

BOTANY AND BOTANISTS IN PUERTO RICO

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IN THE YEARS between 1923 and 1931, Nathaniel L. Britton and Percy Wilson published their *Botany of Porto Rico and the Virgin Islands*; this publication was part of the *Scientific Survey of Porto Rico and the Virgin Islands*, sponsored by the New York Academy of Sciences and the New York Botanical Garden. The University of Puerto Rico and the Agricultural Experimental Station in Río Piedras, were also instrumental in the exploration and the research involved in the preparation of that book. The United States Forest Service was also very helpful in the scientific compilation of data.

This publication was the culmination of many years of exploration in these islands, by numerous botanists from many different countries. Here I provide a short history of the botanical explorations that came before Britton and Wilson's publication and of the botanical work done after their book.

Starting with the time of the Spanish discoverers and "Conquistadores," some of the first Europeans to visit the West Indies describe the vegetation in detail; the first to mention the plants encountered by the Spanish people in our islands was Fernández de Oviedo. He never visited Puerto Rico, but he was in Hispaniola, the first island to be conquered and colonized in the Antilles. In his book, *Historia general y natural de las Indias, Islas y Tierra-firme del Mar Océano*, partially published in 1535, and finally completely edited and printed between 1851 and 1855, there are fifty "books;" five of these are devoted to the description of agriculture, fruit trees, native trees and medicinal plants; finally he mentions the herbs and seeds brought from Spain into the island of Hispaniola. He mentions the vernacular names of the plants and trees; many of these were native names and Linnaeus often used them when giving scientific names to these plants. For plants of European origin, Oviedo uses the Spanish name.

Oviedo's line drawings, combined with his descriptions, are very useful in identifying the plants mentioned in his text. We can thus clearly identify the sea-grape, the mamee, the golden shower, the calabash tree, the pineapple, the sweet sop, the beach lily, and many others.

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Although Oviedo never visited Puerto Rico, his many years in Hispaniola, his extensive travels in America, describing in detail everything he saw of interest to him, made him one of the pioneers in the botany of the West Indies.

Many years passed under Spanish rule without any particular study of the vegetation of this island. Puerto Rico was of little importance in the colonization of America; Cuba and Hispaniola were on the path of the vessels coming and going from Spain, and Puerto Rico was only an agricultural island away from the main sea routes. In 1772, however, Ignacio Labad y Lasierra, a benedictine monk came to Puerto Rico; he spent years taking notes on the flora and the fauna on the island, and in 1782 he had finished his manuscript titled *Historia Geográfica, Civil y Natural de la Isla de Puerto Rico*. He does not describe the plants nor the animals, but he mentions them by their vernacular names and states the place where they were found.

The first botanists to collect in Puerto Rico came from Austria, in an expedition led by F. J. Maerter that left Europe in 1783. The botanist Franz Bredemeyer collected seeds and live plants in Puerto Rico in 1785–1786; which were sent to Vienna; he also collected in Martinique and Haiti.

In this same year, 1786, a Danish specialist in agriculture, Julius P. von Rohr visited our island to study the culture of cotton; he also visited many other islands in the Caribbean and made a good collection of seeds and plants that were sent to Professor Vahl in Copenhagen, Denmark. Vahl studied these collections and described several plants new to science.

A French expedition under the leadership of Louis Claude Marie Richard came from the Guianas and Brazil and visited the Caribbean Islands, spending a short time in Puerto Rico in 1786–1787. He collected plants and animals and made numerous drawings.

Another French expedition, under Captain Nicolas Baudin, came to Puerto Rico in 1797 to study scientific and social themes. The botanist of the group was André Pierre Ledru, who was accompanied by a gardener named Anselme Riedlé: together they collected many species new to science in the north and northeast parts of the island during 1797–1798. Their plants were studied by Desfontaines, Lamarck, and Ventenat in Paris.

The Dane Hans West, a resident of Christiansted in St. Croix, visited several islands including Puerto Rico in 1797 and sent his collections to Professor Vahl in Copenhagen.

Martin Sessé and José M. Mociño were in Puerto Rico, very briefly in the early 1800s; their collections were mixed with those from Mexico; this led to some misunderstanding, as they described several Puerto Rican plants as growing in Mexico. I. Urban and later N. L. Britton corrected these errors. The best known example is the plant known as Maga, described as *Montezuma spectosissima*, now named *Thespesia grandiflora*, endemic to our island.

An Italian physician and traveler, Carlo Guisepppe Bertero, visited our island in 1819 and collected abundantly; these plant collections were later studied by De Candolle in Paris and published in his *Prodromus*.

In 1822–1823, the French Botanist Auguste Plée visited Puerto Rico, collecting some 1,000 specimens that were sent to the Muséum d'Histoire Naturelle in Paris where they are conserved in the Herbarium.

A Scottish Botanist, Charles Parker, working with P. de Candolle came to the Guianas and later to the West Indies; most of his collections were lost in a shipwreck, but some are kept in England in Kew Gardens.

P. de Candolle sent several expeditions to the New World in order to have at hand the plants he needed to complete his studies for his *Prodromus*; among the botanists he sent to Puerto Rico was the Swiss Heinrich Wydler, who was in the island in 1827 and explored mostly in Sierra de Luquillo. His collections were partially lost, either eaten by insects or damaged by fungi; what was saved is in Geneva.

Robert Hermann Schomburgk, originally from Germany, while acting as British Consul in Hispaniola visited Puerto Rico briefly in 1831, collecting some plants which he later sent to Germany.

The German scientist Karl Moritz, spent three months collecting plants in the island; he also published a short study of our fauna.

Another Danish Botanist, Frederick M. Liebman, paid a short visit to Puerto Rico in 1841.

The first American to ever collect in Puerto Rico was a naval officer, James Read; his plants were sent to the Academy of Sciences in Philadelphia, with duplicates to I. Urban in Berlin.

A German explorer, Carl Schwanecke was the first botanist to be interested in fungi in our island; he collected so many plants that they were studied by several botanists each one with his own specialty.

During a very short visit, the Swiss botanist Bernhard Friedrich Blauner in 1852-1853 collected in the eastern part of the island as well as in St. Thomas and Vieques.

A Danish pharmacist, Henrik Johannes Krebs collected in various islands, among them Puerto Rico, in 1866. His plants are kept in Copenhagen.

Around 1850, a French physician, René de Grosourdy established himself at Guayama in southeastern Puerto Rico. He studied the medicinal properties of plants, and after some ten years, he traveled to Cuba, to Venezuela and to the Guianas, completing his book that was published in Paris in 1864 under the title *El Medico Botanico Criollo*. His collections were deposited in the Paris Herbarium.

The first Botanist to write an account on the flora of Puerto Rico was Domingo Bello, a lawyer established in Mayagüez; in his spare time, he collected plants and later, after retiring to the Canary Islands, he wrote his notes on the flora of the island. His collections were sent to Berlin.

A German business man, Carl Wilhelm Leopold Krug came to Puerto Rico in 1857 and established himself in Mayagüez; he was much interested in the study of nature and helped several botanists in their work, among them Domingo Bello, von Eggers and P. Sintenis. He was in constant touch with Ignatius Urban in Berlin, who was much interested in the Antillean flora. The collections of these Botanists were all sent to Berlin and Urban started studying them in preparation for his *Flora Portoricensis*.

Born in Aguadilla in 1842, Agustin Stahl was the first native-born Puerto Rican botanist. After completing his studies of medicine in Germany, he started as a physician in Aguadilla and later in Bayamón. His interest in the

natural sciences was extraordinary, and he published on various subjects, receiving distinctions from scientific societies in both Europe and the Americas. He was the first to publish a flora of Puerto Rico under the title *Apuntes sobre la Flora de Puerto Rico*. This book saw its second edition in 1936. His herbarium is kept in Germany at Göttingen.

A botanist known internationally as one of the best taxonomists of his time was Carl Ernst Otto Kunze. Among his numerous botanical expeditions he spent some time in the eastern part of the island in 1874; his collections were sent to Europe.

We have already mentioned Heinrich Franz Alexander Baron von Eggers. This excellent collector spent several years collecting in the Antilles and was in eastern Puerto Rico from 1881 to 1883. He collected many orchids and described several species new to science. Especially important was his paper on the vegetation of the Luquillo Mountains.

As Krug was active in Mayagüez, Juan Bianchi Pagán from Añasco collected some plants for him in 1880–1884.

Eggers asked a physician named Abraham P. Garber, from Pittsburgh to collect some plants for him near Yauco in 1880.

One of the best plant collections at that time was made by Paul Ernst Emil Sitenis, from Germany. He was in our island from 1884 to 1887, and his work was sponsored by Leopold Krug. He collected in all parts of the island, and he was the first botanist to explore El Yunque. His plants were studied by Urban in Berlin, and several species were described as new to science.

At the end of the nineteenth century, American botanists began to develop interest in the Antilles: one of the first was Charles Frederick Millspaugh. He visited the Caribbean in his yacht, *Utowana*, observing and collecting throughout the Caribbean, and stopping in Puerto Rico in 1889 at Cataño and at Guánica. His plants are kept at the Chicago Natural History Museum.

Starting in 1899, the New York Botanical Garden and the New York Academy of Sciences became interested in the Natural History of Puerto Rico and began a series of scientific studies in Puerto Rico. Several American botanists visited the island, among them Dr. Nathaniel Lord Britton, Director of the New York Botanical Garden. Underwood, Griggs, Howe, Wilson, Gleason, Cook and Collins were the most important visitors. In 1903, Cook and Collins published a book on the economic plants in the island.

In 1902, Percy Wilson sent by Britton, and W. A. Evans from Harvard University visited Puerto Rico, studying the vegetation of Sierra de Luquillo, ascending to Pico del Yunque.

Ignatius Urban should be considered our foremost botanist: although he never visited the West Indies, his knowledge of our flora was unrivaled. His interest in Antillean botany began early and he started publishing papers on the plants of the West Indies in the 1880s. He published a series of papers on the taxonomy of the plants of the Greater and Lesser Antilles in his *Symbolae Antillanae* (nine volumes), from 1889 to his death in 1931. He described numerous plants new to science and is still considered as the foremost botanist for the West Indian flora.

The fourth volume of this series, published in 1903–1911, is devoted to the

flora of Puerto Rico, under the title *Flora Portoricensis*. He cites the plants known from the area with their synonymy, the collections existing in the European herbaria, and the general distribution of each plant. This was the first attempt after Stahl's *Flora* to have a complete listing of the plants growing on this island.

Britton visited the island in 1906; this was his first contact with the vegetation he was beginning to study in preparation for his book on the flora. He stayed about one month and was accompanied by his wife Elizabeth Gertrude Knight, a specialist in the mosses.

Britton has explained how the *Scientific Survey of Porto Rico and the Virgin Islands* came about: "In the latter part of the year 1913, subsequent to a discussion in the Council of the Academy relative to proposed extensions of the Academy's ordinary activities, a proposition for the scientific survey of Puerto Rico was approved and referred to a committee; the Council appropriated \$500 annually for five years for the purpose of the investigation." Consequently, explorations in Puerto Rico started in 1914 by the visit of Dr. J. A. Shafer. This was only the beginning.

In his numerous visits to the island, Britton made contact with the University Administration, and with the Government of Puerto Rico. He obtained complete approval for the project and both financial and logistical help. This ensured the continuation of the scientific work already begun. Although as originally planned the Survey was to be completed in five years, it was not actually finished until the mid-1940s, when the last part of the series was finally published.

From the Smithsonian Institution in Washington, Mrs. Agnes Chase came in 1912 to collect and study the grasses; these were studied in collaboration with Alfred S. Hitchcock and were very helpful in the preparation of the book *Grasses of the West Indies*, published in 1936, by the Smithsonian Institution.

The islands adjacent to Puerto Rico needed special attention; in 1914, Britton, his wife, Shafer and Cowell came to visit Mona, Desecheo, and Vieques. Britton published a paper on the flora of Mona in 1915 on the 25th anniversary of the Missouri Botanical Garden. At that time, it was decided to include the Virgin Islands in the project; this made the studies more complete, and as for the vegetation there were few plants to be added to the list of the Puerto Rican flora.

Again in 1915, Britton explored the western part of our island, mainly Maricao and Indiera Fría, later Boquerón, Cabo Rojo, and the Ponce area, going into the mountains at Adjuntas, Jayuya and Utuado; the collections made during this trip were very useful for the understanding of many rare plants. From that year on, Britton came almost every year, nearly always in the company of several scientists and also his wife, making many collections kept in the New York Botanical Garden Herbarium. The duplicates were sent to the Agronomic Station at Río Piedras. This was in preparation for the *Botany of Porto Rico and the Virgin Islands*, volumes V and VI of the Survey. Britton and Wilson were in charge of the flowering plants, the grasses were studied by Agnes Chase and by Hitchcock, the ferns by William R. Maxon from the Smithsonian Institution, and the mosses by Mrs. Britton. The New York

Academy of Sciences sponsored the publication: the first installment was issued on August 10, 1923, the second on January 10, 1924, the third on June 10, 1924, the fourth on November 8, 1924. These four parts were the fifth volume of the Survey.

Volume VI was also published in four installments: the first one on January 14, 1925, the second on August 31, 1925, the third on June 15, 1926 and finally the fourth on December 19, 1930. The length of the time elapsed between the last two parts is explained by the fact that Britton was revising the whole book and publishing two supplements; the first one was published as an appendix in the third part, just before the Pteridophyta; in the fourth part, we find a supplement to the Spermatophyta and to the Pteridophyta, the Bibliography and the general index for the two volumes.

The plant ecology for the survey was studied by Henry Allan Gleason and by Melville T. Cook; they spent several months in Puerto Rico in 1926, traveling throughout the island and making observations. These were published in 1926, a two-part volume, the seventh of the Survey. Subsequent publications include *Mycology* (vol. VIII, part 1, 1926), the *Myxophyceae* (Vol. VIII, part 2, 1917), the *Diatomaceae* (Vol. VIII, part 3, 1938), the *Mosses* (Volume VII, part 4, 1957).

Britton used to travel often to Puerto Rico, and although he turned 70 in 1929, he kept himself very active, visiting the many friends he had among the University Faculty. Late in 1933, Elizabeth Britton became paralyzed and she died in February of 1934. Britton himself did not survive long after his wife's death and he died on June 25, 1934, at the age of 74. We owe to this eminent botanist the book that has served as a guide to all interested in the botany of Puerto Rico. After so many years, and in spite of many nomenclatural changes and additions, this book is still our best source of information for the study of our flora. He was also very active in the completion of the vast project of the whole survey and of its publication by the New York Academy of Sciences.

There are 899 genera and 2196 species in Britton & Wilson's *Botany of Porto Rico and the Virgin Islands*; the subsequent explorations and studies made in these islands have added many species to our flora; we have also to include newly introduced plants that have become naturalized; some were intentionally introduced, either as useful plants, fruit or timber trees, or as ornamentals; some have come fortuitously as weeds and are now quite abundant. The approximate number of plants added to the botanical catalogue of Puerto Rico is 600. Among these plants new to the island, there are some sixty species new to science.

After the publication of the *Botany of Porto Rico and the Virgin Islands*, a good number of scientists, botanists, technicians and persons interested in botany and agriculture published papers and books. One of the most important has been the book by J. I. Otero and R. A. Toro: *Catalogo de los Nombres Vulgares y Cientificos de Algunas Plantas Puertorriqueñas*, published in 1931 by the Agricultural Experiment Station in Río Piedras, with a second edition in 1945.

We must mention here a person who by her artistic work was very influential in the knowledge of our flora. Mrs. Frances W. Horne, wife of Mr. Charles E.

Horne, Professor at Mayagüez, started a series of paintings of Puerto Rican flowers. These very accurate paintings were usually accompanied by a herbarium specimen sent to Dr. Britton at the New York Botanical Garden. He named them for her, and later these paintings were sent to the New York Botanical Garden, where they are kept; there are more than 800 such paintings. During Britton's visits to Puerto Rico, Mrs. Horne accompanied him to the field and got to know thoroughly the plants of the island. Let us hope that this marvelous collection of paintings will one day be published as a whole or in part.

Several Puerto Rican scientists studied some aspects of the flora or of the plants of the island; Francisco M. Pagán studied the Hepaticae and published in 1939 a preliminary list of these plants. José I. Otero made numerous collections of plants and in 1944 visited Mona Island with Carlos M. Chardón. Rafael A. Toro, a mycologist, collected in Puerto Rico and other parts of the Caribbean.

Carlos E. Chardón, also a mycologist, studied the fungi of Puerto Rico and other islands, collected many times on Mona Island, and made a great contribution to the Herbarium of the Experimental Station.

One of the rarely mentioned botanists from Puerto Rico is Ismael Vélez. As Professor of Botany at the Polytechnic Institute of San Germán, he gathered an important herbarium and wrote several well-documented papers on the Flora of the Antilles. He published a well-illustrated book on the noxious weeds of the sugar-cane fields. He was Professor of Botany for many years in San Germán.

At the Forest Service in Puerto Rico came Leslie R. Holdridge, a forestry technician. He explored in Puerto Rico during 1934 to 1936. He became interested in the identification of the trees of the island, and published several papers on the subject in a scientific periodical named *Caribbean Forester*. He often had the opportunity to get advice and help from other technicians, such as Gerard Gerhardt, Joaquín Martínez, William Barbour, Jr. and Luis F. Martorell. From the studies made by Holdridge in the West Indies and in Central America, his classification of the life zones of the world came about, a very accurate way of assessing the life zones. He was also active in the field in the island of Hispaniola and later in Central America. His contribution to our knowledge of our forests has been considerable.

In October and December of 1940, Luis E. Gregory and F. J. Roena of the U.S. Forest Service, visited Mona Island, which had not been studied since Britton's visit in 1913-1914. They collected specimens of trees and shrubs; later on, from 1944 to 1947, Mona Island was the object of several scientific expeditions both from Puerto Rico and from the United States. Some of those working in botany were Carlos E. Chardón, José Otero, Arturo González Mas, Frank Wadsworth, José Gilmorini, Elbert L. Little Jr., and Luis F. Martorell; several other scientists did research in other fields of biology. The result of these numerous expeditions was the publication in 1977 of *The Flora of Mona and Monito Islands* by Woodbury, Martorell and García-Tudurí.

Elbert L. Little, from the Smithsonian Institution started in 1950 studying the common trees of Puerto Rico and the Virgin Islands. Frank Wadsworth from the U.S. Forest Service in Río Piedras, was also interested in these studies

and in the collection of tree samples throughout the island and in the U.S. Virgin Islands. This led to the publication in 1964 of the *Common Trees of Puerto Rico and the Virgin Islands*, by the Forest Service and the U.S. Department of Agriculture. This book was translated into Spanish by José A. Marrero and published in 1967 by the University of Puerto Rico.

The second volume, with the title of *Trees of Puerto Rico and the Virgin Islands* was published in September of 1974; the authors were Elbert L. Little, Roy Woodbury and Frank Wadsworth. This second volume has also been translated into Spanish and printed in 1988 by the Forest Service.

Frank H. Wadsworth was very active in the field of forestry and silviculture from 1943 to 1955; with Elbert L. Little he gathered much information on the trees of the island and the Virgin Islands. He was Director of the Institute of Tropical Forestry from 1956 to 1978. He is the author of many papers on the ecology and distribution of the trees in the Caribbean. His contribution to the knowledge and the management of our forests is invaluable. He has also contributed to the re-forestation of the island.

Roy O. Woodbury, an American botanist and long-time Florida resident, arrived in Puerto Rico in 1955 and was appointed taxonomist at the Agricultural Experimental Station; he collected and identified the local flora; later he moved to the Río Piedras campus, as Professor of Ecology and Botany. He has made numerous collections in Puerto Rico and the Virgin Islands, and his knowledge of the local flora is enormous. He was co-author of the second volume of the *Trees of Puerto Rico and the Virgin Islands*, with Little and Wadsworth. He has collected intensively in the Virgin Islands and also on Mona and Monito, and on Desecheo. Several plants have been named after him. Once he had retired from his post at the University of Puerto Rico, he served as Botanist at the Department of Natural Resources; there he continued his explorations until his final retirement around 1988.

Richard A. Howard came to Puerto Rico as a Professor at Harvard University, in the company of some of his students interested in tropical botany. He worked mainly on the elfin forest in the Luquillo Mountains; his papers on the subject show a keen observation and accurate conclusions. This study conducted for several years is one of the best on the dwarf forests in the world.

I spent some time in Puerto Rico in 1961 and in 1963–1964, collected most actively in the western part of the island, and described some species new to science. Later, in 1978, I came from Hispaniola as taxonomist for the Botanic Garden in Río Piedras. Since that year, I have been active collecting and organizing the Herbarium of the Botanic Garden at the University of Puerto Rico. My first publication on the Puerto Rican flora was a revision of Britton & Wilson's *Botany of Porto Rico* . . . , published in *Rhodora* in 1965 and in 1967.

In the company of Luis F. Martorell and often of María P. Mejía, I explored in many parts of the island and organized a Herbarium of over 36,000 specimens. The Botanic Garden at Río Piedras has nowadays the most important Herbarium in Puerto Rico; many of the specimens of Britton and other collectors are kept in this Herbarium, after the merging of the Herbarium of the Agronomic Station and the Herbarium of the Forest Service in a single collection. Currently I am preparing the manuscripts for a new *Flora of Puerto Rico*

and Adjacent Islands; four volumes have already been printed, and the last one is being prepared. This new Flora will substitute and update Britton and Wilson's *Botany*; many species have to be added to the list given by Britton and many nomenclatural changes have to be made. Nevertheless, Britton's book is still the main source of information for the botanists working on the island.

I have mentioned Luis F. Martorell; a native of Yabucoa in southeastern Puerto Rico, he became an excellent entomologist. He was especially interested in the insects on sugarcane. He worked from 1933 to 1970 as an Entomologist at the Agronomical Experimental Station in Río Piedras. He was also interested in botany, and in his explorations made notes on the phenology of the plants he encountered. Upon retiring from the Station, he began working part-time at the Botanic Garden; his main interest was the flowering and fruiting time for each plant. In spite of his advanced age, he is currently working on a book on the phenology of the plants of Puerto Rico. He also published in 1970 a book on the plants that serve as food for the insects in Puerto Rico.

The late José L. Vivaldi graduated from Cornell University and came to the Botanic Garden, where he worked for some time. His principal interest was the genus *Malpighia*; he made a complete revision of the genus for his thesis. He worked at the Botanic Garden for two or three years, and was later appointed as Coordinator of Scientific Programs at the Department of Natural Resources in San Juan. He worked actively there for several years, and finally moved to the Park Service in the continental United States. His untimely death in 1992 was a great loss for the scientific world.

The fern flora of our region was first studied by William R. Maxon for the *Botany of Porto Rico and the Virgin Islands*; Conrad V. Morton complemented these studies. Lately, George R. Proctor, foremost West Indian pteridologist has spent several years exploring and collecting in the region and completed a very accurate book, published in 1989 by the New York Botanical Garden: *Ferns of Puerto Rico and the Virgin Islands*. In his book, he has added some 87 species to the fern flora of Maxon's treatment.

As for the Orchidaceae after many specialists have been exploring and collecting in our forests, James D. Ackerman has finally put together a list of our orchids. His well-illustrated volume on some of the orchids of Puerto Rico, with beautiful paintings by Maruja del Castillo is an antecedent to a forthcoming taxonomic treatment of this family for our *Flora*.

It would be impossible to cite all the various scientists that on one occasion or another have worked for some time in Puerto Rico or are still active in research in the island. The University of Puerto Rico has been instrumental in inviting many botanists to visit this island, sometimes for a short trip, other times for an extended visit. Many specialists have collected and later published papers on some aspects of the flora, its ecology or on taxonomic problems.

As stated above, much work has been done since the publication of Britton and Wilson's treatment of our flora. Some forests until a few years ago little or not explored have been studied thoroughly and have yielded a number of plants unknown to science.

The rain forest in the Luquillo Mountains has been studied in detail: all plants and animals have been identified, and ecological observations have been made. The Maricao State Forest has also been a source of interest, and several plants new to science or new records for our flora have been added. There is yet much to be done in this field—we are only beginning to understand the relationships between plants and animals, soil and climate in the tropics. We find in the western part of the island some mountains with serpentine with a very distinct flora and a number of endemic plants. Though much has been done in that area, it is still possible to find plants new to science; the ecological observations need to be completed and there has been very little work on genetics and other aspects of the botanical sciences in that region.



The flora of Puerto Rico belongs to the Greater Antilles group and its closest affinities are with the larger islands; nevertheless, this flora has many plants in common with the Lesser Antilles, and with South America. If we compare the flora of Puerto Rico with that of the Greater Antilles, we find the following data:

	Area (km ²)	No. of species	Density	% Endemism
Cuba	114,524	6,000	0.052	49
Hispaniola	77,914	5,000	0.064	36
Jamaica	10,991	2,888	0.262	25–30
Puerto Rico	8,897	2,800	0.314	9

In conclusion, the smaller the island, the higher the species density. Our plant species can be grouped in the following categories:

a) Cosmopolitan Species

Many of these plants are tropical weeds, often growing near the beaches. Among these are some aquatic plants, mainly growing in shallow saline waters. Some examples: *Batis maritima*, *Coccoloba uvifera*, *Rhizophora mangle*, and *Uniola virgata*.

b) Tropical Weeds

These are plants, usually weeds, found throughout the tropics; a few examples: *Plantago major*, *Sonchus oleraceus*, *Argemone mexicana*, *Eleusine indica*, *Eclipta prostrata*, *Passiflora foetida*, *Sida cordifolia*, *Tridax procumbens*, and *Waltheria indica*.

c) Antillean Elements

They belong to the plants common in all or nearly all of the West Indies, such as: *Amyris balsamifera*, *Bucida tetraphylla*, *Bursera simaruba*, *Clusia rosea*, *Crescentia cujete*, *Cyrilla racemiflora*, *Weinmannia pinnata*, *Prestoeca montana*, *Chiococca alba*, to name only a few.

d) Endemic Elements

There are some 240 endemic species of phanerogams in Puerto Rico, about 9% of our flora, including the naturalized species. Comparing this figure with the other islands, Cuba has about 45%, Jamaica 25 to 30%, Hispaniola about 36% and the Lesser Antilles less than 9%. We have no endemic genus: the genus *Stahlia* once considered to grow only in Puerto Rico has recently been collected in Hispaniola; the genus *Montezuma* was thought to be exclusive to Puerto Rico, but it is now considered to be equivalent to *Thespesta*, a pan-tropical genus; *Neea* is also a near endemic, with some trees in the Virgin Islands; *Sabinea*, described as endemic to Puerto Rico, with two species, is now considered as part of the Hispaniolan genus *Poitea*.

The family with most endemics is the Myrtaceae, with 31 endemic species; the Compositae have 19 and the Polypodiaceae 16. Comparing our palm flora with the other Greater Antilles, Cuba has over 60 endemic species, Hispaniola about 12, Jamaica 9 and Puerto Rico only 2.

In the orchid family, there are nearly 300 species in Cuba, about 200 in Jamaica, 250 in Hispaniola and 144 species in Puerto Rico, with the higher endemism in Cuba and Hispaniola.

The Myrtaceae is one of the families with more endemism in the Caribbean; our flora has 75 species (31 endemic), Cuba 250 (220), Jamaica 75 (50) and Hispaniola 156 (117).

To conclude this short analysis of our flora, we note that the larger islands have higher percentages of endemism and the lower species density; Puerto Rico being the smaller of the Greater Antilles shows about 9% endemism while the species density is the highest in this group.

It is our wish and hope that young botanists will continue working on the flora of this island and that progress will be made in many aspects of the plant life that have been neglected until now. Many of our plants are little known; there is much left to be learned. For example, chemical analysis of them could result in discoveries of many medicinal properties and applications in medicine. Thanks to the pioneering work of botanists like Britton, Wilson, Little, Wadsworth and many others, we now have a much better understanding of the vegetation of our island; this leaves to young scientists the challenge of continuing the work begun long ago and completing the scientific study of our vegetation.

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