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Front and back covers: The lotus pond at the Harvard tropical garden, Cienfuegos, Cuba, featuring the traveler's palm, *Ravenala madagascariensis*. Photo from August, 1935.

Inside front cover: *Sassafras albidum* at the Arnold Arboretum. Photo by Rácz and Debreczy.

Inside back cover: The striking foliage of *Morus alba* 'Venosa' growing at the Arnold Arboretum. Photo by Rácz and Debreczy.



Lady into Landscape Gardener: Beatrix Farrand's Early Years at the Arnold Arboretum

Jane Brown

One of America's great landscape gardeners, Beatrix Farrand was deeply influenced by Professor C. S. Sargent, the Arboretum's first director.

For the whole of her long and successful career, Beatrix Farrand was consistently and loyally appreciative of the place she regarded as her *alma mater*, the Arnold Arboretum. Her gratitude and affection shine through her public writings, from a piece she called "The Debt of Landscape Art to a Museum of Trees" for the *Architectural Record* of November 1918,¹ to her pieces for *Arnoldia* in 1949, describing her work on the azalea border and her layout plan for Peters Hill.² Her friendship with Professor Charles Sprague Sargent, her adored "Chief" who had taught her "by precept and example," was maintained until the end of his life in 1927; and after that, she conducted a lengthy and vigorous correspondence with Alfred Rehder and Karl Sax, and especially with William Henry Judd, the Arboretum's English propagator, who died in 1946. Judd, who had first come to the Arnold in 1913, was her closest contact after Sargent's death, and there was a rather sad irony in that *Arnoldia* of May 31, 1946,³ announced his sudden death from a heart attack at the same time it made public Beatrix's appointment as consultant landscape architect. Beatrix's last surviving letters on Arboretum matters—she

refers to herself as "the old lady" whose mind works very slowly—are dated in the spring of 1953, just six years before her death.

This well-documented relationship of her later years will be the subject of a future *Arnoldia* article, but for the moment, I would like to concentrate upon how it all began. For my forthcoming book on Beatrix Farrand's life and work, I have had to piece together much more elusive evidence on how she came to study at the Arnold in the 1890s and what she did there. She left no diaries or letters of that time, and her references to it were persistently vague, even to the drafting of what amounted to her own obituary, for the *Reef Point Bulletin*, where she mentioned "a fortunate meeting" (one of many in her life) with Mrs. Charles Sargent and how the Professor became interested in her love of plants. She then became "the grateful guest" of the Sargents, at which time the facilities of the Arboretum were thrown open to her. Thus, as she also wrote, her life was changed; it most certainly was, for chance and circumstances had brought her into the realm of perhaps the only person, in the only place, where the restrictions imposed by her native society could

A portrait photo of Beatrix Cadwalader Jones at her debut, circa 1890, the year she first met the Sargents. Reprinted courtesy of the College of Environmental Design Documents Collection, University of California, Berkeley.

be overcome, and she could be launched into the world of men as an independent professional woman.

Family Connections

Beatrix Jones was born into a rigid society of old-money New York in the 1870s, where it was decreed that a lady's name only appeared in print to announce her engagement and her death. She was an only child, born on 19 June 1872, something over two years after the marriage of her parents, Frederic Rhineland Jones and Mary Cadwalader Rawle. Her father (who had a young sister who would grow up to be the novelist Edith Wharton) was rich, fun-loving, and purposeless; her mother was lively, bookish, and used to the company of scholarly Philadelphia lawyers and soldiers in the society from which she came. Mary had probably married in haste, and she and Freddy soon discovered their deep incompatibilities, so that by the time Beatrix was ten her father was virtually absent from her life.

Beatrix was highly intelligent and well educated; she grew up to be a handsome young lady, of elegant bearing, always beautifully turned out, but with an awesome briskness of manner. This was probably a self-protective device, a result of her fatherlessness. She was surrounded by her mother's friends, a predominantly female society with a sprinkling of eminent men, including John La Farge, John Singer Sargent, Francis Marion Crawford, and later Henry James, as well as Mary's dour and fastidious cousin, the lawyer John Lambert Cadwalader. But of almost equal influence as any person on Beatrix (except for her mother) was the place she loved most, Mount Desert Island and Bar Harbor in particular, where she spent her summers. Beatrix explored every inch of the island, she was an expert on its trees and wildflowers, and she sailed her catboat around its rocky shores. At her home, "Reef Point" in Bar Harbor, she learned to garden with a sympathy for the soils and conditions of the island. She learned from her parents at first, but as Mary Cad-

walader Jones became busy with other things, Beatrix took control of the garden and was probably in charge of its progress by the time she was fifteen or sixteen.

A Suitable Profession

Given her passion for the Maine landscape and gardening, it seems likely that John Lambert Cadwalader suggested that she should study the subject seriously; he could well have been prompted by his friend Mariana Griswold van Rensselaer's timely approval of landscape gardening as a career for ladies.

But the key to her decision was, as Beatrix wrote, her "fortunate meeting" with Mary Sargent. Beatrix was immediately attracted by Mrs. Sargent's skill in botanical illustration; she was nearing completion of her set of watercolors of the flowers, leaves, and fruit of each tree represented in Professor Sargent's collection of the woods of America. In her turn, Mary Sargent probably enjoyed Beatrix's enthusiastic and knowledgeable chatter about plants, which was in a lighter vein than the high-flown table talk of the Professor and his academic friends. Anyway, Beatrix Jones⁴ was soon swept up into the comfortable and capacious milieu of the Sargents' house, Holm Lea, where apparently the Professor too appreciated her interest in plants. Her good looks and elegance were not wasted upon Sargent, but of course she in turn was quite used to distinguished gentlemen, and would not have been shy or daunted by his stern gaze and the aloofness of his Boston soul.

By the summer of 1893, the Sargents were convinced of the seriousness of Beatrix's interest in landscape gardening. Beatrix and her mother Mary had visited Holm Lea en route from New York to Maine (this became a regular habit in later years) in June when the rhododendrons were at their best. The Sargents may have visited them at Reef Point (this too became a regular event in later years), but the Professor had most certainly instructed Beatrix to make the most of her summer, to use her eyes, to observe good land-



The pond at Professor Sargent's estate, Holm Lea, in Brookline, Massachusetts. Photographed in 1900 by Thomas Marr.

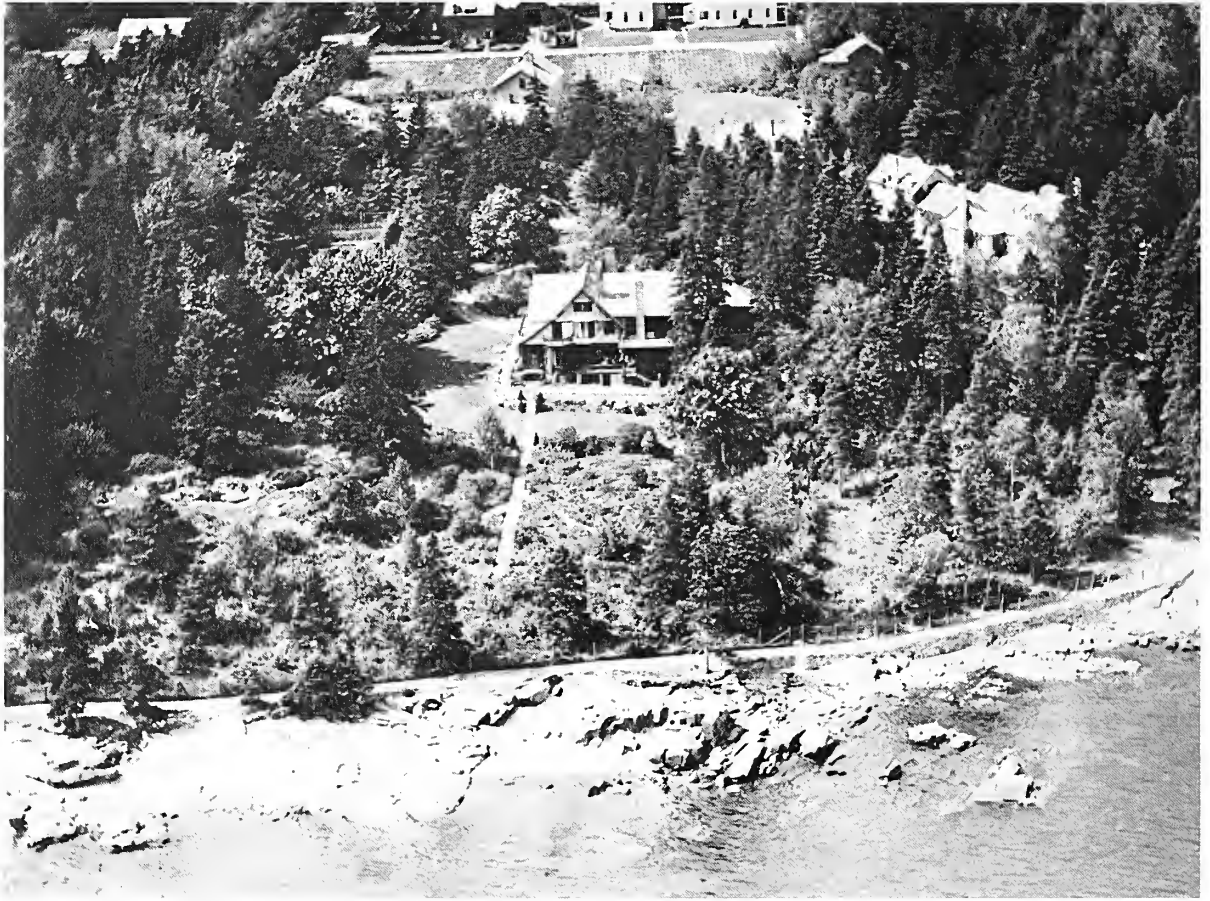
scape effects and plant relationships and note them down. Her summer flew by, as happy holidays are wont to do, but towards the end of September she remembered that she needed something to show her "Chief," and bought a brand-new notebook. This was almost certainly not her first, but it was the only one she kept as a treasured reminder of what were to be some of the most momentous days of her young life.

Observing the Landscape

The notebook begins on 10 October 1883 with her comments on the landscape around Bar Harbor; one of her favorite haunts is the Dorr family's Oldfarm at Compass Harbor, where

she finds many good planting ideas, but she is noticeably critical of exotics on her island setting, including Mrs. Dorr's "unfortunate" weakness for magnolias. Her last holiday entries are made on the train as she leaves for Boston to meet up with the Sargents, who had promised to take her to the World's Columbian Exposition in Chicago, to see the wonders of the fair, but especially the triumph of Olmsted's landscape setting. After a short rest at Holm Lea, Beatrix and the Sargents are bound for Chicago, where they arrive on October 19.

For a week she wandered around the Exposition, investigating details of design and planting, and noting them down; she was mys-



An aerial view of Beatrix Farrand's home, Reef Point, in Bar Harbor, Maine. Reprinted courtesy of the College of Environmental Design Documents Collection, University of California, Berkeley.

tified by the first Japanese bonsai that she saw, but entranced by the mix of gardens and contrived wilderness on Olmsted's precious wooded island. Being at the fair under the Sargents' wing taught Beatrix a great deal, but it also brought her into the inner circle of her chosen profession. She was no longer on the outside, but having met so many people and heard so many conversations on the hard-won triumph of the fair, she became one of the "few" who realized, as Sargent had thundered in *Garden and Forest* "that the harmony of the scene and the perfection and convenience of the whole scheme of arrangement were due to the genius of one man, Frederick Law Olmsted."⁵

Beatrix returned to New York to continue her reading, but her future was decided and must have been talked about; the following February (1894) she and her mother were in the Sargents' party to visit Biltmore, which caused Olmsted to remark rather grumpily that she was "inclined to dabble in Landscape Architecture."⁶ This much-quoted slight reveals the depths of the difficulties Beatrix had to overcome, and just how important Sargent's faith in her was to her eventual success. Olmsted was on the summit of his fame, yet conscious of his failing energies; he had a punishing schedule of travels that spring of 1894, and was obsessed with the "exceptional" education of his son, Frederick, Jr., who, on

the point of graduating from Harvard, was being fitted to be his heir. No man, with Olmsted's almost messianic fervor, could look kindly on a society lady who dared to dabble in his precious profession. But, on Beatrix's side, was it not hard for her that her contemporaries, her equals in so many ways, Charles Eliot, Henry Sargent Codman, and Frederick Olmsted, Jr., should be pampered, eased, and ushered through the surveying and field work, the European travels, and the office experience necessary to becoming a landscape architect? She had to do it all on her own. It was this imbalance that made Sargent's encouragement crucial. He was kindly, he had that Brahmin tendency to give a serious-minded woman encouragement, and just perhaps, she appeared at the right moment, with her brightness and enthusiasm, to fill the gap left by the death of his former protégé, Henry Sargent Codman, in early 1893.

Beatrix probably never knew of Olmsted's slight, but the situation was clear enough; it was to affect her life greatly, as well as her later relationship with the American Society of Landscape Architects. She refused to call herself a landscape *architect*, always preferring the term *gardener*.

After the trip to Biltmore in February 1894, she returned to Holm Lea in the summer for what was to be her longest stay; she studied at the Arboretum and was ushered around Brookline by Sargent (including a visit to H. H. Hunnewell at Wellesley, and he was impressed by her knowledge and manner). On June 5, she faced up to her Waterloo, taking a chance to visit Olmsted's office (in his absence). She was allowed a thorough look around the shrine she could never enter professionally. Her notes were detailed: "The entrance is quite charming, a lych gate covered with *Euonymus radicans*, both the plain and variegated, and quite bushy on top. The road goes around a tiny island with shrubs planted on a high mound and completely shutting out the gate. To the right the ground has been dug away making a little dell . . ." Her description goes on, and has

gathered interest with time, for the entrance to 99 Warren Street is still much the same as she saw it. She describes the planting around the house, noting some "badly arranged" shrubs and the clashing azalea flowers in bluish pink and bright orange.

But she was really interested in the Olmsted office, and she was allowed to see every aspect of the work, as her detailed notes reveal. She was shown, perhaps by the affable John Charles Olmsted, how design layouts and areas for planting were sketched on tracing paper over the site surveys, and how planting plans were made by reference to a card index, which gave size, shape, availability, and required growing conditions for each plant. The plants were keyed into the design by a number. All she saw was of vital interest to Beatrix, and she carried all the ideas and methods away with her for future reference.

On the following Sunday, June 10, 1894, Professor Sargent drove her to the Arboretum; she took this in her stride since for her to have a private tutorial was almost certainly not a unique occasion, but it is the only excursion she recorded in detail:

On the way we stopped and looked at Mr. Parkman's collection of shrubs. It was awfully dreary—house and grounds taken by the Park Commission, house being torn down [Parkman had died the previous year]. Only a year ago the grounds were under cultivation and now they look as if they had been deserted for years, paths overgrown, and long grass springing up everywhere. St. Bruno's lily in full bloom—*Azalea calendulacea* still fine too, *Magnolia macrophylla* not flowering yet—the largest in the neighborhood. *Aruncus spirea* in bed quite handsome altho' a little coarse . . . Jamaica Pond is lovely—or at least must have been lovely before the Parkway took it—Mr. S. is trying to make the Commission give up the plan for the road along the shore in one of the loveliest spots.

In the Arboretum itself a great deal of work has been done, especially behind the building [the Hunnewell laboratory was completed in 1892] where the Magnolias are to begin.

Beatrix noted *Magnolia parviflora* (= *M. sieboldii*) in bloom, though only a small bush, and *Magnolia glauca* (= *M. virginiana*), perfumed almost like a rose. Professor Sargent led



An 1894 photograph of F. L. Olmsted's Brookline home and office, Fairstead. Beatrix Farrand visited Fairstead on June 5 of that year. Photograph courtesy of the National Park Service.

her on to the roses—*Rosa spinosissima* in bloom and also *R. nitida*, *R. lucida*, *R. setigera multiflora*, and the Austrian briar were all noted for future use. Other shrubs that caught her eye were the hydrangeas, stewartia, *Viburnum molle*, and *V. dentatum* in bloom and *Fothergilla gardenii*, just beginning to fruit.

Sargent must have insisted—if Beatrix needed any bidding—that she attend J. G. Jack's dendrology lectures, which he gave that June; and being Beatrix, she would have made the most of every chance to learn from that remarkable character, the chief propagator and Arboretum superintendent, Jackson Dawson. Dawson, a jovial, good-natured Yorkshireman, resplendent each morning in a fresh boiled white shirt (on which he invariably wiped his plant labels), knew everyone who had any business among his precious plants in the Arbore-

tum. Beatrix would have found him an immensely attractive personality, always willing to answer her questions and explain what he was doing. It seems likely that her later friendship with Chief Propagator Judd was founded on her earlier good relationship with Jackson Dawson.

If Beatrix had acquired a foundation of good plant knowledge from her visits to Holm Lea and the Arboretum, especially in that summer of 1894, she still needed to learn in other ways. In the autumn she made arrangements for private courses in technical drawing and surveying from the teachers at Columbia's fledgling School of Architecture, and she made plans for her very necessary European study tour.

This first important tour lasted for six months, from March until October of 1895;

she and her mother traveled alone (except for their lady's maid) but met old and new friends in many places, including Teddy and Edith Wharton. Beatrix wrote that Sargent exhorted her "to see all the gardens she could, and learn from all the great arts as all art is akin." He gave her introductions to the Jardin d'Essai in Algiers, where she studied subtropical plants, and to the Rovelli brothers who had a collection of azaleas and rhododendrons near Milan. Charles Eliot was also very helpful, with good advice on parks and gardens he had seen in Paris and Berlin, giving her as well an introduction to the "very kindly" Carl Bolle and his marvelous garden of trees on an island in the Tegel. Sargent may well have paved the way for her to meet the reigning triumvirate of English gardeners, William Robinson, Gertrude Jekyll and Theresa Earle, which she did, all in one week in July.

Olmsted's advice to William Platt had included his opinion that the "fine and costly" Italian gardens had less to offer the young landscape architect than the carefully observed details of the everyday landscape and common places. Beatrix, attuned by Holm Lea dinner-table conversations to the sensitivities of formal versus natural landscape tastes, adopted right from this start her carefully judged position along the middle way, that was to mark the whole of her career. She saw over twenty villa gardens in Italy, as well as the great formal gardens of Germany, France, and England, but it is interesting to note that her first contribution to *Garden and Forest* (and her first published piece of writing)⁷ was on the merits of a vernacular stone bridge she had seen in the English Lake District. (She designed very similar bridges for the woodland at Dumbarton Oaks over thirty years afterwards.) She pursued further egalitarian interests in city parks on her return, and it was her ideas for these that brought her to the notice of Samuel Parsons and eventually the embryonic American Society of Landscape Architects.

In the April 7, 1897, issue of *Garden and Forest*, she wrote about a paper that the land-



Portrait of Jackson Dawson, chief propagator at the Arnold Arboretum, and a good friend of Beatrix Farrand. Photograph from the Arnold Arboretum Archives.

scape gardener Henry Ernest Milner had delivered in London on "The Garden in Relation to the House," which was really concerned with the architect in relation to the landscape gardener. By this time also, Professor Sargent had delighted her by finding her a little job, which she described as to do "some tree thinning and remodel a little planting on a garden slope." By the following autumn, when she gave her first professional interview to the *New York Sun* (October 31, 1897), she could speak with a breezy, though conscientious confidence of her work—draining a 25-acre swamp, clearing a 40-acre forest plot in Bar Harbor and transforming it "into a pleasing grove," laying out a cemetery at Seal Harbor, as well as more garden work in Bar Harbor and the landscaping of the entrance to Tuxedo Park in New York State—these last two jobs



The bridge over the River Kent at Levens Hall, from Garden and Forest, 1896 (vol. 9, no. 25). In her first published article, Beatrix Jones described the bridge this way: "The simple lines and quiet color of this ivy-draped bridge in Westmoreland are what make it satisfying to the eye and an added charm to the stream; it is made from the stone of the country, and the native plants grow about it as familiarly as though it were a boulder playfully deposited there by nature in the ice age."

being current. The *Sun* reporter noted her long box full of plans, the three hundred books on her subject, and asked if landscape gardening was profitable, and could a young woman afford to marry on it? Beatrix laughed as she replied that "she did not think a young woman dedicated to her profession could afford to marry at all."

Miss Jones, "twenty-five years old and comely" was well on her way, to a full and busy life and a professional reputation for fine work that was truly deserved. Beatrix, whose honesty was one of her most engaging features, never ever forgot that she owed so much to that "kindest of autocrats,"⁸ her "Chief" Charles Sprague Sargent and his generously helping her over so many of the professional hurdles that time and society placed in her way. Probably we shall never now know the full extent of his kindnesses. And, of course,

he also opened up for her his living textbook of shrubs and trees, her professional stock in trade.

Endnotes

- ¹ Vol. 44 (5): 407.
- ² *Arnoldia* 9 (2): 6-7; Vol. 9 (9): 38-43.
- ³ Vol. 6 (4): 5.
- ⁴ Beatrix married Max Farrand in 1913.
- ⁵ May 3, 1893, editorial.
- ⁶ Laura Wood Roper, *FLO: A Biography of Frederick Law Olmsted*, John Hopkins, 1973, p. 455.
- ⁷ *Garden and Forest*, January 15, 1896.
- ⁸ E. H. Wilson, quoted in *A Reunion of Trees*, by S. A. Spongberg, Harvard U. Press, 1990.

Jane Brown studied landscape design, but, as she says, "happily diverted to writing." She is a prolific writer on the subject of garden history and design, and is currently working on a biography of Beatrix Farrand, from which the above article is extracted.

Why Study Mistletoes?

Elizabeth A. Kellogg

This unlikely plant group provides insight into the purposes and processes of basic research.

If athletes get athlete's foot, what do astronauts get? Yup, you guessed it—mistletoe.

I am getting to an age when I am pleased that I can remember anything I learned in the fourth grade, even if it's just a joke. Fortunately, I have some reason to remember the astronaut one fairly frequently as I continue work on the genus *Phoradendron*, the largest genus of mistletoes in the Western Hemisphere. It is a group of plants that so few people know about that I feel compelled to write this article in self-defense, not only to explain what mistletoes are (they are often beautiful plants) but also to explain what I am doing with them and a bit about why I am doing it.

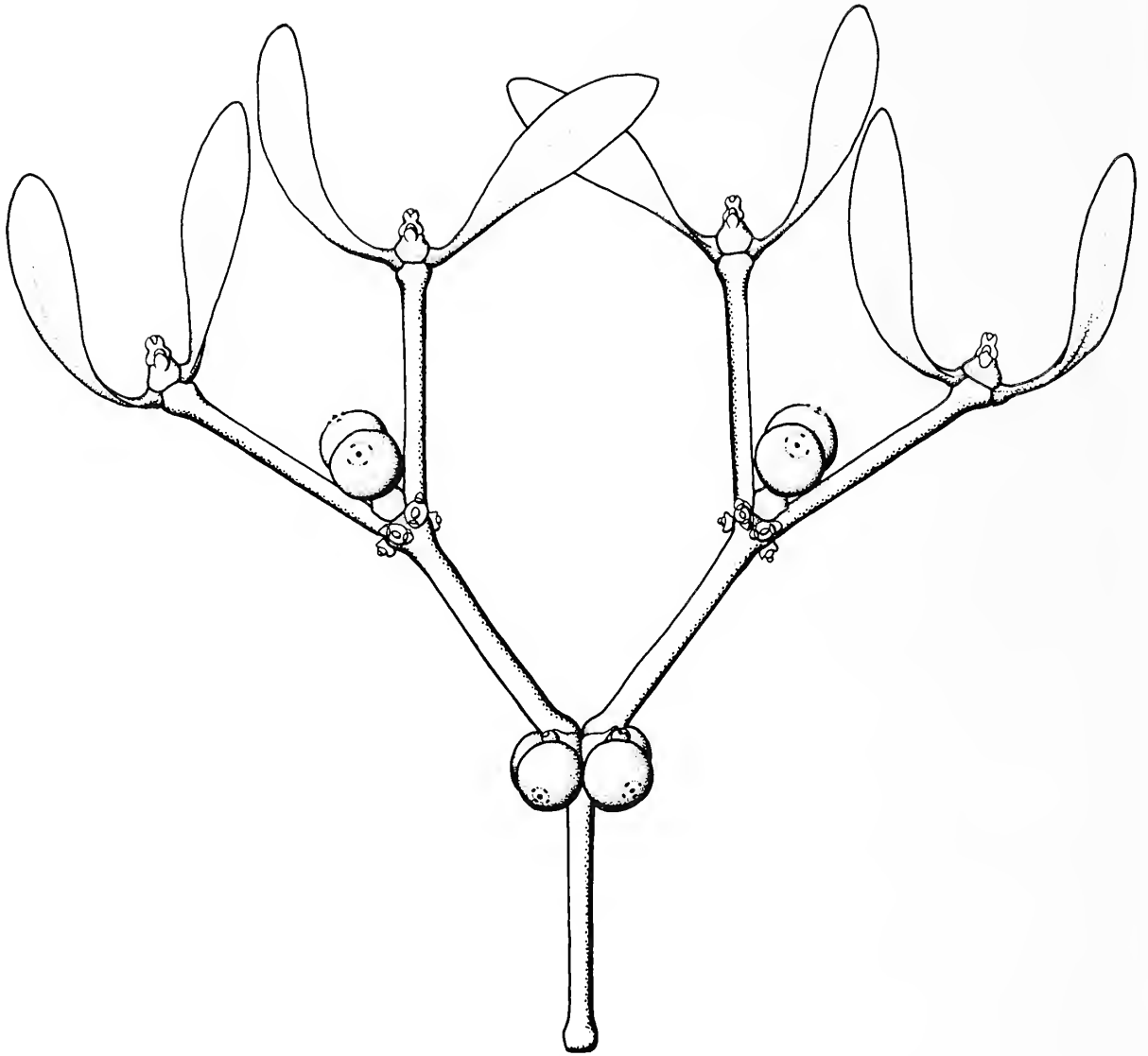
The most familiar mistletoe, of course, is the waxy little plant that is hung in strategic places at Christmas time. In this country the species is *Phoradendron leucarpum*, a U.S. native; most plants sold commercially come from New Mexico and Oklahoma (Howard and Wood, 1955). Its European counterpart is *Viscum album*, a plant that figures in Norse mythology and later was endowed with magical properties by the Druids.

All mistletoes are parasites on woody plants. Like most other plants, they have green leaves and manufacture their own food, but unlike other plants, they have no roots; instead they form a complex absorptive organ called a *haustorium* that penetrates the vascular system of their host, absorbing water

and nutrients. Thus they grow right into the tree trunk or branch, unlike other epiphytes, such as orchids and tropical ferns, that merely perch. Mistletoes have fleshy fruits with a layer of sticky mucilage surrounding the seed. The fruits are generally bird-dispersed. After the seed has passed through the bird's gut, the mucilage allows it to stick firmly to a branch where it will then germinate and form a new haustorium.

Taxonomy of a Little-Known Family

The mistletoes are sometimes grouped in a single family, the Loranthaceae, but the loranthids are more often divided into several different families (Loranthaceae, Viscaceae, Eremolepidaceae, and Misodendraceae) because of major differences in floral form and possibly of evolutionary history; Loranthaceae and Viscaceae together comprise by far the majority of the species. The Loranthaceae, in its most narrow sense, includes mistletoes mostly with large, strikingly colored, bird-pollinated flowers and equally showy fruits. The mistletoes that I study, however, are in the Viscaceae, in which the major genera are *Viscum*, *Phoradendron*, and *Dendrophthora*, all bearing tiny, inelegant flowers with three or four sepals and no petals at all. Also included here are dwarf mistletoes, the genus *Arceuthobium*, a serious pest in timber trees in the western United States. As the haustorium of these dwarf mistletoes penetrates the wood, it causes strange deformations and



Vicium album, the legendary mistletoe of Europe. In North America, species in the genus *Phoradendron* are used as substitutes for this plant at Christmas time. From *The Biology of Parasitic Flowering Plants* by Job Kuijt, University of California Press, 1969.

excessive branching, which effectively ruins that portion of the tree for lumber.

Despite the lack of showy flowers, *Viscaceae* are frequently beautiful when alive. Their leaves are thick and glossy, often a yellowish green that contrasts with the surrounding trees. The plants have white, red, or orange berries that stand out against the leafy stems.

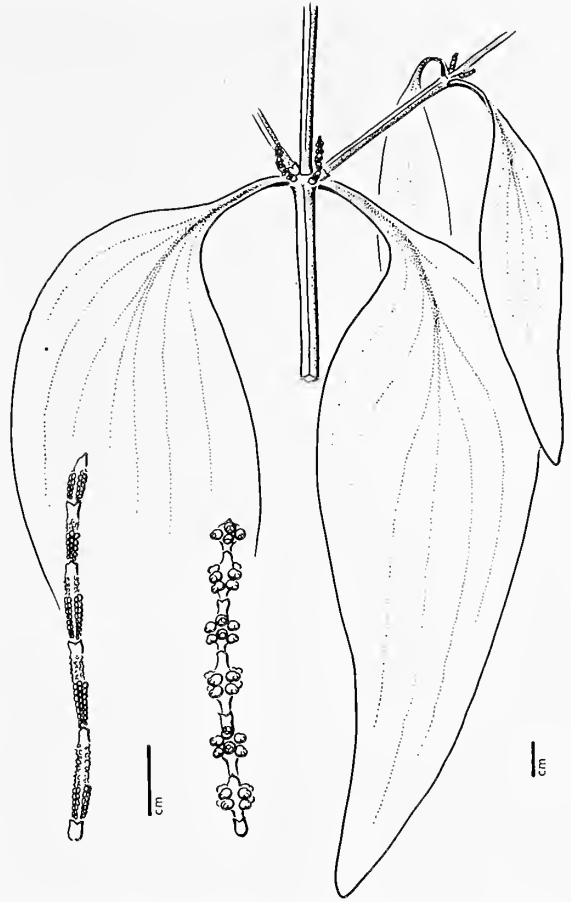
When the plants are collected, pressed, and dried, however, they become something only a taxonomist could love—and only a few taxonomists at that. The glossy foliage becomes dull and turns dark brown; the berries shrivel and lose their color; the flowers solidify. More annoying, the jointed stems tend to break at the nodes, so the leaves and inflorescences fall

off. All herbarium specimens are accompanied by an envelope of fallen leaves, broken stems, and inflorescences; in fact, with some specimens, nothing is glued to the herbarium sheet at all—everything is stuffed into the envelope.

A Personal Encounter

I began studying mistletoes seven years ago while I was working with Dr. Richard Howard, former director of the Arboretum, on his *Flora of the Lesser Antilles*. At that time he asked me to prepare descriptions and keys for the Loranthaceae and Viscaceae of the area (Kellogg, 1987a, b). Writing up most genera was straightforward because I could refer to the work of Dr. Job Kuijt (now at the University of Victoria, Victoria, B. C.), who has spent his career studying the natural history, taxonomy, and biology of parasitic plants (for example, see Kuijt, 1961, 1966). Possibly the only group Job has tried to avoid is the genus *Phoradendron*. As I began working on it, I could see why.

The problems with *Phoradendron* are several: First, there are between 100 and 150 species, primarily in Central and South America, with many of these extending into the Caribbean region. Second, leaf shape within a single species is very variable, making it hard to tell if two dissimilar plants may really be representatives of the same species. Third, and most important, the botanist William Trelease worked on the genus; in 1916 he published a massive volume on its taxonomy (Trelease, 1916). Trelease, like many botanists around the turn of the century, had what is called “a narrow species concept.” This means that virtually any variation, no matter how subtle, was assumed to represent a different species and thus to require a new name. If the slightly different plant occurred in a different place, all the more reason to name it. Thus, for example, *Phoradendron piperoides* is a South American species, and the name had also been used for similar plants in the Caribbean. Trelease, however, felt that some of the Caribbean plants had a distinc-



Phoradendron guatemalense Kuijt. Reprinted from *Proc. Kon. Ned. Akad. v. Wetensch.* Vol. 93, no. 2, p. 146 (1990).

tive leaf shape, which meant they should get a new name so he called them *P. ficulneum*. My task in studying the Caribbean *Phoradendrons* was to link up these names and to determine if Trelease’s distinctions held up. In some cases they did, but in others, like *P. piperoides/ficulneum*, there seemed no reason to think that the two were different species; hence all are now grouped under the name *P. piperoides*.

An aid in this sort of detective work is the requirement that all botanists designate a *type specimen* when they describe a new species. Thus when Trelease gave the name *Phoraden-*

dron ficulneum to a group of plants, he noted a particular specimen as being a representative of that name. The specimen happens to have been collected by E. L. Ekman in Haiti and a duplicate (isotype) is in the herbarium at Kew. When I went to Kew to see the specimen (among others), it was easy to see that it could be included in *P. piperoides*.

I also discovered that Trelease occasionally used the same type specimen for two different species names, that is, he named the same thing twice, perhaps an easy mistake to make when you consider how many names he produced in his lifetime. Once I determined what had happened, I could correct it, with the earliest name taking precedence. The results of this work were presented in a regional monograph, or revision (Kellogg and Howard, 1986).

The Job Gets Bigger

Some time after I had finished the Caribbean work, I was asked by the late Dr. Julian Steyermark, of the Missouri Botanical Garden, to write keys to the species of *Phoradendron* for his *Flora* of the Venezuelan Guyana, the eastern part of Venezuela that includes the tepuis. Job Kuijt was working on *Dendrophthora*, the closest relative of *Phoradendron*, as well as all the other Venezuelan mistletoes, but *Phoradendron* required a major independent commitment of time. Furthermore, the nature of the work in *Phoradendron* demands a big herbarium with a comprehensive library, such as the Harvard University Herbaria, one of only a few institutions where this sort of study can be easily done.

In undertaking the project, I have had to become familiar with the South American members of the genus and have begun to produce a full monograph, which will quite likely be completed by Job, including all the names (wrong ones linked with the right ones), complete species descriptions, and lists of representative specimens. I have nearly finished the Venezuelan species, and from the long monographic manuscript I have extracted

the necessary information for Steyermark's flora (now being completed under the editorship of Dr. Paul Berry). In the process of doing this flora, we have found what appear to be several new species—ones without any names at all, Trelease notwithstanding. This is not surprising for a plant that grows on rain forest trees: the trees themselves are often poorly known, and plants growing in their uppermost branches are even more unlikely to have been found.

My study of *Phoradendron* is in many ways a typical piece of systematic work, the kind of study undertaken by research botanists at the Arnold Arboretum since its establishment. In this large genus, new species are routinely found by plant collectors; the existing taxonomic literature is large and somewhat



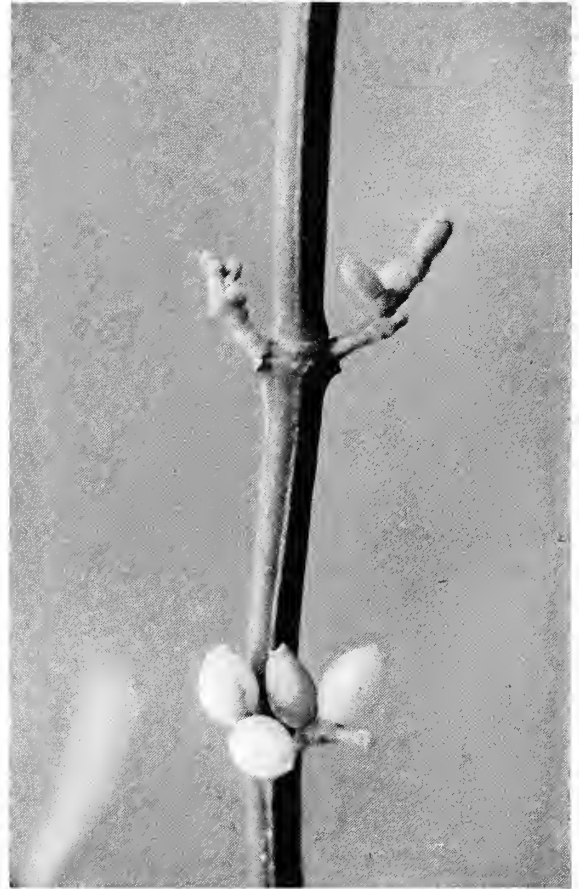
Phoradendron molinae Kuijt. Reprinted from *Ann. Missouri Bot. Gard.* Vol. 74, p. 520 (1987).

confused. The approach I take is illustrative of the analytical nature of taxonomy: the specimens are first grouped into sets of plants that look alike; they are quite literally put into piles of matching plants. This is the most time-consuming part of the process, and the stage at which most of the analysis takes place. It requires solving dozens of smaller problems along the way: for example, if leaf shape varies among some of the plants, does this mean that they belong in separate stacks of specimens (that is, represent separate species), or does it just mean that shape changes in response to light or moisture conditions? Or, as another example, if one plant is wholly male and another wholly female, do they really belong together, or have I found the male of one species and the female of another?

Once I am happy with the contents of each stack of specimens, I write a formal species description. Only then can the appropriate name be determined—by working out which type specimens fall into each stack. Finally, an identification key can be constructed. Traditionally, all this is solitary work; the *Phoradendron* study is somewhat unusual in that it requires close collaboration with Job. Although he is studying the sister genus to *Phoradendron*, the two groups are so similar that we sometimes make mistakes and end up with each other's specimens.

What Is Basic Research?

But all of the foregoing begs the question, So what? How do I justify days and weeks spent writing descriptions and keys of an obscure tropical plant? The answer lies in part in the nature of basic research: basic, as opposed to applied, research is work with no immediate application. It increases the store of human knowledge on the assumption that the increase is a good thing in itself, and will lead to future application. Consider, for instance, the work of Gregor Mendel, whose experiments and results are studied and memorized by every beginning student of biology. Mendel was an Austrian monk who, in the mid-nineteenth century, did a series of experi-



The mucilaginous fruits of Phoradendron trinervium. Photographed in Montserrat by R. A. Howard.

ments on garden peas, experiments that form the basis of the modern science of genetics. Mendel crossed plants that produced smooth yellow peas with those that produced wrinkled green peas and counted the number of smooth and wrinkled yellow and green peas in the resulting offspring. He was able to show that each characteristic was controlled by a single inherited factor that we would now call a gene. But we can be sure that he didn't know that his work would form the basis for such diverse applications as plant breeding, animal production, and understanding of such heritable diseases as hemophilia and cystic fibrosis.

This is typical of basic research—its immediate value is negligible and its ultimate



Toby Kellogg collecting a mistletoe in the genus Amyema in Australia in 1988.

NEWS

FROM THE ARNOLD ARBORETUM



Plant Sale 1991

People listening to National Public Radio's "All Things Considered" on Friday morning, September 14, heard one of New England's best-kept secrets revealed when the Arnold Arboretum's annual horticultural extravaganza was the featured weekend event selection.

The result? A larger than ever crowd (over 2,500 people), undeterred by cool weather and overcast skies, lined up for their chance to acquire some of the unusual plants on sale in the Case Estates barn. Meanwhile, the Arnold Arboretum Associates' "straight sales" table recorded its first purchase at 7:30 a.m., a prelude to the frenzied bidding in the later silent and rare plant auctions.

Members of the various participating plant groups—the Herb, Hosta, Iris, Rhododendron, and Bromeliad societies—joined together with old and new *Friends* of the Arboretum to make this a special day for the New England "plant community." Almost \$46,000 was raised to support the work of the Arnold Arboretum, and our thanks go to everyone who helped to make the event another memorable occasion.

Historic Landscape Maintenance Workshop

Despite the fury of Hurricane Bob on the previous day, Tuesday, August 20 saw eighty-five managers and horticulturists from historic sites across the country—from California, Louisiana, Georgia, and the Midwest to Washington, New York, and New England—travel to the Arnold Arboretum for a three day national workshop. As the first tangible result of the new cooperative agreement between the Arnold Arboretum and the National Park Service, the program included talks covering, "Plants as visual cues in the historic landscape," "Developing a systematic approach to preservation maintenance," and "The evolution of turf management." The program, which included lectures, problem solving discussions, and field workshops, was developed and co-sponsored by the Arboretum, the North Atlantic Region of the National Park Service, and the Frederick Law Olmsted National Historic Site.

The roster of speakers included National Park Service personnel from Washington, D. C., the North Atlantic Region Office, and the Olmsted and Longfellow Historic Sites.

Continued on page 3

The Deland Award

Robert Cook, Director

Why, for many years now, have individuals continued to give major bequests to the Arnold Arboretum?

Perhaps they have shared the same belief as the original trustees of the James Arnold estate. In 1872 these three men chose to establish an arboretum at Harvard University, the most pre-eminent institution for scholarship in the country. They believed that by choosing Harvard, their investment in research and teaching would be of the highest quality, all for the benefit of humankind. They hoped too, that others would see their example and so be similarly encouraged to invest in work of exceptional quality. And, indeed, others have.

In 1987 we received a generous bequest from the estate of F. Stanton Deland, Harvard Class of 1936, and long-time friend of the Arnold Arboretum. After discussions with Mrs. Sue Deland and her family last spring, the Arboretum established an endowment in memory of Stan Deland.

Each year the income from this endowment shall be used to make one or more awards, called the Deland Award, to support the research of a graduate student or advanced undergraduate working on the comparative biology of woody plants. Such studies may include ecology, reproductive biology, genetics, physiology, or development. While preference will be given to students enrolled at Harvard, graduate students at



F. Stanton Deland

other institutions may apply as well.

Preference will also be given to projects that utilize the 5,500 different kinds of woody plants in the living collections of the Arnold Arboretum. We anticipate making the first awards in 1992.

The Deland Fund joins the other endowments which support research here. For many years, Mercer Fellows have joined the permanent staff of the Arboretum to engage in research and study using the library and herbarium collections largely housed in Cambridge. In addition, through generous gifts from the Putnam family, we now

award fellowships and research support from the Katherine H. Putnam Fund. Putnam Fellows are chosen for projects that specifically use the Living Collections of the Arboretum. The most recent Putnam Fellow was Professor Michael Dirr from the University of Georgia who spent a sabbatical semester at the arboretum in the spring of 1991,

We deeply appreciate the generosity of these individuals and the far-sighted vision that inspired these gifts to our endowment. More than any other area, critical support for research at the Arboretum will benefit us all for many generations to come.

SYMPOSIUM

American Landscape Design as a response to the nation's varied topography and rich cultural heritage, as well as present-day issues in conservation and restoration will be explored by landscape designers and architects on Saturday, November 16, in a day-long symposium co-sponsored by the Arnold Arboretum and New York Botanical Garden. Speakers include John Fitzpatrick (Monticello, Virginia), Isabelle C. Greene (Santa Barbara, California), Dan Kiley (Charlotte, Vermont), and Darrell Morrison (University of Georgia). To request a brochure on the program, call (212) 220-8720.

EVENING LECTURE SERIES

Foretaste of the Future

Which of the plant introductions now being tested in American nurseries will be voted "most likely to succeed?" What are the sources of these new plants, and how do leading nurseries locate and decide among them?

Join Steven Frowine, Director of Horticultural Research and Information at *White Flower Farm* in Litchfield, Connecticut, for a thought-provoking slide-lecture titled, "Distinctive Plants for the Year 2000" to find out how new plants are found, tested, and evaluated. This is a rare opportunity to preview plant treasures from Britain, Europe, and the Far East that have yet to enter the commercial pipeline.

The lecture is open to the public and will be held at the Hunnewell Visitor Center from 7 p.m. to 8 p.m. on Thursday, November 7. The fee is \$12 for members and \$15 for non-members.

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Architecture and the Garden

Beginning on January 8 for three Wednesday evenings a special lecture series discusses relationships between the development of architecture (house) and the site (garden).

Gary R. Hildebrand, Landscape architect, Graduate School of Design will help us to develop an

understanding for some of the ways in which we presently envision the connection between building and landscape in *Understanding Types*.

Architectural Historian *Judith B. Tankard* traces the development of the *Arts and Crafts Style* of small enclosed Garden exemplified in the work of Lorrimer in Scotland and Lutyens and Jekyll in England.

Diane Kostial McGuire examines the work of Beatrix Farrand and her distillation of the best of European style for use in the American landscape.

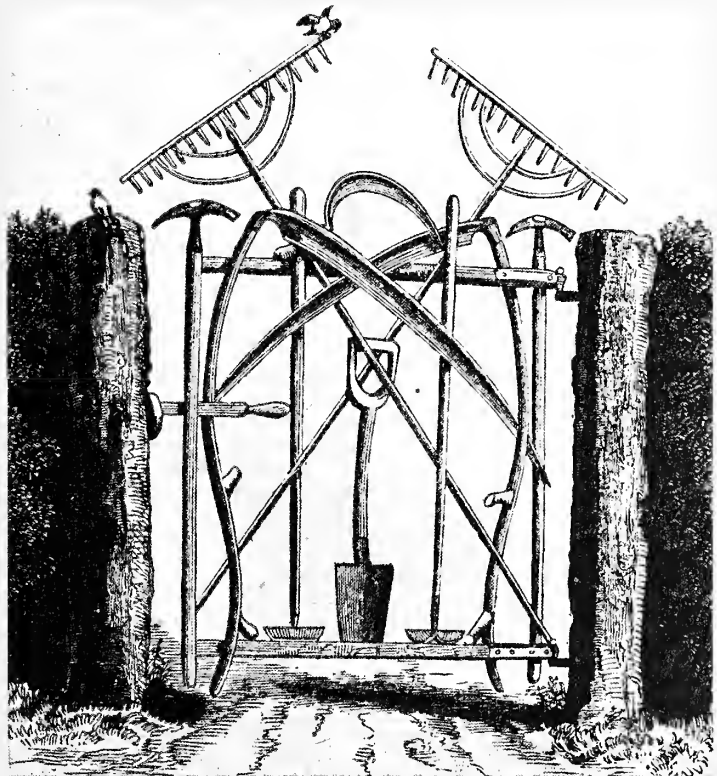
Call (617) 524-1718 for registration information.

Landscape Maintenance Workshop

Continued from page 1

Arnold Arboretum staff presented several lectures, using the Jamaica Plain site as an example of an historic landscape. Guest speakers included Dr. Michael Dirr, Scott G. Kunst, Rudi Favretti, Dr. Martin Petrovic, and Paul Rogers.

As a result of this popular workshop (many would-be registrants had to be turned away due to space limitations), the Arnold Arboretum will begin development of a bibliography for historic landscape preservation and will work with the National Park Service to design a curriculum that will permit working professionals to increase their expertise in landscape preservation practices.



Ornamental garden gate at Wodenethe, the residence of H.W. Sargent, Esq. (circa 1856)

George Pride

George H. Pride, the Associate Horticulturist at the Arnold Arboretum from 1967 to 1978, died of a heart attack on Sunday 21, July at the age of 79 years. Many of our members will remember George not only for the classes he taught and the horticultural information he dispensed so freely, but also for initiating the Arboretum's Friends organization in the early seventies and for hosting the "Meet the Staff" and "Meet the Friends" presentations at the Case Estates.

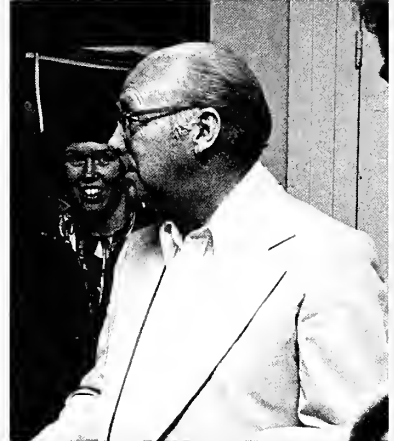
Born in Westbrook, Maine, George graduated from North High School in Worcester in 1930 and from Clark University in 1936, also receiving a Master's Degree from that institution in 1941.

From 1937 to 1967 he taught biology at Senior High School in Worcester. George travelled widely and brought back seeds from many other gardens to the Arboretum. He had an excellent talent in photography and developed an outstanding series of botanical travelogues. He was always in demand as a lecturer.

George's interests in terms of plants was wide ranging, but he showed a distinct favoritism towards bulbs and perennials, doing extensive hybridization with iris, hemerocallis, lilies, gladiolus, amaryllis, and orchids. Many of the daylilies he hybridized while living at the Case Estates are still growing along the Wellesley Street stone wall. George also did extensive planting of the rock garden adjacent to the Red School House.

In 1976 George was instrumental in bringing the then

young Roy Lancaster to the United States to address a meeting of the American Rock Garden Society. In his "thank you" letter to George, Roy noted: "You are a mine of information and I cannot think that you have an equivalent in Great Britain nor a peer in your own country."



George Pride



NEW ARRIVALS in the Bookstore for Today's Gardens

A Natural History of Trees by Donald Culross Peattie, 2 volumes. Reprint of an eloquent and informative classic of natural history.

Eastern and Central North America \$18.95; member's price, \$17.06. *Western North America*, \$16.95, member's price, \$15.20.

Indian Herbalogy of North America by Alma R. Hutchens.

The definitive illustrated guide to more than two hundred native medicinal plants and their uses. \$17.00; member's price, \$15.30.

Northeast Gardening by Elvin McDonald. A practical guide that speaks directly to the considerations of New Englanders. \$35.00; member's price, \$31.50.

American Wildflowers 1992 Engagement Calendar. Abbeville Press in association with the National Wildflower Research Center. Striking photography from across the country of wildflowers in their natural habitats. \$11.95; member's price, \$10.76.

The Bookstore is open daily, 10 a.m. to 4 p.m. Stop by or call (617) 524-1718 for mail order information.

value cannot possibly be assessed. The work itself seems arcane, even silly at times; somehow counting smooth and wrinkled peas does not fit with an image of "serious" scholarship. Yet that work has profoundly affected our lives over a century later.

There are currently many questions about the relationship of basic research to society today: how much scientific effort should be directed to basic, rather than applied, research? To what extent should the general public foot the bill? How should something without obvious application be evaluated? These are not easy questions, particularly in times when public money is in short supply.

The Desire to Know

But there is a more immediate and personal question, and that is, How does an individual motivate herself for such work? I don't get paid to do it, and even those who are paid will never become wealthy, so money is hardly the answer. There is a large element of deferred gratification, in some respects like teaching, in that a teacher will probably never really know the sort of impact she has had on her students. Similarly, I may never know the value (if any) of my work on *Phoradendron*.

Certainly any taxonomic study of a tropical plant group can be justified by the rapid destruction of the rain forest. We need to know what grows there before it is gone forever; we need to know areas of greatest diversity to set priorities for what to preserve. And there is the argument that many, many medicines were originally extracted from plants. The National Cancer Institute continues to fund plant collection in order to screen plants for anticarcinogens; some of this work is currently being done by Dr. John Burley at the Arboretum. Similarly, the Pacific yew, *Taxus brevifolia*, has been used effectively in treating some forms of ovarian cancer. This application has generated interest in other species of the genus, which in turn requires that someone has already completed the basic work describing what species there are and how to tell them apart.

But I would never work on *Phoradendron* if the sole incentive were the possibility that someday someone would find a use for it. The motivation is much more immediate and fundamental, what the poet Robinson Jeffers called "the curious desire for knowing." It is something as human as the desire to create a symphony or a song, or a sculpture or a story. It is the desire to solve a puzzle that explains part of the world. The truth is *Phoradendron* is fun.

Which brings me back to the fourth grade. Remember how clever you felt when you thought you'd learned a secret? I now know a lot about some very curious plants—I know a secret now. And the next most fun part of secrets, of course, is telling them to your friends.

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Acknowledgments

Thanks to L. Pierce and J. Kuijt for their helpful comments on the manuscript.

Elizabeth Kellogg earned her Ph.D. in biology from Harvard in 1983, and is an Associate of the Arnold Arboretum.

Sweet Pepperbush: A Summer Sensation

Michael A. Dirr

Native to the wetlands of much of eastern North America, *Clethra alnifolia* is now spreading into the cultivated landscape.

My olfactory senses have often been inundated by the sweet floral perfume of the seemingly ubiquitous sweet pepperbush that occurs along water edges and moist areas throughout its Maine to Florida range. While *Clethra alnifolia's* landscape worthiness has never been exploited by gardeners and nurseries, new and resurrected cultivars of the species are currently stimulating interest. Gardeners are pleading for flowering shrubs out of synchronization with the April-May bonanza. *Clethra* typically flowers in July and August, and it is obvious from observing native populations that selections for a continuum of flowering times could be made.

The delightful sweet floral fragrance from which the plant derives its common name is among the best in the shrub world. The individual five-petaled, white flowers are 8 millimeters in diameter and occur in racemes 5 to 15 centimeters long (2 to 6 inches) and 2 centimeters wide (0.75 inches). The fruit is a dry, dehiscent, five-valved capsule that persists into winter.

The lustrous medium to dark green leaves are 3 to 10 centimeters long (1 to 4 inches) and sharply serrate. In the fall the leaves develop a lovely golden to yellow color that ages to a golden brown. The fall foliage, like that of *Fothergilla* and *Calycanthus*, is quite long-lasting, due in part to its resistance to damage from freezing temperatures.

The growth habit of this late-summer-blooming shrub is distinctly rounded to broad-

rounded because of its suckering, colonizing nature. Size is extremely variable with a height of 2 to 3 meters (6 to 9 feet) occurring most commonly. However, at the Howe Estate in Newport, Rhode Island, I stared in disbelief at a six-meter-tall (18 feet) specimen and muttered repeatedly, "It's not supposed to grow this large."

In the Arnold Arboretum's extensive collections, *Clethra alnifolia* is represented by seventeen different accessions, with #23139-A (a compact, densely branched, heavily flowered colony of unknown origin) measuring 2.5 meters high (8 feet), 12 meters wide (36 feet), and 13 meters long (40 feet). Remarkably it is prospering in the shade and root competition of two large shagbark hickories (*Carya ovata*).

Propagation

Clethra is easily propagated from seeds that require no preconditioning and can be sown as soon as ripe. Softwood cuttings root readily with or without a hormone treatment, but a five-second dip in an aqueous solution of 1000-ppm KIBA is an inexpensive insurance. Jack Alexander, chief propagator at the Arboretum, and I conducted a media rooting study utilizing *Clethra alnifolia* as the test plant. Rooting was 94% in a peat and perlite mix, 83% in perlite, 78% in peat, and 56% in sand or sand/perlite. *Clethra* is one of the few plants in which cuttings continue to grow while under mist.



A large colony of *Clethra alnifolia*, Accession #23139-A, growing at the Arnold Arboretum. Of unknown age, the colony is now 2.5 meters high, 12 meters wide, and 13 meters long. Photo by Rácz and Debreczy.

The cultural adaptability of *Clethra alnifolia* is phenomenal, and I have observed thriving specimens throughout the upper Midwest, New England, and south into Georgia. The species adapts to wet and dry sites as well as to a variety of soil pH's. The dry New England

summer of 1991 exposed many shrubs, such as weigela, deutzia, philadelphus and hydrangea, as less than drought tolerant. Sweet pepperbush, however, showed no signs of drought stress. But mites can be a problem when conditions are extremely hot and dry.

With the new and resurrected cultivars, *Clethra* can find a home in any landscape. Mass plantings along waterways and shady areas are always effective. Use the pink-flowered or compact forms in shrub and perennial borders. I used the pink form as a foundation plant in my Georgia garden and have pruned it back once in thirteen years. Since

flowers develop on the new growth of the season, late winter or early spring pruning is recommended.

Cultivar List

'*Anne Bidwell*' was grown by Mrs. John Bidwell, of Cotuit, Massachusetts, from, *C. alnifolia* seed purchased through F. W.



The inflorescences of Clethra alnifolia, Accession #23139-A. Photograph by Rác and Debreczy.

Schumacher of Sandwich, Massachusetts. The habit is more restrained (4 to 6 feet high) than the species, but the genuine difference resides in the large, multibranched, almost fluffy, flower panicles that are 10 to 15 centimeters long (4 to 6 inches) and 8 to 12 centimeters wide (3 to 5 inches). In Massachusetts the flowers open two to three weeks later than those of the species. This clone is currently being propagated and will soon be released through the Arnold Arboretum's Plant Introduction Program. An announcement of its availability will appear in a forthcoming issue of *Arnoldia*.

'**Compacta**' ('Nana') was given to me by Mr. Vincent Simeone, an undergraduate at the University of Georgia, who obtained it from a friend on Long Island. It is more compact than the species and will probably mature between 1 and 1.5 meters tall (3 to 4 feet). Leaves and flowers, to date, are smaller than those typically found in the species.

'**Creel's Calico**' is, as of this writing, an unreleased selection with beautiful variegated foliage. The leaves emerge with cream variegation that is primarily speckled but with some solid areas on some leaves. In transition the leaves are bright green with creamy variegation; in maturity, they are black green with pure white variegation. The leaves are large and average 10 centimeters long (4 inches). The original plant was a stoloniferous colony about one meter high (3 feet). To my knowledge, this is the first variegated clone of the species. In shady environments, a mass planting would provide eye-catching color.

'**Hummingbird**' is the current *haute couture* of plant fashion. Its compact habit (1 to 1.5 meters), in conjunction with normal-sized leaves, flowers, and fruits, is this cultivar's principal asset. Plants will be wider than high at maturity. Random measurements of twelve

inflorescences produced a range from 7 to 19 centimeters (2.75 to 6.25 inches) with an average length of 10 centimeters (4 inches). At Swarthmore College, 'Hummingbird' is used as an effective ground cover. I am extremely positive about the landscape possibilities of this selection. Fred Galle of Hamilton, Georgia, is responsible for bringing this plant into cultivation.

'**Paniculata**' supposedly represents a clone with multibranched inflorescences. What currently poses in the trade for 'Paniculata' is doubtful and certainly no better than what can be found in many wild populations. I surveyed several native populations on Cape Cod and found everything from the single unbranched raceme type to many clones with the multibranched racemose-panicle.

'**Pink Spires**' and '**Rosea**' (forma *rosea*) are pink-flowered forms with the wonderful fragrance of the species. Although 'Rosea' is described as pink fading to pinkish white, plants in my Georgia garden maintain the pink coloration until senescence. Supposedly, 'Pink Spires' remains uniformly pink throughout the flowering cycle. I examined both clones at the Arnold and saw no difference in color. 'Rosea' was introduced in 1906, and it is possible that 'Pink Spires' is simply a rename. Both clones are vigorous growers, easily reaching 2 to 3 meters (6 to 9 feet). The leaves are lustrous dark green, perhaps several degrees darker than the white-flowered types. Inflorescences average 7 to 9 centimeters (3 to 3.5 inches), and the buds are deep rose-pink while the open flowers are lighter pink. In both of these clones, the peak flowering period is about a week later than the species.

Michael Dirr is a Professor of Horticulture at the University of Georgia in Athens and recently concluded a sabbatical leave as a Putnam Fellow of the Arnold Arboretum.

The Harvard Garden in Cuba—A Brief History

Marion D. Cahan

Begun in 1899, the Atkins Garden became a model for the development of many later tropical botanical gardens.

The Harvard garden in Cuba was Harvard's virtually unknown jewel. Few people, other than those actively involved in the study of tropical plants, have ever been aware of its existence. While the garden was primarily devoted to the improvement of sugar cane for commercial purposes, it was also the site of research in other areas of tropical agriculture and botany. The unique blend of economic reality and academic vision that characterized the garden produced farsighted results that subsequently served as a model for the development of tropical botanical gardens in other countries.

As a center for tropical plant research and sugar cane investigation, the Harvard Botanic Station was established on the Atkins sugar estate at Soledad, Cienfuegos, Cuba, in the summer of 1899 at a conference attended by businessman Edwin F. Atkins and Professors Oakes Ames and George L. Goodale, both of Harvard University. This meeting initiated the development of what was to become one of the richest tropical gardens in the world. Without the vision of the those who were so deeply involved in its conception and implementation, this institution would probably not have been created.

The Inception of the Garden

As a businessman, Edwin Atkins was interested in increasing the profits from his sugar cane operation. He had previously consulted Edward Wilson, then Secretary of

Agriculture, to seek his opinion about expanding the sugar cane industry in Cuba. Wilson discouraged him, believing that the climate of Cuba was not suitable for the enterprise, and warned against spending large sums of money on a wholly doubtful venture. Atkins's response at the time was, "When one lawyer gives me advice that I do not like, I go to another lawyer," and so he consulted Professor George Goodale of Harvard for his opinion, who in turn consulted his colleague, Professor Oakes Ames of the botany department. Both Goodale and Ames supported Atkins's proposal with enthusiasm, and history eventually proved Atkins right about the suitability of Cuba for expanded sugar cane cultivation.

As a result of that first meeting in Cuba in 1899, Edwin Atkins gave Harvard University a gift of \$2,500, of which \$2,000 was to be used for a traveling fellowship in economic botany. The recipient of this fund was to visit certain stations in the far eastern and western tropics where experiments on the improvement of economically important plants, particularly sugar cane, were in progress.

In these early days, there was no official connection between the Botanical Garden of Harvard University and the garden in Cuba—the latter being Mr. Atkins's personal property—nor was there an endowment or land to which the university had title. The cooperative efforts of Atkins and Harvard to further research and development in the field



Enterolobium cyclocarpum (Leguminosae) growing in the Harvard tropical garden in Cienfuegos. The tree is 50 feet tall with a spread of 100 feet. Photographed in 1928 by Alfred Rehder.

of tropical botany served their mutual benefit. The first superintendent, Robert M. Grey, was paid by the Atkins fund, chiefly for services rendered in the development of sugar cane. Both Ames and Goodale were optimistic and keenly interested in establishing a biological institute in Cuba. Goodale, whose primary interest was zoology, "adopted" the garden on his own authority. At a later date, Professor Ames was appointed its first official director.

Early History

The history of the garden is inextricably linked to the history of Cuba. Shortly after the discovery of the island by Europeans, the native American Indians were either killed or died as a result of introduced diseases. The

island became a colony of Spain, and slaves were eventually brought in from Africa to work the fields that were created by cutting down the indigenous forest. While the island was initially populated by the descendents of these slaves and by immigrants from Spain, many other nationalities settled in Cuba, including an influx of North American businessmen in the mid-1800s.

The town of Cienfuegos, located on the western side of Cuba, was founded in 1819 as a result of the development of sugar lands by Trinidadian families who had come to the island with their slaves for that purpose. Eventually the area became one of the most economically important parts of the island. An American, Elisha F. Atkins, had established



A panoramic view of the palm collection at the Harvard tropical garden. Photograph by E. G. Stillman, 1941.



A vista of the Harvard tropical garden. Photograph by E. G. Stillman, 1941.





A panoramic view of the palm collection at the Harvard tropical garden. Photograph by E. G. Stillman, 1941.



A vista of the Harvard tropical garden. Photograph by E. G. Stillman, 1941.



Hura crepitans (*Euphorbiaceae*) growing in front of the Harvard house at the Harvard tropical garden in Cienfuegos. Photographed in 1928 by Alfred Rehder.

a sugar business in Cuba in 1838, heading the firm called E. Atkins & Co. Initially he had started a banking commission business for Cuban sugar producers, advancing money on sugar crops and molasses to be shipped to the United States. Through purchases and foreclosure proceedings, the Atkins Company eventually acquired many sugar estates, including Soledad, the most important one developed prior to 1850.

When Elisha Atkins first came to Cienfuegos, practically all the sugar business was in the hands of Spanish merchants. This situation changed during the 1870s when beet sugar produced in Europe first provided serious competition to cane sugar. To counteract this situation, Elisha's son Edwin expanded his father's commission business to include the actual cultivation and production of sugar.

At the age of sixteen, Edwin had left the family home in Boston on January 24, 1866, and had sailed from New York to take charge of his father's business interests in Cienfuegos. Initially a receiving clerk, within two years he was given responsibility for the management of the business, his father having assumed the vice presidency of the Union Pacific Railroad, a post he held until his death in 1882.

The year 1882 marked the beginning of the Atkins sugar-producing business in Cuba. Soledad, the primary plantation, which consisted of 4,500 acres of beautiful land isolated by hills and mountains, was taken over by Atkins by foreclosure in 1884. With Edwin assuming active supervision, the mill was ready for production within a year with a labor force comprised of Africans and

Chinese. He gradually acquired more land and, within twenty-five years, had one of the most modern and progressively managed sugar estates on the island.

In 1892, Edwin took over another large plantation in the city of Trinidad on a long-term lease and became president of the Trinidad Sugar Company, eventually acquiring many adjacent sugar estates. The success of these ventures attracted a large colony of Americans to the area.

In 1894, general political unrest spread throughout Cuba, due primarily to Spain's increasingly repressive presence on the island. Serious problems existed in the form of low production, unemployment, theft, hunger, and poverty. Because of these persistent difficulties, Atkins kept plantation employment at a low level. Fostered by American business interests, there was a growing sentiment in the United States to encourage the independence of Cuba. The island was still under Spanish military rule in 1896 when Atkins lobbied Washington to protect American properties. The political tensions ultimately led to the Spanish-American War, which Spain lost—along with Cuba, her last colony. A brief American occupation of the island followed the conclusion of the war, and in 1898 the United States recognized the independence of Cuba.

The Growth of the Garden

The original Atkins fund, established in 1899, was to be used to support the garden after Edwin's death. In 1901, the Harvard Botanic Station for research and sugar cane investigation was formally inaugurated, situated in the area called Colonia Limones, a barren but picturesque site.

Robert M. Grey, a renowned horticulturist employed by Professor Ames, was commissioned to visit Soledad in December 1900 to investigate the cane-flowering conditions and to locate a site for the new garden. He had lived in the warm tropics of South America and was admirably qualified for this new task in subtropical Cuba. In 1901, he was

appointed superintendent of the garden, with his salary paid out of the Atkins fund. His tasks were to lay out trial beds for vegetables and to produce new varieties of sugar cane by hybridizing different strains. The overall purpose of the project was to develop cane that not only was resistant to the fungal diseases but also had a higher sugar content. Perfecting his own techniques with great success, Grey remained in Cuba for over thirty years, maintaining a record of distinguished service until his retirement in 1936.

During the first few years, operations at Cienfuegos were largely devoted to the sugar cane work; however, Grey also imported many other plants and fruit trees from Florida for experimentation, developing one of the largest collections of tropical plants in the Western Hemisphere. An additional purpose of the garden, beyond the study of sugar cane, was to introduce as many different kinds of plants as possible and to experiment with their cultivation. Letters from 1901 to 1902 sent to Professor Ames by Hugo Bohnhof, an assistant to Mr. Grey, reported good results with lettuce, tomatoes, cabbage, beans, cucumbers, and artichokes. In later years, experiments with bananas, cocoa, coffee, and rubber proved successful; however, cotton and tea crops were failures.

In the early days of the garden, many of the best-known tropical fruit trees were established on a trial basis. Citrus was one of the early subjects of the research program; hundreds of hybrid mango seedlings were produced and tested. A choice collection of ornamental plants from Professor Ames's conservatories in North Easton, Massachusetts, were also sent to the garden in 1901, along with seeds and plants from the Harvard Botanical Garden in Cambridge.

Sugar Breeding

Before the inception of the garden, and during its early years, the principal variety of sugar cane grown in Cuba, 'Cristalina,' was performing badly because of a combination of factors, primarily fungal diseases, exhausted

soil, and climatic problems. A small collection of newer cane varieties was immediately planted, but these produced little or no improvement over the older cultivars. Between 1902 and 1904, the first improved cane seedlings were produced as a result of the successful hybridization experiments initiated by Grey.

During the cane breeding season of 1906-07, 320 clones, mostly hybrid seedlings produced by Grey, were retained for use in the cane-breeding program. Several varieties, superior to 'Cristalina' in size and sugar content, were selected for large-scale commercial cultivation. They proved drought resistant, disease tolerant, and high yielding under a variety of soil types. The best all-round performer was Harvard #12,029.

In 1908, experimental hybridizing between the best varieties of these commercial canes and Japanese canes took place. Eventually these seedlings were crossed with Chinese and North Indian varieties, and they too proved to be commercially successful.

By 1912, at the second Cuban National Exposition, the Atkins garden exhibited thirty distinct varieties of the new Harvard seedlings. These plants had the distinction of being the only canes of Cuban origin among the many others exhibited. Subsequently, cane breeding on other estates in Cuba was successfully carried out.

Building the Collections

By 1903, the garden contained some 243 genera and 400 species of plants. The growing collection, constantly augmented by imported plants as well as native species from different parts of the island, necessitated the construction of a second greenhouse in 1907.

Also in 1903, eighteen Cuban-grown banana varieties were brought together to form a collection, which was still being maintained in 1926. There were, in addition, a few species of cycads, a large palm collection, and a fine assemblage of bamboo and other grasses. Leading varieties of strawberries and their hybrids were successfully cultivated for many

years. Grey also hybridized oranges, grapefruit, mangos, and many other fruit trees that flowered in the garden. But sedges, planted experimentally, grew so rapidly that they were a costly nuisance and were eventually eradicated. Forage legumes and grasses also gave unsatisfactory results.

In 1908, experiments with flowering and ornamental plants (northern annuals, herbaceous perennials, bulbs, and roses) failed because of the hot, damp summer weather and the prevalent fungal diseases. The rose collection brought together in 1908 was discontinued in 1925, at which time there were about seventy different varieties.

On June 3, 1911, a forty-five minute cyclone severely damaged or destroyed buildings, trees, and crops. Replanting was initiated immediately and recovery was rapid. The following years were devoted to planting new species and increasing the garden area. By December 31, 1925, the garden contained 144 families, 629 genera, and 1358 species—exclusive of native species.

Stronger Ties with Harvard

Pleased with the sugar cane research and other developments at the garden, and by this time deeply interested in the scientific approach to tropical agriculture, Atkins, on December 9, 1919, gave \$100,000 to perpetuate the project. From the beginning, the Harvard Botanical Station in Cuba and Harvard University had maintained a hazy relationship, as Atkins had never passed any land to Harvard and had paid only for the expenses of the garden.

In 1920, the connection between the garden and Harvard was cemented by this large gift of money, and the garden became a recognized part of the university. Edwin Atkins died in Cuba in 1926 at the age of seventy-four; his wife continued the family interest in the garden throughout her long life.

In 1924, the Harvard Biological Laboratory was constructed at the garden, along with a house for the use of scientists who came to study. Scholarships were available to Harvard

students interested in tropical biology. A new section of several acres was added to the garden in the spring of 1929, devoted to the cultivation and preservation of native hardwoods and timber trees. Unfortunately, this project was short-lived; most of the trees were destroyed when the land was cleared for cane cultivation and other agricultural pursuits.

In 1932, administration of the Harvard Experimental Station in Cuba was transferred to the Arnold Arboretum and renamed The Atkins Institution of the Arnold Arboretum, as voted by the Harvard Corporation; interest then shifted from commercial crops to the planting of tropical tree species imported from Florida, Jamaica, the East Indies, Australia, tropical Africa, and Central America.

In the following years, the collections grew, more land was purchased, and numerous researchers came to the Atkins Institution to pursue botanical field work. The garden

reached its zenith of beauty and diversity at this time. The travel restrictions imposed during World War II, however, made it difficult for botanists to travel to Cuba, and the number of foreign visitors declined.

In 1946, the garden was divorced from the Arnold Arboretum, and the name, once again, was changed—to the Atkins Garden and Research Laboratory, with Dr. Arthur G. Kevorkian as the first resident director. His job was to convert the garden to a tropical agricultural research facility, concentrating on crops specifically adapted to the environmental conditions prevailing in Cuba. Dr. Kevorkian resigned in 1949, and Dr. Duncan Clement (Ph.D. Harvard '48) became the new director. Under his aegis, the garden assumed greater significance as a scientific institute.

The garden flourished during the ensuing years, benefiting tropical research and horticulture, and advancing the welfare of Cuba.



Some of the damage caused by a severe storm at an unknown date.



Professor J. G. Jack, of the Arnold Arboretum staff, at work pressing specimens in the Harvard house laboratory at the Harvard tropical garden in Cienfuegos. Photographed in 1928 by Alfred Rehder.

By 1957, the garden's influence extended well beyond the confines of the island.

In 1958, Cuban society was disturbed by political unrest, and by 1959, the Communist revolution was in full progress. Initially this had little effect on the garden, and work there continued as before. By 1961, however, increased uncertainties and difficulties caused a breakdown in the operation. Dr. Clement left Cuba in January 1961, financial support was terminated by Harvard in August of that year, and all plant records were transferred to Cambridge. Satisfactory operation of the garden had become a casualty of the deteriorating political situation.

When diplomatic and consular relations between the United States and Cuba terminated, traveling to Cuba from the United States became very difficult, requiring a visa from a third country such as Mexico, Canada,

or Jamaica. Those botanists who recognized the growing importance of tropical botany and who had made use of the garden's facilities felt a tremendous loss. Harvard University's operation of the Cuban garden was suspended indefinitely on September 1, 1961.

The Garden Today

With improved political conditions, it was hoped that the Atkins Garden and Research Laboratory would be reactivated and would resume its former position in the Institute of Plant Sciences at Harvard. To date, this has not come to pass, but the monies set aside to support the garden are still used to support research in tropical botany through the Atkins Fellowships administered by Harvard.

According to Dr. Duncan Clement, who wrote to the author on February 9, 1991, from Pembroke Pines, Florida, the garden survives

Oakes Ames—A Harvard Botanist

Oakes Ames and his critical role in the history of the Cuban garden's development and its absorption into the Harvard administration.

Oakes Ames was an instructor in botany at Harvard from 1899 to 1909, and almost concurrently (from 1900 to 1910) was director of the Harvard Botanical Garden in Cambridge. A practical botanist, Ames had an extensive knowledge of plant growth and form. Shortly after he became director of the Arnold Arboretum, he interested President Lowell in transferring the administration of the Cuban garden to the Arnold Arboretum, and with the financial support of Edwin F. Atkins, the garden in 1927 became known as the Atkins Institution of the Arnold Arboretum. It had been Ames's wish to endow a professorship at the garden and thus give it worldwide academic stature, but this never occurred.

Although Oakes Ames was involved in the development of a variety of economically important plants at the Cuban garden, his prime interest was in orchids, which he collected from many sources, including Cuba, and cultivated in his greenhouses in North Easton, Massachusetts. His estate, called Borderland, consisted of some twelve hundred acres and included a stone house (completely fireproof for the protection of his books) over which still hangs a huge bronze and gold bell he purchased from the sugar estate at Limones, once used to call the slaves to and from work. This tract of land and the imposing stone house were transferred to the Commonwealth of

Massachusetts in 1971. Now called Borderland State Park, it is open to the public.

Oakes Ames was a sensitive man with the mind of a scholar and the soul of a poet. He was deeply disturbed "by holding in bondage one's fellow man and driving him to and from work by the note of the doleful bell, a kettle drum aided by the stinging of the lash." It was this bell that he brought back with him to hang over his house in North Easton, as if it were a symbol for him of the liberation of the slaves of Cuba.

Ames fervently hoped that the garden would be a thing of beauty in addition to its practical and scientific value. He introduced showy palms and other trees for the purpose of enhancing the appearance of the garden for visitors. A letter, dated December 17, 1930, from Modesto Martinez to Thomas Barbour, who succeeded Ames as director of the garden in 1922, demonstrates how ably Ames succeeded:

The Garden is a Garden of Dreams, is a Paradise. Even the oriental trees and palms remind the visitor of the biblical legend; I found, bordering a pond, the bullrushes where Moses was found by the Pharaoh's daughter. One detail will give you an idea of how I felt in that Garden: I was for ten hours there, seeing every tree, every plant, every bush, without any food because I was so happy and I was learning so many things.

today as a tourist attraction. He noted that two tourist events involving the garden had been mentioned in an article in *El Nuevo Herald* (the Spanish language edition of the Miami Herald), excerpted from the Cuban newspaper *Granma*. These were, first, Cuban Aviacion has inaugurated a new weekly route from Toronto, Canada, to Cienfuegos, which the paper called the "third most important tourist destination in Cuba"; and, second, the German cruise ship *Miss Berlin* included Cienfuegos in its itinerary between Key West and Grand Cayman. *Granma* emphasized that tourists could enjoy the three four-star hotels in the city, as well as other attractions, such as the "Jardin Botanico."

The most recent information on the garden comes from Professor Duane Kolterman of the department of botany at the University of Puerto Rico. Writing in *Harvard Magazine* (July-August 1991), he notes that the garden is administered by the Academia de Ciencias de Cuba: "It has a director, a small scientific staff, and maintenance personnel. While the plant collections are in fine shape, the staff expressed considerable interest in exchanging information and library materials with botanists and horticulturists outside of Cuba."

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Letters and writings of Ames, Oakes (botany); two boxes. Contents: Letters to his family and autobiographical writings (MS), 1902-1949. This collection formed the basis for Pauline Ames Plimpton's book about her father, *Oakes Ames: Jottings of a Harvard Botanist* (1979).

Marion Davis Cahan is a graduate of Radcliffe College, an architect, and presently a volunteer at the Arnold Arboretum. She would be delighted to hear from any readers who have visited the garden since the revolution.

CORRECTION: *Ginkgo biloba*

In the article that appeared in the last issue of *Arnoldia* (vol. 51, no. 2, 1991) entitled "*Ginkgos and People: A Thousand Years of Interaction*," a sentence on page 10 reads, "The *Ginkgo* tree is apparently mentioned in the oldest Chinese herbal, *Shen Nong Ben Cao Jing*, dating from 2800 B.C. (Michel and Hosford, 1988)." According to Dr. S.-Y. Hu, a former staff member of the Arnold Arboretum, "I have turned the pages of the three volumes of *Shen Nong Ben Cao Jing* (1854 edition) page by page and checked the entries item by item. *Ginkgo* is definitely not in this publication."

Since Michel and Hosford do not cite any sources for their statement that *Ginkgo* is mentioned in *Shen Nong Ben Cao Jing*, their statement must be considered as unfounded, particularly in light of the fact that no Chinese-speaking authors mention this reference.





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