

H. E. Moore, Jr. Memorial Volume

PRINCIPES

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THE PALM SOCIETY

A nonprofit corporation engaged in the study of palms and the dissemination of information about them. The Palm Society is international in scope with world-wide membership, and the formation of regional or local chapters affiliated with The Palm Society is encouraged. Please address all inquiries regarding membership or information about the society to The Palm Society, Inc., P.O. Box 368, Lawrence, Kansas 66044, U.S.A.

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SEED BANK: Mr. Ernest B. Chew, Correspondent, P.O. Box 551, San Diego, California 92112; Mrs. Lois Rossten, Seed Distributor, 6561 Melbourne Dr., Huntington Beach, California 92647.

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EDITORS: Dr. Natalie W. Uhl, 467 Mann Library, Ithaca, N.Y. 14853. Dr. John Dransfield, The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, England.

FIELD EDITORS: Mr. Ernest B. Chew, Mr. DeArmand Hull, Dr. Dennis Johnson, Mrs. Pauleen Sullivan, Mr. Ralph Velez.

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Clinostigma collegarum silhouetted by setting sun (Photo by J. Wood).

PRINCIPES

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Early Days of The Palm Society and Principes Revealed in Letters: Excerpts from Correspondence between Dent Smith and H. E. Moore, Jr.*

November 28, 1955

Dear Dr. Moore:

Mrs. Lucita H. Wait was kind enough to send me your address so that I might write to you about the newly proposed Palm Society. I enclose a memo about it.

I expect to write to any other scientists known to be working with the palms, in the hope that they will assent to becoming members of the Society. I dare hope that the replies will be favorable if only I can make it clear that the Society is not intended to be yet another garden club or organization given over to meetings and discussions of trivial garden subjects.

The Society has no credentials other than its roster of members. Your own well-known work with the palms, and hence identification with them, has made it seem to me imperative to try to engage your interest in the Society and to ask your assent to becoming a member right here in the very beginning.

* * *

2 December 1955

Dear Mr. Smith,

I like the prospectus of the society very much. It appeals to me particu-

* Edited with permission from Dent Smith by John Dransfield and Natalie W. Uhl.

larly in that it is more or less a loose grouping of people having a common interest but without the formality that so often accompanies such societies.

It will be a pleasure to join so many of my friends. I only regret that I will be an absentee member for some time yet since my return to the States is not scheduled until next November. In the meantime I shall be storing up valuable information about the bases of our knowledge of the palms, the types and historic specimens collected over a century ago in many instances and described by von Martius, Blume, Griffith and others. Thus far it has been rather exciting work in Brussels where the personal herbarium of von Martius now reposes—as distinct from the von Martius collections that are incorporated in the museum at Munich and which I also hope to study while abroad.

May I wish you the best of success in rounding up the many people who are fascinated in any one of many ways by this extraordinary family of plants.

* * *

January 2, 1956

Dear Dr. Moore:

Our first mimeographed paper, or Bulletin, should go into the mails this week, and I shall send one to Ithaca to be forwarded to you. It is hardly all

that could be desired, for, besides a few longish quotations, it consists pretty much of a monologue. In later papers we may have enough contributions from the members to provide more engaging fare.

* * *

February 11, 1956

Dear Dr. Moore:

Much to my distaste I have had to face up to some of the details attendant upon organization. I enclose a sheet containing some proposals under that head. It seems we cannot avoid organization, but I hope that it can be kept fairly simple and never fouled up with all sorts of red tape.

I had thought it was best not to propose your name as a Director during your absence. My thought there was not to bother you at all during your stay in Europe.

A new paragraph to return to the question of Directors. It seemed to me extremely doubtful that there would be time to get your assent to having your name placed on a proposed slate which would be placed in the printer's hands next week, and I surely would not place it there without assent. It seems to me a better way would be to nominate you as a Director at the meeting itself, making it clear that such a post would be strictly subject to your acceptance and the effective date of it strictly subject to your convenience. (Maybe I should have been a lawyer instead of a field hand.)

The Society now has about 90 members, among them many more of your friends or acquaintances.

* * *

10 April 1956

Dear Mr. Smith,

The last bulletin of the palm society arrived some time ago, in fact during our very cold weather here. I shall try to give you some information on cold damage in a later letter but for the moment will confine myself to a few notes and to forwarding the postcard proxy. You were very right in thinking that I would prefer to be omitted from consideration for posts. To have a title without doing anything about it doesn't sit well with me and certainly I am in no position to do more than applaud your fine efforts. I have been very much interested in watching membership climb and hope that eventually I may have some contributions of a technical nature to make to the group.

* * *

April 21, 1956

Dear Dr. Moore:

On my return from the big doings at the FTG (our meeting) I found your welcome letter here. Before commenting upon it, I'll tell you something about the meeting.

I got stuck with the job of president. Though all the offices are to run for two years, I said that I would resign at the end of one year. This because the job of editing the papers entails much correspondence and other work, and is quite enough by itself for any one mortal to undertake.

What a challenge it is to tackle the palms! The more I see of them, and the more places I visit, the better I realize how much remains to be learned. It would be appalling if nothing were being done about it. Fortunately for us growers, you have evi-

dently got the great resolve and courage that it takes.

* * *

11 May 1956

Dear Mr. Smith,

It would seem ungracious not to accept the directorship in the Palm Society so kindly offered and, indeed, I am most pleased to have been thought of. In view of the present situation I cannot guarantee to be much more than a name but if that is sufficient can accept without reservation.

I trust that things are off to a good start and will be watching progress eagerly. Best of fortune in your new (but really not so new considering all you have done) job.

* * *

May 16, 1956

Dear Dr. Moore:

The Society is progressing in numbers (181 now) fairly fast. We are falling down, though, abroad—in Europe, Asia, Africa, Australasia, Oceania, Central and South America. This is not because we cannot enlist interest. It is because we have not solicited it, not having the names and addresses of the foreign palm-fanciers and scientists. Perhaps after your return you can steer us in the right direction.

* * *

July 25, 1956

Dear Dr. Moore:

As you may have noticed in our July bulletin, I expect to supplant our mimeographed papers with a quarterly

journal, printed and illustrated. I am hopeful to have some interesting matter for the first number of it, and with that end in view I wonder if you might have the time and inclination to send me something for inclusion. I remember that you had thought you might say something for us about the work you are doing in Europe. My rejoinder was that it would be swell, but that I did not think we should ask you to let it impinge upon your time. I still say the same thing, adding only that it seems now a very opportune time if circumstances are more favorable for you. My deadline with the printer is Sept. 1st.

On the head of a quarterly journal, I should value greatly your opinion of the proposed name—*Principes*. I ask myself if it's too grandiose. I also recall that old Berthold Seemann argued with it, on the grounds that the palms have some very "low relations."

The Society has many problems that are not easily solved during your absence. I believe that you may know some or all of the solutions and could give us some much needed guidance. I'd be quite willing to make a special trip to Ithaca, after your return, if it would help matters.

* * *

November 12, 1956

Dear Dr. Moore:

I hope very much to see you in Ithaca some time this month if it can be arranged to suit your convenience. It is not hard to imagine how busy you are at the moment after the long absence, but I am hopeful that, ten days or so hence, you will have had a chance to catch up with some of the accumulations.

If I could visit with you by corre-

spondence, the trip up there could be avoided. I fear, however, that it would be quite impossible to deal with the matters I have in mind even in a whole series of letters. I should like to consult with you about the Society's affairs—its future and its policies, its methods of operation and its management—and also several other things.

* * *

November 19, 1956

Dear Mr. Smith,

The interval between my landing and the present has been somewhat hectic due to a deadline on a book manuscript which I expect to have met by Thanksgiving. After that I can devote full attention to other problems. I must confess that I have misgivings as to the amount of help that I may have to give. I can, however, assure you of the best assistance I know how to give.

* * *

30 November 1956

Dear Hal:

First, I wish to thank you for all your kindnesses and attention. I came away with a feeling of great pride in you for having accepted the post of editor, and in our young and promising Society. My visit would have been enjoyable and also informative even had your decision been different; but all such workaday adjectives were transcended by the fact of your acceptance. Please count upon me at all times for any assistance or support that I might be capable of rendering. That would be forthcoming anyhow, but, you see, you have relieved my mind of terrible forebodings and anxieties.

* * *

10 December 1956

Dear Dent:

I was glad to have your letter describing your visit to Longwood and the reaction from Mrs. Wait. Now that I am free to think about other things, I suppose the Palm Society will receive the attention it deserves. Although I am a little apprehensive, I am looking forward to tackling this stimulating job.

Apart from any editorial matters, it was a very real pleasure to have you visit us here in Ithaca. I am only sorry that you couldn't have stayed longer. I am looking forward to the possibility of exploring new subjects in conversation when and if I get to Florida again.

I have sent a small packet containing six fruits of an extremely interesting palm from the Fiji Islands. Its name, *Neoveitchia Storckii*. It is not to be confused with *Veitchia Joannis* for although somewhat similar in habit, it is quite distinct in technical characteristics. The material was sent by surface post from Fiji and I have little hope that the seeds are still viable.

* * *

December 20, 1956

Dear Hal:

Many thanks for the *Neoveitchia* seeds. We'll hope for the best.

I have a pretty good backlog of ideas for the contents of *Principes*. I'll try to put them in some sort of order and send them to you next month. You may have to discard some or all of them, but perhaps they would be worth a glance. Among other things, I had asked Mrs. Wait if she would do a series of very brief sketches of various members of the Society, preferably in each case accompanied by a

photograph. She began it with a few paragraphs about A. C. Jordahn who has written for us a little paper on the cultivation of palms in the limestone area of Fla.

* * *

December 27, 1956

Dear Hal:

Here are a few random thoughts and notions concerning *Principes*. First, I have thought that it would be of immense practical value to record lists of palms actually under cultivation in New World collections—a sort of series or continuing effort to determine what grows where. Such lists to be accompanied, if possible, by a general description of the plantings and preferably a few pictures. Obtaining this kind of thing has been like pulling eye teeth up till now. At last, however, Stanley Kiem advises me that the FTG palms have been indexed on cards (the old catalog had become quite undependable). Then there's the Montgomery collection still to tabulate. After Chapman Field and my own plantings, the only other collection in the state containing more than 100 palm species is at Melbourne—H. Bertram Smith. So far as I know, I should say. But with the stimulation resulting from the formation of our Society, several new and expanding collections are now in process, and in another year or two there will be plantings qualifying as something more than representative. Then there are the other notable gardens of the hemisphere—and after that, there's the world. I don't know whether you'll want to continue this series, so called, but I thought I'd try to put into words my somewhat vague and necessarily flexible notions about it.

And there's at least one article in

Baileya that should be reprinted in *Principes*! Dr. Dress's "On the Gender of Scientific Plant Names," Mar., '55. This article could be assimilated by our members with much more ease if all the plant names employed were substituted with the names of palms. The examples then would have more point and be more apposite for our members. I shouldn't think that Dr. Dress would object to such substitution. Some examples used are already existing in palm binomials and would not be substituted, e.g., *albus*, *niger*, *elatior*, etc. There's other good stuff in *Baileya* that would help to reduce the growers' mystification. I doubt that 10% of our members ever see it. But everything I say is for you to accept, reject or retire to the "possible" drawer.

I had thought that we would index the volumes (of P.) and not bother with an index in each issue; but I'm not sure that it is for the best.

* * *

31 December 1956

Dear Dent:

The idea of publishing lists of palms cultivated seems to me a good one for, from my point of view, it would serve as a basis for including many things in *Hortus* that are now not dealt with simply because we have no catalog reference to their existence in the United States as plants for sale. It would also serve as a basis for comparison in the future. My ideas on *Principes* are being formulated rather slowly, but tomorrow being a holiday I hope to find time not only to answer a large pile of personal correspondence but to set down on paper some of these thoughts and to begin functioning. Although I regret that your trip to Mexico must be postponed, it is somewhat comforting

to know that you will be reachable through the period of initial struggle. Of course, if you would like to do the July number yourself, I should be most happy to have you take over or rather continue the job you have started. If you want to have a finger in the July pie please don't hesitate to say so. Regarding the index I definitely feel that a terminal index for each volume would be most helpful.

The project for the present is to attempt, if possible, to straighten out the confusion that now exists amongst the plants cultivated as *Veitchia Joannis* and to elaborate the description of *Neoveitchia*. With excellent series of specimens from the Fiji Islands and all of our cultivated material, I should manage at least to make a beginning. I also hope that I can finish up my notes on the genus *Reinhardtia* since I note that Bruce is puzzled by the varying treatments in *Gentes Herbarum*. As I think I told you while you were here, I cannot separate *Reinhardtia* and *Malortia* and in this regard follow Burret. Since these are coming into cultivation, it would perhaps be well to get them on the road with some good names.

* * *

3 January 1957

Dear Hal:

I have already advertised pretty widely that you are to take over as Editor after the April *Principes* appears (this because it seemed a bright feather in the Society's cap and justifiably something to crow about), and it would be something of an anti-climax were I to do the July issue. Apart from that, I need a breathing spell so that I can attend to my neglected affairs and mend my fences. But I can and will contribute something—both text and

illustrations—to that and subsequent issues, subject to your acceptance. Very likely I'll have on hand to turn over to you a fair number of MSS., good, bad and indifferent, and perhaps enough material to make up an entire issue.

Actually, Hal, I believe your only worry will be how to accommodate all you want to print rather than to be at a loss for matter. I believe you will get more printable papers than you can use.

A final word about *Principes*. It's a lead-pipe cinch if you have a good printer, and it's a preposterous and almost un-doable chore if you don't. The thing to do is to take time by the forelock, get all set well in advance and then the draught will go down like nectar instead of nitric acid with castor oil for a chaser. If you ask me, I think for you it's going to be a barrel of fun. So, having pontificated in this very high style, I'll bow out before getting started all over again.

* * *

11 January 1957

Dear Dent:

Your recent postal card is very much in line with my thinking. Unfortunately, I don't know any of Martius' works that are translated. As time goes on, perhaps I should attempt to make translations as I work with his writings. Most of the literature on fossil palms is in German or French. There is one very interesting paper on the oldest fossil palm which appeared not too long ago. I'll attempt to get hold of the periodical in which it appeared (a French or Belgian journal) and if not translate, at least abstract for *Principes*. Along the lines of your thoughts regarding brief biographies of members of the Society, I have been

wondering whether a series of sketches about the botanists who have worked with palms might not be of interest. Linnaeus himself would, of course, be one of the first, but some of the early explorers made rather good notes on the palms they saw and Linnaeus' son prepared a small manuscript which today rests unpublished in the Library of the Linnean Society in London. I hope that we will be able to obtain the microfilm of this manuscript. Written in Latin, it would not be the sort of thing that could be published in its entirety, but an article could be written about it and perhaps the Linnean Society would grant permission to reproduce one or a few pages. I have a few hurried notes on it made during a visit to the Society's headquarters, but time didn't permit the kind of study that it deserves. Others on this list would be one of Linnaeus' students, Giseke, some of the Dutch botanists who early noted palms in the East Indies, Wurmb, Rumphius, Blume, then such giants amongst palm students as von Martius, von Humboldt, Wendland, Drude, the incomparable Beccari, Bailey and some of today's older but still living students such as Burret and Furtado. This would make a series that would last for a good number of years. Of course, it may be that because these men are so interesting to me, I assume they would be interesting to others. Many times I shall be referring thoughts to you for your very frank comment regarding their pertinence to *Principes*. I get carried away and if time permitted, could very happily sit down and write several numbers of the Journal right now. Unfortunately, time is not that free, so that there is no danger of my over-writing.

* * *

Jan. 16, 1957

Dear Hal:

Your letter for publication. Swell. Just what I wanted. If any members fear that the journal will become so technical as to be unintelligible, this letter will completely convince them otherwise. (See *Principes* 1:77—Eds.)

A series of sketches on the botanists who have worked with the palms would be ideal, and would indicate excellent editorial perception. If possible, one such sketch should appear in every number. Don't forget Seemann—an interesting fellow. But aren't they all? Pictures often tell a story. There are two of Ekman in *Flora de Cuba*, Vol. 1, that intrigue me no end. Sort of a Before-and-After combination: No. 1 shows him in "civies" looking so very mild and smoking a pipe; No. 2 shows him in the jungles looking very grim and somewhat fierce. No words could ever make such a graphic presentation of what the collecting botanist has to endure. I believe that Hermano Alain might lend you the 2 engravings—worth a million to *Principes*!

Do you know Dr. Velva Rudd at Smithsonian? She's a member, was O. F. Cook's secretary and helper for some years. (*We'll be publishing her article later this year—Eds.*) He would have Orator for a given name. I think his "palm families" and his many other oddities were quite mistaken, but no one could say that he was bereft of strange and novel and even fascinating ideas.

* * *

6 February 1957

Dear Dent,

The manuscript arrived shortly after my last letter went off to you. I have

read and enjoyed it. The fact is that I have no blue marks to make anywhere. I have so long taken it for granted that the fan palms are and should be more hardy than others that I was surprised at first to read your comments. Just for fun, I have gone through a number of books and articles on palms (especially on those cultivated) and find that no one has come out with a bold statement. Even Chabaud (do you know his *Les Palmiers de la Côte d'Azur?*) fails to do more than suggest indirectly this propensity of the fan palms.

When I get to Daytona Beach perhaps we can talk a bit about this. Being more than casually interested in the geography of palms and the processes of evolution that have brought them to their present state of development and distribution, I have done some rough plotting. To my way of thinking, most of the fan palms have gone an independent way almost since (and perhaps quite since) the first. They are found, generally speaking, much to the north of the usual concentration of palms. Someday I am going to write an essay on palm distribution and evolution but this not until I have finished a *Genera Palmarum* and a popular book and have gotten a better understanding of the fossil record.

* * *

February 9, 1957

Dear Hal:

This doctor and mister business is quite a puzzle as well as a headache when you have no means of checking. Pichi-Sermolli refers to you as *Mr.* Moore and Furtado addresses me as *Dr.* Smith. So there you are.

Furtado quite enthusiastic and wish-

es to be enrolled. Please remind me to pull his letter from the files when you come down here. Several other interesting ones too. Nothing from Burret so far. I hope that your letter has elicited an answer.

I fear I'm going to lose that *Zombia* I was so elated over getting from Loo. Another thing about fan palms—tougher to transplant when young than the feathers. In this case the usual trouble—not enough roots.

* * *

14 February 1957

Dear Dent:

I was glad to hear that Pichi-Sermolli and Furtado have shown interest. Since Burret is retired it may be that he no longer cares about palms, so I am not too surprised that you have heard nothing from him.

The Mr. and Dr. business really needn't bother you. There are some who have a title and worry about it. However, it's been my experience that they are the least likely to be people about whom you would worry. Since Pichi and I are on a first-name basis, I suppose we have never worried about titles and certainly it's the last thing that I ever concern myself about.

* * *

February 20, 1957

Dear Hal:

Another notion: An article on the subject of palm nomenclature, with the reasons for name changes. This subject seems to get little comprehension in most quarters.

* * *

February 28, 1957

Dear Hal:

The next issue of *Principes*, I regret to say, chiefly contains junk. This fact will tend to make your own first issue look like a great improvement.

* * *

9 April 1957

Dear Dent:

Made it back with only minor difficulties and am now trying to get my desk cleared up. I really don't know how to thank you for all the kind things that you and Marta did for me during my two visits. It's really a great pleasure and privilege to know you.

* * *

17 April 1957

Dear Dent:

I bet Lucita is up to her ears in arranging things on shelves by now. I am in the last stages of manuscript writing and can begin to devote my attention to *Principes*—a job too long delayed, but certainly a challenge in the next month or so. Our printer here has fallen in everyone's estimation.

* * *

April 23, 1957

Dear Hal:

Again thanks for the reprints. Cook did not deal with the history of the coconut palms in Fla. That's one for *Principes*. Let's have it, please. Would take a little digging to get the facts straight. Many people are under the impression that the coco is native;

Mowry so included it. I believe that's quite wrong. The earliest explorers were never mentioned seeing the coco palm. Cowgill told me that in 1900 there were blessed few cocos anywhere in Fla., said they really got going in quantity when shiploads were brought into Tampa. The subject would fascinate our members. Why don't I undertake it? No library. (Those interested in the latest on this question see Harries, H. 1978. *Evolution, dissemination and classification of Cocos nucifera L. Botanical Review* 44: 265-320.—Eds.)

* * *

30 April 1957

Dear Dent:

It seems to me most appropriate that we include photograph and biographical sketch of our retiring president along with what I hope will be the retiring president's report. If you can do that for me, I think somehow we will manage without the article on *Washingtonia*. Barry Tomlinson has sent in a long article on palm morphology—a report on progress to date as it were—which will take a fair amount of space accompanied as it is by two plates. With my own article on *Reinhardtia*, ones on the ages of palms, cultivation of *Sabal minor* in Pennsylvania, *Zombia*, and Dave Barry's note on *Jubaeopsis caffra* things are beginning to fill up. With the president's report, treasurer's report, a message from the editor, classified ads etc. it should be possible to manage a 28 page issue without too much filler material. At any rate, don't worry about the *Washingtonia*.

For the moment I am going to put a note in the suggestions file regarding

the history of *Cocos* in Florida. The reason for this being that with daylight saving time I seldom get in from Moorings before 9:00 p.m. and on my docket for this summer I have *Principes*, the finishing up of these blessed palm papers, a little job to do on the palms of Okinawa for Walker at the Smithsonian, a job to do on the palms of Guatemala for the Flora of Guatemala, some odds and ends on *Chamaedorea*. Since there are time limits on the two floristic treatments I have to give them preference and since these are all evening jobs, you can see that time is again at a premium.

* * *

May 24, 1957

Dear Hal:

Do you know anyone qualified to write an article on house palms for *Principes*? Occasionally somebody pesters me on that subject. Also occasionally on "how to start a palm nursery." *-&,* Have you thought of trying to continue a series on living palm collections in the U.S. at least? We have not yet had anything on the FTG or Jennings Collections. A small but good collection in Miami is Frank May's. I have various and sundry ideas for future issues of *Principes*, but hesitate to spring them for the reason that you probably have more on hand than you can get at. Any problems I can help you with?

* * *

27 May 1957

Dear Dent:

You must be wondering by now whether any progress has been made on *Principes*. I am happy to say that although I haven't written you for

some time I have kept a succession of letters going and finally Saturday morning after a solid week of working on it got *Principes* manuscript with the exception of a few filler items off to Lucita. As I was typing the accompanying letter I received a telegram from her stating that she had located a printer in Miami and surprisingly enough at a price less than Menninger's. I don't know how this will work but feel that most of my work has been done for the moment. Now I must finish the papers for *Gentes Herbarum* so that I can have a month or two without any sword hanging over my head.

I don't know what your reaction is going to be but I hope you will like what you see. I had enough material for 48 pages but have held back two articles so that we can have a 36 page issue. This seemed wiser in view not only of finances which apparently are OK but of balance in the magazine. I have held out Tomlinson's 11 page article on progress in anatomical studies in the palms since that plus my own paper on *Reinhardtia* would have considerably over balanced the issue on side of the technical. I would have dropped *Reinhardtia* were it not for the fact that I am including the combinations and one new description in it for "scientific tone." Tomlinson's work will make a nice technical contribution for October and in January I can follow up with a second taxonomic paper on *Veitchia*. It took a while to get some background for this job, but with the first issue on its way I think succeeding issues should be less difficult. I sincerely hope that you haven't been worrying and that your freedom has given you a chance to use the boat and do some of the many things that you have had to give up for the past year and a half.

You asked what I was doing on the land in addition to admiring it. Only

rain prevents me from working each evening there from 6 to 9. This is one resolution made to myself that I am keeping regardless of anything else. Weekends give me a chance to do even more. Thus far I have gotten most of my major lawn areas into some sort of shape and at last have finished the first dam bringing the water level up sufficiently so that I will have a very nice water lily pool close to 150 feet long and 20 feet wide. It is already planted and now I can hardly wait for action. This is my answer to the palms you have in your front yard. I hope the latter are doing beautifully.

* * *

June 3, 1957

Dear Hal:

No, I haven't wondered much and have not worried in the least about *Principes*. For several reasons. It would just not occur to me to doubt your ability to cope with the task, and much less to think that you would just let it slide. Besides those things, I must again say that I couldn't worry about any lack of original matter because of the marvelous library you have there at the Hortorium—which you could fall back upon any time that you were in a jam for material. But I hope you'll give us ignoramuses some of the older writings (and the older the better) without being in any jam. Unless you do, we shall never see the likes of them, for we haven't got access to Linnaeus, Humboldt, von Martius, y Cia. Or Beccari. Or even Small.

Still about *Principes*. You don't know what my reaction will be, but I can tell you in advance. It will be much better than just favorable. And as for the sweat that editors sweat, I don't care if it's perfumed or not, but always think it's as admirable as such

exudations can possibly be. Anyhow, the contents, as you outline them, sound good to me. I do hope that you remembered to use Russ Seibert's hydra-headed royal.

* * *

4 June 1957

Dear Dent:

So far things seem to be going reasonably well. Lucita's new printer has a good series of type faces and I can only hope that my scaling on previous issues of *Principes* will serve for this printer as well. There certainly is a lot to learn about this business and at this point I can only hope that the first issue under my name will be up to par.

* * *

19 June 1957

Dear Dent,

My own boat is out but not caulked nor varnished. Guess I'll be in the boat-owner but not -user category too! Your comments on the ownership of land are most true. Every second that I can manage finds me there. It is amazing what progress has been made. Now that plans for the basement are in my hands I hope to get going on construction—that is if I can find a contractor who will tackle the problem for a reasonable figure at this late date. Hope to be at RFD 2 this fall.

* * *

June 24, 1957

Dear Hal:

I'm glad to hear the pressure is letting up a little. I can readily understand how you would spend every

available moment at your bucolic retreat.

* * *

7 July 1957

Dear Dent,

Principes page proof went off to Lucita yesterday 30 seconds before the post office closed at noon. It looks fairly decent though I find I have a great deal to learn about editing. The next issue should be much easier all around. I feel that the printer has been very good so far and hope that the finished product will please you.

McCurrach wants to do a picture book along the lines of Hawkes with some help from me. I'm not sure that this will work out but do hope that we can talk it over. I am still holding out myself for a more definitive work even though it may take another few years. I can understand his hurry but can also understand my own desire for a more cautious approach especially after the headaches of the gesneriad job. If things work out, I want to convince him to come here where we can sit down in the midst of things and work with material as well as ideas.

* * *

17 July 1957

Dear Dent:

Mr. and Mrs. McCurrach have been here all day and undoubtedly will be here a good part of tomorrow. I am enjoying them very much indeed. I only hope that we will have given him enough stuff to make his trip worthwhile. In any event we certainly are glad to have had the company. I must say that I admire him for his enthusiasm and courage in attempting a job that is really a pretty big one.

Guess that is all for the moment. I hope that you will send me a criticism of the July issue of *Principes* without waiting to be asked. It may not be possible to get together on my ideas for the editorial board for a little while yet so any comments you have will be more than welcomed.

* * *

July 23, 1957

Dear Hal:

I have *Principes* before me. The thing that really "sends" me is, quite naturally, your contribution on *Reinhardtia*. It tells us non-botanists everything we are capable of absorbing and it tells the botanists much that is new to them and further illustrates for them a fact they should know, viz., that the publication will not hold interest for freshmen only. Now I know much more about the plant I have here, which appears to be *R. gracilis* var. *gracilior*. I have long hankered for a start of *R. elegans*, not only because it is called elegant but because it is a mountain palm and so should be very happy here. I must interject something else that has nothing to do with criticism, to wit, that my little plant now has incipient flowers on each of 3 stems, that it is more vigorous and a better color now, that I have to counsel caution about concluding that Florida may be too cold for it, and that I devoutly hope it will fruit this year. The illustrations accompanying your article are swell (the others are good too), and if the article seems too learned to some members it will nevertheless tend to make those members have increased respect (a synonym for admiration) for the work we are attempting to do. I especially commend it because you did not write down too

much and did not confine it to strait-jacket space. A very fine job, Hal.

In short, without going into any more detail, I think the issue is very good and I am truly pleased with it.

* * *

29 July 1957

Dear Dent,

Your fine letter of the 23rd was on my desk this morning when I returned from my summer's "vacation" of a weekend at Tanglewood in the Berkshires listening to some fine music during dry spells. It was encouraging to have your comments on *Principes*. I blanch at a number of items—none of them DS—to wit that the page head *Principes* was omitted throughout though I'm sure it was on the dummy I sent down. I certainly missed it in page proof too. Ah well! Also some typographical errors missed such as "beraking through." The fillers were written single column more or less at the last minute to fill space remaining in page proof. I rather prefer a 30 em line myself for such and will ordinarily use it when I can plan on it. The October issue ought to go much more easily for I have learned a great deal through this first issue of *Principes* and through a week of proof-reading with Miss Kurtz at Macmillan. I almost begin to feel that I know something of an editor's duties now.

* * *

20 Sept. 1957

Dear Dent,

Nothing like starting out with business. Firstly, since the Society is now incorporated I supposed that something should be done on the masthead

and wrote Walter about it. He feels, and I agree with him, that it is probably not necessary to have an Inc. after the title so we will leave it as is but substitute corporation for association in the write-up. October *Principes* is at the printers now but I haven't seen galleys. Perhaps Lucita will stir things up when she returns from her vacation. It looks as though we will have 40 pages this time with 8 of these being index. A quirk of mine—indexes—but I have hunted through so many unindexed periodicals of this sort that I felt we should do better by our members.

Here, things are beginning to straighten out. The book is out of my hands, *Principes* is in the works, I am making some progress in cleaning up the old farmhouse where I now live and once an editorial job for another book company is out of the way I hope to be free for palm work evenings. *Chamaedorea* is on the docket and I begin to feel the excitement that comes with setting out on a new project.

* * *

6 December 1957

Dear Dent,

I am substantially in agreement that palm lists are important to readers of *Principes*. In addition to the identification problem of palms in collections and errors in naming I have another objection to the repeated use of individual lists. That is in their repetitious nature. Unless they have a particular slant, i.e. at high latitudes, in areas where palms are being newly tried, my reaction (and perhaps only mine) is that they become just one more list of the same thing with perhaps a few additions or subtractions.

As a counter, would you comment on the following proposal. Nat has

asked more than once how botanical gardens could grow palms under erroneous names and often with plants grossly misidentified. For *Hortus*, I must of necessity deal with all the plants and names for the United States. As I read your letter, therefore, my mind jumped to a thought that cannot be put into effect immediately but might, in the long run, solve the problem—to wit an annotated list of the palms known to be in cultivation, not just in the United States but in both hemispheres.

Also in mind: a series of biographical sketches of palm students such as Martius, Beccari, Furtado, Dugand, Drude, Wendland, Giseke, Blume, Linnaeus f. (whose palm manuscript lies unpublished in the Linnaean Society and which we hope to have microfilmed with permission to write a story), Spruce, Wallace, Barbosa Rodrigues and so on for several lines; these obviously not to be written by one person!

I want sometime to contribute a "life history of a search for a name" (e.g. for *Chrysalidocarpus* "Soledad") to attempt an explanation of the "delay" in coming up with an identification.

These are a few of the many things that come to mind for original contributions and I suspect they will begin to come in as letters already written and to be written bring response. There are, as you point out, many re-putable accounts too. I hate to use too many of them if a supply of freshly written material keeps up. It seems too bad to duplicate when so much has yet to be said. Either way, one could keep *Principes* in fuel for years once the supply begins to flow.

I have noted your comments about the cover. May I give you mine? I cannot feel that the use of a handsome photograph and bold but simple print

on the cover of *Principes* can in any way cheapen it. We can't duplicate *Natural History* but if we can come close to having the photographic attraction of that magazine I'd feel we were doing something. When I look at a couple of Tibetan lamas with their pipes, or a New Guinea bird hunter, or Michaelmas Daisy on the cover of that magazine, I don't get that "Marilyn Monroe" sensation but I do get a very strong compulsion to dash for the contents but only after really absorbing the cover content. I would hope that we might do something of the same for palms in *Principes*. Shall we see how the January issue fares with the critics?

You are concerned with the amount of time required for *Principes*. So am I. One learns as one goes. Editing a college newspaper is a far cry from *Principes* (especially as it was years ago and I wasn't exactly the best editor the paper ever had). It sounded much easier than it has proved to be. The fault is mine and though I know it, I either have to do it my way or not at all. And the latter possibility appeals strongly at the moment.

If my name is to be associated with *Principes* then the criticism or praise should attach to me.

Unfortunately, by nature I seem so constructed that I can only do one thing at a time and that I like to do as well as I know how. If I can continue to feel that *Principes* warrants the time it takes from (to me) more productive research, then I want (whether I can or not remains to be seen) to do it in a piece with my full attention. My greatest headache here is the piecemeal way in which so many things have to be done at once—I find it extremely distressing and never do my best work that way.

The personal life that I promised myself is being pressured out of exist-

tence. I'm unhappy, to say the least, at the prospect of even further reduction. *Principes* is done, palms for Guatemala will be done, but I still don't have a sink to wash dishes in, nor have I finished painting, nor have I had time to work up a scale model of a prospective home to say nothing of thinking about it or getting a well drilled or electric plans made *ad nauseam*. And on top of all this, I fairly itch to work with palms and other plants, not with a typewriter. There's a satisfaction in working out problems with living materials and specimens and literature that no amount of editing, letter-writing, looking up answers to other people's problems, can match. In short, I'm a botanist.

* * *

15 December 1957

Dear Dent,

I cannot tell you how relieved I was to read through your letter. My spirits are considerably higher now and I had been afraid that in my lowness I might have offended. Actually, I enjoy the chore immensely—the real problem is the unceasing flow of questions and aggravating little jobs that come in here and keep me from my work as they keep you from your garden. But in 15 years I can shed all that. I am

trying to keep abreast of things as they come in for April and am confident that the job will be easier next time and increasingly so as manuscript piles up—and I think eventually it will do just that. From all appearances, it may be possible to have a 40 page issue in April. I would have done so this time were it not that adding 4 pages would have disrupted the arrangement of articles around the center spread.

Time flies and half this Sunday morning is gone. This afternoon I am going to put up my sink if it kills me thus eliminating one crying point!

* * *

17 January 1958

Dear Dent,

Principes for January arrived this morning. I'm pleased; are you? I'm looking forward to your comments.

Am at *Chamaedorea* hammer and tongs temporarily trying to get enough straightened out for the Guatemalan species. What a job the whole thing will be but what a wonderful pleasure it is to be at work on it. Ideas buzz around in my head 24 hrs. a day and I begin to see light. This is the life for me!

* * *

CLASSIFIED

AVAILABLE at this time, year old palm seedlings: *Acoelorrhaphe wrightii*, *Arenga engleri*, *Phoenix rupicola*, *Neodypsis decaryi*. RICHARD RUDY, 6830 77 St., Vero Beach, FL 32960.

Principes, 26(2), 1982, pp. 70-72

Salacca zalacca, The Correct Name for the Salak Palm

JOHANIS P. MOGEA

Herbarium Bogoriense LBN-LIPI, Bogor, Indonesia

In 1823 Blume proposed the name *Salakka edulis* in his catalogue without description, the name apparently suggested by Reinwardt when they worked in the Bogor Botanical Gardens. Later Reinwardt (1826) gave a fragmentary description of *Salacca* as a new genus based on his *Salacca edulis*. In the description Reinwardt also added some observations on the vegetative parts which were apparently based on living plants of the single species that he saw in Java, *S. edulis*. Reinwardt's description of *S. edulis* was very brief. A more detailed description was given by Blume in Roehmer & Schultes, *Systema Vegetabilium* Vol. 7 of 1830 (Farr et al. 1979). Later Blume gave a very full description of this species under the name *Zalacca edulis* in 1843. *Salacca edulis* Reinw. was the only species based on *Calamus salakka* of Willdenow (1799); the latter was based in turn on *Calamus zalacca* Gaertner (1791): Gaertner described *Calamus zalacca* from a fruit which was probably collected by Thunberg, as he stated "A CL. Thunberg" in the description. The fruit which Gaertner described and figured can belong to either *S. edulis* Reinw. or to *S. sumatrana* Becc. Since Thunberg is known to have visited Java but not Sumatra (Steenis-Kruseman 1950) and only *S. edulis* Reinw. occurs in Java, we may suppose that Thunberg's fruit described by Gaertner is *S. edulis* Reinw. This was the first validly pub-

lished name for a *Salacca* species after 1753. Therefore the taxon which was described by Reinwardt may be proposed as type species of the genus. This taxon is widely cultivated for its fruits especially in some localities in Java (Mogea 1978), and therefore it is not surprising that '*edulis*' was chosen as the specific epithet. However, as the generic name is correctly spelled *Salacca* and not *Zalacca*, *Salacca zalacca* is not a strict tautonym and must thus regrettably be the correct name for this species (c.f. *Normanbya normanbyi* (W. Hill) L. H. Bailey and *Lycopersicon lycopersicum* (L.) Karsten). Voss (1895) in Vilmorin's *Blumengärtnererei* published the combination *Zalacca zalacca* (Gaertn.) Voss, referring in the generic citation to Reinwardt, and thus incorrectly spelling the generic name. In the absence of a relevant rule concerning whether erroneously spelled tautonyms are or are not correctable, I propose to follow established custom and adopt Voss' existing combination after correction of spelling, rather than put forward a new combination. The salak palm is hence correctly cited as *Salacca zalacca* (Gaertn.) Voss.

The nomenclature of *S. zalacca* is indicated as follows:

Salacca zalacca (Gaertn.) Voss in Vilmorin's *Blumengärtnererei* ed. 3. edit. Sieb. & Voss 1: 1152. 1895, "*Zalacca zalacca*."—*Calamus zalacca* Gaertn., *Fruct. Sem.* 2: 267, t. 139 a—

f. 1796; Willd., Sp. Pl. 2: 204. 1799; Poir. in Lamk., Encycl. Méth. Bot. 6: 307. 1804; Spreng., Syst. Veg. 2: 17. 1825; Roxb., Fl. Ind. ed. Carey 3: 773. 1823.—*Salacca edulis* Reinw., Syll. Pl. Ratisb. 2: 3. 1825; Blume in Roehmer & Schultes, Syst. Veg. 7: ?. 1830 (n.v.); Rumphia 2: 159. 1843, '*Zalacca*'; F.T. Hubb. & Rehd. in Bot. Mus. Leaf. 1(1): 9. 1932; Furtado in Gard. Bull. Singapore 12: 384, fig. 1. 1949.—Type: "A Cl. Thunberg" (TUB), fr. presumably from Java.

Zalacca blumeana Mart., Nat. Hist. Palm. 3, 1st ed.: 202, t. 123, t. 159, III. 1838; Kunth, En. Pl. 3: 203. 1841; Mart., Nat. Hist. Palm. 3: 201, t. 123. t. 159, III. 1845; Becc., Malesia 3: 65. 1886; Becc. in Ann. R. Bot. Gardn. Calc. 12, 2: 77. 1918, atlas: pl. 1921.—Type: Blume s.n. (M, holo, sheets 244, 245; L) from Java, staminate plant.

Zalacca edulis (non Reinw.) Wall., Pl. As. Rar. 3: 14, t. 222–223, 224. 1831 is *S. wallichiana* Mart.

Zalacca blumeana (non Mart.) Ridl., in Trans. Linn. Soc. Bot. 3: 392. 1893 is *S. glabrescens* Griff.

Zalacca edulis (non Reinw.) Merr., Int. Rumph.: 114. 1917 is *S. zalacca* var. *amboinensis* (Becc.) Mogeia.

a. var. **zalacca**

b. var. **amboinensis** (Becc.) Mogeia var. *amboinensis* Becc. in Ann. R. Bot. Gardn. Calc. 12, 2: 74. 1918, atlas pl. 43. 1921.—Type: C.B. Robinson Pl. Rumph. Amb. 25 (FI, holo; BO; BH; K; L; US) from Moluccas, Ambon, Kusy-kusy Sereh, pistillate flower, fruit, VIII. 1913.

Zalacca edulis (non Reinw.) Merr., Int. Rumph.: 114. 1917. Based on *Zalacca* Rumphius, Herb. Amb. 5: 113, t. 57 f.2 and C. 1747.

Notes

Confusion in this genus was caused by the dioecious habit; moreover au-

thors often recorded the species uncritically for places where the living specimens in a botanical garden were supposed to originate. In 1831, Wallich described and illustrated a species from Burma, of which he had fruiting material and a staminate plant in the Calcutta gardens, said to be from Sumatra although this species has never been found there again. First he had intended to name it *Z. rumphii*, inscribing his plates with this name, but withdrew it in the text, placing the species, which we now know as *S. wallichiana* Mart., incorrectly under *Z. edulis*, acknowledging Martius for the suggestion. However, a few years later, Martius himself recognized Wallich's specimen as new, describing it under the name *Z. wallichiana*, in his *Historia Naturalis Palmarum* 3 (1838). He also described *Z. blumeana* as a new species, under which he cited *S. edulis* Reinw. as a synonym. Furtado (1949) suggested that Martius did this to avoid the false impression that all edible fruited species must be *S. edulis* because of the meaning of the specific epithet. As early as 1843 Blume himself correctly reduced the species named in his honor to *S. edulis*. A complication developed when just those pages of Martius' work dealing with *Salacca*, were in 1845 published again with additions (2nd ed.). The additions Martius made were largely taken from an important paper published by Griffith in the *Calcutta Journal of Natural History* of 1844. Griffith adopted *Z. edulis* in Wallich's sense (our *S. wallichiana* Mart.), adding three unnamed varieties; these in my opinion cannot be maintained. Beccari wrote three publications on *Salacca*, the first in Malesia III in 1886 accounting for his collections from Borneo and Sumatra. The second, with Hooker in the *Flora of British India* in 1893, deals

chiefly with the Malayan species, and the third is a full monograph in Annals of the Royal Botanic Garden Calcutta, the text in 1918 followed by the plates in 1921. A plant from Sumatra was included by him in *Z. edulis* in 1886, but described as a new species *Z. sumatrana* in 1918. He also reinstated *Z. blumeana* (which Blume had correctly reduced to *Z. edulis*), adding some materials and referring one of Martius' figures to *Z. edulis* but did not greatly alter the concept of this species. In 1893 Ridley recorded *Z. blumeana* from Malaya, but Furtado (1949) rightly referred it to *S. glabrescens* Griff. From Ambon no data had been received since Rumphius, to whose work so many authors had referred, until C. B. Robinson made a collection of the *Salacca* plant there. Merrill, on Beccari's advice, placed it in his interpretation of 1917 under *Z. edulis*, but Beccari, in his monograph of 1918, described it as *Z. edulis* var. *amboinensis* Beccari. This did not, however, end the confusion about *Salacca zalacca*. We remember that in 1886 Beccari had placed Sumatran material under his Javanese species. In 1918 he took the former and described it as a new species *Z. sumatrana* Beccari; under *Z. edulis* he described new Sumatran material as var. *riowensis* of which the identity remains doubtful, but is close to *S. sumatrana*. Beccari also described under *Z. blumeana* (i.e. *S. zalacca*) a var. *rimbo* from Sumatra, which has now been reduced to *S. sumatrana*. Under his *Z. edulis*, Beccari expressed uncertainty about the identity and distribution of the species. Indeed, Beccari did not have the advantage of a clear starting point, which

gave priority to Gaertner's fruit, nor can he originally have had a clear notion of the type method which indicates Thunberg's fruit from Java as the type of *S. edulis*, a synonym of *S. zalacca*. Our work has revealed that *S. zalacca* is the only species in Java, and was only recently collected in North Sumatra. *Salacca zalacca* is wild in Southwest Java and South Sumatra. This species is widely cultivated in Java, Madura and Bali. Within its area, there are differences between the genuine Javanese form and another variety from Bali. The one from Bali is the same as that from Ambon, i.e. *Salacca zalacca* var. *amboinensis*.

Acknowledgments

This paper was prepared to clear up the taxonomy and nomenclature of well-known *S. edulis* in answer to a critical question from the late Prof. H. E. Moore, Jr. of L. H. Bailey Hortorium, Cornell University, New York, USA. Dr. J. Dransfield to whom I wish my sincere thanks drew my attention to Voss' combination and kindly helped me with some valuable suggestions during the preparation of the manuscript. Thanks are also due to Dr. R. K. Brummitt and Dr. D. H. Nicholson for their opinion concerning tautonyms.

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Clinostigma in New Ireland

JOHN DRANSFIELD

Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, U.K.

Abstract

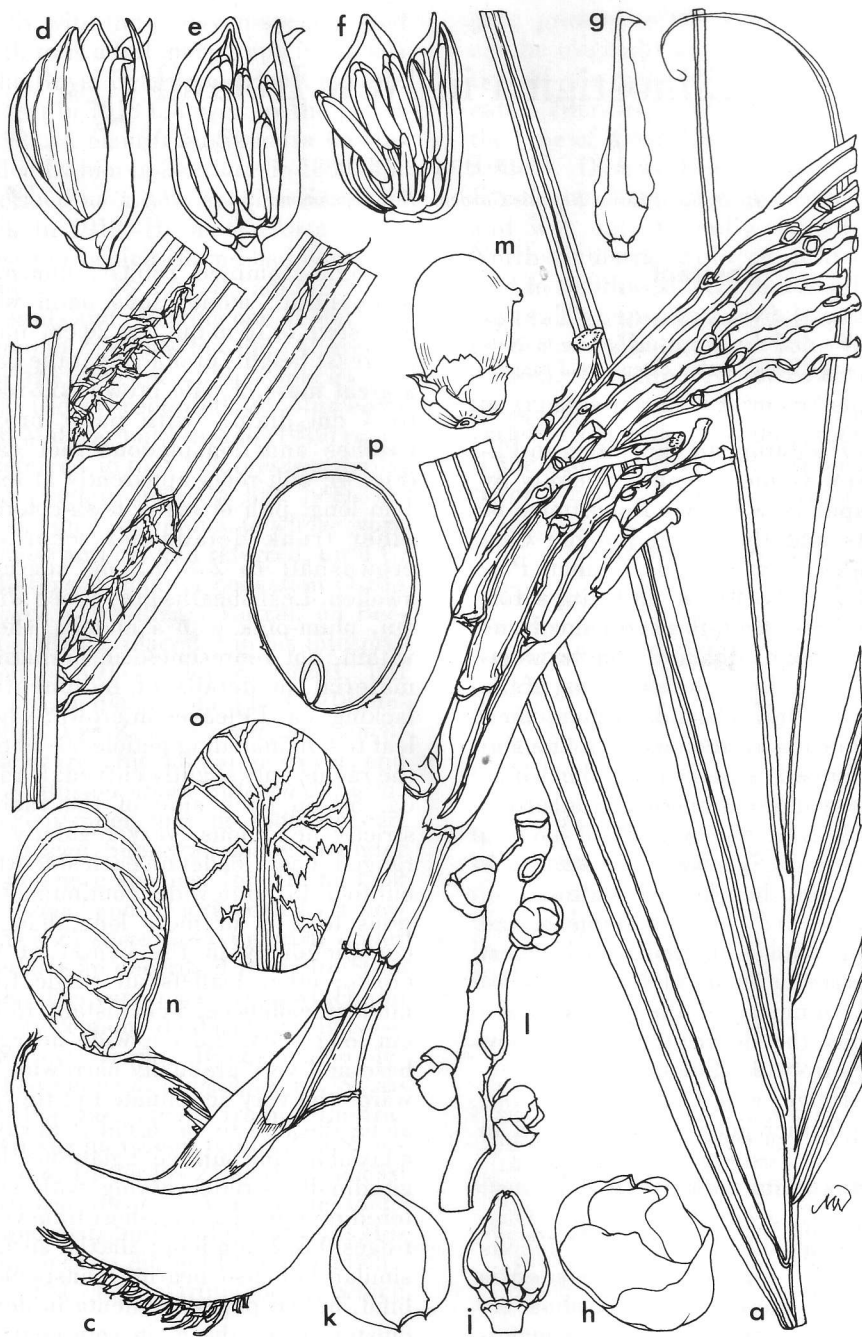
A new species, *Clinostigma collegarum*, represents the first record for the genus in New Ireland and a considerable extension of range.

In 1975 during an expedition to Papua New Guinea organized jointly by the Papua New Guinea Department of Forests and the Royal Botanic Gardens Kew, Martin Sands, Graham Pattison, Jeffrey Wood and Jim Croft reached montane forest in the Hans Meyer Range, about 8 km to westwards of Taron on the east coast of the island of New Ireland. Among their collections is a specimen of a fine single-stemmed, stilt-rooted palm which obviously differs in flower details from *Gulubia* and *Gronophyllum* (genera which were expected); the staminate flowers with their keeled acute sepals, their lob-sided petals, 6 stamens, and small pistillode immediately suggest *Clinostigma*. Moore (1969) provided a useful summary of the genus to accompany the description of two new species from the Solomon Islands, *C. haerestigma* and *C. gronophyllum*, and a further account is provided in Moore and Fosberg (1956).

***Clinostigma collegarum* J. Dransf.**
sp. nov. *C. gronophyllo* insulae Guadalcanal ut videtur affinis sed foliis conspicue pendulis, inflorescentia multo robustiore rachillis pluribus, sepalis floris masculi petalis aequantibus, fructu ovoideo differt.

Typus: New Ireland, *Sands et al.* 2552 (holotype K).

Single-stemmed robust, unarmed pleoanthic, monoecious palm with grey stem to 16 m tall, ca. 20 cm diam. at breast height, producing at the base a great mass of pale brown stilt-roots to 4 cm diam., with paler brown patches and conspicuous root caps (Fig. 4); stilt-roots apparently at least 1 m long; pith of trunk flesh-colored; other trunk details not recorded; crownshaft to 2 × 0.2 m, scarcely swollen. Leaf sheaths grey-green without, plum-pink with a metallic sheen within, not represented in herbarium material so details of indumentum lacking; ca. 13 leaves in crown; whole leaf to 4 m including petiole 60-70 cm, the rachis only slightly curved; leaflets ca. 56 on each side of the rachis, strictly pendulous, very regularly arranged; basal leaflet on each side without fold, to 5 mm wide, continuing into reins to 2 m or more long, hanging conspicuously in the center of the crown; other leaflets all single fold; midleaf leaflets ca. 5 cm distant, to 117 cm long × ca. 2.8 cm wide near the base and very gradually narrowing towards the very acuminate tip; tip split along the fold to ca. 6 cm (? always); adaxial lamina surface ± glabrous, longitudinally striate, drying with scattered prominent, very short transverse ridges 0.5-2 mm long; abaxial surface similar but also bearing conspicuous bifid, brown papery ramenta in dense clusters along the main vein near the base, and scattered to ca. 30 cm above the base, and minute scales all over the surface. Inflorescences infrafoliar,



1. *Clinostigma collegarum*. a, leaf tip $\times 2/3$; b, abaxial surface of two mid-leaf leaflets showing ramenta $\times 2/3$; c, infructescence with rachillae removed, viewed from the side, showing the bulbous base of the peduncle $\times 2/3$; d, staminate flower $\times 4$; e, staminate flower with one petal and two sepals removed



2. View through the crowns of *Clinostigma collegarum* from the mountain ridge top to the coast of New Ireland (photo. J. Wood).



3. A windblown group of *Clinostigma collegarum* (photo. J. Wood).

\pm scopiform ca. 8 exposed at any time, erect at anthesis, ca. 70 cm long, increasing somewhat with age, and becoming \pm horizontal; base of peduncle with 2 wings encircling the stem, to 14 cm wide in all; base of peduncle flattened at anthesis, swelling grossly as the fruit develops, to form a bulbous boss to ca. 4.5 cm thick, pushing the inflorescence away from the trunk; bracts 2 only, the inner partially preserved glabrous; first order branches spirally arranged, ca. 20 in all, the apical unbranched, the basal soon branching to produce up to 48 rachil-

lae; rachillae glabrous, \pm pendulous, angular, slightly zig-zag, at anthesis ca. 45 cm long, ca. 3 mm diam. near the base decreasing to ca. 1 mm near the tip, bearing triads each subtended by a minute triangular bract except near the tip where triads replaced by solitary or paired staminate flowers. Staminate flowers drying brown, ca. 6 mm long; sepals 3, free \pm to the base, narrow, elongate, \pm keeled, to 6×1.5 –2 mm, tip and margins incurved; petals 3, valvate, free \pm to the base, asymmetric, acute, strongly nerved, to 5×3 mm; stamens 6,

←

$\times 4$; f, vertical section of staminate flower to show pistillode $\times 4$; g, sepal of staminate flower $\times 4$; h, pistillate flower $\times 4$; j, ovary $\times 4$; k, petal of pistillate flower $\times 4$; l, detail of section of rachilla with pistillate flowers $\times 2$; m, mature fruit $\times 4$; n, seed from one side $\times 4$; o, seed showing longitudinal hilum $\times 4$; p, vertical section of seed $\times 2$. Drawn from *Sands et al.* 2552 by Mary Millar Watt.



4. The stilt-roots of *Clinostigma collegarum*
(photo. M. J. S. Sands).

somewhat shorter than the petals, with filaments to 1.5 mm and anthers to 3×0.7 mm; pistillode conical to 15 mm. Pistillate flower in bud globular, ca. 5 mm diam.; sepals 3 imbricate, \pm rounded, to 3×3 mm; staminode minute; ovary somewhat conical. Fruit ripening from yellowish to scarlet, borne on the enlarged perianth whorls; mature fruit \pm ovoid, to 12×8 mm, bearing the stigmatic remains on a short subapical beak to 2×1.5 mm, usually less; epicarp drying \pm smooth; mesocarp apparently thin; endocarp thin. Seed ovoid, ca. 9×6 mm, with longitudinal hilum; endosperm homogeneous; embryo \pm basal (Fig. 1).

Specimen Examined. BISMARCK ARCHIPELAGO: NEW IRELAND; Manatanai Sub-Province, Hans Meyer Range, on steep ridge ca. 8 km WNW of Taron on East Coast ($152^{\circ}58'E$, $4^{\circ}26'S$), montane forest of *Syzygium*,

Podocarpus, with frequent thickets of bamboo, alt. 1,350 m, 26.10.1975, M. J. S. Sands, G. A. Pattison, J. J. Wood and J. Croft 2552 (holotype K; isotypes BH, BISH, BO, CANB, L, LAE, PNH, USF).

This is a striking and beautiful palm (see cover and Figs. 2 and 3); it is to be hoped that it may eventually be introduced into cultivation. The specific epithet honors my colleagues at Kew, Messrs. Sands, Pattison, and Wood.

Clinostigma with about 13 species has a remarkable distribution occurring in a great arc from the Bonin Islands and Carolines in the north, south, and eastwards through the Western Pacific to the New Hebrides, Fiji and Samoa. The discovery of two new species in the Solomon Islands in 1965 helped to fill in a great gap between the New Hebrides and Ponape; *C. collegarum* helps further to fill in the arc, at the same time suggesting links between New Ireland and the Pacific rather than the more expected links with New Guinea.

Acknowledgments

Martin Sands and Jeffrey Wood provided habitat details and the photographs; Mary Millar Watt prepared the diagnostic drawing.

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Cultivated Palms in Tahiti and The Jardin Botanique de Papeari

DON HODEL

881 Sycamore, La Habra, CA 90631

While living in Tahiti for six months in 1980 and early 1981, I had the opportunity to survey the palms that are cultivated there. It must be noted that no palms are presently known to be endemic or indigenous to Tahiti and her immediate islands of Moorea, Huahine, Raiatea, and Bora Bora. The closest naturally occurring palms are *Pritchardia vuylstekeana*, known from Makatea, about 150 miles north of Tahiti; *P. pericularum*, reported from the Tuamotu Archipelago to the east of Tahiti; and the famous *Pelagodoxa henryana*, found in the remote Marquesas Islands about 750 miles northeast of Tahiti. Mention is made in Langlois (1976) of the possible existence of a *Balaka* in Tahiti but this is not too probable. It is now thought, as Langlois speculated, that the report of a *Balaka* from Tahiti by Pickering of the United States Exploring Expedition in the 19th century was due to human error in the mislabeling of an herbarium folder from Samoa to Tahiti.

The present state of cultivated palms in Tahiti is only slightly more encouraging than that of the native palm situation. In fact, with the exception of the coconut, palms are not at all common in Tahiti and are very rarely seen. My survey revealed that there are only 33 species of palms currently established successfully. Although a few species may be seen scattered here and there throughout

Tahiti, the best, and for all intents and purposes, the only location for viewing palms in Tahiti is at the Jardin Botanique de Papeari, a 35 mile and one hour drive along the south coast from Papeete. Almost all 33 species of palms can be seen at the Jardin Botanique.

Jardin Botanique de Papeari

The Jardin Botanique de Papeari was originally the estate of Harrison Willard Smith, an American from Boston Massachusetts, who was a professor of electrical engineering at Massachusetts Institute of Technology. In 1919, after serving as a volunteer ambulance driver on the western front in World War I, Smith gave up his professorship at M.I.T. and position of instructor in navigation for the U.S. Navy and abandoned the amenities of western living to return to his beloved Tahiti that he had initially visited and fell in love with in 1903. There he lived out the remainder of his life in simple native fashion until his death in 1947.

Upon his return to Tahiti in 1919, Smith set about building a tropical paradise and purchased Motu Ovini, a flat promontory of land laced by the Vaite River and heavily fringed with coconut palms, that juts into the spectacular blue, green, and turquoise waters of the Papeari Lagoon. A more idyllic setting for a tropical garden could not have been chosen. In addi-

tion, Smith acquired hilly land, containing three small protected valleys and their adjacent plateaus, that is directly opposite and across the around-the-island road from Motu Ovinu. The entire estate was known as Motu Ovinu. Today, the Jardin Botanique is composed solely of the flat promontory of land on the lagoon side of the road while the hilly land across from the Jardin on the opposite side of the road is privately owned. This latter area is now an overgrown jungle but contains a wealth of plant material with some specimens, palms included, being the only or the most outstanding examples of Smith's numerous introductions. It is hoped that someday this area will become part of the Jardin Botanique.

Harrison Smith has been described as a gracious, humorous, considerate, and personable but outspoken man whose altruistic nature and love and compassion for Tahitians are well illustrated by, among other things, his donations of funds to build the first school and hospital in his district. In addition, he made generous loans to farmers, gave money to schools, assisted the poor, and protested to the government about the ease of access to alcohol by the natives and the destruction it was causing. He also distributed seeds and plants of his introductions to all those interested, making Papeari the "flower district" of Tahiti which it still is today (Barrau and O'Reilly 1972).

Although he had travelled widely, having visited Sumatra, Sarawak, Borneo, Moluccas, New Guinea, New Zealand, Australia, Hawaii and Panama, and was well educated, having graduated from Harvard in 1895 and M.I.T. in 1897, Smith deplored large cities and wealth, opting instead for a simple native lifestyle. In fact, visitors to Motu Ovinu were always requested to give a loud warning shout upon their

arrival for Smith was usually out and around, dressed in his typical attire which was nothing! Smith was close friends with the writers Charles Nordhoff and James Hall of the *Bounty Trilogy* fame, and John Russel and Robert Dean Frisbee. A prolific letter writer, he corresponded with such great botanists of his time as David Fairchild and Elmer Merrill and botanical institutions around the world, not only to exchange scientific information but to procure seeds of valuable plants for introduction into Tahiti. Much revered and nicknamed "Grandfather of Trees" by Tahitians, Smith was responsible for introducing over 250 species of plants into Tahiti during the 1920's and 1930's for his gardens at Motu Ovinu. This is remarkable when one considers that in those days the mode of mail carriage was ocean steamers which stopped only occasionally in Tahiti on their months-long trans-Pacific voyages. Most of his introductions are plants of food and/or economic value but many, like the palms, are outstanding ornamentals.

Before his death, Smith attempted to donate Motu Ovinu to Harvard University as a tropical experiment station but this could not be arranged. Finally in his will, he left his gardens to Jean-Marie Boubee, who along with Edward John Spies, an American who lived nearby, was Smith's right-hand man. Boubee in time sold Motu Ovinu to an American industrialist from Chicago, Cornelius Crane, who had philanthropic ties with Tahiti. In the early 1950's, Crane donated a parcel of land of about 40 acres, consisting of the flat point of land on the lagoon side of the road, to the Territory of Tahiti with the expressed wishes that the portion of Smith's botanical collections contained therein be maintained and open to the public. Today, the Jardin Botanique is administered under a dual



1. A trio of *Pelagodoxa henryana* located across the road from the Jardin Botanique.

program of the Territory of Tahiti and the Harrison Smith Foundation with Michel Guerin, a Palm Society Member, as director and Tevai Vanaa as foreman, and houses, in addition, a museum honoring Paul Gauguin, the French painter of Tahitian fame.

Thanks to Harrison Smith, there are many fine old specimens of plants, including palms, at the Jardin Botanique that date back to the 1920's and 1930's. This is the great attraction of this garden besides its idyllic setting; all the plants introduced by Smith are now approaching 60 years of age and as such are fully grown and mature, placing them in their prime as botanical specimens. Two exceptions to this among the palms are *Corypha elata* and *Metroxylon warburgii* which flowered, fruited, and died in 1976-1978

but have been replanted as young plants.

The palm that Tahiti and the Jardin Botanique are famous for is, of course, *Pelagodoxa henryana*. For detailed accounts accompanied by excellent photos of this palm in Tahiti and the Marquesas, see Gillett (1971) and Sneed (1974) and (1979). While Tahiti and in particular the Jardin Botanique are famous for *Pelagodoxa*, there are other magnificent palm specimens at the Jardin meriting special mention. Among these are several fine old plants of *Arenga pinnata* and several enormous clumps of *Oncosperma tigillarum*, the latter with trunks up to 80' tall. Both are located on the hills across the road opposite the Jardin Botanique. In the Jardin proper, palms worth noting include large clumps of



2. Clumps of *Nypa fruticans* thrive in brackish water ponds in the Jardin Botanique.

Nypa fruticans, a 35' tall *Phoenicophorium borsigianum*, several very tall *Areca catechu*, two *Pritchardia* spp. from Polynesia, and a handsome grand allée of *Chrysalidocarpus madagascariensis* v. *lucubensis*, many of them over 50' tall. All the above are fruiting and with the exception of the *Arenga* and *Oncosperma*, are located along the grand allée of *Chrysalidocarpus madagascariensis* v. *lucubensis*.

Papeari has a very wet and warm climate that makes it possible for the most tender and sensitive of tropical plants to thrive. The average annual rainfall is 100" while the mean annual temperature is 80° F. Almost all the species of palms have become naturalized throughout the Jardin Botanique due to the amiable climate. This naturalizing of palms is very prevalent

in the swampy and shady areas in and adjacent to the intriguing forest of native *Inocarpus edulis* (Tahitian Chestnut or *Mape*) trees. This forest of *Mape* trees with their huge but very thin, plank-like buttresses reaching 30–40' up the tree and numerous flying stilt roots spreading out over the dark still water is one of the outstanding features of the Jardin. Several species of palms have also become naturalized in the forest on the hills and in the valleys opposite and across the road from the Jardin Botanique. Here, in the 1920's Smith planted such great forest giants as *Cavanillesia*, *Durio*, *Sterculia*, *Pterocarpus*, *Swietenia*, *Terminalia*, *Bombax*, *Couroupita*, *Parkia*, and *Artocarpus* that are now spectacular specimens pushing their crowns over 100' high, creating



3. Sixty-year old plants of *Areca catechu* are now almost sixty feet in height.

a shady jungle where palms have become well naturalized.

In addition to palms, visitors to the Jardin Botanique cannot help but be captivated by the various trees and shrubs introduced by Smith that are noted for their spectacular floral displays. Among these are *Brounea* spp., *Saraca* spp., *Cassia* spp., *Amherstia nobilis*, *Warszewiczia coccinea*, *Medinilla magnifica*, *Clerodendrum* sp., and various gingers and heliconias. High overhead in the crowns of tall trees, large vines such as *Mucuna* spp., *Strongylodon macrobotrys*, and *Thunbergia mysorensis* are eye-openers with their showy flowers. Also noteworthy at the Jardin are such famous tropical fruit and spice trees in-



4. Two young plants of *Chrysalidocarpus madagascariensis* var. *lucubensis* in the Jardin Botanique are handsome specimens.

roduced by Smith as *Garcinia mangostana* (mangosteen), *Nephelium lappaceum* (rambutan), *Lansium domesticum* (lansett), *Durio ziebitinus* (durian), *Citrus* cf. *grandis* (pamplemousse), *Cinnamomum zeylanicum* (cinnamon), *Pimenta dioica* (allspice), and *Myristica fragrans* (nutmeg).

Harrison Smith died on January 3, 1947 at Motu Ovini in Papeari. On the night of his death, the local Tahitian villagers cut a trail to a point on one of the plateaus across the road from and overlooking Motu Ovini. Here they laid their beloved friend to rest. Today, it is a steep but interesting walk through a dense jungle of trees to Smith's gravesite where the visitor will be rewarded with a spectacular view of Motu Ovini and the Papeari Lagoon. The trees and palms of the Jardin Botanique and those that have been scattered from there throughout



5. This *Pritchardia* sp. was thought originally to be *P. vuykstekeana* but its identity is now uncertain.



6. A graceful specimen of *Heterospathe elata* that originated as a volunteer on the edge of the *Mape* forest. This species has become naturalized extensively in the Jardin Botanique, forming beautiful stands in and near the *Mape* forest.

Tahiti, all stand as living monuments to the pioneering efforts of the "Grandfather of Trees."

Cultivated Palms in Tahiti

The following list of palms that are cultivated in Tahiti is by no means exhaustive as I did not have time to search out every back road. The list includes only those species established in the ground as of January 1981. The Jardin Botanique has in its nursery young seedlings of many species not included on my list and waiting to be set out in the grounds. In the years to come these will swell the number of species of palms cultivated in Tahiti.

Aiphanes caryotaefolia—one fruiting specimen across the road from

the Jardin Botanique, a few fruiting specimens elsewhere.

Areca catechu—several very tall fruiting specimens in the Jardin Botanique, several fruiting specimens elsewhere.

Arenga pinnata—several fruiting specimens and many naturalized seedlings across the road from the Jardin Botanique, none seen elsewhere.

Caryota aff. *cumingii*—a few flowering specimens at the Jardin Botanique, very few elsewhere, identity of this species not certain.

Chrysalidocarpus lutescens—several fruiting specimens and naturalized seedlings in the Jardin Botanique, several fruiting specimens elsewhere, fast becoming one of



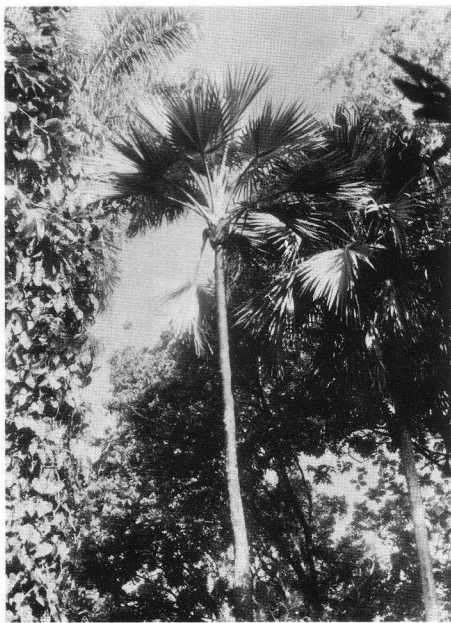
7. *Livistona rotundifolia* (right) and *L. saribus* (left) are stately palms in the Jardin Botanique.

the most widely planted palms in Tahiti.

Chrysalidocarpus madagascariensis v. *lucubensis*—a handsome grand allée of old fruiting specimens in the Jardin Botanique, naturalized in Jardin Botanique and adjacent areas, several fruiting specimens elsewhere, becoming more widely planted.

Coccothrinax sp.—rare, only a few fruiting specimens in Tahiti, none at the Jardin Botanique.

Cocos nucifera—abundant in the Jardin Botanique and throughout Tahiti, introduced by the early Poly-



8. Two tall specimens of *Latania* sp. grow side by side in the Jardin Botanique, the only location in Tahiti where two individuals (and in this case, both sexes) can be seen together.

nesians to whom it was the tree of life, widely used today for its domestic and landscape value.

Corypha elata—several young plants in the Jardin Botanique grown from seed collected when the initial tree flowered and fruited from 1976–1978; naturalized in the Mape forest, a few young plants elsewhere, possibly is *C. umbra-culifera*.

Elaeis guineensis—several fruiting specimens in the Jardin Botanique, a few fruiting specimens elsewhere.

Gaussia sp.—one fruiting specimen in the Jardin Botanique, none elsewhere.

Heterospathe elata—several fruiting specimens in the Jardin Botanique, naturalized in the Jardin

- Botanique and adjacent areas, none seen elsewhere.
- Howea forsterana*—only one immature specimen cultivated in a private residence in Papeari, none elsewhere.
- Latania* sp.—one male and one female tree adjacent to each other in the Jardin Botanique, with few seeds produced; several mature handsome specimens elsewhere, but always occurring as lone individuals so there is little chance for seed production.
- Licuala grandis*—several fruiting specimens in the Jardin Botanique, several fruiting specimens elsewhere with a handsome planting of mature specimens along Avenue Bruat in Papeete; a popular palm among Tahitians, many young plants to be found in yards and nurseries.
- Licuala spinosa*—two fruiting specimens observed in private residences on Tahiti, only seedlings in the Jardin Botanique.
- Livistona australis*—several fruiting specimens in the Jardin Botanique where becoming naturalized in the *Mape* forest, a few fruiting specimens elsewhere.
- Livistona rotundifolia*—one fruiting specimen in the Jardin Botanique, a few fruiting specimens elsewhere, becoming popular among Tahitians for use when young as a pot plant.
- Livistona saribus*—several fruiting specimens in the Jardin Botanique where becoming naturalized in the *Mape* forest, a few fruiting specimens elsewhere.
- Metroxylon warburgii*—a few young plants in the Jardin Botanique grown from seed collected when a tree flowered and fruited 1976–1978, a few young trees.
- Nypa fruticans*—many large fruiting specimens in the brackish water ponds in the Jardin Botanique, none seen elsewhere.
- Oncosperma tigillarum*—five magnificent clumps of fruiting specimens and naturalized seedlings located across the road from the Jardin Botanique, none seen elsewhere.
- Pelagodoxa henryana*—at least 15 fruiting specimens in Tahiti, 12 at the Jardin Botanique or adjacent areas across the road; not all produce viable seeds; becoming popular with Tahitians.
- Phoenicophorium borsigianum*—one 25' tall fruiting specimen at the Jardin Botanique, none seen elsewhere.
- Phoenix dactylifera*—none at the Jardin Botanique; three mature specimens, one fruiting, in Paea outside of Papeete.
- Pritchardia* sp.—two fruiting specimens of this handsome palm at the Jardin Botanique; one seen elsewhere, originally thought to be *P. vuylstekeana* but the late Dr. H. E. Moore, Jr., after studying material sent to him in 1979, indicated it has a closer affinity with *P. maideniana* which was described and known only from a cultivated specimen in the Sydney Botanic Gardens, Australia.
- Ptychosperma elegans*—several fruiting specimens in the Jardin Botanique; a few elsewhere, naturalized in Jardin Botanique and adjacent areas across the road.
- Ptychosperma macarthurii*—several fruiting specimens in the Jardin Botanique; very few elsewhere, naturalized in Jardin Botanique and adjacent areas across the road.
- Rhapis excelsa*—one mature clump in Jardin Botanique, rare elsewhere in Tahiti.

Roystonea regia—one fruiting specimen at Jardin Botanique, several fruiting specimens elsewhere.

Sabal sp.—fruiting specimens of an undetermined *Sabal* at several localities, none at Jardin Botanique.

Socratea durissima—a few seedlings in Jardin Botanique and elsewhere; in January, 1981, the only fruiting specimen in all of Tahiti, a handsome tree located in the Jardin Botanique, for no apparent reason fell over and had to be cut and removed.

Thrinax sp.—one fruiting specimen in Jardin Botanique, a few fruiting specimens elsewhere.

Veitchia merrillii—one fruiting specimen at Jardin Botanique, rare elsewhere.

Acknowledgments

Much of the biographical information of Harrison Smith was obtained from Barrau and O'Reilly (1972), news clipping from the *Boston Herald* obituary for Smith, and the 50th and 55th Class of 1895 Reports from Harvard University. Additional information was obtained from Mrs. Edward John Spies, Christina Spies, and Marianne Spies Hodel, wife, daughter, and granddaughter respectively, of Edward Spies, Smith's close friend. Michel Guerin, Director of the Jardin Botanique, contributed palm information and some historical data on Smith. All the above deserve sincere thanks.

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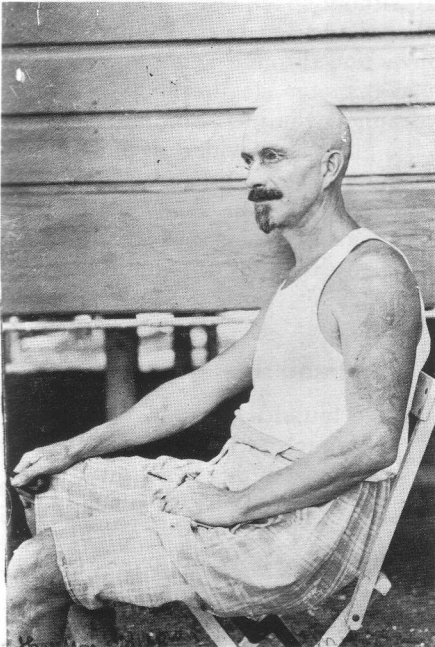


Fig. 9. Harrison Smith, ca. 1930.

Raising Ornamental Palms

ROSS I. WAGNER

4943 Queen Victoria Road, Woodland Hills, CA 91364

There is no "how to" book to provide detailed information for the amateur horticulturist attempting to raise ornamental palms. Until such time as a manual of this sort is written, one must be guided by fragmentary information published on a limited number of palm species. Extensive studies have been directed toward defining the optimum conditions necessary for the germination and culture of only a few species of economically significant palms. Some data are available for many of the extensively cultivated ornamental palms as well as a lesser number of rarer species. These must be applied by analogy to species of unknown horticultural requirements. I report herein the results of my efforts to germinate and grow a number of species both common and rare hoping that some of the information presented will promote a more successful propagation of these palms.

All of the horticultural work was done in a greenhouse in the southwest section of the San Fernando Valley, Los Angeles, California. The climate in this area at an elevation of about 950 feet is insulated by the Santa Monica Mountains (approx. 1,500 ft. high) from the moderating effect of the Pacific Ocean some nine miles distant. The climate is Mediterranean—mild, moderately rainy winters and hot, dry summers. Table 1 gives the monthly average maximum and minimum temperatures observed over the past several years. Maximum temperature in the greenhouse is usually 5-10° F

above the outdoor maximum, but occasionally it is a few degrees below when hot dry winds blow from the desert. The minimum temperature is maintained at 55° F by an electric space heater (5 kw) and thermostat controlled bench cables distributing 12 watts/ft².

The greenhouse consists of a 9' × 12' × 10' high redwood and glass structure plus an attached 9' × 7' × 10' high redwood and acrylic structure lined with polyethylene film but without space heat. Air circulation (other than from heater) is by natural convection through vents operated by a "heat motor" (a thermally operated hydraulic cylinder). Summer shading of the glass is provided in part by overhanging tree limbs and the remainder by 50% Saran shade cloth. The acrylic structure is not shaded. No provision exists for automatic humidity control.

Plant and Seed Acquisition

I have found it advantageous to remove as much of the potting medium as possible from newly acquired palm seedlings or plants without seriously disturbing the roots and to replace it with a potting mix of my own. The rationale for this procedure is first that the old mix will most probably have a different capacity for retaining moisture or absorbing nutrients and second that it is more convenient to provide all my plants with a common potting medium rather than to change my

Table 1. Average Monthly Temperature Maxima and Minima (Superscript is the number of days minimum temperature fell to 32° F or below. Subscript is the lowest minimum recorded during the month.)

Month	1974		1975		1976		1977		1978		1979		1980		7-year average	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
JAN	57	39 ₂₅ ⁴	65	38 ₂₄ ⁷	68	37 ₂₄ ⁷	59	37 ₂₈ ⁷	58	40 ₃₀ ³	53	34 ₃₂ ^{1,1}	60	42 ₃₂ ¹	60	38 ⁶
FEB	67	37 ₃₀ ³	63	37 ₂₉ ⁵	63	40	71	40 ₃₁ ¹	61	40 ₃₁ ¹	60	35 ₃₀ ¹⁰	64	42 ₃₀ ³	64	39 ³
MAR	66	42 ₃₁ ¹	64	38 ₃₀ ⁹	68	38 ₂₈ ⁴	62	35 ₂₈ ⁸	66	44	64	39 ₂₈ ²	62	38	65	39 ⁸
APR	78	42	63	38 ₂₉ ³	67	39 ₃₁ ¹	75	41	65	41	70	41	70	42	70	41 ¹
MAY	76	48	78	45	78	47	68	42	79	46	74	46	67	44	74	45
JUNE	90	51	78	48	88	50	83	51	86	50	85	51	81	47	84	50
JULY	93	57	99	53	88	56	94	53	91	53	89	53	92	55	92	54
AUG	90	54	89	52	86	52	90	57	86	53	84	55	85	55	87	54
SEP	92	54	89	55	78	57	82	51	86	54	93	55	83	51	86	54
OCT	76	49	74	45	81	50	79	48	81	50	75	47	80	46	78	48
NOV	71	41	68	39 ₂₇ ⁵	73	46	73	43 ₃₂ ¹	61	38 ₂₈ ⁶	65	39 ₂₇ ²	68	40 ₃₂ ¹	68	41 ²
DEC	60	38 ₂₇ ⁵	64	39 ₃₀ ⁴	64	37	62	43 ₃₂ ¹	55	32 ₂₂ ¹⁷	63	38 ₂₇ ⁶	66	39 ₂₉ ³	62	38 ⁵

watering and fertilizing regimen to suit a diversity of other media. Since adopting this practice, loss of plants has been reduced due particularly to decreased fungal attack (damping off). If the root structure has been unduly disturbed, I treat with a vitamin B₁ solution in addition to the usual fungicidal treatment.

By far the most common means of propagating palms is from seed. Division of plants (limited to those which produce suckers) is also much practiced while air layering or ground layering is used only infrequently on a few species which can develop roots along the stem. Virtually all articles on palm horticulture stress the importance of promptness in planting seeds since those of many if not most species lose viability rather quickly (De Leon 1958). All soft fruit tissue should be removed and the seed should then be washed, dried, and treated with a fungicide as soon after collection as possible. The seed is then either planted or packaged in polyethylene bags together with a small amount of damp peat moss for transport to the planting site for prompt planting.

Germination

My seed bed is a 2' × 10' area, enclosed on the back and sides with polyethylene film and located under a bench in the glasshouse. It is equipped with a thermostatically controlled cable at 12 watts/ft² of bottom heat set to maintain a minimum temperature of 70–72° F at the seed depth during the winter months. The cable is buried in a 2" bed of vermiculite which supports the seed containers. For seed that might be more readily germinated at a higher temperature, I have a second seed bed maintained at 80° F at the seed depth. This bed is located indoors and consists of a hot pad on

which is placed a 12" × 15" aluminum roasting pan enclosed by Styrofoam sides and polyethylene film top, back and front. The seed containers are supported by 2" of crushed lava rock. A Gro-lux fluorescent lamp 8" above the seed bed operates for 15 hours per day on an automatic timer. With this arrangement the more tender seedlings can be grown until they are large enough to be transplanted and placed in the glasshouse. All seeds in either seedbed are planted individually rather than in community pots for the following reasons: 1) root damage on transplanting from seed bed to bench pot is nearly eliminated, 2) other seed and seedlings are undisturbed when an individual seedling reaches size for transplanting, 3) germination time, speed (to be discussed later), and percentage are easily observed. With this system a larger seedbed is required but the decreased loss of many rare species on transplanting justifies it.

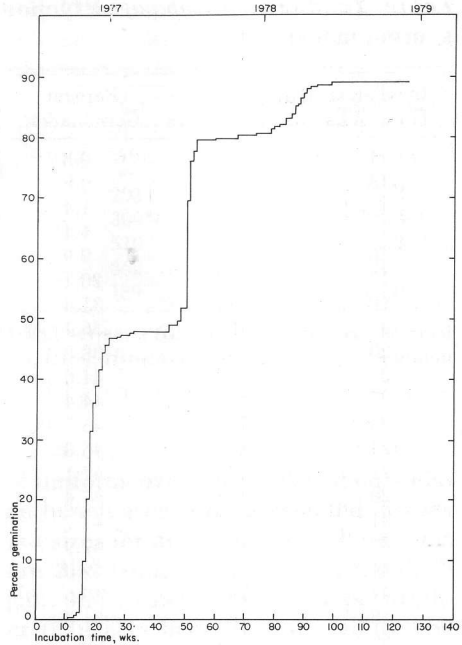
Two sizes of seed containers are used for all but a relatively few species that either have very large seed or exceptional germinating requirements. Seed up to 0.5" dimensions are planted in 1" × 1" × 2¾" deep containers which I make by cutting a vacuum formed polystyrene 196 unit cavity tray into individual units with an electrically heated Nichrome wire (caution: wire must not be more than dull red or plastic will catch fire). The individual containers are unable to stand unaided and are placed in an uncut cavity tray for support in the seedbed. For larger seed (up to 1.5" dimensions) the standard 2¼" × 2¼" × 3¼" plastic liners are used.

There are probably as many formulas for germinating media as there are horticulturists using them. The general requirements for a medium are well known: 1) retention of moisture, 2) porosity and good drainage, and 3)

sterility. The components of the germination mixture that I use were selected on the basis of availability and economy rather than by comparative testing. Equal parts by volume of peat moss, vermiculite, and well washed silicious beach sand are used. The first two components have good moisture retention and all three are porous and sterile. The mixture packs firmly holding the seed in place without restricting penetration of the emerging roots and it is easily tapped out of the container without crumbling. The heavier sand inhibits washing away of the other lighter components during watering. In the absence of information to the contrary all seed are covered to a depth of $\frac{1}{8}$ "– $\frac{1}{4}$ " depending on their size.

Since the seedbed is open on one side to the glasshouse environment it is watered daily with a fine spray. At this time an inspection is made for seed germination which I shall define as the appearance of the plumule or ligule above the planting medium and not the initial (and usually unobserved) extension of the cotyledon out of the seed.

Several methods of reporting germination time are in common practice. The most prevalent method records the time from planting of the seed batch until the first seedling emerges (Loomis 1958). A second method is to report the time to emergence of the first seedling, the speed or time to 50% of the final germination, and the final percent germination (Rees 1963). The germination is considered complete if after a given (albeit arbitrary) interval no further seedlings emerge (e.g., 10 consecutive days with no germination for *Elaeis guineensis*). A third method is to measure percent of germination as a function of time. I use the last method because it gives more information than the first two, particularly



1. Germination of *Ptychosperma macarthurii*.

on the length of time the seed remains viable under incubation. An illustration of the three methods and the information each conveys is provided by a planting of seeds from an entire infructescence of *Ptychosperma macarthurii* (363 seed) on 24 July 1976.

Method 1: Germination time, 74 days.

Method 2: First germination, 74 days. Half of total seedlings up, 157 days (22 weeks, 3 days). Percent germination, 89.3%.

Method 3: See Tables 2 and 3 and Figure 1 (wherein incubation time is given in weekly increments rather than daily for brevity). The last viable seed germinated after 862 days incubation.

I do not terminate the incubation period arbitrarily but continue it until all

Table 2. Germination of *Ptychosperma macarthurii*

Incubation Time, Wks	No. Seedlings	Percent Germination
11	1	0.3
13	3	0.8
14	5	1.4
15	16	4.4
16	36	9.9
17	73	20.1
18	114	31.4
19	131	36.1
20	141	38.8
21	151	41.6
22	161	44.4
23	166	45.7
24	170	46.8
27	171	47.1
28	172	47.4
31	173	47.7
32	174	47.9
44	178	49.0
47	180	49.6
48	188	51.8
50	253	69.7
51	276	76.0
52	283	77.7
53	289	79.6
59	290	79.9
67	292	80.4
73	293	80.7
78	296	81.5
79	297	81.8
81	298	82.1
83	302	83.2
85	304	83.7
86	309	85.1
87	310	85.4
88	314	86.5
89	317	87.3
90	320	88.2
91	321	88.4
93	322	88.7
98	323	89.0
124	324	89.3

seed have either germinated or are no longer viable, i.e., show evidence of rotting or a missing embryo on a semi-annual inspection. Note that if the second method had been used (with termination of incubation after 10 consecutive days without germination) incubation would have been stopped

on the 176th day and the periodicity of the germination would not have been observed (cf. Braun 1968, p. 54). Interestingly the periods of maximum germination rate are at about eight month intervals and thus do not correlate with seasonal influences. I have noted that the seedlings which emerge near the end of the incubation period are often less vigorous and succumb to diseases more easily than those having a shorter incubation. In many cases the primary root of the dead seedling is found to be stunted or absent altogether.

In addition to the planting of *Ptychosperma macarthurii* discussed above, data on four other seed batches and two literature reports are presented in Table 3 to emphasize the variability of germination among different plantings. Note that two of these batches were planted at the same time and under the same conditions.

It is obvious from even a casual perusal of horticultural articles that many widely differing results in germination of a given palm species are attributed to "old seed." While viability is surely affected by prolonged storage time, numerous other factors such as 1) incubation temperature, 2) moisture and oxygen content of the seed bed, 3) presence of naturally occurring or inadvertently introduced germination inhibitors, 4) presence of fungi and molds, or 5) the differing environmental conditions under which the seed matured, are not often considered by the average palm horticulturist. Almost never considered by other than botanists is the possibility that the seed may be a hybrid and not that of a pure species. Since a large part (if not the major part) of the seed distributed by the Seed Bank is obtained from cultivated sources without controlled pollination rather than from the

Table 3. Variability of Germination in *Ptychosperma macarthurii*

Total No. Seed	Seed Source	Date Planted	Germination, Days			Percent Germination
			First	Last	½ of total	
ca. 100	a	—	58	—	—	—
14	b	2/12/62	78-108	—	—	57.1
27	c	9/ 3/72	91	293	233	85.2
16	d	10/14/73	258	309	273	93.8
27	c	7/24/76	205	510	369	77.8
363	e	7/24/76	74	862	157	89.3
10	f	12/18/77	90	189	147	60.0

a, Indian Botanic Garden, Calcutta, India (Basu and Mukherjee, 1972); b, The Palm Society Seed Bank (School, 1962); c, Foster Botanical Garden, Honolulu, HI; d, Hirose Nursery, Hilo, HI; e, Sheraton Kauai Hotel, Kauai, HI; f, Pauleen Sullivan, Ventura, CA.

wild, the potential for obtaining hybrid seed is high. Thus, one or more hybrids and/or the true species could be produced on the same infructescence and each seed type could exhibit different qualities, e.g., germination time or viability, under comparable incubation conditions.

Germination data for a number of species are presented in Table 4 in the same form as was done for *Ptychosperma macarthurii* (Table 3), i.e., method 2. This method rather than the more informative method 3 is used because the rather small seed batch sizes, lack of repetitive plantings, and usually undocumented species purity do not justify the space required to publish more complete data. However, the incubation time for the last viable seed is also included. For those seed batches the incubation of which was incomplete at the time this manuscript was submitted, the data are given parenthetically and are subject to revision. All seeds were planted individually with the exception of the 1980 planting of *Chrysalioarpus lutescens*.

Culture

Because of the limited growing area available and the fact that more pots

of uniform size can be placed on a given bench area, I have selected just six pot sizes for my collection. These sizes are 2¼" (square), 4", 1 gal., 2 gal., 5 gal., and 15 gal. I use plastic pots rather than clay because they reduce the watering requirements. No problems normally associated with soggy overwatered soil have been encountered with the growing medium that I use since it drains very well.

The growing medium is the same as that used for seed germination (1 volume each of peat moss, vermiculite, and beach sand) plus up to an additional volume of sandy loam. If any information is available on the optimum pH for growth of a particular species, I add additional peat moss to increase acidity or crushed egg shells (limestone) to increase alkalinity.

Except for the sandy loam the constituents of the growing medium are almost devoid of nutrients. I supply the three basic nutrients (nitrogen, phosphorus and potassium) in the form of medium granular MagAmp (7-40-6) manufactured by W. R. Grace Chemical Company and available at nursery supply dealers. The nutrients are derived from magnesium ammonium phosphate and magnesium potassium phosphate, both of which have very low

Table 4. Germination of Various Palm Species

Species Name	Seed Source ^a	Date Planted ^b	Total No. Seed ^c	Germination, Days			Percent Germination
				First	Last	½ of total	
<i>Acoelorrhaphe wrightii</i>	PG	5/ 8/74	27	358	(1,142)	(416)	(70.4)
	PG	5/23/78	10	78	1,096	430	80
<i>Acrocomia antioquiensis</i>	81-PS-122 (W-1)	6/15/81	4	(-)	(-)	(-)	(0)
<i>Aiphanes acanthophylla</i>	FTG	7/ 7/74	2 ^d	—	—	—	0
	RBG	10/16/79*	2	62	121	62	100
<i>A. caryotaefolia</i>	PG	6/30/80	12	42	(44)	(42)	(16.7)
<i>A. lindeniana</i>	FG	7/24/76	1	—	—	—	0
<i>Archontophoenix alexandrae</i>	PG	6/29/80	11	13	193	24	81.8
<i>A. cunninghamiana</i>	HBG	9/21/74	8	154	262	230	100
	PG	9/21/74	18	77	288	169	66.7
<i>A. sp. (Purple Crownshaft)</i>	W-2	5/25/80	24	32	67	33	25
			(8 GOA)				
	PG	6/29/80	8	(-)	(-)	(-)	(0)
<i>A. sp.</i>	PG	6/29/80	18	23	32	26	61.1
<i>Areca hutchinsoniana</i>	PS(W-3)	5/20/79	12	37	189	57	58.3
<i>A. ipot</i>	PS	5/17/79	8	—	—	—	0
<i>A. triandra</i>	F-1233	7/24/76	12	297	649	309	66.7
	PS	2/25/79	10	119	133	121	100
<i>A. vestiaria</i>	F-80	9/ 3/77	11	132	177	137	100
	PG	12/18/77	10	127	168	155	70
	PS	11/23/78	10	78	189	83	90
<i>A. sp. "concinna"</i>	L66-539	6/30/80	6	186	323	258	100
<i>A. sp.</i>	F-1768	9/ 2/72	17	111	268	245	70.6
	F-1768	7/24/76	6	282	336	309	83.3
<i>A. sp.</i>	80-PS-177 (W-4)	9/30/80	12	(-)	(-)	(-)	(0)
<i>A. sp.</i>	81-PS-11	1/17/81*	15	20	27 ^d	20	33.3
<i>Arenga caudata</i>	PG	12/18/77	10	226	451	286	80
<i>A. engleri</i>	HBG	7/12/81	17	56	(79)	(62)	(17.6)
<i>A. pinnata</i>	80-PS-170	9/30/80	12	280	(354)	(284)	(66.7)
<i>A. porphyrocarpa</i>	PS(W-5)	5/16/74	15	148	792	461	80
	PG	6/29/80	17	185	(410)	(247)	(64.7)
<i>A. tremula</i>	80-PS-220	11/ 7/80	55	247	(324)	(292)	(41.8)
<i>A. sp.</i>	FG71.466	7/24/76	9	374	752	488	77.8
<i>A. sp.</i>	F-3	6/29/80	20	70	(388)	(326)	(35)
<i>Asterogyne martiana</i>	PS	7/28/79	15	—	—	—	0
	81-PS-155	8/ 3/81	23	(-)	(-)	(-)	(0)
<i>Bactris jamaicana</i>	W-6	11/14/76	7	—	—	—	0
<i>Basselinia eriostachys</i>	80-PS-258 (W-7)	1/ 7/81*	16	79	79 ^d	79	6.3
	80-PS-258	1/ 7/81	22	172	(185)	(190)	(40.1)
<i>B. pancheri</i>	80-PS-142 (W-8)	8/16/80	10	(-)	(-)	(-)	(0)
<i>B. sp.</i>	80-PS-143 (W-9)	8/16/80	24	—	—	—	0
<i>B. sp.</i>	81-PS-49	2/21/81	20	(-)	(-)	(-)	(0)
<i>Brahea armata</i>	PG	7/16/78	67	47	(639)	(102)	(92.5)
<i>B. brandegeei</i>	PG	1/12/76	12	365	(812)	(566)	(66.7)
	PG	2/ 4/79	14	162	(556)	(464)	(78.6)
<i>B. edulis</i>	LACA	3/18/75	7	151	598	272	100

Table 4. Continued

Species Name	Seed Source ^a	Date Planted ^b	Total No. Seed ^c	Germination, Days			Percent Germination
				First	Last	½ of total	
<i>Burretiokentia vieillardii</i>	80-PS-259	1/ 6/81	13	170	(242)	(180)	(30.8)
	80-PS-259 (W-10)	1/ 6/81*	12	86	168 ^d	86	33.3
<i>Butia capitata</i>	PG	10/15/72	1	278	~643 (twin)	278	100
	HBG	11/18/75	7	968	(1,789)	(968)	(28.6)
	PG	9/20/76	17	636	(-)	(636)	(5.9)
<i>B. capitata</i> × <i>Jubea chilensis</i>	PS	8/ 4/77	9	284	704	306	44.4
F-2 hybrid (mesocarp removed)	PS	9/ 6/78	6	313	313	313	16.7
<i>Calamus ornatus</i>	PS	11/17/78*	8	76	88	76	25
<i>C. reysianus</i>	79-PS-180	11/22/79	16	93	126	120	37.5
	79-PS-180	11/22/79*	16	46	97 ^d	54	50
<i>C. siphonocanthus</i>	81-PS-50	2/21/81	16	133	(167)	(137)	(37.5)
<i>C. vitiensis</i>	PS	8/ 8/78	5	—	—	—	0
<i>Calyptrocalyx spicatus</i>	PG	6/29/80	4	22	42	31	100
<i>Calyptronoma rivalis</i>	PS	5/25/79	51	43	183	43	88.2
<i>Carpentaria acuminata</i>	PS	3/30/74	19	—	—	—	0
	FG	7/24/76	17	212	350	320	64.7
	PG	12/18/77	10	157	225	186	70
<i>Caryota cumingii</i>	FG	9/10/71	4	178	322	214	75
<i>C. griffithii</i>	FG64.290	6/29/80	5	—	—	—	0
<i>C. mitis</i>	PG	10/14/73	50	216	346	260	92
	PG	7/24/76	111	114	482	177	90.1
<i>C. urens</i>	FTG	7/ 7/74	6	100	100	100	16.7
<i>C. sp. "plumosa"</i>	F-1815	7/24/76	10	142	180	142	20
	FG	6/29/80	10	60	351	81	100
	LA	6/29/80	7	62	(98)	(80)	(71.4)
<i>C. sp.</i>	PG	7/24/76	6	200	350	200	33.3
<i>Ceroxylon quindiuense</i>	80-PS-12	2/17/80	15	(-)	(-)	(-)	(0)
<i>Chamaedorea cataractarum</i>	PS	2/25/78	55	44	47	44	3.6
	PS	1/13/79	20	34	34	34	5
	PS	1/14/79*	15	11	27	15	20
<i>C. costaricana</i>	79-PS-71	8/ 1/79	32 (4 GOA)	15	(436)	(31)	(14.3)
<i>C. elegans</i>	PG	8/16/80	3	347	(347)	(347)	(33.3)
<i>C. erumpens</i>	PG	3/20/74	6	84	125	111	100
	PG	8/ 9/80	18	27	(57)	(34)	(77.8)
<i>C. glaucifolia</i>	PG	6/ 1/78	36	43	(409)	(52)	(50)
<i>C. graminifolia</i>	PS	3/24/74	12	—	—	—	0
<i>C. microspadix</i>	PG	1/12/76	36	196	271	217	100
<i>C. oblongata</i>	PS	5/24/79	15	86	(846)	(443)	(53.3)
<i>C. radicalis</i>	PS	4/25/74	16	124	687	132	93.8
<i>C. seifrizii</i>	PS	4/20/74	19	107	(1,941)	(141)	(94.7)
<i>C. seifrizii</i> hybrid	80-PS-236	12/11/80	18	234	(234)	(234)	(5.5)
<i>C. tepejilote</i>	PS	2/25/78	14	31	98	33	85.7
<i>C. sp.</i>	W-11	3/24/74	2	—	—	—	0
<i>C. sp.</i>	PS	5/11/74	15	—	—	—	0
<i>Chamaerops humilis</i>	PG	9/ 5/73	1	282	282	282	100
	PG	1/19/75	13	75	276	261	30.8
	PG	10/19/75	5	55	91	60	80

Table 4. Continued

Species Name	Seed Source ^a	Date Planted ^b	Total No. Seed ^c	Germination, Days		½ of total	Percent Germination
				First	Last		
<i>Chrysalidocarpus lutescens</i>	PG	9/ 2/72	7	43	259	156	100
	PG	9/ 3/72	9	66	140	101	100
	PG	7/ 3/75	16	110	110	110	6.3
	PG	7/ 2/80	531	54	(218)	(96)	(97.7)
<i>Clinosperma bracteale</i>	80-PS-144 (W-8)	8/16/80	10	(-)	(-)	(-)	(0)
<i>Clinostigma onchorhynchum</i>	81-PS-78	4/ 8/81	23	87	(153)	(99)	(39.1)
		4/ 8/81*	23	47	69	66	21.7
<i>C. samoense</i>	80-PS-30	3/31/80	20	157	(-)	(157)	(5)
	(W-12)	3/31/80*	10	170	(-)	(170)	(10)
<i>Coccothrinax fragrans</i>	PS	2/ 3/79	25	205	(345)	(205)	(8)
<i>C. sp.</i>	PG	6/29/80	10	61	87	71	80
<i>Cocos nucifera</i>	PG	9/21/72	7	303	303	303	28.6
<i>Copernicia prunifera</i>	FG	9/ 1/72	8	300	319	319	25
<i>Cryosophila nana</i>	PG	3/11/73	11	58	90	70	72.7
<i>C. warszewiczii</i>	81-PS-56	2/21/81	20	—	—	—	0
<i>C. sp.</i>	MSP	6/29/80	3	36	57	47	100
<i>Cyphokentia macrostachya</i>	80-PS-190	10/11/80	14	(-)	(-)	(-)	(0)
<i>Cyphophoenix nucelle</i>	PS(W-13)	8/22/74	13	39	78	60	46.2
<i>Cyrtostachys lakka</i>	PS	4/30/78	21	15	45	15	31.6
			(2 GOA)				
	PS	6/ 1/78	50	8	33	18	14.3
			(29 GOA)				
<i>Daemonorops loheriana</i>	79-PS-194	12/15/79	20	20	74	43	35
	79-PS-194	12/15/79*	26	14	84	26	61.5
<i>D. mollis</i>	79-PS-154	10/21/79	15	159	(267)	(252)	(23.1)
			(2 GOA)				
	81-PS-7	1/14/81*	15	28	159 ^d	53	73.3
<i>D. sparsiflora</i>	79-PS-207	12/29/79*	12	52	85	70	100
<i>Desmoncus orthacanthos</i>	PS	2/ 1/79*	7	143	190	164	85.7
<i>Dictyosperma album</i> var. <i>album</i>	PG	9/21/76	62	144	363	293	71
<i>D. album</i> var. <i>aureum</i>	PS	3/24/74	15	—	—	—	0
<i>Drymophloeus beguinii</i>	PG	7/ 7/74	4	49	57	52	75
<i>D. pachycladus</i>	80-PS-140	8/12/80	10	—	—	—	0
<i>Elaeis guineensis</i>	PG	6/27/80	6	(-)	(-)	(-)	(0)
<i>E. oleifera</i>	PG	6/29/80	7	(-)	(-)	(-)	(0)
<i>Euterpe purpurea</i>	80-PS-189	10/11/80	12	65	111	71	91.7
	(W-14)						
<i>E. sp.</i>	PS	10/27/77	16	46	120	62	50
<i>E. sp.</i>	PS	2/ 3/79	13	5	66	49	100
			(4 GOA)				
<i>E. sp.</i>	PG	6/30/80	12	33	56	43	91.7
<i>E. sp.</i>	81-PS-104 (W-15)	5/15/81	18	122	(122)	(122)	(5.5)
<i>Gastrococos crispera</i>	80-PS-147	8/16/80	10	(-)	(-)	(-)	(0)
<i>Geonoma interrupta</i>	PS	2/25/79	80	37	(74)	(47)	(63.6)
<i>G. pinnatifrons</i>	PS	8/1/77	30	770	770	770	3.3
<i>G. schottiana</i>	79-PS-160	10/21/79	12	500	(613)	(613)	(41.7)
	80-PS-59	5/ 9/80*	19	49	242 ^d	110	78.9
<i>G. sp.</i>	PS	9/19/77	20	117	201	157	20

Table 4. Continued

Species Name	Seed Source ^a	Date Planted ^b	Total No. Seed ^c	Germination, Days			Percent Germination
				First	Last	½ of total	
<i>G. sp.</i>	W-16	3/24/74	7	—	—	—	0
<i>Gulubia costata</i>	81-PS-96	5/16/81	22	—	—	—	0
	81-PS-96	5/16/81*	18	—	— ^d	—	0
<i>G. macrospadix</i>	79-PS-150	10/20/79	26	129	163	151	15.4
<i>Heterospathe negrosensis</i>	80-PS-65	5/20/80	33	37	(209)	(80)	(60.6)
	80-PS-65 (W-17)	5/20/80*	12	69	111	85	66.7
<i>H. philippinensis</i>	80-PS-76	6/ 2/80	22	24	45	28	18.2
	80-PS-76 (W-18)	6/ 2/80*	12	49	49	49	8.3
<i>H. sibuyanensis</i>	80-PS-36	4/25/80	23	—	—	—	0
	80-PS-36	4/25/80*	12	—	—	—	0
<i>H. woodfordiana</i>	PG	6/29/80	5	(-)	(-)	(-)	(0)
<i>H. sp.</i>	80-PS-194	10/11/80	13	25	57	29	30.8
<i>H. sp.</i>	80-PS-195	10/11/80	26	92	92	92	3.8
<i>Howea belmoreana</i>	PG	8/ 5/73	5	—	—	—	0
	PG	9/18/73	4	—	—	—	0
<i>H. forsteriana</i>	PG	8/ 5/73	4	(-)	(-)	(-)	(0)
	PG	9/18/73	15	1,694	(-)	(1,694)	(6.7)
	PG	4/20/75	10	811	811	811	10
	PG	7/15/78	14	396	(611)	(396)	(14.3)
	PG	7/15/78	12	(-)	(-)	(-)	(0)
<i>Hydriastele wendlandiana</i>	PS	1/ 8/78	8	185	232	189	62.5
<i>H. sp.</i>	PS	2/ 3/79	10	—	—	—	0
<i>Hyophorbe lagenicaulis</i>	FG	7/24/76	4	348	357	349	75
	PS	10/12/78	15	255	(1,021)	(261)	(86.7)
<i>H. verschaffeltii</i>	PG	12/18/77	10	181	609	195	70
	LA	6/29/80	14	374	(374)	(374)	(7.1)
<i>Hyphaene crinita</i>	PG	9/26/76	1	—	—	—	0
<i>H. thebaica</i>	FG	8/ 1/76	1	—	—	—	0
<i>Iriartea ventricosa</i>	81-PS-171 (W-19)	8/21/81	6	21	38	29	83.3
<i>I. sp.</i>	81-PS-164 (W-20)	8/21/81	10	(-)	(-)	(-)	(0)
<i>Jessenia sp.</i>	PSSB-28	6/25/77	6	13	20	13	100
<i>Jubaea chilensis</i>	HBG	9/21/74	3	(-)	(-)	(-)	(0)
	PG	7/15/78	1	—	—	—	0
<i>Korthalsia laciniosa</i>	81-PS-34	2/ 9/81*	15	45	81 ^d	61	60
<i>Laccospadix australasica</i>	PS	2/ 3/79	10	45	167	52	40
<i>Latania loddigesii</i>	PG	6/27/80	8	47	47	47	12.5
<i>Licuala grandis</i>	PS	11/23/78	20	70	(165)	(106)	(45)
	PS	5/20/79*	39	87	308 ^d	168	33.3
	PS	5/20/79	11	124	(299)	(202)	(54.5)
	PG	7/ 9/79	14	108	227	145	71.4
<i>L. lauterbachii</i> var. <i>bougainvillensis</i>	PS	2/ 3/79	15	(-)	(-)	(-)	(0)
<i>L. ramsayi</i>	PS	11/17/78	10	197	381	207	90
<i>L. spinosa</i>	FG	9/10/71	10	238	273	246	40
	FG	7/24/76	22	321	(399)	(321)	(9.1)
<i>L. sp.</i> "elegans"	PS	5/31/74	10	849	1,149	860	90

Table 4. Continued

Species Name	Seed Source ^a	Date Planted ^b	Total No. Seed ^c	Germination, Days			Percent Germination
				First	Last	½ of total	
<i>Linospadix monostachya</i>	PS	3/26/74	22	130	499	203	81.8
	PS	3/ 9/78	19	—	—	—	0
	PS	11/22/79	61	228	(244)	(228)	(9.8)
<i>Livistona chinensis</i>	PG	6/29/80	9	35	53	48	44.4
<i>L. eastoni</i>	79-PS-104	8/30/79	11	379	(740)	(740)	(27.3)
<i>L. loriphylla</i>	PS	3/29/74	22	64	131	94	36.4
<i>L. merrillii</i>	80-PS-169	9/30/80	20	170	(321)	(296)	(85)
<i>L. muelleri</i>	PS	1/ 8/78	14	20	44	30	85.7
<i>L. rigida</i>	W-21	5/25/80	20	55	(424)	(412)	(30)
<i>L. robinsoniana</i>	PG	6/29/80	10	—	—	—	0
<i>L. rotundifolia</i> var. <i>luzonensis</i>	PS	1/29/79	15	171	259	199	66.7
	PG	7/15/79	31	35	(237)	(42)	(80.6)
<i>L. sp.</i> "blackdownsii"	PS	7/ 1/78	14	41	99	56	78.6
<i>L. sp.</i>	FG71.519	7/24/76	1	—	—	—	0
<i>Mauritia sp.</i>	PS	1/16/78	6	201	(—)	(201)	(16.7)
<i>Microcoelum weddellianum</i>	PS	5/11/74	13	70	77	70	15.4
<i>Nengella sp.</i>	81-PS-88	4/30/81*	12	—	— ^d	—	0
<i>Neodypsis decaryi</i>	PS	9/ 6/78	10	9	37	21	50
<i>Neoveitchia storckii</i>	PS	5/19/79	8	64	87	68	75
<i>Normanbya normanbyi</i>	PS	12/23/77*	8	14	21	14	75
	PG	7/ 1/80*	6	—	—	—	0
<i>Oncosperma tigillarum</i>	FG	7/24/76	4	74	297	74	50
<i>Opsiandra maya</i>	PS	3/26/74	12	117	129	117	16.7
	80-PS-212	10/29/80	11	23	(268)	(237)	(63.6)
	80-PS-212	10/29/80*	11	20	34	26	90.9
<i>Orania sp.</i>	PS	1/28/78*	3	59	62	59	66.7
<i>Orbignya sp.</i>	PG	6/27/80	3	179	179	179	33.3
<i>Phoenix canariensis</i>	PG	1/16/77	29	43	275	55	89.7
<i>P. dactylifera</i>	PG	11/ 6/75	6	53	80	59	100
<i>P. humilis</i> hybrid	LACA	3/18/75	3	88	106	88	66.7
<i>P. roebelenii</i>	PG	10/13/73	13	174	258	209	76.9
	PG	1/19/75	11	—	—	—	0
<i>P. rupicola</i>	PS	7/ 6/78	12	—	—	—	0
<i>Physokentia insolita</i>	81-PS-132	7/18/81	12	(—)	(—)	(—)	(0)
<i>Pigafetta filaris</i>	PS	2/ 4/79	45	90	178	105	84.4
	PS	2/ 4/79*	6	23	101	23	33.3
<i>Pinanga barnesii</i>	80-PS-254	6/ 1/81*	15	20	47 ^{d,e}	29	86.7
<i>P. copelandii</i>	79-PS-65	8/ 3/79	12	52	145	53	100
<i>P. coronata</i>	PG	7/ 7/74	10	49	89	67	90
	PG	11/14/76	12	126	237	134	50
	PG	12/18/77	10	85	170	93	50
	LA	6/29/80	10	35	(58)	(42)	(80)
<i>P. dallasensis</i>	79-PS-156	10/21/79	12	(—)	(—)	(—)	(0)
<i>P. elmeri</i>	79-PS-184	11/22/79	38	30	138	58	63.2
<i>P. geonomaeformis</i>	PS	2/10/79	24	142	142	142	4.2
	79-PS-21	4/13/79	25	36	77	46	44
<i>P. insignis</i>	PS	1/14/79*	2	—	—	—	0
	PS	2/ 3/79	23	124	432	124	8.7
<i>P. isabelensis</i>	79-PS-155	10/21/79	36	129	—	129	2.8

Table 4. Continued

Species Name	Seed Source ^a	Date Planted ^b	Total No. Seed ^c	Germination, Days			Percent Germination
				First	Last	½ of total	
<i>P. maculata</i>	PS	4/13/79	9 (1 GOA)	—	—	—	0
<i>P. merrillii</i>	79-PS-181	11/22/79	38	16	129	73	65.8
<i>P. mooreana</i>	PS(W-22)	1/ 8/78	5	—	—	—	0
<i>P. patula</i>	FG	9/10/71	12	110	227	149	50
<i>P. philippinensis</i>	80-PS-22	3/18/80	20	85	(315)	(112)	(75)
<i>P. polymorpha</i>	81-PS-161 (W-23)	8/21/81	10	(-)	(-)	(-)	(0)
<i>P. sp.</i> (black crownshaft)	79-PS-68	8/ 4/79	20	51	114	75	45
<i>P. sp.</i> (orange crownshaft)	79-PS-67	7/28/79	16	47	238	71	93.8
<i>P. sp.</i> (purple crownshaft)	79-PS-66	8/ 3/79	15	52	84	74	73.3
<i>P. sp.</i> (white crownshaft)	PS	2/16/79	25	100	392	118	24
<i>P. sp.</i>	PG	10/14/73	32	98	293	140	84.4
<i>P. sp.</i>	79-PS-31	5/12/79	65	49	(396)	(76)	(35.4)
<i>P. sp.</i>	79-PS-32	5/12/79	15	68	157	86	80
<i>Prestoea montana</i>	79-PS-171	11/ 8/79	15	32	64	38	80
	PG	6/29/80	25	(-)	(-)	(-)	(0)
<i>Pritchardia affinis</i>	W-24	7/ 1/80	10	58	(89)	(75)	(30)
<i>P. beccariana</i>	PG	7/ 1/80	3	308	(308)	(308)	(33.3)
<i>P. pacifica</i>	PG	9/10/72	42	44	260	73	33.3
	PG	7/24/76	14	51	110	84	35.7
<i>P. thurstonii</i>	PS	11/ 9/77	22	51	124	63	50
	PG	6/29/80	35	28	(41)	(33)	(80)
<i>P. sp.</i>	PG	7/24/76	26	73	132	90	84.6
<i>P. sp.</i>	FG	9/ 3/77	6	—	—	—	0
<i>P. sp.</i>	MSP	7/ 1/80	2	—	—	—	0
<i>Ptychosperma angustifolium</i>	FG	9/ 2/72	3	112	345	226	100
<i>P. elegans</i>	PS	5/28/74	21	67	100	70	14.3
	PG	5/23/78	17	55	254	91	23.5
	PG	6/29/80	16	21	82	32	93.8
<i>P. hospitum</i>	LA	6/27/80	10	71	(319)	(71)	(40)
<i>P. microcarpum</i>	PS	6/27/74	7	46	48	46	28.6
	80-PS-100	7/11/80	15	17	(47)	(35)	(46.7)
<i>P. propinquum</i>	L66.312	6/29/80	19	53	(-)	(53)	(5.3)
<i>P. sanderianum</i>	PG	7/ 7/74	9	64	325	72	77.8
<i>P. sp.</i> (prob. hybrid " <i>P. nicolai</i> ")	PG	6/27/80	22	82	(412)	(350)	(63.6)
<i>P. salomonense</i>	FTG	7/ 7/74	6	33	40	36	100
	79-PS-59	7/ 5/79	15	51	(64)	(51)	(26.7)
<i>P. sp.</i>	WBG72.636	6/27/80	6	29	214	29	100
<i>P. sp.</i>	80-PS-98	7/11/80	14	53	(350)	(76)	(71.4)
<i>P. sp.</i>	FG	6/27/80	8	73	(381)	(341)	(75)
<i>Reinhardtia gracilis</i>	PS	2/ 1/79*	10	52	122	52	20
<i>R. gracilis</i> var. <i>rostrata</i>	PS	6/28/79	12	47	109	71	58.3
<i>R. simplex</i>	FG	9/ 2/72	9	119	234	134	100
	FG	7/24/76	8	—	—	—	0
	PS	7/28/79	12	(-)	(-)	(-)	(0)
<i>Rhapidophyllum hystrix</i>	PS	2/ 4/79	15	195	(-)	(195)	(6.7)
<i>Rhapis humilis</i>	PG	7/24/76	22	—	—	—	0
<i>Rhopaloblaste</i> sp.	PS	4/25/74	10	46	63	50	70

Table 4. Continued

Species Name	Seed Source ^a	Date Planted ^b	Total No. Seed ^c	Germination, Days			Percent Germination
				First	Last	½ of total	
<i>Rhopalostylis baueri</i>	PG	11/16/80	32	73	(202)	(91)	(90.6)
<i>R. cheesemanii</i>	81-PS-98	5/15/81	14	(-)	(-)	(-)	(0)
<i>R. sapida</i>	PG	9/21/76	18	(-)	(-)	(-)	(0)
	PG	11/14/76	18	94	195	114	100
	PG	2/13/77	21	—	—	—	0
	PG	7/15/78	7	72	(-)	(72)	(14.3)
	PG	1/27/80	44	62	(601)	(151)	(72.7)
<i>Rhyticocos</i> sp.	MSP	6/29/80	8	(-)	(-)	(-)	(0)
<i>Roystonea</i> sp. (<i>regia</i> ?)	PG	5/23/78	38	54	(717)	(140)	(68.4)
<i>Sabal causiarum</i>	PG	5/ 1/75	10	60	114	74	90
<i>S. mauritiaeformis</i>	FG	7/24/76	17	108	616	176	82.4
<i>S. mexicana</i>	LACA	3/18/75	57	92	917	180	98.2
<i>S. minor</i>	LACA	3/18/75	19	133	548	495	57.9
<i>S. palmetto</i>	NBG	10/ 8/75	13	349	349	349	7.7
	PG	1/21/77*	32	37	99	55	62.5
<i>S. uresana</i>	PS	1/28/78*	12	25	903 ^d	25	83.3
<i>S.</i> sp.	PG	7/ 7/74	4	39	40	39	75
<i>S.</i> sp.	PG	7/ 5/75	13	34	68	36	92.3
<i>Serenoa repens</i> (green)	PS	2/ 4/79	10	—	—	—	0
	PS	2/ 4/79	25	—	—	—	0
<i>Syagrus comosa</i>	80-PS-148	8/16/80	10	40	(55)	(47)	(50)
<i>S. coronata</i>	FG	6/29/80	10	40	(44)	(40)	(40)
<i>Synechanthus warscewiczianus</i>	PS	7/28/79	10	25	41	25	20
<i>Trithrinax acanthocoma</i>	PG	5/20/79	34	105	(448)	(217)	(38.2)
<i>Veillonina alba</i>	81-PS-108	5/16/81*	12	—	— ^d	—	0
<i>Veitchia arecina</i>	L64. 2794	6/27/80	6	55	105	75	83.3
	FG	7/24/76	3	93	93	93	33.3
<i>V. joannis</i>	PG	6/27/80	4	48	120	59	100
	LA	6/27/80	6	32	(100)	39	(83.3)
<i>V. merrillii</i>	PG	9/ 1/72	17	24	35	28	94.1
	PG	7/ 3/75	2	31	(-)	(31)	(50)
	PG	4/30/78	3	42	45	45	100
	PG	7/ 9/79	7	23	28	24	100
<i>V. montgomeryana</i>	LA	6/27/80	6	32	(71)	40	83.3
<i>V. sessilifolia</i>	*LA	6/27/80	6	41	(54)	(41)	(33.3)
<i>Washingtonia filifera</i>	W-25	11/11/79	50	25	145	40	100
<i>Wettinia fascicularis</i>	80-PS-202 (W-26)	10/20/80	12	(-)	(-)	(-)	(0)

^a Abbreviations used refer to the following sources:

The Palm Society Seed Bank

PS

PSSB-number

year-PS-number

Botanical Gardens

FG

F-number }—Foster Botanical Garden, Honolulu, HI

FTG—Fairchild Tropical Garden, Miami, FL

HBG—Huntington Botanical Garden, San Marino, CA

RBC—Royal Botanic Garden, Kew, Surrey, England

LACA—Los Angeles County Arboretum, Acadia, CA

LA

L-number }—Lyon Arboretum, Honolulu, HI

Table 4. *Continued*

MSP—Manuka State Park, HI

NBG—National Botanic Garden, Washington, D.C.

WBG—Wahiawa Botanic Garden, Wahiawa, HI

Private Gardens—PG

Wild (W) (days between collection and planting if known)

1. San Joxónime Antioquia, Colombia (31 days)
2. Mt. Lewis, Queensland, Australia
3. Nabua, Sorsogon Province, Philippines
4. Island off Manado, Celebes (80 days)
5. John Dransfield #4180
6. Rat Trap, Jamaica
7. Near Pontrihoven, New Caledonia (24 days)
8. Mt. Do, New Caledonia (between 16–47 days)
9. Tchamba Valley, New Caledonia (between 16–47 days)
10. Mt. Aoupinit, New Caledonia (23 days)
11. Robert W. Read #74-98, Panama
12. Near Pago Pago, Tutuila Is., American Samoa (21 days)
13. Seed Bank Expedition, Lifou Is., Loyalty Islands
14. Depto. de Antioquia, Cocorná, Colombia (27 days)
15. San Carlos, Antioquia, Colombia (55 days)
16. Robert W. Read #74-59, Panama
17. Near Nabua, Philippines (44 days)
18. Near Real, Quezon, Philippines (59 days)
19. Tarapoto, Peru (28 days)
20. San Francisco de Ichó, Chocó, Colombia (37 days)
21. Northwest Queensland, Australia
22. John Dransfield #5313, Sq. Medalam, 4th Div., Sarawak
23. Cameron Highlands, Malaysia (39 days)
24. Punaluu, HI (14 days)
25. Palm Canyon, Anza-Borrego State Park, CA (1 day)
26. Santa Rita, Municipio de Guatapé, Antioquia, Colombia (59 days).

^b Asterisk (*) indicates 80° F incubation temperature; others 70–72°F.

^c A parenthetical number and the letters GOA indicate the number of seed in the planting which were germinated on arrival.

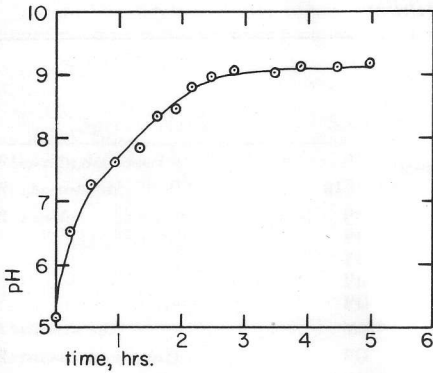
^d Germination terminated on 24 June 1981 by a fire which destroyed seedbed.

^e Of the 13 seedlings obtained 6 had mottled reddish leaves and 7 had uniformly dark green leaves.

solubility in water. Thus the nutrients are not leached out quickly by the daily watering, but are released in a controlled manner over a 6–12 month period. The pH of pure water in contact with granular MagAmp changes with successive leachings at 0.25–0.5 hr intervals from slightly acid to basic and stabilizes at about pH 9 (Fig. 2). The MagAmp is incorporated in the planting mix at the volume rate of 1 oz/gal. of mix. Not only does the low solubility of this fertilizer diminish leaching losses but with inadequate watering the dissolved material returns to

the solid state so that buildup of soluble nutrient salts and subsequent burning of the plant do not occur. Twice a year a top dressing of MagAmp is applied. For convenience of application of iron I moisten the MagAmp granules and coat them with an iron chelate powder.

The time for transplanting seedlings from the seed bed containers depends not only on the growth characteristics of the species (see Tomlinson 1960 for types of seedling development) but on the vigor of the individual plant. Species in which seed germination is



2. pH of successive leachings of MagAmp.

characterized by a downward extension of the cotyledon often have a thick primary root protruding from the container at the time the plumule is first observed. Such plants are transferred to larger pots immediately. Palms which have a fine root structure or slow growth rate can often remain in the germination container (with subsequent fertilization) for periods up to a year or more. Usually I transplant seedlings to the next larger pot size when the second juvenile leaf emerges. For those species that develop the seedling adjacent to the seed (as opposed to those with extended cotyledons), I replot the seedling at a shallower depth than in the seedbed such that the seed is almost completely exposed. I have found that this procedure decreases loss of seedlings from damping off.

Ideally young palms should be moved up to larger pots before excessive crowding of the roots limits the growth because of restricted availability of water and nutrients. Often the growth rate of palms is slowed and their stature diminished when they are raised in containers. Thus, if the growing space available is limited the desire to encourage rapid growth can sometimes be subordinated to increas-

ing the variety and size of the collection.

The environment provided by the greenhouse not only benefits the plants growing therein, but pests as well. Probably the most damaging in my experience is the red spider mite. This tiny arachnid, barely visible to the unaided eye, feeds by sucking the plant juices and in so doing injures a small spot on the leaf. With a life cycle of only three to four days, large numbers of these spiders develop rapidly so that the more susceptible palm species can be severely stunted or even killed by a heavy infestation. A periodic spraying of the foliage with either Malathion or Diazinon (according to the label directions) serves to keep the population in check. Between sprayings an application of a systemic insecticide to the soil around the more susceptible species serves to keep them alive. Mealy bugs and occasional aphids are also controlled by these sprays. Snails and slugs do not appear to cause much damage to the palms (as long as there is a supply of other foliage plants present) but periodic distribution of an arsenic free metaldehyde-containing bait keeps them in check. Other pests frequently seen but doing little harm are earwigs, sow bugs, millipedes, and ants. The last, however, are active spreaders of both mealy bugs and aphids. Perhaps more annoying is the ants' preference for nesting in the greenhouse during the winter months. Whenever nests are found in the gravel benches or in a potted specimen they are sprayed with Ortho Ant and Roach Killer (manufactured by Chevron Chemical Company), containing 1% 2-(1-methylethoxy)phenylethyl carbamate and 82.3% petroleum distillate as active ingredients. Although the label directions for this product specifically state not to use it on any vegetation, I have

routinely given both an infested root ball and the inside of the pot a light spraying to eliminate the nest without any evident effect on the palm. Many plants (particularly broadleaf, fern, or bromeliad) but not all are defoliated or withered by misdirected spray so that care in application is advised.

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NEWS OF THE SOCIETY

News of the South Florida Chapter

On October 17, 1981, the South Florida Chapter of The Palm Society, under new Chairman Jim McLeod, approved a 12-member Board and incorporation under the laws of the State of Florida.

The meeting was held in the Activities Center of East Ridge Retirement Village near Cutler Ridge, new home of Ted and Teddie Buhler. Jonathan Foote, plant propagator at Fairchild Tropical Garden, presented an excellent program on how to plant and/or transplant palms. He brought a large bare rooted *Ptychosperma elegans* and graphically demonstrated how palm roots grow. New roots form from the base of the trunk only, never from the severed old roots. Root pruning before moving is not essential. However, a palm should be planted as soon after being dug as possible because roots should never be allowed to dry. Jon also demonstrated on his specimen how to cut off many of the old fronds, then halve the remaining ones to lessen the exposed leaf surface and to minimize wind resistance. The spear leaf is left intact and gradually the fronds will develop until the palm is again in its full glory. Frequent water-

ing is essential during the early period. When planting the palm a sort of saucer should be shaped at the edge of the hole to retain water. Mulching helps to keep soil cool and moist and also adds to its enrichment.

After the business meeting and program the group walked to the new palmetum where, in June 1980, Teddie had had 100 holes drilled and about 80 palms planted so far. Some are large ones from her old property but most are smaller specimens; all are doing very well thanks to the hot and humid summer weather.

Before planting, a wheelbarrow load of good soil was mixed with the ground up rocky soil that had come out of each yard wide and yard deep hole. A good layer of mulch was spread over and starting last spring the palms were lightly fertilized every month. Watering is handled by a sprinkler system covering the 250 by 50 foot area of the palmetum. After a little over a year, some of the palms are already assuming their more mature characteristics. Eric Beers was instrumental not only in supervising the plantings, but in actually putting most of the plants into the ground. Without his help it would have been well nigh impossible.

After the palmetum walk, a delicious covered dish dinner was served. It was a good meeting.

Palm Sale

On November 14 and 15 the South Florida Chapter Annual Palm Sale took place. It was held in the charming 50-year-old building of the Coco Plum Woman's Club east of Red Road on Sunset Drive in South Miami. The building and the patio were jammed with thousands of palms grown by both amateur and commercial members. A large group of at least 10 foot tall carpentarias, veitchias, and green and yellow Malayan coconuts in the center of the patio seemed to make it into a veritable garden. About two minutes after the sale opened that entire lot of palms was sold to a gentleman who was just starting to landscape a large home nearby. This was a good omen for us and a stroke of luck for Eric Beers who had worked hard to bring all those large plants in through the building to the patio. By Sunday closing time thousands of palms had been carried off by enthusiastic buyers. The members, too, were delighted. Eighty percent of the sale price went to those who had brought the plants. Out of the remaining twenty percent the South Florida Chapter paid all expenses with enough left over to fund future projects. The perfect weather, free admission, free parking, and the central location all helped to lure buyers. There were approximately 90 genera and 185 species represented at the sale. A list of these is available. Come see (and buy) at our Palm Sale next year!

Jim McLeod received a baptism into a big multi-faceted job and emerged with the praise of all who worked with him. He is already planning for next year.

TEDDIE BUHLER

News from Texas

The Houston Area Chapter met on September 26th with Professor T. Antony Davis as guest speaker. Dr. Davis was not only a very interesting speaker, but also a most charming and entertaining person. For the past four years he has been working for the United Nations to try and find ways to improve coconut production, a major food source, in Indonesia. Coconut yield has been steadily decreasing because according to Dr. Davis and his research team, coconut palms in existing grooves are senile. The 13,000 islands of Indonesia were searched for coconut palms that were high yielding, disease resistant, and produced nuts with a high oil content. A promising new hybrid was developed by crossing the hardy tall or standard palm with a hybrid strain that is less hardy but has about four times as great a yield. Young replacement trees are being planted among old trees which are then felled in six years. About 650 hectares of the new hybrid trees have been planted and should significantly increase coconut production in the next decade.

The November meeting was at the lovely home of Ivan Britt, 2712 Glen Haven, Houston. The house has a unique design with every room viewing a private garden. The Chapter's library was discussed. It now consists of over 200 books on palms and a complete hard-bound set of *Principes*. The seedling give-away program was the subject of the meeting. Jim Cain prepared and distributed booklets of information, culture, and growing habits

of the 18 seedlings that have been distributed thus far.

Plans for 1982 include six interesting and unusual seedlings, a big show and sale in May, a special program on *Rhapis* palms, door prizes, the Biennial Meeting of The Palm Society in Florida in November, a more extensive library, participation in civic projects, and more. As a beginning the January meeting at the Houston Garden Center featured "Palm and Tropical Gardens of Hawaii" by Erwin Ruhland. Seedling of the month was *Chamaedorea microspadix*.

Margaret Hirose

Margaret T. Hirose of Hilo, Hawaii died in 1981. She will be remembered as a gracious hostess at the 1980 Biennial Meeting. The Palm Society extends its deepest sympathy to her family and friends.

Biennial Meeting

Check the inside of the paper cover on this issue of *PRINCIPES* for information on the 1982 Biennial Meeting.

BOOKSTORE

INDEX TO PRINCIPES (Vols. 1-20, 1956-1976, H. E. Moore, Jr., 68 pp.)	\$ 3.00
CULTIVATED PALMS OF VENEZUELA (A. Braun, 1970, 94 pp. and 95 photographs.)	4.50
PALMS FOR THE HOME AND GARDEN (Lynette Stewart, 1981, 72 pp., in color)	10.95
THE INDIGENOUS PALMS OF SURINAME (J. G. W. Boer, 1965, Part of Flora, 172 pp.)	42.00
PALMS OF SOUTH FLORIDA (G. B. Stevenson, 1974, 251 pp.)	6.00
PALMS OF THE WORLD (J. C. McCurrach, 1960, 290 pp.)	19.00

SUPPLEMENT TO PALMS OF THE WORLD (A. C. Langlois, 1976, 252 pp.)	25.00
THE MAJOR GROUPS OF PALMS AND THEIR DISTRIBUTION (H. E. Moore, Jr., 1973, 115 pp.)	4.50
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A Notice to All Members of The Palm Society

In accordance with our Bylaws, the following slate of candidates is proposed by the Nominating Committee:

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President	Mr. Richard Douglas, N. California, USA
Vice-president	Mr. Allan Bedeson, S. California, USA
Secretary	Mrs. Pauleen Sullivan, S. California, USA
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Mr. James P. Specht, chairman	S. California, USA
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Please send in additional candidates if you wish. Members in good standing may submit additional nominations in writing to: Mrs. Pauleen Sullivan, Secretary, 3616 Mound Ave., Ventura, CA 93003, USA. Each nomination must be accompanied by the written consent of the proposed candidate to serve if elected, and must be seconded in writing by another member. The Secretary will forward the candidate's name to the Nominating Committee for inclusion in the final ballot. Ballots will be mailed in time for the results to be announced at the Biennial Meeting.

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