



*Dedicated to the memory of*  
**ELMER DREW MERRILL**

## DEDICATION

The completion of the sixth volume of this Flora gives me the privilege to dedicate this to the memory of ELMER DREW MERRILL, a man who has achieved more for the knowledge of the Malesian flora than any other individual botanist.

It is neither my intention to give nor is it the proper place for a full biography of this most distinguished American scientist, as it would for the greater part be duplication of his own 'Autobiographical' (1953), the scholarly essay by ROBBINS (1958), and the vivid life sketch by SCHULTES (1957), which together give the story of his life, his ambitions, his personality, his immense drive, his multiple interests, his capacity for establishing botanical periodicals as well as successfully filling the posts of Dean of a Faculty of Agriculture, director of the Bureau of Science at Manila, director of the New York Botanical Gardens, and administrator of Botanical Collections of Harvard University.

It is my purpose to review MERRILL's aims and vision, ambitions and achievements in the light of his time, to explain the value of his pioneer works for Indo-Malesian botany, how he used opportunities and had to bow to unforeseen events and circumstances which in no mean way influenced his career. Naturally MERRILL's personality pervades the story, that of a straightforward, righteous person, unbiassed in scientific matters, appreciating any progress in biological science. It is of course especially his great achievements with regard to the knowledge of the Malesian flora which are the main theme and I will try to elucidate several aspects which he pursued.

A glance through his immense bibliography, containing some 550 entries, among which ten very large books, reveals his fantastic productivity, largely centered on the flora of Malesia, East Asia and the Pacific.

Scanning the herbarium one becomes aware of the fact that during his lifetime he must have pre-identified, named or definitely identified over half a million specimens from the East, including the Philippines, Sumatra, Borneo, Amboyna, New Guinea, Melanesia, Micronesia, southern China (including Hainan), Indo-China and Burma, made possible by his unequalled knowledge of forms, his cast-iron memory and his zealous devotion.

It is with awe that one observes such a great achievement and then one wonders how one man could find time to do all this. The answer is given by SCHULTES who wrote that 'his reaction to added work was to lengthen the day'.

As ROBBINS wrote, 'he was a man in a hurry who saw clearly a program of research which absorbed him, but which was greater than any individual could complete within the limits of a single life-time. The demands of this program possessed him. It led him to make various innovations and modifications of conventional procedures in herbarium methods with increased efficiency in the use of this, for him, essential tool and to advocate briefer citations, one-name periodicals, and other means of economizing time and effort. It induced him, at least in part, to make quick decisions without long considerations of pros and cons and to act at times without regard to the feelings of others.'

'In spite of his absorption with his speciality MERRILL was not a recluse. Nothing pleased him more than to light his pipe and sit down to talk with a group of gardeners or with a student or his colleagues, mainly, of course, about plants. He played an active part in many organizations and valued the associations he made in them. He joined the Masonic order and eventually became a thirty-third degree Mason. He enjoyed an evening cocktail in his later years, and loved to have visitors and dinner guests. Though he had no hobbies outside his profession, he was interested in sports, especially baseball, football, and tennis. The 'Autobiographical' accounts of his adventures in collecting in the Philippines and in China reveal some of the human aspects of his character.'

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Such human aspects became evident to us very shortly after the war as he sent food parcels to his German colleagues and distributed amongst other botanical material on loan or for gift to colleagues in other freed countries envelopes with pounds of tobacco labelled with dry humour *Nicotiana tabacum* L. in parcels marked as 'botanical specimens for scientific study only'.

'His energy was boundless. It was his habit, at the University of California, to arrive at the herbarium at 6:00 a.m. and work on shipments of plants until he left for the Dean's office at 9:00 a.m.; he continued at noon after office hours, or on sundays and holidays' (ROBBINS, 1958).

As will appear later, his drive was probably born from the challenge he had to face in the Philippines in his early days and which activated his innate energy: it became a life-long habit.

MERRILL was born in East Auburn, Maine, October 15, 1876. His parents were of limited means and belonged to the industrious people of New England. One of his ancestors was NATHANIEL MERRILL who immigrated in 1635 and was of Huguenot descent (originally DE MERLE). In his family there was also English and Scottish blood, a 'melting pot' feature not unusual in the United States. As a young boy he was interested in natural history, in birds, rocks, minerals, fungi, and local woods; before reaching highschool age he became interested in collecting and naming plants, but he went in for engineering in 1894 in Maine State College at Orono which in his senior year became the University of Maine. He took the general science course, but remained interested in biological work, particularly in the classification of plants and worked under Prof. F. L. HARVEY especially on cryptogams; he attended, however, only two semesters on botany. His private herbarium contained some 2000 specimens. In 1898 he got his B.Sc. and became assistant in natural history. While working for his M.Sc. he accepted a post as assistant-agrostologist in the U.S. Department of Agriculture, Washington, as assistant to F. LAMSON-SCRIBNER, then the leading authority on North American grasses, composing amongst others a Manual of the Grasses of Alaska.

In 1902, following the establishment of the sovereignty of the United States over the Philippines, his chief accepted a post as director of the newly established Department of Agriculture in Manila. LAMSON-SCRIBNER was obviously so very satisfied with MERRILL's person and capacity that he asked him to become botanist in his department. MERRILL, however, was completely satisfied with being an agrostologist in his own country and refused twice, arguing that he knew nothing about tropical plants from the East. Finally SCRIBNER convinced him that 'nobody in the United States knew anything about the Philippine flora and that he had as good a chance as any one'. He accepted on Monday afternoon, February 20, 1902, and had to agree to be ready to sail from New York at 1:00 p.m. February 22! He nearly missed the boat because of a heavy sleet storm delaying the train from Washington D.C. to New York, but he made it. He, least of all, could not anticipate that he would remain for twenty-two years in the Philippines. Slightly over two months later he reached Manila where the new personnel had to start work in a vacant building, 'without a chair or table, much less a botanical publication or a botanical specimen'.

With a huge program before him MERRILL started energetically: one month after arrival he made a six weeks trip, partly under military guard, and during his first years he spent approximately one half of his time in the field; in the next twenty-two years he explored in almost all parts of the extensive archipelago.

In September 1902 he paid a two-months visit to the Herbarium Bogoriense, taking with him his botanical specimens, for no trustworthy work could be done in Manila in the complete absence of authentically named material. Here he became acquainted with the literature of Malesia of which he acquired an excellent working knowledge. He himself said that it was of infinite value for building up the botanical library at Manila. He wrote also an extensive report

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on this visit explaining the methodologies of collecting, forest plotting, numbering of trees in forest reserves, herbarium methods and techniques, *etc.* used in Java, which served as a model for the work in the Philippines.

At that time the responsibility for taxonomical research work in the whole of Malesia virtually hinged on two systematists, RIDLEY in Malaya and VALETON at Bogor who collaborated with KOORDERS, the organiser of the collecting; to these MERRILL was now added as a third. In comparison with Malaya and Java, work in the Philippines had the great disadvantage of having a much less solid basis; this consisted only of BLANCO's, FERNÁNDEZ-VILLAR's and VIDAL's early works, and at Manila there were no voucher specimens of these authors' collections, nor of the vital collections of CUMING and HAENKE for comparison.

This vacuum led him to realize that he had to start from scratch and had to build up a collection and library, to interpret plants from older works, enabling the description of new plants and accounts of collections, that it would be compulsory to ask assistance from foreign botanical specialists in various groups, that he had to stimulate interest in the botany of the Philippines by distributing duplicates on a large scale and by bringing Philippine plants into 'circulation', and that he had to bring into being a publication medium for scientific results and for the correlation of Philippine botany with that of adjacent countries.

This clear vision of the items of the enormous amount of pioneer work ahead would have discouraged any average scientist, but to MERRILL it meant a great challenge, to create a centre from scratch.

It became almost a one man show. In the course of twenty years he had never a permanent collaborator, except two honorary collaborators, *viz* E. B. COPELAND for the Pteridophytes and OAKES AMES for the *Orchidaceae*. Another honorary American collaborator, Miss JANET PERKINS, started a series of publications under the name 'Fragmenta Florae Philippinae'; she settled at Berlin where she worked in conjunction with OTTO WARBURG who had made large Philippine collections himself. These collections, together with those of MERRILL and Capt. AHERN formed her basic material, but after 3 fascicles (1904-1905) this promising series was abandoned. Another American botanist who later joined the Bureau of Science at Manila and was employed for three years (1908-1911) was CHARLES BUDD ROBINSON, a critical, promising botanist. He returned in 1912 for another period, but unfortunately met a premature death in 1913 on the island of Amboyna while re-collecting Rumphian plants.

MERRILL of course worked in close collaboration with the members of the staff of the Forestry Institute. They were mostly collectors describing forest composition and timbers, such as H. N. WHITFORD, H. M. CURRAN, and others. An exception was F. W. FOXWORTHY who actually served for some years as botanist at the Bureau of Science and who took care of a revision of Philippine *Dipterocarpaceae*, the most important timber family.

An American botanist of great impact on the development of Philippine botany was ADOLPH DANIEL EDWARD ELMER (1870-1942). He was originally in the employ of the Bureau of Science in Manila (1904-1905), but settled later as a professional free-lance plant collector and collected over 20,000 numbers in the Philippines in a large number of sets. ELMER published lavishly in a series of his own, the 'Leaflets of Philippine Botany', ten volumes, together covering 3936 pages in print, among which descriptions of over 1500 new species. What MERRILL's relation to ELMER was and whether he appreciated him or not are not clear, as he does not mention him in his 'Autobiographical'. At the time of his stay in Leyden, where I had the privilege to have him as our guest, Oct.-Nov. 1951, I omitted to unearth this. I can hardly believe that ELMER's superficial uncorrelated descriptions can have been very welcome. In *Ficus* MERRILL reduced 31 of the 70 described species by ELMER before 1923 and of the total of 85 novelties of ELMER's *Ficus* only

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13 are still accepted in CORNER's monograph. MERRILL had to tolerate ELMER's work because the latter was an entirely independent man whose virtue lies mainly in his profuse collecting.

Why MERRILL never had a larger permanent staff of at least 2-3 qualified botanists is another question left unanswered. He could easily have claimed staff for the Phanerogams as besides his collecting work, he had curatorial and organisational tasks. Since 1912 he also had an associate professorship in the University of the Philippines and served as head of the Department on a half-time basis and without additional compensation (*sic*), 'which until 1918 seriously interfered with productive work in systematical botany'. To make botany popular and to frame a textbook of systematic botany for both residents and students, he had already prepared a 'Flora of Manila' (1912), still a very useful book, covering some thousand species. During the academic year his teaching duties never occupied less than eighteen hours per week, and during certain semesters even thirty-six. It is amusing to read in his 'Autobiographical' how he got rid of it, early in 1919, 'his full time being for the first time in many years available for what he most desired to do'. But after two weeks he was appointed as director of the Bureau of Science, a post neither solicited nor desired, but which he could not refuse under the circumstances, it being an order.

In passing I remark that of the Filipino students he taught not one specialized in plant systematics as far as I know. Those with a biological tendency probably all went in for more applied branches, such as pharmacy, entomology, agriculture, forestry, fisheries, *etc.*, so that when MERRILL left the Bureau of Science in 1923 he had no immediate successor as botanist. It was five years later when Dr. E. QUISUMBING was engaged as such. He had received his primary education at the College of Agriculture, University of the Philippines and at Chicago University. He worked together with MERRILL, then Dean of the Faculty of Agriculture, University of California at Berkeley, for two years, 1926-1928, from which a joint paper 'New Philippine Plants' emanated; from this it appears also that MERRILL was quite capable of making botanical drawings. The main thing was that MERRILL induced him in these two years to start revisional work for the initiation of a 'Flora of the Philippines' and along this line QUISUMBING elaborated the first sample, Philippine *Piperaceae*, while at Berkeley, under MERRILL's supervision, as a final coaching and a start towards this new goal.

Notwithstanding the time-consuming handicaps connected with education and administration MERRILL poured all his available energy into the botanical aims set forth above. He had by necessity been induced to take on administrative duties in the Philippines and had shown his capacity to meet this challenge. This experience served him later enabling him to fulfill other administrative duties in California, New York and Harvard in a successful way. That he could pursue his own botanical work simultaneously in free time and leisure hours is due to the fact that his heart was in botany and that he regarded work in plant systematics and floristics as his 'safety valve' 'when he could immediately forget his administrative problems'. The taking of vacations was rather foreign to him and in the entire period in the Philippines, from 1902 to 1923, he only took vacation in 1905, while in other years he used his annual month's leave for making collecting trips, mainly in China.

He built up a collection, personally, with various famous skilled Filipino collectors (RAMOS, EDAÑO, SULIT and many others) from all parts of the Philippines (the Bureau of Science = B.S. series), acquiring huge collections from private collectors (ELMER, Mrs. CLEMENS, WENZEL, LOHER, VANOBERBERGH, *etc.*) and from the Forestry Service officers (the F.B. series). Besides this he acquired large collections from surrounding regions, Guam, China, Indo-China, Amboyna, and in addition very large sets of duplicates in exchange for the material which he widely distributed 'on a free exchange basis', that is, the liberal but in the long run profitable principle of sending out duplicates as many as each institution has available, thus not on a precise 1 : 1

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specimen basis. He estimated that in 1922, he had sent out more than 500,000 duplicates, the reference collection at Manila amounting to c. 275,000 mounted specimens, containing representatives of practically all Philippine species, in the form of types, isotypes, fragments of types, material critically compared with originals, photographs of types and sketches.

The library, similarly built up from scratch, was after a decade admittedly ranked on the same level with those at Bogor and Calcutta and far larger than the one at Singapore.

He had also to provide for a publication medium and was instrumental in founding the Philippine Journal of Science, Botany Supplement, which was filled mostly by his own contributions but also served for revisions prepared by his associates, Philippine and foreign.

Interpreting the older works he found a great necessity, both for botanical and nomenclatural reasons. He started with the work of BLANCO, for which purpose he had special collections made in Blanco's classical areas, from which emanated his 'Species Blancoanae' (1918), followed by a similar key work on 'Rumphius' Herbarium Amboinense' (1917), both unrivalled for their critical standard. He tried to correlate both interpretations with material from the locus classicus. Only first-class botanists with a very wide knowledge of plants are capable of composing such works. In 1921 he published an evaluation of BURMAN's 'Flora Indica', but this was not sustained by a study of the types at Geneva; unfortunately BURMAN's herbarium is dispersed through the general Herbarium by HOCHREUTNER. For his 'Commentary on Loureiro's Flora Cochinchinensis' (1935) he had at his disposal earlier collections made by Mrs. CLEMENS in the locus classicus near Hué; he also tried to locate types of LOUREIRO in the Herbarium of the British Museum, London. At the end of his life he was working on a very large work on the location and evaluation of the ROXBURGH plants, the MSS for which are left unfinished (a complete copy has been deposited in the Arnold Arboretum, a less complete one at Leyden). We would have preferred that he had started this work earlier instead of his immense evaluation of the works of RAFINESQUE which occupied him for several years onwards of 1940. Admittedly the location and evaluation of the ROXBURGH types could only be performed by prolonged visits to European herbaria, which were impossible during the war and which, moreover, MERRILL could not make while he was Administrator of the Harvard Collections. All these works are extremely important for typification and nomenclature, often of very common tropical plants as many errors or omissions were made in their former interpretation, if indeed any was ever made.

MERRILL contributed lavishly to describing new species — some 4000, of which 3000 from the Philippines — and several new genera of plants. They were partly published in a series of New and Noteworthy Philippine Plants (18 numbers, 1904–1922), partly in accounts of particular collections from certain islands, districts or mountains. It is quite certain that only a fraction of these will stand the test of time. To understand this we must consider his vacuum position and the dilemma with which he was faced, either to do critical-botanical work or to do the best he could in determining plants by reading descriptions, comparisons with available material and if nothing fitted to describe the plant as new. Critical-botanical work of course goes slowly; at a rate of some 20–100 accepted species a year depending on the group and the botanist's capacities and zeal; it also requires that one has access to a large library and can borrow types and authentic material. The absence of the latter facility is the greatest handicap for monographic work in the tropics, as the largely European-centred 'type herbaria' are not prepared, and rightly so, to make large loans to the tropics, an affair which is too risky in several respects. This necessitates that workers in the tropics, after having prepared preliminary MSS, must pay prolonged visits to these institutions for checking type and authentic material and establish identities and names. And although MERRILL gradually assembled at Manila a huge herbarium and photographs or fragments of types from European herbaria, and attached figures, descriptions, notes, pencil

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sketches, carbon leaf impressions, *etc.* to the sheets, framing in this way a new tool of information, a sort of combined plant file and library, he had little of this during the first decade of his work at Manila. At that time he had to be content to study descriptions, an art which he fully mastered, an art which is gradually becoming extinct among contemporary botanists who adhere to the examination of type specimens. Moreover, the incoming Philippine material was overwhelming, all completely unnamed. To cope with this he asked the co-operation of all available specialists in the world to elaborate certain groups. The bulk he had to name himself and this could be done only in a superficial way, thus it amounted to mere floristic name-giving and was not truly systematic, comparative, either regional or semi-monographic. Besides all the already mentioned handicaps to work of lasting value, the Philippine flora offers an additional complication in its specific variability, which is in part certainly a consequence of the archipelagic conditions due to fragmentation of once continuous populations before the block-sinking disrupted these in past geologic time. With scanty material a botanist will under such circumstances be inclined to describe more species than there really are. It must be admitted, however, that the specialists to whom he entrusted the work on as many groups as possible were faced by exactly the same difficulty and their work suffers from the same evil. By working on this level MERRILL certainly created problems for others to solve. I have not scanned families on that point, but the six sedges he described as new are now all in the synonymy.

He himself was of course fully aware that there were far less species in the Philippine flora than listed at the time of his enumeration (1923), and being honest and wise to a high degree, he frankly admitted during a discussion on the virtue of different policies for unravelling the botanical treasures of Malesia, that 'many of my new species, and even new genera, were optimistically proposed', adding that he had seen no other way to create a botanical basis.

Of course nowadays, half a century later, 'collection description' is an obsolete procedure, detested as an inferior sort of botany creating unnecessary duplication and spending valuable time in a useless way. Nowadays it is clear that thorough work is needed and this can be done because in general collections have accumulated sufficiently to provide a solid basis, which we hope is about as good as, or slightly better, than the basis collections which were used for the compilation of the 'Flora of British India'. Fortunately collections are becoming more ample every year due to enthusiasts in Malaya, Sarawak, Sabah, the Philippines, and Lae, to whom we cannot be thankful enough. In MERRILL's 'period' the time was simply not ripe for launching comprehensive botanical works. To have a fair judgement of his pioneer work the commentary just given should be considered.

Several facets of his work were intended to cope with the urgencies of the 'vacuum position', *e.g.* the building up of collections, the library, a publication medium, the nomenclatural evaluation of old works, the description of supposed novelties, the framing of enumerations, as precursors to Floras, and bibliographies. Having a vast knowledge of the literature he was in the latter extremely successful, in accuracy and completeness. His enumerations of the floras of Borneo, Hainan, Banguay I., Guam, and some others are basic for later work, especially that of Borneo.

After the passing of Taft's Law (1917) it was American policy to prepare the Philippines for independence and MERRILL foresaw that his future career would not allow him to compile his ultimate goal, a 'Flora of the Philippines' for which his 'Flora of Manila' had served as a model — actually in 1922 although he was director of the Bureau of Science he was on a year-contract, without pension and could be dismissed with a year's salary as bonus (*sic*) — so he prepared his 'Enumeration of Philippine Flowering Plants', to synthesize what was achieved and leave a basis. This is still a most useful work, without which we would be much the poorer. The introductory

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essays are a masterpiece of work, the enumeration is complete, and the bibliography is still a reliable source of information. Of equal value are his bibliographies of Borneo, the Pacific, and East Asia.

MERRILL's ability of mastering and analyzing literature entailed of course changes in name-giving according to the principle of priority and typification. As a good botanist of course he favoured stability of nomenclature, which cannot always be realized, however, particularly not at species level. He listed especially, in his works on LOUREIRO and RAFINESQUE, the cases where conservation of generic names was necessary.

A corollary of his bibliographic interest was establishing new journals; he was instrumental in founding the 'Philippine Journal of Science' and many others, later pointing out the virtue of one-name periodicals of which he founded several, a procedure later widely accepted (*Blumea*, *Willdenowia*, *Persoonia*, *Adansonia*, *etc.*).

Shortly after the war he also started a promising offset reprinting of rare early works, the desirability of which probably emanated from his study of the rare works of RAFINESQUE. He told me that with a subscription of 150 copies this could be done without loss at a very low cost on a non-profit basis. It is a pity that this was not continued by somebody for the benefit of botany, as there was and is a need for such inexpensive reprints. Before the war I had already tried to raise the interest of *Chronica Botanica* for such a purpose and later made similar proposals to the I.A.P.T., but found no sympathy for the idea. The result is that large firms nowadays produce such offset prints at prohibitive prices on a profit basis, a most undesirable situation for botany in general and the Philippines especially as the reprints of the 'Flora Manila' and the 'Enumeration' fall entirely beyond the financial capacity of most Philippine residents for whom they are intended. That a low-price large sale is still possible is apparent from the excellent offset reprinting in Formosa for educational purposes.

Another corollary which proved to be of great scientific interest was his careful recording of vernacular plant names, an intricate affair because of the many dozens of native languages in the Philippines. He examined these names together with linguists and found that several of them were corrupted Spanish names; thus he contributed to both linguistic and botanic science. He found also that many early plant introductions had never spread and still retained station in the coastal hinterland of Cagayan Bay where the Spanish galleons had anchored. This, combined with the vernacular names, brought him to a consideration of early post-Columbian transtropical transport of cultivated plants and aliens. In this, he found that a clear distinction must be made between the galleon routes of the Portuguese from Brazil to Goa and Macao and that of the Spanish from Acapulco in West Mexico to Manila via Guam. Both galleon routes proved very important indeed, as they persisted for centuries. In this way he was able to unearth the origin of a number of plants on which there was no unanimity of opinion, including such important crops as maize, and of sweet potato and tobacco in the New Guinea highlands. Later he was able to check this in the herbarium by studying the lists of the early BANKS & SOLANDER collections made during the first of COOK's voyages in the Pacific. On this subject he published a book which, notwithstanding acid criticisms on 'certain diffusionists', is a magnificent source on the subject of ethnobotany affecting all tropical botany. In passing I remark that a similar study should still be made on the COMMERSON collections, as a second proof for his theory.

I do not know of course what MERRILL's reaction would have been to a dedication of a volume of our Flora to him. In comparison with the great many honours fallen to him, honorary doctorates and honorary memberships, memberships of academies of science, the gold medal of the French Ministry of Agriculture, the gold medal of the Linnean Society of London, the Geoffrey St. Hilaire medal, Officer of the Netherlands Order of Oranje Nassau, and so forth, our dedication



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is only a very small one. Still, I feel certain that it would have ranked very high with him, because it lies precisely in the field of botany in which he spent probably the best years of his life, and which intrigued him most of all.

He had never any intention to join in our work by personal contributions. Apart from the fact that the Flora started when he was already well in his seventies, he had used his capacities primarily in making tools for botanical workers, such as his critical evaluations of basic early works (BLANCO, RUMPHIUS, BURMAN, LOUREIRO, and in his last years ROXBURGH), enumerations of the flora of local areas (the Philippines, Borneo, Hainan, Guam, Banguet I.), the elaboration of large single collections from various parts of the East (Burma, Sumatra, NE. Borneo, New Guinea, together with Miss Dr. L. M. PERRY) and in compiling valuable bibliographies (the Pacific, East Asia, the Philippines, Borneo). Through his immense knowledge of plants and books he could produce such works at a speed at which normally large teams of workers would have been necessary.

By necessity there is a certain restriction of purpose and objects in making such tools, several were also called 'bibliographical enumerations', indicating that they were not critical and that he was not responsible for the correctness of the names. To expect or request this is of course completely unfair and unjust; they were intended as tools, and this purpose was accomplished.

There was a similar restriction in his systematical work, as he confined his revisions mostly to limited areas, many in the Philippines (*Syzygium*, grasses, *Leguminosae*, etc.), Borneo or New Guinea. Nevertheless it was an immense achievement, but at a certain level, as good as it could be under the circumstances, but largely floristic and not critical. He did not contribute essays on theoretical systematics.

Quoting ROBBINS, 'it has been said that MERRILL seldom went far below the surface, and that he was content in most cases to classify the plants with which he dealt'. ROBBINS defended MERRILL in commenting: 'This type of research was proper for the region he studied and was the only procedure which permitted him to do what he did in his lifetime. It is exactly this characteristic ability to deal superficially with extraordinarily large numbers of plants that makes so apt the epithet 'the American Linnaeus' which has been applied to him. Actually, however, MERRILL did go below the surface. He recognized that classification was prerequisite for other investigations and the magnitude of the job he set for himself left little time to pursue anything else. But his studies of the floristic and faunistic relationships of the Philippines to other Malesian areas, of the significance of vernacular plant names, and of the origin of cultivated plants are examples of 'below the surface' investigations carried out by MERRILL.' I may add his excellent synthesis of the distribution of the *Dipterocarpaceae* which induced him to make a rough outline of the phytogeography of Malesia, and especially its relation to the Formosan flora, in the light of correlating biological distribution with geological history.

To be fair, we should always keep in mind that during the period in which he achieved his great contributions to Malesian botany, that is 1902–1923, he started without a predecessor from absolute scratch, without personnel, without a book or collection, in an almost unexplored very rich archipelago covered largely by primary forest. Later too he had to work under scientific vacuum conditions in that he had almost no colleagues around him in Manila, there were hardly any botanists in the whole of Malesia — except for VALETON and J. J. SMITH in Bogor and RIDLEY in Singapore — while the floras of the islands surrounding the Philippines (Borneo, Celebes, the Moluccas and New Guinea) were botanically only known in the most fragmentary way.

If he had aimed at a critical systematical study of the Philippine flora in 1902, he would have had to wait for half a century for publication and could never have composed the major tools which now belong to our standard bibliographical equipment.

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Even in the Netherlands Indies, which had an infinitely better botanical basis, TREUB had at the turn of the century concluded that a composition of a comprehensive Flora would be entirely premature because of the primitive state of exploration and publication and that only the framing of the very local 'Flore de Buitenzorg' (from Batavia to the peak of Mt Gedeh, W. Java) could be realized as a cautious approach to later projects of large size. Even for this very restricted Flora the volume on Phanerogams never appeared, except for the Orchids. And that was for Java, botanically the best known island in the whole archipelago with a proportionally poor flora compared with the true Malesian element in the Larger Sunda islands. Even a dozen years later BACKER spent three years in the field to get an overall coverage of the Javanese flora!

This illustrates the desperate position MERRILL had to face, a position that contemporary botanists working on the Malesian flora do not always realize. I have sometimes traced arrogance in the rejection by a few contemporary, 'angry' youngsters of MERRILL's floristic methods and premature publication of novelties. It also is for their education that I have in some detail accounted for MERRILL's work and life, projected on the background of the state of Malesian botany in the first decades of this century, with full exposure of the then prevailing conditions in the hope that they will reach a better understanding of the level at which MERRILL had to work by necessity. I have also pointed out what our present-day knowledge owes to his collecting drive and to the pioneer works, bibliographies and other tools which are in our constant use and which he had created from scratch. Possibly they may ask themselves what they would have achieved had they stood in MERRILL's shoes in 1902.

Naturally it is a blessing to be able to work now in well-equipped centres provided with ample facilities, under social security and pension conditions, at leisure on a regional-monographic basis. But let us remember that we harvest what others have sown during the past seven decades.

Among those who paved the way MERRILL was the outstanding figure, a man of boundless energy and vision, a great organisator and a great botanist. It is for these reasons that we dedicate this volume with due respect to the memory of this prominent American scientist.

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## ABBREVIATIONS AND SIGNS

- acc. = according  
 Ak. Bis. = Aklan Bisáya (Philip. language)  
 Alf. Cel. = Alfuresse Celebes (language)  
 alt. = altitude  
 Anat. = Anatomy  
 Ap. = Apáyao (Philip. language)  
 app. = appendix, appendices  
 appr. = approximate  
 Apr. = April  
 Arch. = Archipelago  
 atl. = atlas  
 auct. div. = *auctores diversi*; various authors  
 auct(t). mal. = *auctores malayenses*; authors dealing with Malesian flora  
 auct(t). plur. = *auctores plures*; several authors  
 Aug. = August  
 Bag. = Bagóbo (Philip. language)  
 basionym = original name of the type specimen; its epithet remains permanently attached to the taxon which is typified by it provided it is of the same rank  
 Bg. = Buginese (language)  
 Bik. = Bikol (Philip. language)  
 Bil. = Bilá-an (Philip. language)  
 Bill. = Billiton  
 Bis. = Bisáya (Philip. language)  
 Bon. = Bontók (Philip. language)  
 Born. = Borneo  
 Bt = Bukit; mountain  
 Bug. = Buginese (language)  
 Buk. = Bukidnon (Philip. language)  
 c. = *circiter*; about  
 C. Bis. = Cebu Bisáya (Philip. language)  
 cf. = *confer*; compare  
 Chab. = Chabecáno (Philip. language)  
 citations = see references  
 cm = centimetre  
 c.n. = see *comb. nov.*  
 comb. nov. = *combinatio nova*; new combination  
 c.s. = *cum suis*; with collaborators  
 cum fig. = including the figure  
 cur. = *curante*; edited by  
 D (after a vernacular name) = Dutch  
 Daj. = Dyak (language)  
 Dec. = December  
 D.E.I. = Dutch East Indies  
 descr. added behind a reference = means that this contains a valid description  
 diam. = diameter  
 Distr. (as an item) = Distribution  
 Distr. (with a geographical name) = District  
 ditto = the same, see *do*  
 Div. = Division, or Divide  
 div. = *diversus* (masc.); various  
 do = *ditto* (Ital.); the same  
 Dum. = Dumágat (Philip. language)  
 dupl. = duplicate  
 E = east (after degrees: eastern longitude)  
 E (after a vernacular name) = English  
 Ecol. = Ecology  
 ed. = edited; edition; editor  
 e.g. = *exempli gratia*; for example  
 elab. = *elaboravit*; revised  
 em(end). = *emendavit*; emended  
 em(erg). ed. = emergency edition  
 Engl. = English  
 etc., &c. = *et cetera*; and (the) other things  
 ex auctt. = *ex auctores*; according to authors  
 excl. = *exclusus* (masc.); excluding, exclusive of  
 ex descr. = known to the author only from the description  
 f. (before a plant name) = *forma*; form  
 f. (after a personal name) = *filius*; the son  
 f. (in citations) = figure  
 fam. = family  
 Feb(r). = February  
 fide = according to  
 fig. = figure  
 fl. = *flore, floret (floruit)*; (with) flower, flowering  
 For. Serv. = Forest Service  
 fr. = *fructu, fructescit*; (with) fruit, fruiting  
 Fr. (after a vernacular name) = French  
 G. = Gunung (Malay); mountain  
 Gad. = Gaddáng (Philip. language)  
 gen. = *genus*; genus  
 genus delendum = genus to be rejected  
 Germ. = German  
 geront. = Old World  
 haud = not, not at all  
 holotype = the specimen on which the original description was actually based or so designated by the original author  
 homonym = a name which duplicates the name of an earlier described taxon (of the same rank) but which is based on a different type species or type specimen; all later homonyms are nomenclaturally illegitimate, unless conserved  
 I. = Island  
 ib(id). = *ibidem*; the same, in the same place  
 Ibn. = Ibanág (Philip. language)  
 ic. = *icon, icones*; plate, plates  
 ic. inedit. = *icon ineditum, icones inedita*; inedited plate(s)  
 id. = *idem*; the same  
 i.e. = *id est*; that is  
 If. = Ifugáo (Philip. language)  
 Ig. = Igorot (Philip. language)  
 Ilg. = Ilongót (Philip. language)  
 Ilk. = Ilóko (Philip. language)  
 in adnot. = *in adnotatione*; in note, in annotation  
 incl. = *inclusus* (masc.); including, inclusive(ly)  
 indet. = indetermined  
 Indr. = Indragiri (in Central Sumatra)  
 inedit. = *ineditus* (masc.); inedited  
 in herb. = *in herbario*; in the herbarium  
 in litt. = *in litteris*; communicated by letter  
 in sched. = *in schedula*; on a herbarium sheet  
 in sicc. = *in sicco*; in a dried state  
 in syn. = *in synonymis*; in synonymy  
 Is. = Islands  
 Is. (after a vernacular name) = Isinái (Philip. language)  
 Ism. = Isámál (Philip. language)  
 isotype = a duplicate of the holotype; in arboreous plants isotypes have often been collected from a single tree, shrub, or liana from which the holotype was also derived  
 Iv. = Ivatán (Philip. language)

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J(av). = Javanese (language)  
 Jan. = January  
 Jr = Junior  
 Klg. = Kalinga (Philip. language)  
 Kul. = Kuláman (Philip. language)  
 Kuy. = Kuyónon (Philip. language)  
 Lamp. = Lampion Districts (in S. Sumatra)  
 Lan. = Lánao (Philip. language)  
 lang. = language  
*l.c.* = *loco citato*; compare reference  
 lectotype = the specimen selected *a posteriori* from the authentic elements on which the taxon was based when no holotype was designated or when the holotype is lost  
 livr. = livraison, part  
*ll.cc.* = *l.c.* (plur.)  
 m = metre  
 M = Malay (language)  
 Mag. = Magindanáó (Philip. language)  
 Mak. = Makassar, Macassar (in SW. Celebes)  
 Mal. = Malay(an)  
 Mal. Pen. = Malay Peninsula  
 Mand. = Mandáya (Philip. language)  
 Mang. = Mangyán (Philip. language)  
 Mar. = March  
 Mbo = Manóbo (Philip. language)  
 Md. = Madurese (language)  
 Minangk. = Minangkabau (a Sumatran language)  
*min. part.* = *pro minore parte*; for the smaller part  
 mm = millimetre  
 Mng. = Mangguárgan (Philip. language)  
 Morph. = Morphology  
 ms(c), MS(S) = manuscript(s)  
 Mt(s) = Mount(ains)  
*n.* = *numero*; number  
 N = north (after degrees: northern latitude); or New (e.g. in N. Guinea)  
 NE. = northeast  
*nec* = not  
*neerl.* = Netherlands, Netherlands edition  
 Neg. = Negrito (Philip. language)  
 N.E.I. = Netherlands East Indies  
 neotype = the specimen designated to serve as nomenclatural type when no authentic specimens have existed or when they have been lost; a neotype retains its status as the new type as long as no authentic elements are recovered and as long as it can be shown to be satisfactory in accordance with the original description or figure of the taxon  
 N.G. = New Guinea  
 N.I. = Netherlands Indies  
*no* = *numero*; number  
*nom.* = *nomen*; name (only) = *nomen nudum*  
*nom. al.* = *nomen aliorum*; name used by other authors  
*nom. alt(ern).* = *nomen alternativum*; alternative name  
*nom. cons(erv).* = *nomen conservandum*, *nomina conservanda*; generic name(s) conserved by the International Rules of Botanical Nomenclature  
*nom. fam. cons.* = *nomen familiarum conservandum*; conserved family name  
*nom. gen. cons.* = see *nomen conservandum*  
*nom. gen. cons. prop.* = *nomen genericum conser-*

*vandum propositum*; generic name proposed for conservation  
*nom. illeg(it).* = *nomen illegitimum*; illegitimate name  
*nom. leg(it).* = *nomen legitimum*; legitimate name  
*nom. nov.* = *nomen novum*; new name  
*nom. nud.* = *nomen nudum*; name published without description and without reference to previous publications  
*nom. rej(ic).* = *nomen rejiciendum*; name rejected by the International Rules of Botanical Nomenclature  
*nom. seminudum* = a name which is provided with some unessential notes or details which cannot be considered to represent a sufficient description which is, according to the International Rules of Botanical Nomenclature, compulsory for valid publication of the name of a taxon  
*nom. subnudum* = *nomen seminudum*  
*nom. superfl.* = a name superfluous when it was published; in most cases it is a name based on the same type as an other earlier specific name  
*non* followed by author's name and year, not placed in parentheses, and put at the end of a citation = means that this author has published the same name mentioned in the citation *independently*. These names (combinations) are therefore homonyms.  
 Compare p. 111 under *Wahlenbergia* lines 6 & 7 where there appear to be three different genera all called *Lightfootia* by three different authors, and belonging to three different families. The same can happen to taxa of lower ranks, for example species; compare p. 129b lines 7 & 8 under *Lobelia heyneana*, where it appears that there are two different species of *Lobelia* named *L. decurrens*, viz by ROTH and by CAVANILLES in which the latter antedates the former  
 (*non* followed by abbreviation of author's name) before a reference (citation) headed by an other author's name = means that the second author has misinterpreted the taxon of the first author. Compare for example p. 126b under *Lobelia alsinoides* lines 7 & 8 the synonym name *L. filiformis*; CAVANILLES misapplied in his description and figure the name LAMARCK had given to another species through an erroneous identification. The sense CAVANILLES gave to the Lamarckian plant name does not invalidate the latter: CAVANILLES's use of the name also does not represent a proper synonym; his name has no status and its mention serves only to indicate the identity of his text and plate  
*non al.* = *non aliorum*; not of other authors  
*non vidi* = not seen by the author  
*nov.* = *nova* (femin.); new (species, variety, etc.)  
 Nov. = November  
 n.s. = new series  
*n. sp.* = *nova species*; new species  
*n. (sp.) prov.* = *nomen (specificum) provisorium*; provisional new (specific) name  
*n.v.* = *non vidi*; not seen  
 NW. = northwest  
 Oct. = October  
*op. cit.* = *opere citato*; in the work cited

## Abbreviations and signs

- p.* = *pagina*; page  
*P.* = Pulau, Pulu (in Malay); Island  
*Pal(emb).* = Palembang  
*Pamp.* = Pampáŋgan (Philip. language)  
*Pang.* = Pangasinán (Philip. language)  
*paratype* = a specimen cited with the original description other than the holotype  
*part. alt.* = for the other part  
*P. Bis.* = Panay Bisáya (Philip. language)  
*P.I.* = Philippine Islands  
*pl.* = plate  
*plurim.* = *plurimus*; most  
*p.p.* = *pro parte*; partly  
*pr. max. p.* = *pro maxima parte*; for the greater part  
*pro* = as far as is concerned  
*prob.* = *probabiliter*; probably  
*prop.* = *propositus*; proposed  
*Prov.* = Province  
*pr.p.* = *pro parte*; partly  
*pt* = part  
*quae est* = which is  
*quoad* basionym, *syn.*, *specimina*, *etc.* = as far as the basionym, synonym(s), specimen(s), *etc.* are concerned  
*references* = see for abbreviations the list in vol. 5, pp. cxlv-clxv  
*Res.* = Residency  
*resp.* = respective(ly)  
*S* = south (after degrees; southern latitude)  
*S* (after a vernacular name) = Sundanese (language)  
*Sbl.* = Sambáli (Philip. language)  
*SE.* = southeast  
*sec.* = *secus*; according to  
*sect.* = *sectio*; section  
*sens. ampl. (ampliss.)* = *sensu amplo (amplissimo)*; in a wider sense, in the widest sense  
*sens. lat.* = *sensu lato*; in a wide sense  
*sens. str. (strictiss.)* = *sensu stricto (strictissimo)*; in the narrow sense, in the narrowest sense  
*Sept.* = September  
*seq., seqq.* = *sequens, sequentia*; the following  
*ser.* = series  
*s.l.* = *sensu lato*; in a wide sense  
*S.-L. Bis.* = Samar-Leyte Bisáya (Philip. language)  
*Sml.* = Sámal (Philip. language)  
*s.n.* = *sine numero*; (specimen) without the collector's number  
*Sp.* = Spanish (language)  
*sp(ec).* = *species*; species  
*specim.* = specimen(s)  
*sphalm.* = *sphalmate*; by error, erroneous  
*spp.* = *species*; species (plural)  
*Sr* = Senior  
*s.s.* = see *sens. str.*  
*ssp.* = *subspecies*; subspecies  
*s.str.* = see *sens. str.*  
*stat. nov.* = *status nova*; proposed in a new rank  
*Sub.* = Subánun (Philip. language)  
*subg(en).* = *subgenus*; subgenus  
*subsect.* = *subsectio*; subsection  
*subsp.* = *subspecies*; subspecies  
*Sul.* = Súlu (Philip. language)  
*Sum. E.C.* = Sumatra East Coast  
*Sum. W.C.* = Sumatra West Coast  
*Suppl.* = Supplement  
*SW.* = southwest  
*syn.* = *synonymum*; synonym  
*synonyms* = the names of taxa which have been referred to an earlier described taxon of the same rank and with which they have been united on taxonomical grounds or which are bound together nomenclaturally  
*syntypes* = the specimens used by the original author when no holotype was designed or more specimens were simultaneously designated as type  
*t.* = *tabula*; plate  
*Tag.* = Tagálog (Philip. language)  
*Tagb.* = Tagbanúa (Philip. language)  
*Tagk.* = Tagaká-ólo (Philip. language)  
*Tapan.* = Tapanuli (in NW. Sumatra)  
*taxon* = each entity throughout the hierarchic ranks of the plant kingdom which can be described and discriminated from other taxa of the same rank  
*Taxon.* = Taxonomy  
*Tg* = Tandjung (Malay); cape  
*Ting.* = Tinggián (Philip. language)  
*Tir.* = Tirurai (Philip. language)  
*transl.* = translated  
*type* = each taxon above the rank of a species is typified by a type belonging to a lower rank, for instance a family by a genus, a genus in its turn by a species; a species or infraspecific taxon is typified by a specimen. The name of a taxon is nomenclaturally permanently attached to its type; from this it cannot be inferred that the type always represents botanically the most typical or average structure found in the circumscription of the taxon  
*type specimen* = the specimen or other element to which the name of a species or infraspecific taxon is (nomenclaturally) permanently attached; botanically a type specimen is a random specimen on which the name was based by description. Therefore, it does not need to represent the average or most typical representative of a population. See holotype, isotype, lectotype, syntype, paratype, and neotype  
*typ. excl.* = *typo excluso*; type excluded  
*typ. incl.* = *typo incluso*; type included  
*typus* = see type and type specimen  
*var.* = *varietas*; variety  
*var. nov.* = *varietas nova*; new variety  
*Vern.* = Vernacular  
*vide* = see  
*viz* = *videlicet*; namely  
*vol.* = volume  
*W* = west (after degrees; western longitude)  
*Yak.* = Yakán (Philip. language)  
 $\pm$  = about  
 $\&$  = and  
 $\varnothing$  = diameter  
 $\sigma$  = male (flower, *etc.*)  
 $\varphi$  = female (flower, *etc.*)  
 $\sigma, \varphi$  = bisexual (flower)  
 $(\sigma)(\varphi)$  = dioecious with unisexual flowers  
 $(\sigma\varphi)$  = monoecious with unisexual flowers

## FLORA MALESIANA

(♂♀) = polygamous

(♀♀) = polygamous

∞ = many

> = more than (in size, number, *etc.*)

< = less than (size, number, *etc.*)

×2/5 = 2/5 of natural size

×*montana* = means that the epithet *montana* is that of a hybrid