flora have as yet, for the most part, to be seen by a botanist, even from afar. All of the highland area of the boundary is completely unknown, as are the mountains of the San Blas coast as far as the Canal. The parts of Panama best known and best collected are the Canal area, the dry Pacific coast for thirty miles east, and sixty miles west of Panama City, the wet highlands of Coclé, and the highlands of Chiriqui, all of which would be expected to have affinities with the flora of Costa Rica. Then too, the orchids of Costa Rica and Panama have been quite thoroughly studied in recent years, and their entities fairly well correlated and in any event probably blasted to Glory when Schlecter's herbarium went up in flames during the war. All in all, I have about concluded that the relationships as cited above may actually represent fact, and in any case it would now be pretty hard to make out a case to the contrary".

Paul's first interest, and the group upon which he did the most work, was unquestionably the Orchidaceae. Probably the palms came next. Toward the end of his career he took an active part in organizing the International Palm Society, of which he was elected a Director. As an evidence of his interest in this field, and because it contains information worth putting on record, the following letter to L. H. Bailey, dated 20 September 1950, is quoted in full:

"So far as my experience goes, I have never seen *Guilielma* growing as an unquestionably wild plant, either in Central or South America, with one possible exception, which I will explain in due course. The plants are always cultivated, or may persist for a few years in second growth scrub where dwellings obviously have been within comparatively recent time. The one exception to this that I remember was in the forested hills of eastern Chiriqui Province in Panama, somewhere near Remedios, where I once saw a hillside rather thickly set with *Guilielmas* that appeared to have been deliberately spared when a patch of forest was felled. As I remember it, the forest had the aspect of a typical climax association of the area, and I remember having been considerably surprised at seeing the *Guilielmas* in such a situation. However, I was in a hurry at the time, or thought I was, and thus simply added one more to the innumerable puzzles I must return to investigate some day.

"Russell Seibert tells me that he has seen wild *Guilielma* in the trans-Andean foothills of eastern Perú. He believes that the plants were first cultivated there, and that they have spread eastward and northward into Brazil and Central America, and I am inclined to agree with him. I am not personally convinced that the South American *Guilielma Gasipaes* is distinct from our *Guilielma utilis*. The former has larger fruits, and is in my experience less variable in size and color, but our better Central American forms appear to be identical. In Central America a few plants are to be seen in Honduras and northward, but they are popular and cultivated in quantity only in Panama and Costa Rica. My guess is that their distribution in northern Central America dates from post-Conquest times. In both Panama and Costa Rica the plants are found in nearly every country dooryard, but the fruits tend to be much smaller than those seen on the Orinoco, Rio Negro or Amazon, and are quite variable as to both size and color. Yellow and red forms are common, and nearly seedless, and nearly spineless varieties are sometimes found, although I know of the latter only by hearsay. Plants are almost entirely propagated by seed, with very little done to increase superior varieties. This can very easily be done by taking off the suckers from the better plants, but there is no other way of assuring fruit of high quality, since grafting is impossible and seedlings do not come true. So far as I know there are no commercial nurseries, which is unfortunate, since it is an excellent food plant.

"I do not pretend to know why *Guilielma* is so exceedingly variable as to the size and color of the fruits, since this is not usually the case with wild palms, as you know. Cultivated plants of course often

tend to exhibit more variability than wildlings, and there are of course other well known instances of variability in cultivated palms, such as the races of the coconut and the African Oil Palm.

"The fruits sold on the streets in Panama and Costa Rica (always boiled in salted water) are, so far as I know, from dooryard trees. I have heard of one or two people, in the Reventazon Valley near Turrialba, who are supposed to have private collections of some of the better varieties, but even these stands hardly would be called plantations. I have seen nearly seedless varieties in South America (bunches of fruit in which perhaps half were seedless, and in which the remainder had seeds of smaller size than usual) and similar plants are reported from these Turrialba collections, as well as spineless varieties, but I have not seen them myself.

"It is perhaps of some interest that the fruits of the South American plants are used, at least by the Indian tribes I knew in the Rio Vaupes, as a basis for a fermented drink rather than being eaten boiled as they always are here".

Another item which Dorothy has pulled out of the files, and which seems worthy of inclusion because it is one more evidence of Paul's wide interest in plant life, and because it may have historical value, is a note which he wrote to his friend Wilson Popenoe, Director of Escuela Agrícola Panamericana in Honduras, under date of 2 June 1950:

"I have before me abundant material of what I believe may be the wild ancestor of the West Indian race of avocados, collected in the climax rain forests of the Esquinas district (Costa Rica). It is a tree in the neighborhood of one hundred feet in height, growing in association with things like *Anacardium excelsum, Virola panamensis, Carapa slateri, Terminalia excelsa, Ceiba pentandra;* etcetera. The leaves exactly match those of the cultivated seedlings in my own yard, but the fruits are very nearly spherical, about three inches in diameter, with a very large seed and scanty but characteristic pulp. The monkeys are fond of it".

Of the three horticultural races of avocados, Mexican, Guatemalan and West Indian, the origin of the first two had previously been established rather satisfactorily, but it remained for Paul Allen to tie down the origin of the third. As usual, his observations were backed by good photographs and herbarium material.

In his extensive travels he was always on the lookout for seeds and other planting material, and to this end he maintained contact with that great leader in the field of plant introduction, David Fairchild, to whom he wrote, on 24 March 1953:

"This morning's mail has brought a note from Hal Moore saying that the packet of seeds we collected together while he was with us in Palmar has been started your way via PAA. Most of that lot are palms, including two of our best from the Esquinas forest. These are *Asterogyne Martiana,* a relatively small, single-stemmed species with very decorative, entire, bifid fronds, and an unknown species of *Geonoma,* which forms extremely handsome clumps of up to 12-20 canes twel-

ve or more feet in height. This last *may* be a new species, but whether or not, it should be in Florida. We have sent a lot of seed of both, so I would suggest it might be a good idea to pass a few to other gardens, just to be on the safe side. In the lot are also *Welfia Georgii, Astrocaryum alatum, Astrocaryum Standleyanum, Sheelea rostrata* and several others. I would suggest cracking the seeds of *Astrocaryum Standleyanum* carefully with a hammer, since the outer coating is quite as hard as a coconut, and impervious to water. I hope they all grow, since they are from sea level, and should do well in Florida. I am somewhat less optimistic about importing things from the cool, wet highlands, but even some of those may surprise us if grown in lath houses".

Doubtless, enough has been brought forth above to show the wide diversity of Paul Allen's interests, even though no mention has been made of several branches of science such as anthropology and archeology to which he devoted attention at various times. In his earlier years, his thinking had been deeply influenced by that most inspiring of teachers, Edgar Anderson of the Missouri Botanical Garden. Before terminating this account with a review of The Rain Forests of Golfo Dulce, written by the well-known botanist Richard Schultes, it seems appropriate to quote the following paragraph from a letter regarding this same work which Paul addressed to Dr. Anderson on 1 September 1956:

"I have a strong feeling that all of us owe something to humanity, and that obligation becomes greater if we have had opportunities for observation not likely to be duplicated in the near future. I only hope that our little opus may encourage someone to continue the job on a somewhat more comprehensive scale. I would like to do it myself, and may, some day, since I am increasingly convinced that what we need in this part of the world is a series of illustrated manuals emphasizing recognition of the living plants. With this first step the interested individual would gain the key to the available literature, which thus far has been pretty well closed excepting to the specialist. Actually, the present work was a natural outgrowth of the earlier, and much more extensive ecological study which was to have covered all of Panama, but which never got beyond the card file and preliminary map stage.

"Rain forests are complex, but not as impossible as most people think, particularly if you have the good fortune to live in the area. The last word in plant community mixtures, at least in our hemisphere, is found in parts of northern Honduras and eastern Nicaragua, where the great, unrelated floras meet. Island-like colonies of pine-oak woodlands, which are of course North American in their affinities, occur cheek by jowl with broad-leaved stands whose families, and even genera are of Amazonean origin. This gargantuan projection of the situation found also in the Florida Everglades must be seen to be believed, and will provide a wonderful project for some ecologist.

"I don't know very much about the effect of the Pleistocene sea level changes on tropical American vegetation, but am rather inclined to doubt if it has been a major factor in plant distribution. As I understand it, the maximum range of fluctuation has been about 50 ft., which would not have flooded any of the isthmian areas, on the one hand, or bridged any of the straits, even between Yucatán and Cuba, or Cuba and Florida. The general lack of large mammals in the Antilles, and particularly Cuba, prettly well establishes this.

"Widespread inundations, involving at least much of present day Panama, are presumed to have occurred from upper Eocene until middle Miocene time, but even this has not resulted in the specific differentiation that one would expect. Lower Central America, including Panama, Costa Rica, and those parts of Nicaragua south of the Honduras-like Matagalpa highlands, has a pretty thoroughly South American flora, and generic ranges, with monotonous regularity, are from as far north as Yucatán and Vera Cruz to Brazil and Perú, with, of course, some of the more specialized elements dropping out at intervals along the way. *Cavanillesia* barely crosses the Panama Canal, *Welfia* reaches the Rio Punta Gorda, in eastern Nicaragua, but the broad pattern of generic distribution was obviously established before the isthmian submergence. Orchid populations such as *Cattleya Skinneri* and *Cattleya Dowiana,* which have northern and southern contingents, presumably separated from one another for millions of years, developed well marked, but relatively minor varietal differences, and things like *Oncidium Kramerianum* and *Warscewiczia coccinea* maintained sufficiently stable populations to render the placement of specimens collected from Colombia or Costa Rica, without data, a very dubious proposition. I am losing my faith in isolation alone, as a major factor in morphological change".

I cannot terminate this review of Paul Allen's remarkable career without adding a personal note, for throughout the years I was privileged to be counted among his friends. Close contact enabled me to appreciate not only his unusual contributions to science, but also to sense the inner depths of a rare personality.

What he did for science was motivated in large part by his desire to serve his fellow man. This amounted almost to an obsession. It was with him day after day, especially when he was facing hardships which would have daunted many scientists. And Dorothy, loyally and devotedly standing by his side, shared his feelings.

He died on the 22nd of October 1963, at the very peak of his career. Posterity will know him through his published writings, and the numerous plants which bear his name. Those of us who knew him will cherish his memory, the memory of a warm-hearted friend, as well as a gifted, tireless, tremendously enthusiastic worker. The great Linnaeus once wrote, "Botanicus verus desudabit in augendo amabilem scientiam". Few botanists have more fully lived up to this admonition.

THE RAIN FORESTS OF GOLFO DULCE Reviewed by Dr. Richard E. Schultes, Botanical Museum of Harvard University for Agricultura Tropical, Bogotá, Colombia.

A truly extraordinary book has just appeared in the field of tropical botany, where good books are very rare.

Its title is "The Rain Forests of Golfo Dulce", by Paul H. Allen (University of Florida Press, Gainesville, Florida, 1956). It has been written by a botanist who has dedicated many years of his life to the study of the tropical rain forests, and who has lived, traveled and worked in the forests, who loves the wilderness and who knows its trees and shrubs as intimate friends. Although his previous reputation has been based on his familiarity with the orchids, he now demonstrates a similar command of the taxonomy and ecology of tropical forestry. His activities have been principally concentrated on Central America, but he has also worked in the Colombian Vaupes during the past war, and has written several articles on that area.

Golfo Dulce forms a relatively small part of Costa Rica, but the interest, value and usefullness of the work is of vital importance for those engaged in work in the tropical rain forests anywhere in our hemisphere. The book is written in a very original form, which shows that Allen has a complete command of his subject. His literary style is admirable and he handles the English language in a way that will be refreshing to readers accustomed to technical books that are almost always dry.

It is a comprehensive work. A glance at the chapter headings shows that no aspect of the rain forests has escaped the author's pen. Space does not permit the inclusion of the entire list, but it contains such fundamental material as Ecology (the climatic, edaphic and transitional formations); species conspicuous because of their flowers or other peculiarities, lists of common and scientific names, utilization of the species in the form of wood, medicine, poisons etc. The keys are especially original and useful, since the author has presented the material in three forms: based on fruits, on flowers and on sterile material, employing characteristics of the leaves, bark and trunk, as well as others that will serve the botanist for their identification in the field. For Golfo Dulce, Allen lists plants of 72 families, 267 genera and 433 species, with brief descriptions of each. These, as the author has indicated, comprise the most conspicuous, significant and important part of the flora from the economic and academic point of view.

Allen's spirit is humble: "No man can give an exact account of what these forests may contain, since it is a sobering fact that our knowledge of them is still very incomplete, even after more than four centuries of European contact". Thoroughout the book, Allen preaches an optimistic sermon, that these woodlands are not man's enemy and an obstruction to his progress in the tropics, but "A renewable natural resource of inestimable value" and asks that some of them be preserved from destruction until "an intelligent program can be worked out for their exploitation".

The photographs are clear, well selected and useful. The book is also full of artistic drawings, done by the author's wife, Dorothy Allen. In the appendix ten Latin descriptions are published of new species proposed by Allen. There is also a well selected bibliography of 65 titles. The appearance of the book is of such high quality that we must compliment the publishers, the University of Florida Press.

For its originality, its authenticity, its attention to the problems of the field botanist and forester, from all these points of view the Rain Forests of Golfo Dulce, by Paul H. Allen merits a place in the library of every school, Botanical, or Agricultural Institution in the tropics and of every Botanist, Agriculturist, Plant Explorer and forest Technician that works in the Rainforest regions of Tropical America.