



64. The 'Tambulid' dwarf coconut growing in the Philippines. Photograph by Juan V. Pancho.

local growers it would appear that this dwarf coconut is a variation from the tall or common palm. This is probably due to some change in hereditary units which takes place perhaps very rarely. No experiments involving the genetics of the dwarf variety have been conducted. However, it is assumed that the

dwarf palm is a recessive mutant with only a single factor involved.

Like all coconuts, the dwarf variety 'Tambulid' appears hardy. It grows well in sandy loam soil. Well-drained alluvial soil also makes palms grow fast and mature early.

Botanical Explorations of Liberty Hyde Bailey*

2. THE CARIBBEAN ISLANDS AND BERMUDA

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The story of Liberty Hyde Bailey's travels and collections in the American tropics is basically an account of his studies of the palms. These studies were the result of his dipping into a

plant group new to him merely to satisfy a curiosity, only to find the state of knowledge so incomplete as to be misleading. Student and scholar that he was, he would not turn from it with a shrug of indifference. After all, he had included the palms in his encyclopedias,

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and so he owed it to the users of his works to provide useful accounts of the identification and names of those plants. He lived with the knowledge that the published accounts were in error, that the user would continue to be led astray until they had been corrected. This realization first came to him about 1910, when Bailey was past his mid-century mark, but it was to be another ten years before he commenced serious work on the palms. As soon as the opportunity did present itself, Bailey dug down to the roots of the problem, found the causes of confusion, and then devoted the better part of three decades to properly piecing together the parts of the puzzle.

The underlying cause of the confusion in palm taxonomy and nomenclature was the inadequacy of the preserved material on which were based the species set up by botanists in the past. But why was it true of palms, and not of most other plants? Some kinds of palms are only small shrubs at maturity, and others are tough, spiny, thicket-forming vines, but the majority are trees: trees with tall, slender, unbranched trunks and a crown of leaves that is often well over one hundred feet above the ground; trees with huge, tough, leathery leaves, some weighing fifty pounds and measuring forty feet or more in length; trees with giant clusters of flowers and fruit whose botanically important bracts are trough-shaped woody envelopes up to ten feet long. Plant parts of these dimensions do not lend themselves to being pasted on the conventional herbarium sheet measuring about 12 x 18 inches! Yet it was only such mounted fragments of leaf tips, of flowering branches, or of fruit-shells that Bailey found in the world's museums, where they served as the documentary record of the diagnostic parts of most of these forest giants. It is small wonder that the true char-

acters of the plants were not accurately described in the literature, or that there was no simple way to verify or correct them.

Bailey's first task was to set minimum standards for redocumenting the known palms and for establishing bases for new ones yet to be discovered. His method was to assign a collection number to a particular palm tree; to collect from it a typical leaf and its often sheathing base (no matter how large); to spread it on the ground to photograph it; to cut the leaf into sections, folding each to fit a folder the size of the herbarium sheet, and tagging each part with the same number given the tree. He would cut down a complete flowering or fruiting inflorescence, photograph it if it was large, and preserve the woody boat-shaped bracts or spathes by cutting them into 18-inch sections when necessary. He would retain either the entire inflorescence or major sections of it, often preserving flowers or fruits from it in liquid. Here, too, each item would be tagged with the tree's assigned number. This was time-consuming, often requiring a day or more. When the tree could not be climbed, it had to be felled. This sometimes required authorization from the owner—and more time consumed.

Photographing often was most difficult. Clearings sometimes had to be cut to admit light or to permit a view of the crown of foliage. Very often assistants were hired to do the high climbing or the tree-felling. Frequently Bailey would be wet the day through, unmindful of needing a midday meal, striving to keep his film dry, his field notes legible; and most of these productive years were before the days of modern insect repellents. But he got his specimens and his photographs.

The collection of palm material he

assembled at Ithaca is certainly the world's finest, qualitatively if not quantitatively. It is small wonder that predecessors had failed to get "the stuff," as Bailey would express it. And it is small wonder that Bailey's quests for palms of the Caribbean provided him with anecdotal material wondrous to listen to. However, he was always sensitive lest listeners remember the anecdote only to forget the primary reason for the quest. This was one reason why he would never write memoirs. To him, the experiences were truly incidental to getting the specimens.

All of this palm interest began in his fifty-second year, in 1910, when, according to reports, his wife chided him for not knowing the names of the palms she pointed out to him from a hotel veranda at Kingston, Jamaica. Bailey prided himself on his knowledge of garden plants, and her gentle teasing stimulated him to make the decision to learn about the palms.

It was very much in character that Bailey did not start with those particular planted palms whose names he did not know. He followed his larger plan: his guiding rule, that study of any group of garden plants must be based first on knowing the wild members of the group, and that the identification and naming of the cultivated kinds will then later fall into place. So, Bailey started his journeys to see the wild palms—to the volcanic islands of the Caribbean, to the jungles of Panama and South America, to the hinterland of Mexico, and to the less traveled areas of our southern states. He visited the Caribbean area itself on eighteen different occasions from 1910 to 1949, and collected palms and other plants on at least thirty-one of the islands in the two Antilles chains.

Each of these trips was an adventure

in itself. There is much we do not know about them because Bailey kept no detailed journal, no diary, and did not later write very many anecdotes. Too seldom was much recorded of his informal talks about the trips. What we do know is indeed fascinating. Our knowledge comes from his botanical writings in which he named and described the new species he had found, from his fragmentary notes accompanying the plant specimens, and from the few recordings that were made of his talks in the 1950's.

Among these recordings is his account of his 1935 trip to Andros Island. This was an adventure with all the elements of a movie melodrama: hurricanes, famine and thirst, a shipboard fight, and a cast that included two young Englishmen who were studying diseases of the Caribbean sponges, and an internationally famous swimmer. To the non-botanist, the finding of a new species of palm becomes incidental. Space considerations prevent inclusion of the story in this article, but it will be among those given in full in the forthcoming biography now in preparation.

Sabal is the Latin name of the palmetto palms, a large genus to which Bailey devoted considerable study. He collected its members from many places in the Caribbean: Bermuda in 1922; Dominica in 1922; Cuba in 1929, 1931, and 1938; Puerto Rico in 1932 and 1939; Martinique in 1938, and, of course, many times in Mexico and the southern United States. In addition, he received material from other collectors and studied specimens in the major herbaria. By seeing and photographing the palms in their native haunts, bringing back specimens of their foliage, their flowers, and their fruits, he assembled—often for the first time—an indisputable documentary record of their characteristics. It was

through the subsequent painstaking study of this record that he was able to put the pieces together and produce a true picture of their relationships. In 1940 he wrote, "Several undescribed species of *Sabal* are in my collection awaiting the experience and opportunity to publish a complete revision. The palmettos are so common in cultivation and so abundant in nature that they invite continued attention."

Four years later he penned confidently, in *Gentes Herbarum*, as he monographed the genus, "The genus *Sabal* begins to take cohesive shape in my mind . . . ardent growing collections in many regions have been studied, bundles of sterile and fragmentary material in my herbarium have been burned, and now the way is clear. We should have an encouraging journey."

The journey was more than encouraging, it became satisfying for in addition to recognizing and naming the new species *Sabal bahamensis*, he named and published *Sabal peregrina*, based on material he had collected on Martinique, and *Sabal yucatanica* of Mexico. He also brought together most of the information known about other species, a valuable contribution in itself.

Four other palm genera also held particular fascination for Bailey: *Thrinax* (the peaberry palms), *Acrocomia* (the gru-gru palms) *Coccothrinax* (the seam-berry palms), and *Roystonea* (the royal palms). His Caribbean palm collections were coordinated with specimens he collected in other parts of the American tropics, the whole being studied together, and the results published in *Gentes Herbarum*.

Blackberries and their relatives belong to the genus *Rubus*. This was another of Bailey's favorite groups, and for seventy years was the object of his studies. His *Rubus* studies in the Carib-

bean, while not so important in their results as was his palm work, nonetheless helped him gain a perspective on their interrelationships with those of the North American continent.

Travel restrictions imposed by World War II forced Bailey to suspend palm exploration activities. Restive and impatient at this, he conserved allocations of rationed gasoline so that he might fill in broad gaps of knowledge by collecting *Rubus* in hitherto unstudied areas in the United States. In those war years he canvassed southern and eastern parts of the country, collecting the wild blackberries. However, during this period he never abandoned his plan for studying thoroughly the palms of the Caribbean. The war over in 1946, he was back for them once more in that area.

To record the scope and results of each trip is not possible at this time. A list of the new palm species Bailey discovered and named, and of the dates and major stopping places of his Caribbean trips, is appended to this article.

In the course of his studies Bailey kept clearly in mind that, next to adding to man's knowledge through scientific investigation, his most important contribution would be to make these findings available to the plantsman and the gardener. He did this by writing new descriptions in a language that was both meaningful and understandable, and by basing his accounts on his observations of the plants and their structures. He did it, too, by going back to the earliest literature, sifting the reliable from the unreliable, and giving the reader not only the correct name for each plant, but readable explanations of why that name was correct.

Bailey was noted for his singleness of purpose and his energy. These attributes are well exemplified by the way

he planned his trips and went about making the collections. He was always prepared and knew the particulars of each plant he was searching for. On every trip he carried with him a hatchet, machete, and a saw; a plant press and drying papers to preserve the specimens, even wrapping paper and cord for the parcels; storage boxes; a bulky 5x7 camera and tripod, film-developing materials, and photographic accessories.

Bailey would spend a day or more in one locale to get the photographs, fruit, flowers, and leaves essential for an adequate record of a single palm tree. Knowing he might not come that way again, he would develop his negatives on the spot to assure himself that he had good pictures before leaving. (Once, he incurred the wrath of guests and management because he used up the hotel's limited water supply to wash his negatives.)

Seldom did terrain prove insurmountable when the plant he wanted was there. He was "on top of Haiti" (about 6,000 feet above sea level) in 1937, and at the town of Bottom, in Saba, in 1948. He collected in the almost inaccessible Oriente province of southeastern Cuba, and over most of Trinidad, Tobago, and Little Tobago. In *Gentes Herbarum* he wrote, "The llume or *Gaussia* of Puerto Rico is on inaccessible castellated limestone steepes high above the road. All day long I have hunted *Raphia* in water from knees to hips . . ." And he got his specimens.

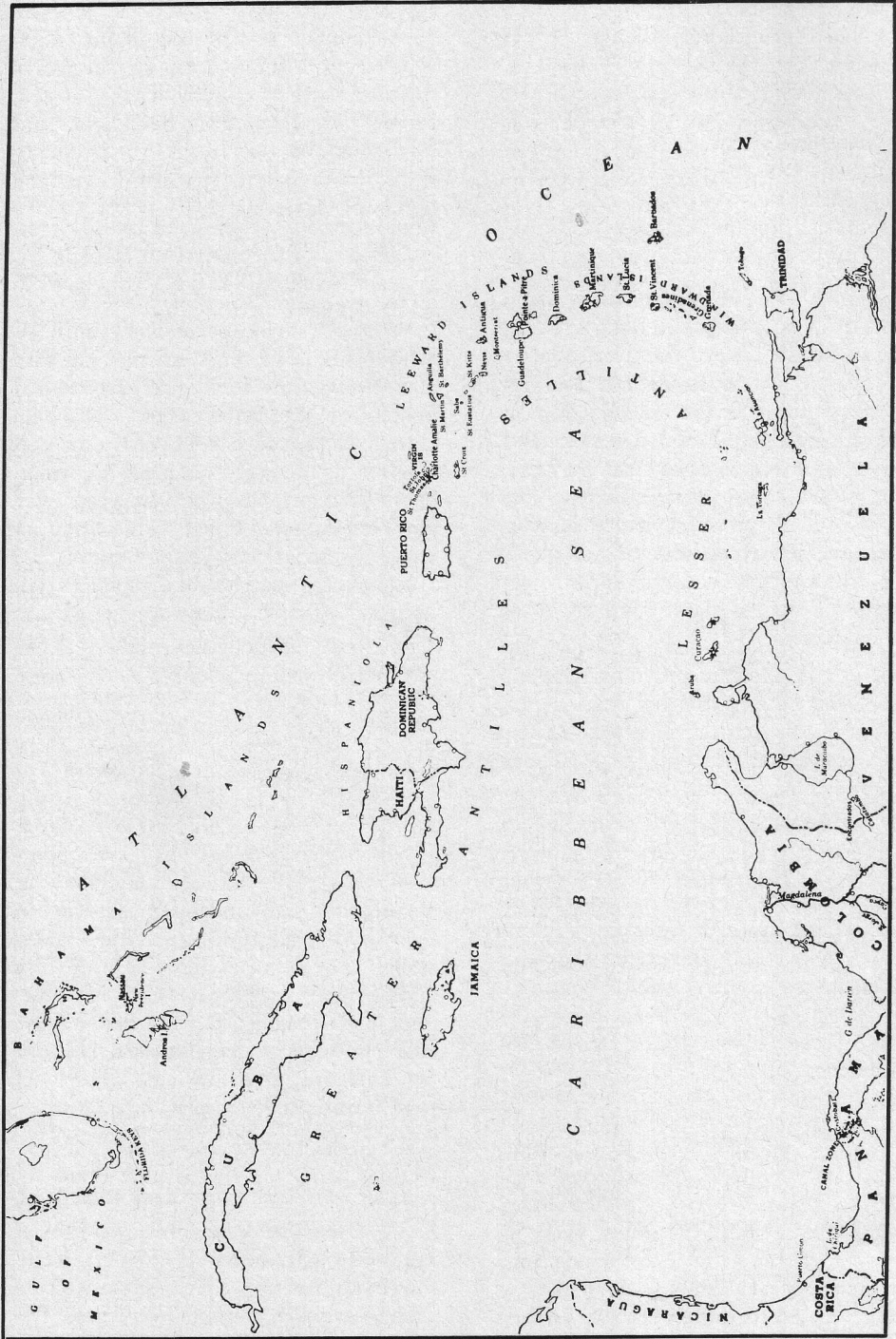
On most of his later expeditions Bailey traveled alone. In the 1920's, however, Mrs. Bailey and their daughter Ethel accompanied him on several trips to the Caribbean and South America. A trip into Brazil in 1922-23 was the last out of the country for Mrs. Bailey, who later in 1923 suffered a stroke from which she never fully recovered.

Ethel Bailey's last collecting foray with her father was a few months after her mother's death, when, in November 1938, they went to Martinique. It was a rigorous, exhausting trip, associated with landslides, filthy hovels, and food poisoning, and Ethel's laconic field notes read: "Changed packs today, blisters bad . . . climbed up-hill most of day; in awful native hut in rain . . . roads flooded, father has fever . . . both ill but finished packing."

Ethel Bailey's part as his assistant was indeed considerable. It was usually Ethel who pressed the specimens, who spread the hundreds of damp or wet blotters out to dry—on a lawn, a hotel roof, or a veranda—or who scrambled for them when a quick tropical shower came down. It was usually Ethel who wrapped the parcels of specimens for shipment home, who scrounged for precious newspapers in which to press the plants, and who worked by her father's side getting the material to be pressed. Her name, too, is fittingly commemorated in new species they discovered together.

Bailey usually engaged local help, both as guides and porters. The native islander would climb the tall palm to cut carefully an entire leaf, the fruiting cluster, or the bulky flowering branch that Bailey would need, sometimes lowering it with cord or rope to deliver it below, intact. Often the guide located the hut where Bailey could sleep for the night, bought the chicken to be cooked for food, or knew where beer could be bought for drink—it was safer than water.

Bailey would sometimes make arrangements with persons living in areas to which he could not return in the proper season, to send him the palm parts he wanted from trees that he had marked. When Bailey collected in His-



65. Map of the Caribbean region which Dr. Bailey explored intensively for palms.

paniola, for example, he had the help of Félix Pierre Louis, of the Botany Department of the Services du Département de l'Agriculture Damien. On Antigua, Bailey met an old resident who had himself "introduced seeds of royals from Trinidad and had grown trees on his place in the hills, and from these trees he had seen the clumps arise in many places down the valleys."

Brother Léon was one of the persons whom Bailey always contacted when he was in Cuba. This French-Canadian priest taught at the Colegio de la Salle, a Catholic college in Havana, and of course spoke fluent Spanish. In 1951 Bailey recounted an adventure they had shared many years earlier when going by train to get some palms he wanted. Both had become thirsty in the tropic heat.

"We stopped at a small station where vendors, as usual, were selling all sorts of things, including beer. He lowered the window and bought two bottles. I didn't have any apparatus for getting the cap off the bottle of beer, so Brother Léon unbuttoned his robe, and drew out a machete. He held the bottle up at arm's length while standing in the aisle, and took a long-armed swipe with the machete and clipped the cap off as slick as a whistle. He had done that before! . . . He was a rare old man. I loved him very much."

When one is confronted with the lists of islands Bailey visited, one is impressed by the number of places where he stopped, by the distances he covered. In fact, his whole life seems one continuous voyage, with longer or shorter stops here and there. The two Antilles chains extend for some 15,000 miles; their islands vary from a few to over one hundred miles apart. Bailey sometimes traveled back and forth between two islands several times during a single tour of

the area. On one of his trips, in 1922 for example, he covered about 1,800 miles in three months. On six successive days his stops were at St. Kitts, Antigua, Montserrat, Dominica, St. Lucia, and Barbados, in that order, and during these short visits he prepared over one hundred specimens.

These figures are the more impressive when one remembers that in those days one could reach the islands only by boat. Often he never knew until he arrived at a dock whether he could hire a small boat or find a skipper to sail him where he wished to go.

Things were very different on his last three trips to the Caribbean, in 1946, 1948, 1949. The airplane had taken over, and its scheduled flights revolutionized Bailey's itinerary-making. He could reach objectives sooner and could plan trips to islands never visited before. These trips seem to have been greater adventures than most of his earlier ones.

Bailey flew down to the Caribbean in January, 1948, and spent three months visiting a dozen islands for palms. He had a penchant for being away from home on his birthday, March 15. In his later years this gave opportunity to recall, for example, that on his seventy-ninth birthday he was in Port-au-Prince, Haiti; on his eighty-second in Oaxaca, Mexico; on his eighty-eighth in Trinidad; on his ninetyieth on Grenada; and on his ninety-first at sea on a small sailboat between St. Eustatius and St. Kitts. The next four birthdays were spent at home.

When he turned ninety, he was collecting palms at the Grand Étang in Grenada. Friends at Cornell University had made other plans for that day—they were to have had a ninetieth birthday party for him—but had to wait on their guest of honor's convenience. The party was held after he returned home

in May. He had wonderful stories to tell, and he told them well.

The Dutch island of Saba was one of his goals that year. He had been told that a certain species of *Coccothrinax* was not to be found there. Bailey was convinced by earlier studies that it was. The fact that an earlier collector had not discovered the palm was unconvincing. To learn for himself, he chartered a sloop to take him there from St. Martin.

The skipper of the sloop, the "Blue Peter," was understandably concerned when the aged white-haired man asked to be taken to Saba that seventh of February. His concern grew when next day they had to "beach" at Saba in choppy water. There was no pier, no harbor. The coast is rocky at the base of this volcanic crater island and one landed by wading ashore. This time the sea was too rough, the breakers too high for any casual wading. Two sailors formed a cradle and, shoulder-deep in the water, carried Bailey—waves breaking over the heads of all three—to the rocky shore. Drenched and shaken, he was nonetheless eager to climb the steep slope to the rim of the volcano cone, to descend to the little town of Bottom nestled deep within its crater. There was no transportation. Everyone climbed up one side and down the other.

Despite his being ill much of the time while on Saba, and flouting the doctor's orders to remain in bed, Bailey set out to look for his palm. He was not disappointed. The *Coccothrinax* was there, and he got his specimens. Later he named it *Coccothrinax sabana*, after the island. He was not yet satisfied, however. One did not come to an island once in a lifetime without looking it over thoroughly. He had to see what was growing on the rim, high above the spotless Dutch village. So he climbed to

it and walked its four-mile circumference of outcroppings, along narrow ledges often skirting sheer drops of hundreds of feet. And there he found another palm, one he hadn't expected. It, too, proved to be a new species. He named it *Prestoea sabana*. What a triumph that day was for him!

The rest of the month was equally rewarding. The "Blue Peter" returned him to St. Martin, and later took him to St. Eustatius and to St. Kitts. From there he flew to Trinidad, thence to British Guiana, back to Tobago, on to Barbados, and to Grenada, stopping at each island for specimens of particular palms. On Richmond Hill, near St. George's in Grenada, Bailey took a specimen of another palm that later proved to be unnamed. He published an account of it in 1949, naming it *Acrocomia grenadana*.

When Bailey flew to St. Lucia a few days later, he set out for Barre de l'Isle, a nearby spit of land whose rich volcanic soil nurtures a dense rain forest. There, among the understory growth, he found another new palm, a dwarf, which he later named *Aiphanes luciana*.

His ninety-first birthday, in 1949, Bailey spent en route by sloop from St. Eustatius to St. Kitts. He had been in the Caribbean on that trip since the end of January, at Puerto Rico, at St. Thomas and St. Croix in the Virgin Islands, and at Antigua. He made only 23 collections on this trip. His constitution was beginning to deteriorate, was becoming incapable of meeting the demands he would make on it. The one specimen he took on Antigua, on February 25, turned out to be another new palm, *Acrocomia antiguana*. After a short stay at St. Kitts and at St. Eustatius, he came back to Antigua to do some collecting at St. John's. While there, he had an unexpected acute at-

tack of asthma which forced him to rest under medical care, though not for long.

Eight days later he was on the other side of Antigua, taking a few last specimens before flying to Puerto Rico, and thence home. He had a second and more severe asthmatic attack on the plane on the last leg of the return trip, and was hospitalized immediately on landing at Boston. (Bad weather had closed New York airports.) Released the next morning, he went to New York by train, still a sick man. There a Hortorium colleague met him and accompanied him to Ithaca.

Soon Liberty Hyde Bailey was at work with the new specimens, studying, comparing, and writing about them. In the next few months he wrote accounts for *Gentes Herbarum*, reporting the findings of his two most recent trips. These were his last collecting expeditions, although he was still planning one final trip and even bought the ticket that was to take him to the Belgian Congo to study the oil palms. He never made it. Mind and body revolted against the still-ambitious spirit.

These Caribbean adventures had brought many rewards for Bailey: full herbarium cases, excellent photographic records, valued publications, world renown as a student of the American palms, and countless vivid memories. Nevertheless, he had not yet fulfilled his plans, for the promise of the future and the work he yet would do continued to be foremost in his mind. He wanted to master all the palms, to produce an opus about them that he would title "Genera Palmarum." A manuscript of the first page of the Introduction for it, written after he was denied the trip to Africa, is evidence of his unflagging determination. It is a work that will yet be written and towards which his Caribbean expeditions and studies will contribute much.

Outline of L. H. Bailey's travels in the Caribbean islands.

- 1910 (Feb.-Mar.) Jamaica, Cuba (en route from Panama to New Orleans).
- 1912 (Sept. 1-27) Lesser Antilles: St. Kitts, Antigua, Guadeloupe, Dominica, Grenada.
- 1920-1921 (Dec.-May) Puerto Rico (en route to Venezuela and Trinidad).
- 1922 (Jan.-Apr.) Bermuda, Barbados, Dominica, St. Kitts, Antigua, St. Lucia, St. Vincent, Grenada.
- 1923-24 (Dec.-Apr.) Barbados.
- 1929 (Feb.-Mar.) Cuba.
- 1931 (Feb.-Mar.) Jamaica, Cuba.
- 1931 (June-Aug.) Jamaica.
- 1932 (May) Puerto Rico.
- 1935 (Nov.-Dec.) Jamaica.
- 1937 (Mar.-Apr.) Haiti, Santo Domingo.
- 1937 (Nov.) Bahamas, Cuba.
- 1938 (Mar.) Cuba.
- 1938 (Nov.) St. Thomas, Guadeloupe, Martinique.
- 1939 (July-Aug.) Puerto Rico, Haiti, Santo Domingo.
- 1946 (Jan.-Mar.) Trinidad, Jamaica, Tobago.
- 1946-47 (Oct.-Jan.) Haiti, Jamaica, St. Kitts, Nevis, Antigua.
- 1948 (Jan.-Apr.) Lesser Antilles, Jamaica, Barbados.
- 1949 (Jan.-Apr.) Lesser Antilles, Bermuda, Puerto Rico, Virgin Islands, Antigua, Tortola.