

E. D. Merrill, From Maine to Manila

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Twenty-two years of adventure in Southeast Asia preceded E. D. Merrill's career as director of several important botanical institutions, among them the Arnold Arboretum. His knowledge of the flora of Asia and the South Pacific was encyclopedic, and it was said he could name more species at sight than any other American taxonomist.

When twenty-six-year-old Elmer Drew Merrill left New York harbor for Manila on February 22, 1902, he had no idea that he would remain in the Philippines for the next twenty-two years, laying the foundation for a botanical inventory of the archipelago. After accepting a job offer as botanist with the Insular Bureau of Agriculture, he had had less than forty-eight hours to arrange his affairs, pack, and get to the boat. This rough-and-ready approach, spawned of a rigorous childhood in rural Maine, was to characterize Merrill's remarkable life: this would not be the last time he made a major career change at the drop of a hat.

From 1935 to 1946, Merrill was director of the Arnold Arboretum and Administrator of Harvard University's Botanical Collections, which included the Botanic Garden, the Gray Herbarium, the Bussey Institution, the Botanical Museum, the Harvard Forest, the Atkins Institution, and the Farlow Reference Library and Herbarium. When he arrived at Harvard, he had already had sixteen years' experience managing organizations with diverse functions, in addition to an extraordinary record of scholarship and publication in taxonomic botany.

Merrill was born in 1876 in East Auburn, Maine, a village of farmers and shoe factory workers, one of twins. He described his progenitors as simple, hardworking folk who, nevertheless, possessed the "pioneer spirit." His maternal grandfather was a forty-niner who journeyed to California by way of Panama, returning to his wife and children in Maine

without having found any gold. Merrill's father had run away to sea at age fourteen and worked as a common sailor until he married; he continued to sign on for extended fishing trips to the Grand Banks during E. D.'s youth. It was the work and the pleasures of rural life that shaped Merrill's character, as he recalled years later:

Swimming, boating, fishing, hunting, tramping in the woods—many things were more appealing to us than work, but when there was work to be done it always came first.¹

Yet even at an early age he often found time to collect natural history specimens and to press plants.

Unlike their three older siblings, Elmer and his twin, Dana, continued their education beyond the elementary grades, attending high school in Auburn, three miles distant from their home. In one of his more telling comments on his background, Merrill wrote:

Many times in winter we walked the entire distance to the city in a howling blizzard only to find "no sessions" because of the inclement weather. We came to have a rather scornful opinion of city people, not blaming the children, but rather the authorities. At times we made the trip on snowshoes. . . . This school experience doubtless had its effect in establishing one quality—that of persistence, a quality to which I believe I owe most of the success as I attained in after life.²

After graduating, both young men entered the Maine State College at Orono, which became the University of Maine in 1898, the year they



Merrill, right, and E. B. Copeland, left, with Joseph French and, standing, Henry Osgood, in the bachelor's mess in Manila, ca. 1905. From the time he arrived in the Philippines until he received an appointment as Associate Professor of Botany in the University of the Philippines in 1912, Merrill spent at least half his time working in the field. E. B. Copeland, who joined the botanical staff of the Bureau of Science in 1903, was one of Merrill's traveling companions. In 1909, accompanied by a group of American schoolteachers, the two climbed to the summit of Mount Pulog in northern Luzon, the third known ascent of the mountain by Westerners

received their degrees. Although they enrolled as engineering students, they both transferred to the general science course after a surfeit of math classes during their first year. During his remaining undergraduate years, Elmer took as many biology courses as he could and studied the classification of flowering plants on his own since no formal training was offered. Like most New England botanists of his day, he tramped and botanized on New Hampshire's Mount Washington and likewise explored Mount Katahdin in northern Maine. He later gave his 2,000-specimen herbarium to the New England Botanical Club. He also traded a collection of his pressed plants dating from this period to Nathaniel Lord Britton for a copy of Britton and Brown's *Illustrated Flora of the Northern United States*. Though neither of

them could have foreseen it, Merrill would one day succeed Britton as director of the New York Botanical Garden.

The outbreak of the Spanish-American War determined Dana Merrill's career choice. He enlisted in the Maine Volunteer Infantry, received his diploma *in absentia* that spring, and soon headed out to fight in the Philippines. He remained in the Army after the war and advanced through the ranks to brigadier general in 1935.

Elmer remained at Orono for a year after graduation. While he worked as an assistant in the Department of Natural Science, he took additional courses and continued to study systematic botany on his own. (In 1904, the University of Maine awarded him a master's degree for this work.) In 1899 he went to work in Wash-

ington at the U.S. Department of Agriculture (USDA) as an assistant agrostologist (a specialist in grasses, a family Merrill termed "particularly difficult"). He found the job rewarding and appreciated the opportunity to become more familiar with the literature of plant taxonomy, but he was still undecided about a career. With time on his hands evenings, he completed a year and a half of medical school. Then the offer of employment in the Philippines turned him permanently in the direction of plant science.

Among the many programs the U.S. government started in the Philippines after taking it over from the Spanish was an Insular Bureau of Agriculture, opened in 1901, the year before Merrill was persuaded by his boss at the USDA to accept the post of botanist there. He had expected to see his brother Dana when he arrived in Manila after the two-month voyage, but in the first of many ironies that would punctuate his life, he found that his twin had sailed for San Francisco two weeks earlier. It would be thirteen years before the two met again.

Merrill quickly applied his energies to the challenges of his new assignment. The previous two and a half years of work on the taxonomy of grasses had expanded his botanical purview from New England to Wyoming, Idaho, and Montana. Compared to that of the Western grasslands and Maine, however, the flora that he now confronted was exuberant and vastly complex. Undaunted, he immediately envisioned a complete survey of the Philippine archipelago, 7,000 tropical islands with extensive, mountainous, old-growth forest ringed by lowlands that had been cultivated for centuries.

Resources for studying this fascinating flora were

almost nonexistent in Manila; any botanical specimens and literature that had been assembled during the long years of Spanish rule had either burned in the 1898 war or disappeared during the disruptive period of American takeover. Never one to hesitate, Merrill immediately started collecting weeds behind the vacant house that served as headquarters for the Bureau of Agriculture. And within a month he had left on his first collecting expedition, a six-week trek through the mountains of Luzon to Aparri on the north coast. For the next eleven years he would spend nearly half his time in the field.

Government officials in Manila quickly recognized Merrill's abilities and gave him an additional appointment to the Bureau of Forestry, thereby consolidating botanical research. In 1903 all botanical work was transferred to the Bureau of Government Laboratories, which in 1906 became the Bureau of Science.



Bureau of Science buildings in Manila, 1916 Although Merrill's work in the Philippines commenced in a vacant dwelling rented as headquarters for the Bureau of Agriculture in 1902, within three years a new facility was constructed to house the Bureau of Science. Merrill was director of the Bureau from 1919 to 1923. The destruction of these buildings, along with most of their contents including the herbarium and botany library, during World War II was a tragic episode in Merrill's career, even though he was director of the Arnold Arboretum by that time

From the outset Merrill spent much time and energy building the reference library that was needed to identify the rich flora he found during his explorations. In 1902 he made a visit to the 85-year-old botanical garden in Buitenzorg, Java (Bogor). He found the library and herbarium there very helpful; in addition to identifying the Philippine plants he had brought along, he was able to familiarize himself with the botanical literature of the Malay Archipelago, the great chain of islands stretching from southern Asia to northern Australia. Undoubtedly this visit inspired his efforts to amass similar resources in Manila: by the time he left the Philippines in 1923, the herbarium had grown from almost nothing to over 250,000 specimens, complemented by a library he characterized as one of the most complete in all of Asia.

Adventures in the Field

Merrill's travels in search of plants took him the length and breadth of the archipelago and included remote areas where few, if any Filipinos, let alone Westerners, had set foot. One of these was the summit of Mount Halcon, which he and a party of forestry and military personnel reached in November 1906 after twenty days of arduous, wet climbing. There existed no report of Westerners having previously attained the summit of this mountain; and apparently local Mangyan tribespeople had never ascended either, for no signs of trails were seen anywhere near the peak and Merrill was sure that no human could get there without cutting a trail, so dense was the mossy forest and so steep the terrain.

Halcon, at 8,500 feet the third highest mountain in the Philippines, is located on northern Mindoro, one of the most humid areas in the entire country. Halcon and its subsidiary ranges capture an enormous amount of precipitation nearly year-round, and the mountain is continually shrouded in fog and clouds. During the ascent Merrill encountered the entire gamut of rainforest vegetation that he later came to know so well. Starting from Calpan to the north, the party soon left behind the coastal lowland with its mangrove swamps, cultivated crops, and abundant tropical weeds. They followed river courses and occasional Mangyan trails through

dense vegetation dominated by huge trees with canopies so high and thick that only twilight reached the forest floor. For the most part this was primary forest with a several-storied, species-rich mix of trees that included many Dipterocarpaceae. They also encountered many areas of secondary forest, the abandoned clearings of the Mangyan people who regularly cleared a few acres of the old-growth forest, burned it over, then planted upland rice, corn, and other crops for a year or two before moving on to a new area. Once cultivation stopped, these clearings were rapidly re-vegetated by a mix of indigenous and introduced plants quite different from those of the original rainforest.

Travel was extremely difficult. The rivers the party followed often led them into steep-sided ravines, forcing them to ford the swift water frequently. Then, after finally reaching the ridges at the top of the canyon walls, they had to hack their way slowly through more forest using bolos, the Filipino equivalent of machetes. Sometimes the only way to proceed was to chop their way up 80-degree slopes.

Once they attained 4,000 feet, the vegetation began to change markedly to that known as the mossy forest—a diverse mix of smaller trees including oak, maple, and several Malaysian genera with many-branched, scraggly habits, as well as *Rhododendron*, *Vaccinium*, *Rubus*, and other shrubby genera found in more temperate regions. Moisture-loving ferns, mosses, and epiphytes grew even more profusely here at higher elevations than they had in the lower forests:

Epiphytic ferns and orchids . . . become more plentiful and there is a greater diversity in species; mosses are much thicker and more luxuriant, enwrapping even the branches and branchlets of trees and forming a deep, soft, soil cover, frequently a foot in thickness.³

The going was not easier in the mossy forest, even though the woody vegetation became more and more stunted the higher they climbed. Thickets of gnarled trees and branching shrubs, covered with epiphytes and intertwined with vines, allowed no forward progress without first clearing a trail step by step. The temperature had dropped considerably, averaging 60 degrees Fahrenheit in the daytime, and a rainy period that lasted thirteen days set in.



ARCHIVES OF THE FAIRFIELD TROPICAL GARDEN

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Veitchia merrillii (formerly *Adonidia merrillii*) The Christmas palm or Manila palm is admired for its pendulous clusters of crimson fruit, which contrast attractively with its whitish fruit stalks and sheaths. It was known only from cultivation in the vicinity of Manila when named for Merrill by Italian palm specialist Odoardo Beccari (1843–1920). Later the Manila palm's native habitat was determined to be restricted to Palawan and the Calamianes Islands on the basis of specimens collected by Merrill and A. D. E. Elmer, one of his colleagues at the Philippine Bureau of Science.

Surprisingly, when they reached 7,800 feet, the montane brush gave way to vegetation Merrill described as open heath, a collection of tufted grasses broken only occasionally by stunted trees and shrubs. They quickly traversed this area only to find that the final 500 feet of elevation was covered with thickets more dense than any they had previously encountered:

At times as we came to the crest line, the cold wind would add to our discomfort. . . . Pitcher plants (*Nepenthes*) became very abundant, clambering everywhere in the thickets, so that in cutting our way through the underbrush, at frequent intervals our bolo slashes would upset the equilibrium of from one to a half a dozen pitchers, each holding one-half quart or more of water, which would be precipitated upon us. These irregular douches were far more disagreeable than the constant shower bath from the falling rain.⁴

In storms worse than ever, Merrill and another scientist reached the summit, where clouds obscured the view. They quickly took barometric readings and left a record of their visit sealed in a bottle tied to a tree, since there were no boulders to use for a cairn.

The return trip to the coast took nearly as long as the ascent. They were delayed by more storms, and two members of the party became lost for a while. When the porters were sent back to retrieve supplies left at lower elevations and got cut off by rain-swollen rivers, the party had to forage in the rainforest for a Thanksgiving "dinner" of broiled wood rats and boiled fern tips. Merrill commented that "a man can come nearer to starving to death in a primary tropical forest than in almost any other part of the world," since there is little game, and edible fruit is either too high in the canopy or too widely spaced for efficient harvesting. It was some consolation to Merrill that a new species was later described from the rat skins and skulls left over from the holiday dinner.

Although this was probably the most strenuous of his field trips, Merrill accepted many more challenges in his search for the Philippine flora. On some occasions he walked 36 miles in a single day. There were precarious landings in the surf on remote coasts, and the unnerving experience of collecting plants among the hast-

ily made graves of tribesmen who had resisted American troops. And at times he risked his life by staying overnight in remote villages of the Mountain Province, where headhunters were reputed to live.

In order to determine the relationships between the flora of the Philippines and those of surrounding areas, as well as for help in identifying certain species, Merrill and his associates at the Bureau of Science also made collecting trips to Guam, Borneo, Amboina, Indochina, and China. He acquired additional specimens for the herbarium collection in Manila by exchanging material from the Philippines for Indo-Malaysian, Australian, and Polynesian plants.

Publications

Of course, the fieldwork was only the beginning for Merrill. His observations in the field and subsequent scrutiny of pressed specimens, along with intense study of botanical literature,



Elmer Drew Merrill photographed in Manila, 1914.



ARCHIVES OF THE FAIRCHILD TROPICAL GARDEN

A circle of distinguished friends photographed in the 1940s. Seated from left, Merrill, plant explorer and collector David Fairchild, naturalist and herpetologist Thomas Barbour, and standing, citrus hybridizer Walter T. Swingle and paleontologist Theodore White, in Barbour's Florida garden.

became the material for a prodigious output of publications. He worked assiduously not only on problems of identification and classification but on nomenclature and bibliography as well. In the course of this work, for example, he published several papers updating Manuel Blanco's 1837 *Flora de Filipinas*. His long-term goal was to produce a complete descriptive flora for the Philippines, but first many new species had to be described and published, and their relationships with other plants explained.

"New or Noteworthy Philippine Plants," a series of some seventeen papers, was published intermittently from 1904 to 1922. Merrill also published about twenty revisions of genera or families as they occur in the Philippines. Altogether, between 1904 and 1929, he authored one hundred strictly taxonomic papers on the Philippine flora. Most were published in the Botanical Section of the *Philippine Journal of Science*, which Merrill edited from 1907 to 1918.

The publication in 1912 of the 500-page *A Flora of Manila* was a major step toward his

longer-term goal. Since the 1,007 species it covered—a small percentage of the total known for the entire country—were those that inhabited low altitudes and could be found in most towns, this work provided a useful guide for the Philippine people.

But the tasks Merrill assigned himself were not limited to the Philippine flora. In the course of studying the origins of Philippine plants and their relationships to the vegetation of neighboring regions, he wrote exhaustive commentaries on the work of earlier botanists, including the pre-Linnean work of Rumphius on the flora of Amboina in the Moluccas, and the *Flora Cochinchinensis* (1790) of Portuguese missionary Juan Louriero; assembled a great deal of information on the literature of Malaysian botany, and became an expert on the local names for plants of Southeast Asia as well as the biogeography of the region. He also published papers on the plants of Borneo, Guam, Sumatra, Hainan, and Papua, often based on the many specimens that he received from those areas.

Having begun his botanical career at the USDA and gone to the Far East under the auspices of the Department's divisions of agriculture and forestry, Merrill was ever aware of the practical aspects of plant science and of the human influence on the flora. His observations on introduced weeds, cultivated plants, and local plant names initiated a lifelong interest in the origins of agriculture and the migration of plants in pre-Columbian times. "The American Element in the Philippine Flora" (1904), "Medical Survey of the Town of Taytay: The Principal Foods Utilized by the Natives" (1909), and "Notes on the Flora of Manila with Special Reference to the Introduced Element" (1912) are some of his earliest papers in economic botany.

In all his many publications on the flora, Merrill rarely failed to comment on the destruction of forests and other changes in ecosystems caused by human activities:

The practical extermination of the original vegetation of those regions best adapted to agricultural pursuits is a subject that deserves more consideration than it has received. Unquestionably, many species of plants have been exterminated in various parts of the Malayan region within the past century as the population has increased. The areas being devoted to agriculture are being rapidly enlarged . . . and the consequent destruction of primeval forests over large areas is a strong argument in favor of vigorous and intensive botanical exploration of Malaya.⁵

The enormous trees and shade plants characteristic of the primary forest cannot persist under the conditions demanded by modern agriculture, and they cannot exist in second growth forest, grasslands, and bamboo thickets that rapidly encroach on cleared areas that are abandoned. . . . We are witnessing in our own generation the rapid extermination of some of the noblest types of tropical vegetation . . .⁶

When Merrill wrote these words, the population of the Philippine Islands was less than that of greater London; today the population is ten million greater than that of all the British Isles.

Becoming an Administrator

Merrill would have loved to spend all his time working in systematic botany, but in 1912 a series of additional appointments began to claim much of it. In that year he was appointed

Associate Professor of Botany at the University of the Philippines; subsequently, his teaching duties would occupy from 18 to 36 hours per week. Then, in 1919, he was appointed director of the Bureau of Science after a six-month stint as acting director. In this capacity his responsibilities included medicine, public health, chemistry, weights and measures, materials testing, geology, mining, fisheries, zoology, and anthropology, in addition to botany. Although he accepted the position "with diffidence and reluctance," he found in himself a talent for handling problems in fields widely divergent from his own, and his executive ability quickly won him respect. It is perhaps not surprising that the botanist whose identical twin became a brigadier general turned out to have a knack for administration.

But his new role cut even more severely into the time available for preparing the major work he had contemplated:

My appointment of Director of the Bureau of Science in 1919 clearly indicated to me that I could scarcely hope to consummate my plan of preparing and publishing a general descriptive flora of the Philippines, as I soon realized that most of my botanical work would of necessity have to be done outside of office hours. I accordingly compromised with myself and . . . commenced the actual preparation of my 'Enumeration of Philippine Flowering Plants.'⁷

The four-volume *Enumeration* was issued between 1922 and 1926. In it Merrill attempted to:

account for all binomials accredited to the Philippine flora, adjust the synonymy, cite all important literature references, illustrative [specimens] when desirable, determine the Philippine and extra-Philippine distribution of each species and record native names.⁸

While it was not the complete, descriptive work that he had hoped to produce, it was a valuable summation of all that he and his colleagues had accomplished. The *Enumeration* allowed Merrill to outline his conclusions on the relationship of the Philippines' climate, geologic history, and plant life to those of adjacent regions. Also included were discussions of the original settlement of the islands; their peoples and languages; and the history of botanical study in the Philippines. Unexpectedly, the

Enumeration served as a kind of closure to Merrill's years in the Philippines, for as it turned out, he left Manila in the fall of 1923 never to return.

The Scientist-Administrator Moves On

Merrill's departure was almost as abrupt as his arrival: he was given only a week to decide whether to accept a position as dean of the College of Agriculture at the University of California. Had there been no family dependent on him, he would undoubtedly have remained in the Philippines. But in 1907 he had married Mary Augusta Sperry of Illinois. After the wedding in Manila, the couple spent a year traveling to China and Japan, followed by a several-month stay in Washington, D.C., and visits to London, Leiden, Berlin, and Florence, where Merrill studied in herbaria. Once settled back in Manila, Mary gave birth to three children over the next seven years. When the third child died in infancy, the Merrills concluded that "Manila was not the proper place in which to bring up a family." In 1915, at the end of another visit to Washington, Mrs. Merrill stayed on with the two children. Elmer returned to Manila and did not see his fourth child, born in 1916, until she was nearly five years old.

It was not easy to leave the scene of so many years of work, the city in which I made such reputation I bear as a botanist.⁹

As he left Manila in 1923 Merrill took some comfort in the good will of his American and Filipino colleagues in the Bureau of Science and in the resources that he left behind for the ongoing work of inventorying the Philippine flora: a fine library and herbarium, and an exhaustive body of research. Through the field collecting of Merrill and his coworkers, the list of known Philippine species had been extended from 2,500 plants of all types in 1900 to 8,120 species of flowering plants, 1,000 species of ferns, and 3,000 species of cryptogams by 1926, when the final volume of the *Enumeration* was published. Perhaps the greatest of all the ironies in Merrill's life would come during World War II, when the collections of the Bureau of Science were destroyed by Japanese bombs.

By that time Merrill was at the Arnold Arboretum and in a position to help rebuild the col-

lections. As soon as the fighting ended, he rallied curators at Harvard and other major herbaria to send duplicate specimens and library materials to the Philippines. Work on the complete flora of the Islands has been carried forward in recent years by Philippine and American botanists at the Philippine National Herbarium, the Bishop Museum, and the Botanical Research Institute of Texas, using Merrill's meticulous scholarship as a starting point. Tragically, many of the plants to be included may no longer exist by the time the flora is published, since rainforest is being destroyed in the Philippines at a rate second only to Madagascar's. Of the extensive primary forests that once covered the mountainous archipelago, current estimates are that less than three percent remain intact.

Endnotes

¹ E. D. Merrill (hereafter EDM.), "Autobiographical Early years, the Philippines, California," *Asa Gray Bulletin* n.s. (1953) 2(4): 338.

² *Ibid.*

³ EDM, "The Ascent of Mount Halcon, Mindoro," *Philippine Journal of Science*, section A (1907) 2(3): 200.

⁴ *Ibid.*, 195.

⁵ EDM, "An interpretation of Rumphius's Herbarium Amboinense," *Bureau of Science Publication*, Manila (1917) 9: 25-26

⁶ EDM, "A bibliographic enumeration of Bornean plants," *Journal of the Straits Branch of the Royal Asiatic Society* (1921) Special number. 27-28.

⁷ EDM, "Autobiographical," 357.

⁸ *Ibid.*

⁹ *Ibid.*, 359.

For Further Reading

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