

The Status of Palm Taxonomy*

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It may be well, at the outset of a consideration of palm taxonomy, to define the term taxonomy. Briefly, it concerns the identification, naming, and classification of plants (or animals). Identification is the determination of a plant as being identical with or similar to another and already known plant or, if all known possibilities are eliminated, its determination as new to science. Naming involves the determination of the correct name of a known plant according to the nomenclatural system accepted internationally, so we may have a means of referring to the plant. Classification is the placing of a plant or group of plants in categories within the framework of a master system which tries to show relationships among the various components of the plant kingdom. Ideally, all the techniques of the science of botany should be used in the identification, naming, and classification of plants—morphology and anatomy (the study of the external and internal structure of a plant), cytology and genetics (the study of cell and reproductive mechanisms and of inheritance), physiology (the study of plant functions), paleobotany (the study of plants now mostly extinct but preserved in the fossil record).

Having very generally defined taxonomy, we may be better able to appreciate the present status of the taxonomy of palms by tracing in outline the history of the study of palms. Modern taxonomy goes back to 1753 when Linnaeus gave us a system of naming plants that was easy to understand and to use. Before that time, travelers and early botanists or herbalists had written about many

plants, some accounts dating back to Greek civilization. Few palms were known to the ancients, however, and even in 1753 Linnaeus wrote about only nine—*Areca Catechu* (the betel palm), *Borassus flabellifer* (the toddy palm of India), *Calamus Rotang* (a rattan palm), *Caryota urens* (an Indian fish-tail palm), *Chamaerops humilis* (the only palm native in Europe), *Cocos nucifera* (the coconut), *Corypha umbraculifera* (the talipot palm of India), and two date palms, *Phoenix dactylifera*, or the cultivated date, and the wild date which he called *Elate sylvestris*, but which we know today as *Phoenix sylvestris*. Linnaeus depended largely on earlier accounts for his study—those of Rheede who wrote of the Malabar coast in India, of Rumphius, whose *Het Amboinsche Kruid-Boek* or *Herbarium Amboinense* published in 1741-1755 described palms and many other plants of the Moluccas and adjacent areas, and of other writers who recorded botanical information noted in their travels.

As more and more parts of the world were explored by persons who collected and catalogued its plant resources, the list of palms increased. In the early nineteenth century a Dutch botanist, C. L. Blume, collected and wrote about palms of the East Indies; Baron von Humboldt gave accounts of American palms; William Griffith, an Englishman in the employ of the East India Company, published fine studies of the Indian palms; Liebmann, a Dane, collected them in Mexico. Thus, using the experience of these men, Von Martius, who had spent two years in Brazil himself, was able to produce between 1829 and 1850 a monumental three volume

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work on the natural history of palms, the *Historia Naturalis Palmarum*, in which he accounted for those species then known, a number small when compared with the total today.

In the latter part of the nineteenth century, much important work was done with palms, principally by R. H. C. C. Scheffer from the botanic garden at Buitenzorg, Java (now Bogor, Indonesia), Hermann Wendland from Hanover, Germany, J. Barbosa Rodrigues, J. W. H. Trail, and O. Drude on palms of Brazil, and Odoardo Beccari of Italy on palms from the islands of the Pacific and continental Asia. From these accounts and from the study of dried specimens of palms stored at the Royal Botanic Garden, Kew, England, Sir Joseph Hooker was able to write another study of palms (in Bentham and Hooker f., *Genera Plantarum*) in 1883, this time dealing comprehensively with the genera as they were then understood. Following him, Otto Drude wrote a similar but less detailed study for Engler and Prantl, *Die natürlichen Pflanzenfamilien* (1889).

From the beginning of the twentieth century to the present, such men as Beccari in Italy, Max Burret in Berlin, C. X. Furtado in Singapore, A. Dugand in Colombia, Brother Léon in Cuba, O. F. Cook, L. H. Bailey, Miriam Bomhard, and B. E. Dahlgren in the United States were able to study an increasing number of palms in the herbarium and in the field. Burret, in the thirty years of his active study, described about 550 species of palms from all warmer parts of the world. Thus, in 1954, when I attempted to sift out the duplication among palms described before then, it appeared that there were in the vicinity of 236 genera of palms known to science and somewhere in the vicinity of 2,650 species (as distinguished from names,

many of which duplicate one another in one or more ways).

But despite two centuries of work, our knowledge of palms is painfully incomplete. Most palms have been described from herbarium specimens brought from far parts of the world to botanical laboratories and museums here and abroad. These specimens could give but part of the whole story, for few botanists were so fortunate as to study palms in the field as well as in the laboratory and thus to provide us with more complete accounts.

This brings us to the present status of palm taxonomy. Today, as a result of the exploration of the world's tropics, we have a permanent record in the form of dried specimens, incomplete as they may be, representing some 2,600 or more different species of palms as opposed to only 300 that can be studied more intensively from plants now known in cultivation. These specimens have been studied by various botanists, we have names for the species they represent, and we have been able to fit these species into genera, the genera into tribes, the tribes into subfamilies, giving us the outline, though still a very imperfect one, of a system or hierarchy of palm classification. We have, in effect, a sort of "bureau of standards" for the identification, naming, and classification of palms with herbarium specimens as the vouchers or standards. We compare new material with these to determine whether an unidentified palm agrees with one already described or is new to science.

The standards are woefully inadequate. A grass, for example, can be preserved in its entirety and comparisons of whole made against whole. Most palms are so unwieldy that only parts can ordinarily be preserved. It may be that material which is sent for identi-

fication consists of parts different from those represented by the "standard" or type-specimen so that direct comparison is impossible. Then identification can at best be only tentative. We have only a skeleton system which must be fleshed out before palms are understood by botanist, horticulturist, or others in the way that smaller plants are now understood.

Perhaps an example will help to make clear the inadequacy of present palm taxonomy. The Fairchild Tropical Garden has distributed among its members plants of a palm known to some as *Chrysalidocarpus* sp. "Soledad" or to others as the Cabada palm. Its story is representative of the taxonomist's problems.

When I first started visiting the Atkins Garden of Harvard University at Soledad, Cuba, Mr. Walsingham, then Superintendent, asked me to identify a handsome cluster palm with red fruit which grew beside the laboratory. Seed had come originally from a plant established in the garden of Dr. Cabada in nearby Cienfuegos. Dr. Cabada had been a ship's doctor, if I understand correctly, and had apparently brought the palm from some other part of the world—but which part no one knew.

In 1952, I photographed the palm, made notes on its habit, colors, size, and collected leaves and fruit, for there were then no flowers. The habit, fruit, shape and certain other characteristics of the inflorescence led me to suspect that it might be a species of *Chrysalidocarpus*, a genus which occurs naturally in Madagascar and the nearby Comores group of islands. I therefore went to the most recent publication on palms of Madagascar and the Comores and tried to identify it with the keys and descriptions therein. If it were a species of *Chrysalidocarpus*, it failed to fit the descriptions

of those then known with one possible exception, *C. lanceolatus* from Grand Comore. The latter, unfortunately, is known only from some fragments of a leaf and parts of an inflorescence with flowers deposited in the herbarium at Paris. Furthermore, *Chrysalidocarpus* was not supposed to have red fruit. Therefore no comparison could be made then.

The next step was to obtain flowers of the Cabada palm. When these were examined, I felt more strongly than ever that the palm was indeed a species of *Chrysalidocarpus*. Although I now had a complete picture of the cultivated palm and although, in general, there was considerable agreement between it and the fragments of the palm from the Comores, no definite identification could be made. Had we known that the Cabada palm came from Grand Comore, there would have been basis for a reasonable assumption that it was *Chrysalidocarpus lanceolatus* despite the lack of information on fruit of the latter. But we do not know from where it came.

Now we must somehow obtain a complete picture of the Comores palm, a not too easy task. In time a letter to government authorities in Madagascar asking for assistance in obtaining fruiting material of *C. lanceolatus* produced some results. I received parts of two palms from the Comores. One had fruit but was immediately identifiable as a species of *Ravenea*, thus was removed from consideration. The other was truly a *Chrysalidocarpus* but in flower. Another letter has gone out explaining that we need fruit of the second.

In the meantime, I had come across the description of a palm growing on the island of Pemba off the east coast of Africa which answered the description of the Cabada palm in some respects, and I had been fortunate enough

to study specimens of it in the herbarium at the Royal Botanic Garden in Kew, England. There was no question but that this was a *Chrysalidocarpus*, and furthermore it had red fruit. The fruit, however, was considerably larger than that of the Cabada palm.

Now we are faced with a dual problem. What is the palm from Pemba which appears to represent a species as yet unknown to science? And still—what is the Cabada palm? To further complicate this problem, we must now re-examine the relationship between *Chrysalidocarpus* and another genus from Madagascar, *Neophloga*. *Chrysalidocarpus* is not supposed to have red fruit; *Neophloga*, though it does have red fruit, is supposed to be a genus of dwarf palms. When considering the delimitation of genera, size cannot be considered of much importance since the basis for all our classification is based on the more constant characteristics of flowers, fruits, and leaves. Perhaps the two genera *Neophloga* and *Chrysalidocarpus* are but one (with variation similar to *Bactris* in the New World) which contains within its limits both yellow- and red-fruited species, both tall and dwarf palms, but which is distinguished from all other palms by more constant and important differences.

Thus the problem has grown and no answer is yet in sight for the identity of the Cabada palm. I hope that fortune will permit someone to visit Madagascar and the Comores, and if so that he may find *Chrysalidocarpus lanceolatus* in fruit on Grand Comore. Then it should be relatively easy to say whether the Cabada palm is identical with it or different. If the former, we must suppose that Dr. Cabada (or someone else, for the same palm has since been found cultivated in other parts of the Caribbean area) brought seed from Grand



33. Mr. Walsingham serves as a scale beside one of several clumps of *Chrysalidocarpus* sp. at the Atkins Garden, Soledad, Cuba.

Comore. If not, then we must search further to discover its native home but, having already eliminated all possibilities, can still with some certainty consider it a new species, proceed to describe and name it, and assign it to a place in our scheme of classification. It is likely that a period of as much as ten years will be required to give an answer to Mr. Walsingham's simple question "What is it?"

What has been said before deals with what has been done, and with what is being done at present. There are fewer persons actively working with the taxonomy of palms today than there were a century ago despite the great increase in material for study. Hence the slow pace at which we progress. Obviously the taxonomist is not working under either ideal conditions nor in an ideal manner. The riches of the tropics are still overwhelming and we are still faced with the problem of finding out what

palms grow there utilizing what little information we can obtain from specimens and notes. Large collections of specimens from the Pacific Islands and from the American tropics still await study in the herbarium at the L. H. Bailey Hortorium and in other herbaria. I know that there are undescribed species in those collections and surely further exploration of remote regions will disclose more, though how many one would be hard-pressed to estimate. For years yet, palm students must continue at least in part in the standard "old-fashioned" taxonomy.

Old-fashioned, because time has brought change to our study of plants. In temperate regions of the world, the describing and cataloguing of plants has largely been done. Today the taxonomist can truly fill his role in bringing together information from all techniques of botany. He can study the species of plants as a whole using experimental methods and arriving at more objective conclusions. Ideally, the taxonomy of palms should someday—and hopefully soon—follow in this more complete fashion so we may understand palms as biological units rather than as museum fragments.

NOTES ON CULTURE

Regulations for the Introduction of Palms

Palms are principally introduced into cultivation through the medium of seeds. Some which do not produce seeds and special clones of others, however, may also be introduced as live plants. Mr. Emile Kostal, Acting Station Head, Agricultural Research Service, Plant Quarantine Division, 209 River Street, Hoboken, New Jersey, has kindly provided pertinent governmental information for the guidance of Palm Society

members. This, in the form of Circular Q.37-13 (6-55), is reproduced below. It should be remembered that an import permit from the Import and Permit Unit of the Division is required before material is introduced.

In explanation of quarantines, Mr. Kostal writes: "The concern of the Department [of Agriculture] relative to palm importations dates back many years to the time a very destructive date scale insect was introduced on date palm offshoots. This insect was a very serious handicap to our developing date palm industry in the southwest. After many years of effort and great expenditure of public money this scale was eradicated. Palms, such as date palm offshoots and large old palm plants, are very difficult to examine for plant pests because of the many overlapping leaf sheaths."

STATUS OF PALMS UNDER QUARANTINE NO. 37

Under the provisions of Regulation 18d of Quarantine No. 37 the importation of palms and woody species which can be grown from and which come true from seed may be imported only as seeds. The Regulation provides that plants within size and age limits may be imported when it is impossible to procure viable seed. Exceptions are also made for clonal material. There should be no difficulty in getting seeds of common palms such as *Acrocomia*, *Attalea*, *Cocos*, *Kentia* (*Howea*), *Livistona*, *Rhapidophyllum*, *Sabal*, *Scheelea*, *Washingtonia*, and others. Viable seeds of genera which may be more difficult to get are those of the so-called under growth palms and others which are likely to be of botanical interest to scientific institutions including arboretums. They would include but not be limited to certain species of such genera as *Chamaedorea*,

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