stooping by and "fanning" with his blade a well concealed *terciopelo (Bothrops atrox,* also known as *barba amarilla* or *fer-de-lance),* one of the most dreaded snakes of the Americas.

This and other days of collecting from Palmar, the joy of late afternoon tea with Paul and Dorothy, spiced by their interest in and conversation about all things pertaining to their adopted countries, have left an indelible impression so that even today, studying palm specimens collected by Paul H. Allen brings home the realization that we are deprived of much more than a talented palm collector and student.

34. *Erythea salvadorensis.* Photo P. Allen.

35. *Cryosophila Williamsii* at Lake Yojoa Photo P. Allen.

Palms in Middle America

PAUL H. ALLEN

Palms form a characteristic and sometimes conspicuous element in the vegetation of most tropical countries. This is certainly true of Mexico and Central America, wherever clearings and cultivation, or lack of rainfall have not eliminated them from the scene. Genera and species increase in number and complexity as one travels southward in the Americas, reflecting the more favorable environment of the rain forest habitat and the physical approach to the great Amazonian *hylaea* that serves as a distributional center for the family, in the Western Hemisphere.

Middle American lands show an infinite variety, holding within themselves all the vast range of climatic zones and plant associations of a continent. Northern and eastern slopes of the central cordillera are, with minor exceptions, relatively rich and fertile, with great tracts of nearly unbroken forest crisscrossed by short, but often precipitous

36. *Acoelorrhaphe Wrightii*, Macantaca Creek, Nicaragua. Photo P. Allen.

rivers that are constantly fed by the torrential rains that characterize this coast. On the Pacific, hot, breathless valleys, dominated by stark and dramatic massifs, alternate with areas of open savanna, where the lush green during the rains is replaced by clouds of dust, and the soft pastels and golden autumnal tones of the dry season. Areas of intermediate elevation, such as the famed Meseta Central of Costa Rica have delightful, Spring-like climates throughout the year. An ascent from the coasts to the icy sphagnum bogs of the Cordillera de Talamanca, in Costa Rica, or to the eternal snows of Popocatepetl, in Mexico, will provide a lesson in vertical plant distribution more forceful than a series of lectures on the relation of living things to elevation and humidity. Depending upon location, the landscape varies from the dark forests of conifers and oaks on the upper flanks of the great, wild mountains of Mexico, Guatemala and Honduras to the tropical rain forests of Nicaragua, Costa Rica and Panama, with rolling plains, swamps, and patches of deciduous woodland thrown in for good measure.

Only an approximate comparison can be made of the palm populations found in the individual countries, due to the imperfect state of our knowledge regarding the group, and this in turn has been true because palms are such hard things to collect in any sort of recognizable condition. Anyone who has tried to preserve the essential character of giants like *Orbignya, Scheelea or Roystonea* between 11 x 16 inch herbarium sheets will know what I am talking about. When faced by such a patent impossibility, the average botanical collector takes fragments, and it has been the varied interpretations placed on these tantalizing scraps that have given rise to many of our taxonomic difficulties. Most palms can only be studied as living entities rather than from museum fragments.

One need only consult Dahlgren's classic *Index of American Palms* to find that some 485 species and varieties are credited to Brazil, as compared with 15

37. *Manicaria saccifera*, swamps near Fort Sherman, Panama. Photo P. Allen.

species for the continental United States, yet the objective inquirer must note that the smaller number from North America has spawned 93 synonyms, that cluster about the mother species like puppies, while the Amazonian list has scarcely any synonyms at all. One would need a faith equal to belief in the annual liquification of the blood of St. Januarius to be convinced that the Brazilian palm names will not eventually be subjected to equal scrutiny and reductions to synonomy. This is not to imply, by any means, that name lists move only in the direction of condensation and simplification. There can be no question that most, if not all tropical countries harbor species, or even genera, that are as yet unknown, or unrecorded. Striking evidence of this basic fact might be presented in the 43 species of palms listed in 1936 for Guatemala, that have been increased to 76 in recent years, through the efforts of Standley and Steyermark. Panama, in 1936 was credited with 37 species, yet at least 73 are known today. Much of the same can be expected from the other tropical American countries, as roads penetrate new areas, or airfields are put into service, so that it would seem safe to predict that new discoveries may tend to keep pace with reductions to synonymy for a good many years to come.

In round numbers, we may say that approximately 350 species of palms are at present known to occur as wild plants in Mexico, Central America and Panama, where they form a much more conspicuous element in the flora than do the palms in the Orient, if a reasonable allowance be made for duplications within the individual lists. The genera involved include the following in Central America (Guatemala to Panama, inclusive), an area with which I am best acquainted through fairly extended periods of residence: *Acoelorrhaphe* (*Paurotis*); *Acrocomia; Aiphanes; Asterogyne; Astrocaryum* (including *Hexope-*

38. *Corozo oleifera.* Photo P. Allen.

tion); *Bactris* (inclusive of *Guilielma, Pyrenoglyphis*); *Calyptrogyne; Chamaedorea* (inclusive of *Collinia, Dasystachys*); *Coccothrinax* (? *Nicaragua*); *Cocos* (introduced and naturalized); *Corozo; Cryosophila; Desmoncus; Erythea; Euterpe; Geonoma; Hyospathe; Iriartea; Manicaria; Neonicholsonia; Oenocarpus; Opsiandra; Orbignya; Pholidostachys; Phytelephas; Prestoea; Raphia; Reinhardtia* (including *Malortiea*); *Roystonea; Sabal; Scheelea; Socratea; Synechanthus; Thrinax; Welfia.*

A great number of Middle American palms contribute greatly to the rural and primitive economies of their respective countries, where the leaves are used for thatch, hats, baskets, brooms or fire fans; the trunks for house posts, walls, floors, water conduits or banana prop poles; and the inflorescences or fruits for everyday utensils, toys and as food for humans or domestic animals in an infinite number of forms. The fermented sap of at least two, fills the flowing bowl in the form of palm wine; and the tender terminal bud, or "cabbage," of many makes a delicious vegetable, either raw or cooked, that would rank as a delicacy in any land. When we have said this much, we have, however, about exhausted the subject insofar as utility is concerned, since few of the species from Middle America have been able to compete with imported or synthetic products on the open market, due probably to their infrequence—as compared with cultivated crops—their relatively slow rate of growth and the fact that their exploitation does not lend itself to the use of mechanized equipment. Isolated exceptions may be cited in the cases of the coconut, which is probably not native to the area, though introduced in very early, and even probably pre-Columbian times; in the shells and kernels of *Orbignya Cohune*, which yield a high-grade charcoal and an edible oil; and in the well-known ivory nuts (*Phytelephas*) that supply material for miniature carvings and buttons to world trade. The most important source of palm oil in Middle America today is *Elaeis guineensis*, the African oil palm, which has reached our shores through the agency of man in the form of high-yielding, selected strains, by way of Sumatra, in the East Indies.

Many Middle American palms that are too small or rare to be of even local importance — such as some kinds of *Chamaedorea* and *Reinhardtia*, for example—make handsome indoor or tropical garden subjects, and it may be said in general that the future of most tropical American palms seems to lie more nearly in that direction than in any prospect of wholesale utilization by industry. As a matter of interest the most popular house palm in the United States today is *Chamaedorea elegans* (usually passing in the trade incorrectly as *Neanthe bella*), a Mexican and Central American species. Less than 50 species can be called at all common, and some of these occur in sufficiently isolated localities to escape the attention of all but the most determined traveller, prepared to endure not a little discomfort for the pleasure of seeing some of Nature's masterpieces in the wild.

Rain Forest Palms of Golfo Dulce

PAUL H. ALLEN

[Editorial Note: One of Paul Allen's major publications is his illustrated volume, *The Rain Forests of Golfo Dulce*, published in 1956 by the University of Florida Press. This book describes intimately the prominent arboreal species of a Costa Rican rain forest near which the Allens lived during five years residence at Palmar, on the Golfo Dulce. All the conspicuous palms of the forest are treated in this book. They are not separated out but rather appear in appropriate alphabetical position among the other genera of trees. It seems proper to excerpt the various scattered paragraphs on the rain forest palms and to bring them together as a single coherent account for students of this group. For this purpose the original key to the palms is included as well as all the accounts of the palms, which follow the key in alphabetical sequence. Thanks are due Lewis F. Haines, Director of the University of Florida Press, for permission to reproduce these paragraphs as well as the descriptive phrases of Archie Carr, who provided the jacket commentary for the original publication. Dr. Carr has this to say about the tropical rain forest, which serves as the habitat for so many palms—W.H.H.]

"Ask a naturalist to name the world's most varied and productive and colorful and generally exciting environment and he is almost sure to come up with the tropical rain forest. He might waver a bit between the rain forest and the coral reef; but make him stick to the land and it will be the rain forest every time.

"The pull of the tropics for cold-zone folk is a curious and complicated thing. It is a sort of romantic aura, distilled from all sorts of associations and dreams; but back of the hankering you always come to the jungle, the broad-leaved evergreen forest. It was the jungle that stirred the old boys—Darwin, Wallace, Humboldt, Bates—who first told the world the real story of the tropics; and if you go down and find a piece of undisturbed jungle and walk around in it, this will be the thing that stands out in *your* mind when you go home.

"If you go to the rain forest after just the feel of it, you will not be disappointed. But if you go as a botanist anxious to know the plants that build it, and determined to behave as you behave on field trips back home, the jungle will drive you crazy. It is hard to find the rain forest in the botany manuals. It is hard to put it into a plant press. It can be done, but it takes years.