PRINCIPES

Journal of The Palm Society

October, 1962
Vol. 6, No. 4

THE PALM SOCIETY

A non-profit corporation primarily engaged in the study of the palm family in all its aspects throughout the world. Membership is open to all persons interested in the family. Dues are $10.00 per annum payable in May. Requests for information about membership or for general information about the Society should be addressed to the Secretary.

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PRINCIPES

JOURNAL OF THE PALM SOCIETY

An illustrated quarterly devoted to information about palms published in January, April, July, and October, and sent free to members of The Palm Society

EDITOR: Harold E. Moore, Jr.

EDITORIAL BOARD:
Paul H. Allen, David Barry, Jr., Walter H. Hodge, Eugene D. Kitzke, Harold F. Loomis, Nixon Smiley, Dent Smith

Manuscript for PRINCIPES, including legends for figures and photographs, must be typed double-spaced on one side of 8½ x 11 bond paper and addressed to the Editor at Bailey Hortorium, Mann Library, Cornell University, Ithaca, New York, for receipt not later than 45 days before date of publication. Authors of one page or more of print will receive six copies of the issue in which their article appears. Additional copies or reprints can be furnished only at cost and by advance arrangement.

Contents for October

Cover Picture

Licuala ferruginea at the Botanic Garden, Singapore. Photograph by G. Addison.

NEWS OF THE SOCIETY

Enclosed with this number of PRINCIPES you will find a new roster of members, according to our membership files as of September 1st, 1962. This roster includes all those members who have paid their dues for the period from May 1st, 1962 to April 30, 1963, according to our new fiscal system. We have done our very best to have this roster complete and correct. If, however, there are any errors or omissions, we shall be very grateful if you will advise the Secretary.

* * *

Mrs. Edwin Moore, 1159 Missouri St., San Diego, Calif., has sent a most interesting account of some recent field trips taken by the California members.

On April 29th, approximately 25 people attended a meeting at Palm Springs, where Bob Schnabel was their host. They toured the residential sections of the city to see good examples of desert landscaping, after which they picnicked among the palms in Andreas Canyon. After driving through some date gardens, they visited the United States Date Field Station, where Roy W. Nixon, Horticulturist, talked to them about the present situation of date growing in California, and personally conducted them through the Station plantings.

On July 22nd, about forty persons met at the city park at Anaheim for a picnic lunch and a tour of this old and lovely park with many palms. From there, chairman Leslie Miller led them to the country estate of Mr. Sam Walker, near Orange. Mr. Walker's hobby is collecting palms. His driveway is lined with old specimens of *Washingtonia filifera*, all retaining their skirts. Many *Trachycarpus Fortunei* surround the house, and quite a large number of other genera and species have been included in the landscaping. He had recently added a *Jubaea chilensis* (*spectabilis*) with a height of 20 feet and weight of 8½ tons. He told the group that the temperature range at his estate varies from 25°F. to 105°F.

From Mr. Walker's, the group proceeded to the A. E. Stiles estate north of the Justin area. Located sixteen miles inland from the ocean, it is on a summit overlooking mountains and ocean for many miles. The area is so frost-free that Mr. Stiles raises papayas and mangoes. Large specimens of *Archontophoenix Cunninghamiana* and *Howeia Forsteriana* have been grouped with stunning effect. *Chrysalidocarpus lutescens, Phoenix Roebelenii,* various species of *Chamaedorea,* and *Chamaerops humilis* are growing successfully. The driveway through this 90-acre estate of avocados, oranges and mangoes ascends to the house bordered by trees of *Washingtonia robusta* 100 feet and more in height. Since the normal rainfall is only 17″ in winter, Mr. Stiles' bill for irrigation is $600.00 per month!

* * *

Mr. Leonard Etter, of Suncrest Nursery, Phoenix, Arizona, writes that he and Mrs. Etter are spending two months in Southeast Asia, studying the palms of that area. He adds: "I would like to extend an invitation to all Society members to look me up while in the Phoenix area. I shall be most happy to show them the palms of this area."

* * *

Mr. and Mrs. Arthur C. Langlois have returned to Nassau, Bahamas, from a "wonderful holiday full of interest and excitement." Even though the Madagascar visit was disappointing, they came home with about five hundred pictures of palms, most of which were photographs of pictures and plates of the genera not so well known to us in the western hemisphere, taken in the librar-

ies at Kew and Kensington. Let us hope for a good article from them, illustrated with some of those photographs.

* * *

Count Knuth, of Knuthenborg, Denmark, has promised an illustrated article about his recent visit to the Seychelles islands, home of the double-coconut or coco-de-mer, *Lodoicea maldivica*. Our members do get around!

THE SEED BANK

In response to our request for reports on germination of seeds received by members from the Seed Bank, several members have responded with interesting data.

The first to send a report was Maria (Mrs. George F.) Adams, the valuable member who planned and executed the remarkable display of palm fronds, inflorescences and fruits at the recent biennial meeting. She wrote:

"In the last Principes I note you ask for reports on germination of seeds from the Bank. Mine were planted in a somewhat haphazard mixture of sifted compost, shredded peat moss and sphagnum, plus some sand and a little Perlite. The *Jubaeopsis caffra*, soaked six days in warm water (changed several times daily) before planting, is just sitting — no sign of life. (I must confess to gently digging it up periodically for inspection!). Of the two *Calyptrocalyx spicatus*, one I fear has rotted; the other one germinated in 36 days and is now 7 inches tall with a second leaf unfurling and looking very fine and healthy. All 12 of the *Pinanga patula* germinated within 42 days and have the makings of a nice little colony."

* * *

Richard B. Murrow, of Los Angeles, has sent the most complete report to date:

"The recent issue of Principes requested comments on seed germination experiences — herewith some brief notes on mine.

Equipment: one 15-gal. aquarium measuring 12″ wide, 24″ long, 12″ high. One inch-high rack in bottom to support seed boxes slightly above ½″ to ¾″ depth of water covering bottom. Heat supplied by 25-watt submersible aquarium heating cable distributed over the bottom (submerged in the water); this is thermostatically controlled to maintain 80°F. bottom heat. (A small inexpensive aquarium thermostat is used, held to inside surface of side glass with rubber suction cups). Eight small seed flats occupy almost the entire area of the case supported on the rack — these are made by cutting down wooden cigar boxes to correct size to contain 12 to 15 erected asphaltum "plant bands" each, which gives a soil depth of about 3″. Bottom of seed flats perforated with drainage holes. Planting medium is equal parts of fine sand, peat, and top soil, with ½″ to ¾″ layer of fine gravel and coarse sand covering bottom of seed flats for drainage. Top of case covered with two sheets of window glass hinged together along the center long axis of the case with plastic electrician's tape so edges can be propped up about ½″ to give ventilation. Aquarium cover reflector light is on top of this running lengthwise of case and contains two 25-watt tubular bulbs. Location is near east and south corner windows giving good indirect light but no direct sunlight. The case maintains a very high internal humidity and all condensate on plants, sides and top glass returns to the bottom water pool, therefore it is only infrequently that the plants must be watered or the bottom water pool replenished. This is very convenient, because I don't have much time for puttering and am often away on business trips during which the seedling case must function

without attention. It can easily go several weeks without replacement or repair.

Mold and Fungus Control: When initially set up, the case soon developed a coating of mold or fungus (white, powdery) on the soil surface and other areas. This was to be expected, of course, because of the high humidity. It was completely eliminated by a couple of light dustings with a commercial fungicide dusting powder. New plantings are always lightly dusted, with complete success in eliminating mold or fungus.

Planting: I always remove the soft pulpy coating of the seed, if it has not already been removed in cleaning, to reduce the amount of useless material which only rots away and causes unsanitary soil conditions. Then I shake the seeds with a small quantity of Rootone in a small plastic bag. This product is supposed to contain hormones favorable to rooting and also a fungicide. I don't know whether it is any actual aid to germination and rooting, but feel that at least it can do no harm, and should keep the soil sweet in the immediate vicinity of the seed. I generally sow seeds on the soil surface and press them into the soil mix until about half submerged. Have also tried covering the seeds with ½" or so of soil mix. Believe less seed rotting and better germination is had without covering seeds, but no firm facts to prove it. Lack of soil covering has the advantage of permitting visual observation of germination process. From one to many seeds are sown in each plant bank area (about 1½" × 1½"), depending on the number and size of seeds available.

General Results: Success in germination has ranged from complete failure to almost 100% success. I do not know to what to attribute such wide variation, but suspect it results from a similarly large variation in the viability of the seeds themselves. This is not necessarily associated with freshness of the seed, because I have had complete failure with seed collected fresh and ripe off local trees and sowed immediately. From the same tree I have had complete failure with one batch of fresh seed and almost complete success with a subsequent batch of fresh seed from a later fruiting. I seem to find that germination either occurs early (within a few weeks) or not at all. I have never had seeds germinate after many months — they simply remain inactive or, more usually, they rot away.

My 80°F. bottom heat was selected in anticipation of its favoring the more tender, tropical palms not commonly found locally — it may be considerably too warm for some genera. For instance, I know from direct observation that seeds falling in flower beds or even thick lawns from outdoor trees of *Archontophoenix Cunninghamiana, Trachycarpus, Phoenix canariensis* and washingtonias germinate and grow with reckless abandon in our outdoor temperatures which seldom get over 80°F. here near the coast and are much under that most of the time, particularly at night. However, I have succeeded quite well with the first two of these in my constant 80°F. conditions. However, what puzzles me is that different plantings of *Archontophoenix Cunninghamiana* and *Chamaedorea erumpens*, both collected and planted fresh from the trees but from different crops, under identical germination conditions have given totally different results — one planting being quite successful and the other failing to germinate at all. Perhaps some of the commercial growers who have an abundance of experience with many genera could shed light on some of these perplexing questions if they could be persuaded to write articles for the Journal."

Gordon B. School, of Riviera Beach, Florida, tabulated his results for us:

Date planted	Number of seed	Name of Palm	Date 1st Seed Germinated	Number of seed Germinated
Feb. 5th	15	*Chamaedorea sp.*	June	12
Feb. 12	35	*Chrysalidocarpus lutescens*	July	3
Feb. 12	14	*Ptychosperma Macarthurii*	May	8
Mar. 9	11	*Aiphanes caryotaefolia*	May	6
Mar. 9	9	*Pinanga patula*	June	5
Apr. 9	25	*Pritchardia Thurstonii*	June	1
Apr. 9	33	*Coccothrinax Dussiana*	July	23

Planting medium: 50% vermiculite, 50% peat moss. Germinate under fiberglass cloth in 50% shade.

Randolph Fuller, of Naples, Florida, wrote:

"I thought you might be interested in hearing how some of the rarer seeds which you sent made out:

Pinanga patula — 100% germination, now nice little plants in 4" pots.

Calyptrocalyx spicatus — 100% germination, rat nibbled one, one died, but have 10 nice plants in 5 and 6" pots.

Jubaeopsis caffra — no germination as yet.

All the seeds you have sent from the regular seed bank have done fine.

I have just recently succeeded in germinating three quite rare palms: *Orania philippinensis* and *O. sylvicola (O. Macrocladus)* and *Pholidocarpus macrocarpus* as well as some more common ones such as *Areca latiloba, Pinanga cuneifolia* and *Oncosperma tigillarium* and *O. horridum.* I had beautiful little seedlings of both *Iguanura grandis* and *I. geonomiformis* nicely started, and lost every one."

* * *

Ralph G. Riggle, of West Palm Beach, Florida, writes:

"If you recall, at the bi-annual meeting of the Palm Society seeds of *Linospadix monostachya* (*Bacularia monostachya*) were made available and I wish to report the seeds I received were planted on April 17, 1962, germinated June 16, 1962 for germination period of 60 days.

I was fortunate enough to acquire four seeds of *Hyphaene Schatan.* I grounded these seeds April 18, 1962 and I am pleased to report that one seed sprouted June 28, 1962, a germination period of 71 days. It is my thought that this is pretty close to a record, as in my limited knowledge and library on these species the average germination period I believe runs from 150 to 180 days. I thought this matter might be of interest as Fairchild Garden in their catalog of plants recently issued, July 1962, offers these seeds for distribution to their members." *

From San Diego, California, James P. Specht wrote:

"In the last Principes you expressed interest in hearing about our experiences with seed received through the Seed Bank. The *Hyphaene* seed germinated the fastest — first leaf appearing within four weeks and 100% germination occurring. Germination was 100% also with *Pinanga patula,* with the first leaf up after five weeks. *Jubaeopsis caffra* left more to be desired. Two of the five seeds received rooted within three weeks but one rotted soon after transplanting

*Fairchild Tropical Garden, 10901 Old Cutler Road, Miami 56, Florida, offers these seeds for sale to the public as well as to its members. Write them for details, if interested.

to a larger container. I believe the soil medium was kept too moist. Bill Dickinson also had one root but ultimately rot. The other rooted seedling showed its first leaf seven weeks after sowing. The remaining three seeds show no sign of germinating. I am not optimistic about their future.

"Are the annual Palm Society meetings to be held in Florida every year? Will California get one eventually?"*

* * *

Joe W. Michael, of Vero Beach, Florida, wrote this charming letter:

"It was nice to talk to you on the telephone this morning. Needless to say, I am glad the seed bank has not been discontinued." (He feared that Fairchild Garden's new catalog and seed sales would interfere with the Society's seed bank, but we reassured him).

"I must tell you what it means to us: After receiving the seeds in our R. F. D. box, we place them on the shelf until that evening. When the children are fed and in bed, Anne and I sit down and relax a bit, then out comes the old geography book and our copy of "Palms of the World." We take a trip to that country and talk of its climate, land, people, and what it must be like to live there. The next day I plant the seeds and give a progress report to Anne every so often — and a trip through our south acre."

* * *

Bill C. Dickinson, San Diego, California, pats us on the back:

"I want to thank you and all the other Palm Society members working with the seed bank, for the seeds I have received this year. Watching them sprout into plants has been a warm and rich experience."

*The Society's meetings are held every *other* year, and the Society would be delighted to receive an invitation from our California members to hold a meeting there.

A. C. Soffe, of Umtali, Southern Rhodesia, has never been able to get one seed to germinate there. He has now given up, and is acquiring small plants instead of trying seeds.

MARIAN BELL FAIRCHILD

Mrs. David Fairchild, a director of The Palm Society, widow of the famed plant explorer and a great lady in her own right, died at her summer home in Baddeck, Nova Scotia, on Monday, September 24th. A more detailed obituary will appear in the January number.

FRANK R. MAY

The Society has suffered a real loss in the sudden passing of Frank Roger May, soon after his fiftieth birthday. Mr. May served as treasurer of the Society from April, 1958 until July, 1959, and was a member of the Board of Directors for several years.

Born in Asheville, North Carolina, Frank came with his family to Miami, Florida when still a young boy. After serving in World War II, he became owner and president of Miami Transfer Company, which specializes in heavy moving. Some years later he and his family moved to their new home at 1953 Tigertail Ave., Coconut Grove. The lot was bare, so he used some of his heavy moving equipment to bring some large coconut trees from his former home in the northwest section of the city. In moving and caring for these trees his interest in palms began, and developed to the point where he had one of the finest privately owned collections in southern Florida. On the afternoon before his passing he was at Fairchild Tropical Garden acquiring some new palms, and seemed to be well and cheerful. He died suddenly the following morning of a cerebral hemorrhage. He had only recently made a very handsome

donation to the Palm Society in recognition of the fine work being done by Nat De Leon through the Seed Bank. He leaves his wife, Juanita, a well-known ceramist, a daughter and two sons, as well as his mother and two sisters.

LUCITA H. WAIT

LETTERS

One of our members, a high-school student in Dallas, Texas, writes:

"We had a severe winter in this part of the country, as you probably know. It was 8°F. in Dallas, but colder toward the west, north and east. Shreveport, La. had 3°F., New Orleans 14°, El Paso, Texas −4°, and San Antonio, Texas 10°F. I have been in all of these cities except San Antonio and have seen palms growing in every one of them. In Shreveport there are *Washingtonia, Butia capitata* and a few others. I have seen palms in Shreveport up to 15 feet and higher. Some say there are a few washingtonias 20-30 feet high. I have also seen date palms in Shreveport less than 10 feet high. Some friends of ours had one at least 8 feet high on the south side of their house. It was killed outright.

I have seen fan palms in Monroe, La., 15-20 feet high.

Almost all of the washingtonias in Dallas survived, at least 90%, possibly more. There are a few sabal palms here, probably *Sabal texana*, but at least 50% were killed.

I haven't been in El Paso in at least seven years, but I saw a few washingtonias there 5-10 feet high at least, some probably higher. At Columbus and Deming, New Mexico I saw a few washingtonias averaging 5-7 feet in height. I have been told that the winter temperature there often reaches 10-15°F., and has been known to reach −7° at Columbus, where I saw two washingtonias 5-10 feet high. Columbus and Deming are approximately 4000 feet in elevation and at approximately the same latitude as El Paso, which is approximately 3700 feet.

I hope this letter is considered for publication in PRINCIPES to stimulate interest in growing palms in colder areas.

Sincerely,

JOHN F. SHINE

To me . . . hardiness is a relative concept. Royals may be thought of as being slightly hardier than coconuts; *Chamaerops* is enormously hardier than *Phoenicophorium (Stevensonia)*. Between the latter two genera one may envision a continuum of species, arranged in order of hardiness. From such a compilation a collector may ascertain that, if *Arecastrum* is marginal in his locale, *Livistona chinensis* is a good bet, but *Archontophoenix Alexandrae* is a bad risk. This is a rather obvious example, but it should demonstrate my point.

How to devise such a continuum? I would suggest that first a list of the commonest species be made and ranked in order of their hardiness. Then let Society members in various climates place the less ubiquitous species at first in relation to the common ones and later, as more accurate comparisons are made, in relation to one another. No doubt there would be disagreements and discrepancies arising from seedling variation, differences in nurture, observer sentiments, etc., but there seems to be little doubt that such a list, albeit imperfect, would be of great benefit to those of us in marginal zones.

JOHN E. SWISHER

PALM ODDITIES

No doubt many have seen palm stems that curve into interesting and attractive shapes and angles. The coconut, for example, frequently assumes a graceful curve over the beach. Many palms curve

67. Spiralling *Coccothrinax argentata*, Bahamas. Photograph by R. W. Read.

gracefully when planted in groups or clusters of three or more individuals. The trunks will tend to grow out away from their neighbors toward the greatest source of light. *Ptychosperma elegans* does this effectively as does the coconut most frequently. Another species of *Ptychosperma*, known as the "Rakii" palm at the Fairchild Tropical Garden, does not curve away from its neighbor. Instead, a group of these slender palms will grow straight up with their heads in a mass. Who can explain the ways of palms?

People often ask why the coconut palm always leans. The coconut does not *always* lean, but so many do that we rarely see a straight one. The coconut palm usually leans to grow toward the greatest light source. Thus, coconuts growing along the coasts of tropical islands lean out over the water in order to be in full sun away from the shade of other trees. In plantations, however, they often grow erect. This mode of growth is controlled by hormonal processes which cannot easily be explained here.

One of the most difficult things to explain is the manner in which some palm stems form a spiral. A *Livistona decipiens* in Florida has a semi-spiralled trunk and I have seen others in various collections. But I had never seen one quite as distinct as the one pictured in Fig. 67. This *Coccothrinax argentata*, or silver thatch palm, was found while vacationing on Paradise Island (Hog Island) in the Bahamas near Nassau. No, it wasn't a vine that did it, but are there any other suggestions? Hormones?

ROBERT W. READ

Some Corrected Epithets for Palm Species

The editor realized with shame, while preparing manuscript for the index to the current volume of PRINCIPES, that he had been guilty of a *lapsus* in using the epithet *pembana* for a new species of *Chrysalidocarpus* (*Principes* 6: 109). The generic name *Chrysalidocarpus* is masculine in gender, the epithet must agree, and the name should be corrected to *Chrysalidocarpus pembanus*.

A further confession relates to new combinations published in *Gentes Herbarum* 8: 462-470, 1956, wherein epithets in feminine form were transferred without change to *Clinostigma* and *Ptychosperma*, both neuter in gender. The following names, therefore, are correct: *Clinostigma carolinense* ("*carolinensis*," p. 462); *C. ponapense* ("*ponapensis*," p. 463); *C. Savoryanum* ("*Savoryana*," p. 465); *Ptychosperma Ledermannianum* ("*Ledermanniana*," p. 469); *P. palauense* ("*palauensis*," p. 470).

H. E. MOORE, JR.

Essays on the Morphology of Palms

VIII THE ROOT

P. B. TOMLINSON

To study the root system of any plant is difficult and palms are no exception. These few notes indicate the main features of the morphology of palm roots in so far as they are known, and will probably serve only to emphasize our ignorance of this subject rather than to reveal any great store of knowledge. One difficulty in studying the roots of palms is that palms in cultivation frequently develop peculiarities of the root system which they may not show in nature. The first problem therefore may be to distinguish that which is normal from abnormal structures.

As in most monocotyledons the first seedling root, being unable to increase its diameter by secondary growth, is replaced by adventitious roots arising from the basal nodes of the seedling (Tomlinson, 1960). As the diameter of the stem increases by superposition of successively wider internodes, so does the potential area over which roots can be borne. Consequently, as the enlarging stem and crown makes increasing demands for water and dissolved mineral substances, these demands are met by the continual production of new roots and by the penetration of existing roots deeper and more distantly into the soil. This contrasts with a dicotyledonous tree in which the primary tap root normally persists but widens by secondary growth so that an ever-widening channel exists capable of maintaining an effective conduit for water supplied by the expanding root system and demanded by the increasing leafy crown. On the other hand, in adult palms the water demands of the leafy crown soon reaches a constant note, because this crown does not branch or increase in size, therefore, the demands made on the absorptive capacity of roots also soon reaches a constant rate.

The origin of the new adventitious roots is of great interest. They all arise at the periphery of the central cylinder. New root initials originate only in living tissues and since they are produced continuously throughout the life of the palm, there must be some growing tissues always active at the base of the trunk. This is quite remarkable when one considers that these tissues are all primary and are the oldest in the palm stem. Certainly the origin of roots in palms in relation to the great longevity of these tissues would be a rewarding study.

Vascular continuity between root and stem is maintained by intimate union of the vascular strands of root and stem, these fusions often being quite deep-seated. Since the vascular skeleton of the stem is itself a continuously ramifying network ultimately associated directly with green leaves at the crown there is thus built up a continuous conducting channel whereby water absorbed by the roots finds its way into the leaves via the xylem tissues. Conduction of complex foodstuffs, in both directions, takes place through the same network, but in the phloem tissue.

The extent of the palm root system in the soil is unknown. From observations of root systems exposed either by land slips, or, as with the coconut on sandy shores, by wind-erosion, the lateral extent of roots may be enormous. The persistence of certain palms in arid regions (albeit almost invariably in obvious water-courses) also suggests that the vertical penetration of palm

roots may be considerable. The extent of the root system must also depend on the texture of the soil.

Palm roots have the basic monocotyledonous root structure. They grow apically and have a well-developed conspicuous root-cap. Roots of the first order are usually quite wide. Certain internal modifications may result from this. One peculiarity of these wide first-order roots is the absence of root hairs. They are replaced by large and often thick-walled surface cells which may not be good absorbers. Absorption seems primarily to be a function of the narrower branch roots, or secondary order roots, which do bear root hairs close to the growing tip. For this reason one essential for vigorous growth of the palm is probably a healthy system of actively growing roots, with the continual renewal of absorbing branch roots. This should also be borne in mind when a palm is transplanted.

One peculiarity of wider roots in palms is that the central stele may not be cylindrical, but fluted or even dissected into separate strands. It is interesting to note that all palm roots at their insertion onto the stem break into separate strands each of which individually fuses with a stem bundle. Thus the persistence of the dissected stele in wide roots is merely an extension into the root itself of structures normally restricted to that part of the root within the stem (Cormack, 1896; Drabble, 1904).

Whilst palm roots normally grow deeply into the soil when originating on the stem base, either below ground or at most a little above soil level, under exceptional circumstances or rarely as a normal condition they may behave otherwise. Commonly a dense cluster of roots is formed at the base of the trunk, a little above the soil surface. These roots have restricted growth but persist in a dormant state. This condition is common, for example, in *Phoenix*. Whether this root cluster is normal or abnormal, and, if abnormal, its cause is not known. However, Small (1936) has evidence that these clusters, at least in *Sabal*, represent the result of fluctuations in water level, the roots only growing out to the height of the trunk covered by flood water. The production of clusters of erect-growing roots at the base of the stem was considered by Cook (1941) to be a characteristic feature of *Thrinax* and related palms. He gave the name rhizotyle to these clusters and suggested that they serve to trap humus. Similar, but spiny, erect roots have been observed at the base of the stem in *Zombia*. This may indicate a transition to the condition in *Cryosophila*.

In *Cryosophila*, the root-spine palm, roots originate at all levels on the trunk, as well as at its base. The basal roots are normal, long absorbing and anchoring organs. The aerial roots early resemble normal roots in that they have a deep seated origin and a root cap, but they soon become erect, short, often branched and always rigid, pointed spines. The spines on the stem of *Mauritia armata* are similar, but shorter and stouter root-spines. In certain other palms, notably of the iriartoid group, thick props originate at successively higher levels on the stem. These are gigantic roots, each with a massive root cap and a complex stele which befits their giant size. They grow out from the stem at an angle, ultimately reaching the ground to function as stout buttresses. These iriartoid palms have a peculiar spindly method of stem growth which necessitates this mechanical buttressing (Tomlinson, 1960). Similar roots appear on a few unrelated palms with a normal stem construction, notably in *Verschaffeltia*. These roots may

not be essential for support of the stem and may be distinguished as "aerial roots," although their anatomy and behavior is identical with that of "prop-roots."

One peculiar feature of many palm roots to which the early attention of plant anatomists and physiologists was drawn is the presence of small appendages called "pneumathodes." Each pneumathode is a lateral root with restricted growth. They are frequently seen on the exposed roots of pot-grown seedlings and most of the early literature on these organs describes them on palms cultivated in glass-houses in Europe. Their frequency and distribution in nature is not well known. Commonly pneumathodes are visible growing erect above the soil surface, but they also occur abundantly underground. In their internal anatomy these short branch roots differ from normal roots largely in having very loose surface tissues. This is apparently designed to facilitate gaseous exchange between the air and the internal atmosphere of the root. It should be noted that many palm roots, particularly those of swampy situations, have a longitudinal system of cortical air-canals with which the pneumathodes are continuous. The function of these pneumathodes as breathing organs is assumed rather than proved, but this interpretation seems likely. For example, in the *Raphia*-swamps of West Africa, the swamp surface is covered by a close carpet of erect-growing roots which are little more than giant pneumathodes. It is reasonable to suppose that these erect roots aerate the underground roots which grow in the oxygen-deficient mud. The situation is analogous to that of *Avicennia* with its breathing roots or pneumatophores, growing in mangrove swamps.

From this brief discussion of roots in palms, with its unhealthy proportion of speculation and supposition, it is evident just how ignorant we are of the structure and behavior of palm roots. Detailed studies on this subject would be of great value and would ultimately throw some light on the physiology and ecology of palms, subjects of great practical importance.

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PALMS AT SUMMIT GARDENS, PANAMA CANAL ZONE

W. R. Lindsay

The present Summit Gardens, or Summit Park as it is now called, was started in 1923 as a plant introduction garden (The Canal Zone Experiment Gardens) for the Panama Canal Zone, Panama. The late David Fairchild of the United States Department of Agriculture and Thomas Barbour of Harvard University were both very active in securing its establishment and made many valuable plant contributions in its early stages. Holger Johansen was the first Agronomist and Director of the Gardens. He was most energetic and did an excellent

job of "putting the infant Gardens on its feet." During his four years at Summit he introduced almost five thousand species of plants.

From 1927 until his death in 1938, J. Edgar Higgins carried on the good work started by Dr. Johansen. I was fortunate in joining the staff in 1930 and have been able to watch the gardens mature. Over fourteen thousand accessions of economic and ornamental plants have been added from all over the tropical world. These include at least two hundred species of palms, of which a hundred and twenty-five species are established. The gardens, embracing some three hundred acres, lie almost directly south of Florida, but are directly in the tropics being only nine degrees north of the equator. The rainfall averages seventy-five to eighty inches a year and practically all of this falls during the period from May through December. The poorly drained, acid, clay soils of this region make it impossible to adopt modern methods of cultivation. This has its drawbacks but also has some advantages. Plants either like it or they do not and respond by making phenomenal growth or dying. This growth is exemplified by the teak tree (*Tectona grandis*), source of the valuable teak wood of commerce, a seedling of which may reach a height of thirty to forty feet by the end of the second year. Seedlings of *Pigafetta filaris (P. elata)* palms have attained a height of over ninety feet in eighteen years.

As it was not always possible to secure cultural requirements for the many plants introduced, an effort was made to plant them out in as many different conditions as possible, such as in the shade or partial shade, in low wet soil or on relatively dry hillsides. Consequently the Gardens were not laid out with definite plots set aside for plant segregation. A small palm planting may be found completely surrounded by fruit trees or even interplanted with them.

A few of the outstanding species of palms include: *Actinorhytis Calapparia*, a single- stemmed palm from the Pacific with beautiful clusters of large orange-pink fruits; *Calamus Muelleri* from Australia, *Cyrtostachys Renda*, a multiple-stemmed palm of Sumatra with bright red leaf sheaths; *Iriartea exorrhiza* and *Socratea durissima* of tropical America with their trunks supported above the ground on a cone of roots, *Normanbya Normanbyi* from a remote part of Australia; *Pigafetta filaris* (P. *elata*), seeds of which were sent to us by David Fairchild in 1941 and which has raised itself to a height of over ninety feet on a bright green cylindrical trunk a foot in diameter, and *Pelagodoxa Henryana*, a beautiful rare shade-loving species from the Marquesas Islands.

A number of other unusual species in our collection are: *Astrocaryum Standleyanum, Bentinckia nicobarica, Calyptronoma dulcis, Deckenia nobilis, Desmoncus oxyacanthos, Euterpe edulis, Manicaria saccifera, Mauritia setigera, Metroxylon amicarum, Phytelephas macrocarpa, Rhyticocos amara.* There are also represented five species of *Caryota*, nine of *Livistona*, seven of *Phoenix*, six of *Sabal* and five of *Thrinax*. Many of the plants produce viable seed which is available in season.

THE EDITOR'S CORNER

It has been suggested that articles on palms which have appeared in other journals, especially those not readily available, be reprinted. A beginning has been made in this issue. Further suggestions will be welcomed.

Culture of Palm Seedlings after Germination

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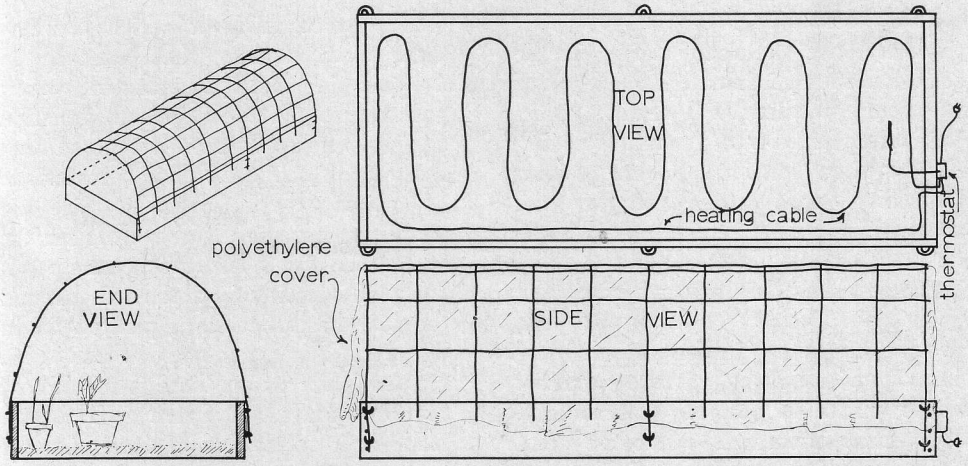
The fascinating hobby of raising palms from seed is beset by difficulties of mysterious origin and equally uncertain cure. These difficulties are frequently a result of inclement weather, poor soil, improper handling or simply poor horticultural practices. A cure often can be effected by the addition of heat in cool weather, a change of potting media or variations in planting methods. While much has been written concerning the planting of palm seeds, little attention has been given to the handling of the young plants after they are removed from the seedbed. The stages of growth after the appearance of the first leaf up to the time of the formation of a "woody" stem are critical, for it is during this juvenile phase that the foundation for the support of the adult plant is laid. During this time of extreme vulnerability to injury and disease, care must be taken to provide the conditions necessary for rapid, healthy growth. Following a brief review of the basic principles of palm seed germination, along with a few pertinent comments, an attempt will be made to describe a technique for the planting of young palms that can be used with safety in all areas where palms are grown.

Various methods of germinating palm seeds have been described in earlier issues of PRINCIPES (see references at the end of this article). The methods differ slightly with the species, location and individual grower, as a result of variations in the porosity of potting media, temperature fluctuations and moisture availability. Most palm seeds, however, have basically the same seedbed requirements with very few exceptions (1). The fundamentals of palm seed germination are: a plentiful supply of moisture without stagnation (perfect aeration and drainage) and a *constant* high temperature (80°-85° F.). If the six rules given here are followed closely, an amateur should have very little trouble.

1. Use only fresh viable seed since many palm seeds lose their ability to germinate within a month or so.
2. Clean the seed carefully and dust with a fungicide.
3. Plant in a sterile, *well drained* and aerated medium (Perlite).
4. Cover seed with about ¼ inch of finely shredded sphagnum moss and granite chips.
5. Keep the medium *moist* and *warm* (not less than 80° F).
6. Do not allow seedlings to remain in the seedbed longer than necessary.
7. Maintain as rapid growth as possible to insure healthy palms.

While doing graduate work at Cornell University I found it necessary to experiment with seed germination and seedling growth conditions in order to have sufficient rapidly growing root tips for cytological studies. These experiments were necessitated by the fact that, although the temperatures in the Cornell

(1) The seeds of *Pseudophoenix Sargentii* often do not germinate if sown when very fresh even though ripe. Based on observations at Cornell University and in Florida, the seed must first dry, with the resulting shrinkage of the endosperm, before germination can occur. When planting seeds of this species, allow them to dry for a month or more, or until the seed is loose within the dry fruit. Then plant in Perlite and keep in a warm seedbed.



68. Diagrammatic drawing of an easily constructed heat chamber, using 6-inch mesh fence wire supporting a plastic cover, for maintaining high temperatures and high relative humidity. The chamber may be heated by a thermostatically controlled heat cable buried in a layer of Perlite or may be heated by the sun in warm climates.

Conservatory were maintained at 80°-85° F. during the daytime and 70°-75° F. at night, germination was relatively poor and seedling growth was slow. When root tips were examined, very few dividing cells were found. The poor germination and slow growth rate may be explained by the fact that soil temperatures are lower than air temperatures as a result of the cooling effect of moisture evaporating from the sides of the containers. In order to insure rapid growth, it was necessary to provide constant temperatures above 80° F. This was achieved by construction of a heat chamber (fig. 68) containing heating cables controlled by a thermostat. The heat chamber also maintained a high relative humidity which consequently reduced evaporation. As a result of constant higher soil temperatures the percentage of germination was greatly increased and required about one-half the time previously required. At the higher soil temperatures root growth and cell division were rapid.

Because of the great loss of seeds and seedlings from damping-off disease in media containing peat moss, experiments using different media were carried out. Due to the fact that palm seeds have a large food storage capacity it is unnecessary to provide nutrients of any kind until after the seedling has formed the second leaf. With this fact in mind Perlite, a sterile medium permitting excellent drainage and aeration, was used in the heat chamber at Cornell. The results were very good. Because Perlite is unable to support fungus growth, no matter how saturated, there were no cases of damping-off disease recorded during the experiments. The results in fact were so good that Perlite is still used almost exclusively in the germination of palm seeds at Cornell University. Palm seeds requiring a long time to germinate are still germinating a year or more after planting with no pre-emergence damping-off. Because of its extreme light weight, however, Perlite is frequently washed out of the pots during watering. This washing can be avoided by the addition of a thin layer of a mixture of finely shredded sphagnum moss and granite chips over the seedbed.

Seedlings should not be allowed to remain in the seedbed longer than ab-

solutely necessary if rapid growth is desired. Once the food supply in the seed endosperm is used up the vigor of the young seedling will decline unless it is transplanted into a medium having the required nutrients. There is also increasing danger of damaging the roots which become entangled with one another.

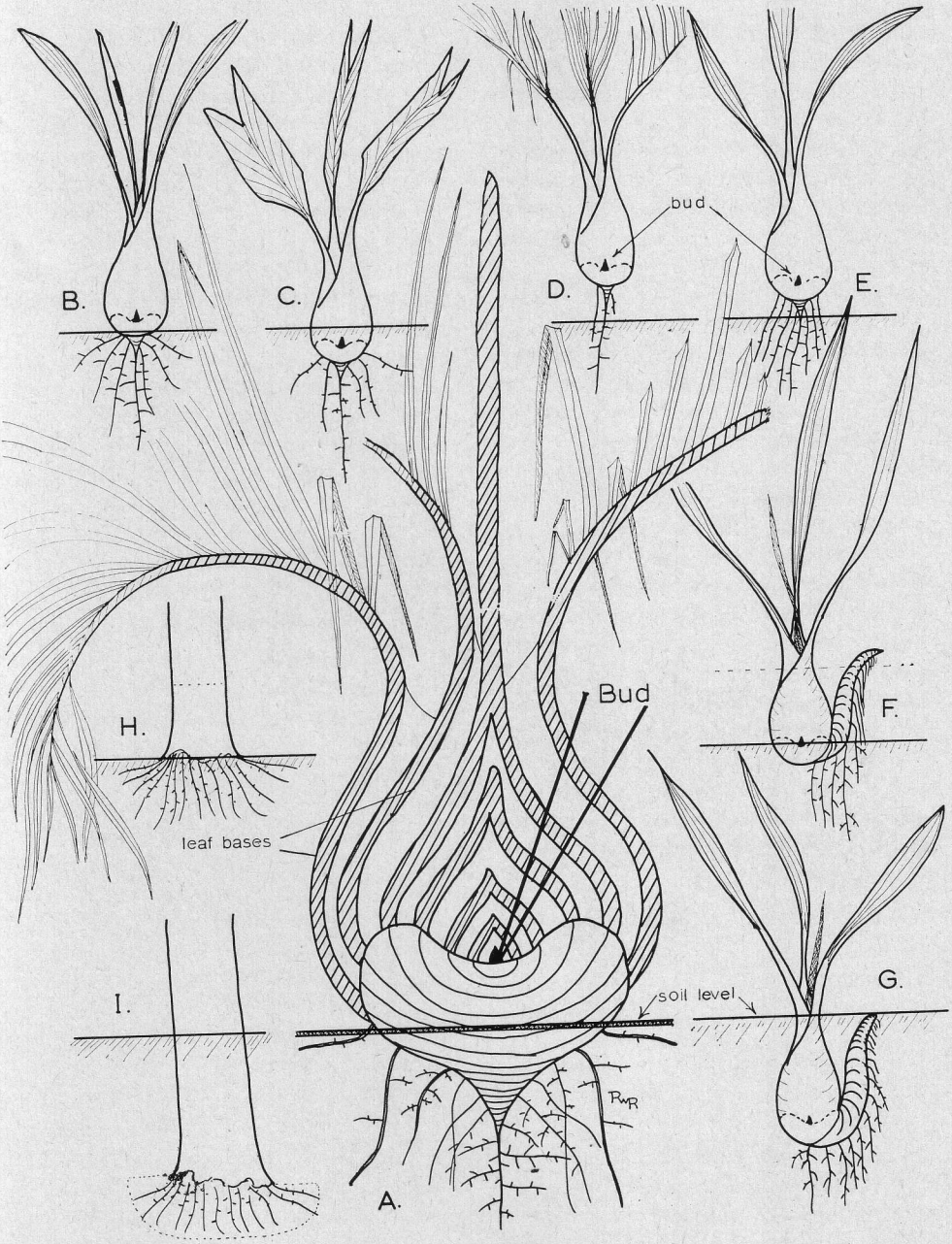
A general potting mixture composed of 1/3 peat moss, 1/3 Perlite and 1/3 pasteurized sandy garden soil or your own favorite potting mixture used for house plants is perfectly satisfactory. It is most important to provide good drainage, disease-free soil and clean pots. Never use soiled containers for palm seedlings. The first transplanting is very critical being the time when greatest loss is experienced. The young seedling, fresh from the seedbed, is extremely tender. Since roots will no doubt be damaged slightly, shock and slower growth occur for a few days until root growth and absorption are resumed. The seedling at this point is unable to outgrow fungus and disease. Additional heat (80°-85° F.), particularly during cool weather, will speed recovery.

Bud Location Important

Because the bud of young palms is located almost next to the roots (fig. 69A and Tomlinson 1960) it is more readily attacked by fungus than the bud of older plants which have stems raising the growing point above the surface of the soil. The loss of the central unopened bud leaf in newly transplanted seedlings is frequently caused by a fungus disease entering through the leaf base where contact is made with the soil, especially when seedlings are planted too deeply (fig. 69C). Observations of numerous seedlings and young palms have revealed an important characteristic of palm roots. The roots of palms have a tough protective layer which prevents them from drying when exposed to the air in shallowly planted young palms. The roots continue to function and grow normally even if exposed near the base of the leaf. This characteristic of the roots enables us to raise the seedlings very slightly above the surface of the soil (fig. 69E) reducing the possibility of infection from the soil through the leaf base. Seedlings planted as in figure 69E. will grow as well as those planted lower unless there is insufficient root support as in figure 69D, which seedling is in danger of being broken by any slight movement. A seedling planted as in figure 69C is in distinct danger of infection from soilborne diseases such as damping-off disease. Figures 69A, B & F illustrate the best level for planting seedlings.

In certain palm genera, such as *Sabal, Borassus, Livistona* and others, the seedling buries itself some distance below the surface (fig. 69G). Such behavior poses no problem in the seedbed or in nature where ecological conditions are ideal. However, in cultivation, where conditions are undoubtably different than in nature and disease is more likely, the seedlings should be raised slightly as in figure 69F to prevent moisture remaining in the leaf bases in contact with the soil. Planting the seedling higher will not hurt it in any way; it will, in fact, reduce the danger of infection.

The location of the leaf bases in relation to the soil level should be carefully watched throughout successive transplantings into larger containers. As soon as the roots begin to grow around the inside of the container, the seedling should be moved into a larger container until a 6-inch pot size (for small palms) or larger for large palms is reached, always packing the soil tight-



69. Palm seedlings. A, longitudinal section of a young palm illustrating the location of the bud in relation to leaf-bases and soil level when properly planted; B, best planting level for seedlings under normal conditions; C, worst manner of planting subjecting seedling to soil-borne diseases; D, seedling with poor root system raised too high; E, best planting level in areas subject to cool weather and high soil moisture or rainfall; F, *Sabal* seedling as it should be planted in cultivation; G, *Sabal* seedling as it grows under natural conditions; H, I, original and new levels for planting mature palms in well drained soil when additional support is needed.

70. Close-up of the inflorescence of the bottle palm, *Mascarena lagenicaulis*. Photograph by Gatteri.

71. Bottle palm, *Mascarena lagenicaulis*, at the Fairchild Tropical Garden. Photograph by Gatteri.

ly about the roots to prevent movement.

The time when a young palm is set out in the garden is probably the *most* critical, *especially in marginal areas* where tropical conditions are not duplicated. The position of the bud and its relation to soil level is the most important factor. Although the plant will be considerably larger than it was in the seedbed, if no visible trunk has formed the bud is still not more than a fraction of an inch from the region of root emergence (fig. 69A), not, as many believe, among the leaves. The location of the bud at the base of the leaves makes it particularly vulnerable to attack by soil-borne diseases which are usually more plentiful in the open ground than in the pasteurized soil of the seedbed or pot. Again, it is far better to have the roots exposed slightly when the seedling is set out. Additional soil can then be filled in to cover exposed roots during a period of warm weather and rapid growth after the plants are well established.

Special precautions are necessary in areas outside the tropics and subject to cool damp nights or occasional freezes. In marginal areas it is particularly important not to plant too deeply because of the slower growth rate during cool weather and the greater danger of an infection becoming established. The loss of the bud leaf during cool weather when growth is slower or after a freeze may be a result of the condensation of water among the leaves which enables fungus and bacteria to spread and infect the delicate tissues or bud leaf. For this reason it is important to keep the bud and leaves of a palm dry during cool weather, except to wash off frost. Frost and freezing present a problem quite different from prolonged cool weather. Damage is immediate during frost or freezing and, as a result, provides openings for later infection.

When planting older specimens, the situation is different from that in seedlings. An older plant having several feet of visible stem can be planted much deeper than the level at which it was growing previously. There is no danger of soil borne diseases gaining passage into the bud. Tall mature specimens of palms with woody or fibrous trunks such as *Sabal, Washingtonia, Thrinax, Coccothrinax, Roystonea, Cocos,* can be set more deeply in the ground, as in figure 69I, so long as there is good soil drainage. Roots will form along that portion of the trunk in contact with the soil as happens many times in nature when the trunk is injured, where atmospheric moisture is high, or in areas of seasonal flooding. Deep planting (1 to 3 ft.) will provide additional support for tall specimens, eliminating the need for some of the usual braces and guy wires. This technique is particularly applicable in new landscaping jobs or in areas, especially those along the coast, subject to shifting sand, high winds and erosion. The soil in contact with the trunk must, however, be highly porous in order to prevent rotting.

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Many of these articles may also be found in *The National Horticultural Magazine, Special Issue, Cultivated Palms* 40 (1): 128-183. 1961.

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[Were someone to write a history of man's interest in the palms, the book would be a long and fascinating one. The accompanying translation is of special interest, and is reprinted (as is a further note in volume 34: 309, 1957) with minor corrections from *Tropical Agriculture* 33: 207-213, 1956, with permission of the translator and the General Editor of the journal. Notes of the translator have been lettered in this reprinting; those of a commentator (though initialed F. R.) numbered. The latter appeared as marginal editorial observations beside Redi's text in the original edition of his *Opere* (vol. 6: 282-298, 1728) edited and published by Hertz. Redi lived from 1626 to 1698. Ed.]

An Account of the Date Palm by Francesco Redi, A.D. 1666

Translated by
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(Translator's Note:

I have translated the article by Redi because it appeared to me of interest in that it contains, so far as I am aware, the first rational account in a European language of the pollination of the date palm, the preparation of date syrup, and the use of the date-palm heart and date-palm sap (*lagbi*). He is the first European writer to mention six well known North African varieties of dates which, so far as he goes, he describes correctly. He, however, confuses the date palm with the Theban palm (*Hyphaene thebaica* Mart.) and with the oil palm (*Elaeis guineensis* Jacq.). His article *Concerning the Nature of Palms*[1] (*Notizie intorno alla natura delle palme*) was written 'for Signor N.N.' and is dated 1 May 1666. Dr. Redi states that his information was obtained from Khawaaja Abul Gheith bin Faraj es-Sa'iid, who was educated in the celebrated schools of Fez and, by virtue of his qualifications, sometime attached to the court of Hajji Mustafa Laas, King of Tunis. M. d'Herbelot is said to have consulted him about oriental languages.—V.H.W.D.)

The palm is a very common and very useful tree in Asia and Africa, but in Europe, particularly in our Italy, it is seen but rarely, and, if it is seen, either it gives no fruit or the fruit does not mature. Of this, there is not only daily experience, but there is also the evidence of Pliny in the 13th book of his *Natural History;* and, before Pliny, Varro mentions it in the 2nd book of his *Rerum Rusticarum* (*sic. De Re Rustica?*) (1) (a).

(1) *The Capuchin Father, G. A. Cavazzi of Montecuccolo in the *History of the Three Kingdoms, Congo, Matamba, and Angola* (*Istoria de' tre Regni Congo, Matamba, e Angola*), speaks at length of the palms. Also there are many excellent notes on these plants by F. Gemelli, in his *Tour of the World* (*Giro del Mondo*), published in Venice, Vol. 5 (1719), p. 102 *et seq.*, and in a short work on the palms printed in Florence in 1693.—F.R.

The palm likes the plain but it is also at home on the mountains provided there be springs there, for there is nothing the palm dreads more than drought, which damages it and kills it, so much so that, although it likes to be well manured and supplied with dung, nevertheless, this is harmful to it in dry years and in places where there is no possibility of watering it abundantly, but if there is water which is applied at the right time, and if the soil suits it, the palm will grow and bear so heavily that sometimes one palm will give two camel loads of dates.

Whereas, according to those who write of the qualities or nature of plants, all plants have a male and a female, yet in no plant is this more evident than in the palm, because they relate that the female will not conceive or bear fruit without the male, and that around the male many females stretch forth their fronds, and it would seem that they entice and coax it, while the sight of him, rough and robust, with his breath, and with his powder makes them gravid. If the male dry up or be cut off, the females growing around it may be said to become widows, for they become sterile(2).

A. Tazio in the first book of the *Loves of Leucippus and Clitofont* tenderly describes these loves of the palm, and the following also have mentioned them with equal grace: T. Simocate in *The Epistles*, M. Glica in *The Annals*, A. Marcellinus, and Claudian who, in *The Marriage of Honorius* (lines 65 & 66) wrote:

Vivunt in Venerem frondes, omnisque vicissim Felix arbor amat, mutant ad mutua Palmae Foedera . . .

All those writers, however, wrap up the truth in a thousand poetic conceits, so much so that, as Abul Gheith tells me, it is not true that the male should be planted near the female, nor that it should be seen by the female, nor that the female should smell its odour, because there are gardens and palm groves where there are no males, yet the females there are fertile, and furthermore, if, in places where there are males, these are removed, the females will not for this reason cease their yearly bearing. It is, nevertheless, true that the male contributes something towards the fecundation of the female and I shall here write to Your Lordship what I have been able to understand of the matter, and this is that the palm, from the age of three, four, or five years to the age of one hundred, produces, at the beginning of each spring, at the place where many of the lowest fronds join the trunk, an involucre, called by Dioscorides *phoinix elatis* (3), which grows to about half the size of an arm, and which then in the month of April, when it is the time for flowering, of its own accord, splits, and opens, and is seen to be full of very many white stalklets bearing a large number of milk-white flowers resembling those of jasmine, with a little yellow in the middle. These spathes and these flowers are borne by both males and females; but the male flowers, which have a pleasant smell, and from which falls a certain white powder, like chestnut flour, sweet and delicate to the taste, however vigorously they grow, never develop into dates, although Theophrastus was of a contrary opinion (4).

(a) The commentator may be confusing the date palm, a native of the sub-tropics, with tropical palms.—V.H.W.D.)

(2) Pliny was of this opinion, as may be seen from the 13th book of his *Natural History*, already mentioned.—F.R.

(3) Dioscorides, Bk. 1, Cap. 127, quoted by Mattioll.—F.R.

On the other hand, the female flowers, which do not smell sweet, and which do not produce the dust, produce dates in large quantities, provided certain things are done. When the flowers begin to burst out of the involucre, that is to say the spathe, this spathe is cut away all round, and the flower stalks are left exposed. Between them are inserted two or three branchlets of flowers cut from the male. The whole is now tied up and left so until the rod-like branchlets of the male have withered, when the tie is undone. It is thus that the female is fecundated. Without such fecundation the dates do not reach perfection or full maturity. I myself do not know whether this practice is a superstition, or just perhaps a useless habit. However, the custom is very ancient; and A. Tazio was indulging in fables when he said that, if the male palm is planted a long way away from the female, it withers and dries up, as though it pines away, and soon becomes a bare trunk, unless the wise cultivator, perceiving what is the matter with it, detaches a sprig from the desired female and inserts it in the male, right in the middle of the medulla, called by some the heart of the palm ([5]).

I must mention, however, that others have told me that, to fecundate the female, it is not necessary to insert those two or three branchlets of the male flowers into the female flowers: it is enough to dust the latter with a little of that white powder that falls from the male. If that were true, we could believe Pliny, who, writing of the palms, wrote:

Adeoque est Veneris intellectus, ut coitus etiam excogitatus sit ab homine ex mariti flore, ac lanugine, interim vero tantum pulvere insperso feminis ([6]).

That which many writers of fables have written of the palms corresponds with the foolish efforts of the Sicilians in their country in fecundating pistachios. These efforts are referred to by Father Don S. Baccone in his *Museo di Fisica*, cap. 282. Experience shows in many places in Italy that the pistachio tree bears fruit as do other plants, without the fecundation, whose value is imaginary.

To Father Anton Salvini were shown by Signor B. Girolami at his villa at Arcetri fine, new pistachio nuts but empty, owing, said Signor Girolami, to not having been fecundated by reason of the death of the neighbouring pistachio tree.

However this may be, when this operation of fecundating the female is done, the dates on the bunch are the size of pearls, and are at that stage very susceptible to damage by rain, which at all other times is of great benefit and should be frequent, and which is necessary for the growth and maturation of the dates. The dates, after the flower has fallen, are green but, when grown to the size of an olive, they begin to turn yellow, and little by little become, when ripe in the autumn, red. When the dates are red and mature on the tree, there sometimes drops from them a certain sweet liquid (as Pliny also notes), which thickens and which becomes granular like honey, whence arose the custom of removing the honey of this fruit artificially. For this purpose,

([4]) Theophrastus' sentence, in which he says that both male and female palms produce fruit, is not confirmed. Mattioli, in the first book of his discourse on Dioscorides falls into the same error.—F.R.

([5]) See the address of Tournefort to the Botanical Institute, chapter 69, where he confesses to not having found enough evidence to believe this.—F.R.

([6]) P. Alpino considers that this practice is necessary for fecundating the palms, whence he is constrained to maintain that, in the deserts of Arabia, the wind carries the fertilizing powder from the males to the females, which seems truly incredible and opposed to reason.—F.R.

at date harvest a large quantity of dates is put in a room provided with a marble floor, in the middle of which a channel is let in, leading to a small pit or basin. The honey oozes out of the mass of dates by itself and collects in the basin. This honey can be put to many of the uses of bees' honey (b).

It is not only honey that may be obtained from dates. On the contrary, in many countries a certain beverage may be expressed from them which can be used as wine, and, just as wine is made both strong and weak, so this beverage can be found either sweet or insipid, and also sometimes rough, according to the variety of date from which it is made (c).

There is a place named Dara, seven days' journey south from Marrakesh, where are to be found dates, which are always green, both when unripe and when mature, bigger than others, and much better than them. When dried in the sun they become hard, and when bitten into they taste like sugar candy, whence their name, *Bu Sukri*, meaning 'Father of Sugar' (d).

Another kind of dates is harvested at Tausar (Fr. *Tozeur*), a place in the Kingdom of Tunis, which is called Hura (*Hurra*), white in colour, with a very small stone, of exquisite flavour, not inferior to that of what are called Ftaimi (*Fatiimi*), a much esteemed variety, whose dates, owing to their excellence, are sent as gifts to Constantinople. In Tunisia also is found a variety called Menacheirzeneib (*Menakhiir Zeinaab*), also good, but having the stone bigger than that of either *Fatiimi* or *Hurra*.

At Djerba are to be found dates called *Lemsi*, which even unripe are sweet, and have not that harsh bitterness which is characteristic of all other unripe dates (e).

Indeed, the flavour of unripe dates is very rough and astringent or *strozzatoio* (choking), as the common people say. Pliny recounts how certain of Alexander the Great's soldiers, in the country of Gedrosia, were choked with eating unripe dates (f).

Other dates are found (g) black, and called Ammari (*Ammaari*), which, being very early, have a large sale.

In antiquity, a large quantity of dates were grown round Thebes in Egypt, which, although they were sour, dry, small, and, because of the continual heat, burnt up and having a bark rather than a skin, nevertheless were of much use in medicine, if we are to believe Dioscorides, Galen, Theodore Priscian, Gariopontus, and, from the poets, Papinius Statius, who joking with his friend Plotius Gripus, enumerated to him amongst the gifts that people used to send to one another at the Saturnalia, namely, *Chartae, Thebaicaeve* (7) (h), *Caricaeve*.

I observe here in passing that in Statius dates are called *Thebaicae*, their

(b) (Correct.—V.H.W.D.)

(c) (I am not sure what is meant here. Perhaps the author is confusing *lagbi*, the sap of the palm, with *'arag*, the spirit distilled from dates.—V.H.W.D.)

(d) (If for 'green' there be meant 'hard' then this paragraph is correct. By Dará is probably meant the Waadi Dhira', south of the Atlas mountains, called on the French maps Oued Dra.—V.H.W.D.)

(e) (For this reason these dates are the earliest on the market.—V.H.W.D.)

(f) (Strabo (Bell, 1916, Vol. iii p. 123, sect. 7) states 'Many persons' (in Alexander's army on its way through Gedrosia) 'were suffocated by eating unripe dates'. On the previous page however we read 'The army was saved by eating dates and the marrow of the palm-tree. E. Gauba[2] suggests that the palm whose fruit Alexander's soldiers ate must have been *Nannorhops ritchieana* H. Wendl., the low *mazari* palm or *piish* of Baluchistan.—V.H.W.D.)

(g) (In Tunisia, that is.—V.H.W.D.)

proper name being omitted, as was common amongst the old Latin and Greek authors. Thus the Prince of Doctors, Hippocrates, having to mention cummin, uses only the word *Etiopico,* as Galen says, in his *Glossary of Ancient Words found in Hippocrates, aithiopikon, hypakousteon to kyminon.* Theocritus also in his *Fourteenth Idyll,* wishing to refer to that wine produced on the low hills of Castel Biblos in Coelesyria on the flanks of the Lebanon, called it simply *byblinos.* This was a very fragrant wine according to Archestratus, quoting Athenaeus in his *Deipnosophistae.*

I think this way of speaking the writers have learned from those who sell fruit or such like, who are accustomed, when selling their goods, to enhance their desirability by giving them the name of the country in which they grow best.

I remember having read in Cicero that a certain Barullus, who had brought figs from Caunus for sale in the port of Brindisi, went about shouting at the top of his voice:—

Cauneas, Cauneas. Cum Marcus Grassus exercitum Brundusii imponeret, quidam in portu caricas Cauno advectus vendens Cauneas clamitabat (8).

I find also the same in Pliny, in the 15th book of the *Natural History*:

Ex hoc genere sunt, ut diximus, Coctana, et Caricae, quaeque conscendenti navem adversus Parthos omen fecere Marco Crasso venales praedicantis voce Cauneae.

I could copy out many other examples, were it not high time to cut short this excessively tedious digression and to return to palms.

Palms produce not only dates for food and medicine, but they also provide, similarly for food and medicine, that sweet, tender, white heart or marrow, which is found at the top of the stem, at the base of the fronds, as mentioned by Galen, Plutarch, Athenaeus, and Philostratus. These said that it was called *enkephalos tes phoinikos* that is, brain of the palm. If this is cut off, the palm dries up and dies, as Abul Gheith several times told me. It must be mentioned, however, that Theophrastus and Pliny mention that there is a certain kind of palm, very different from the other, called *Chamairrhiphes* which lives even though the brain is cut off, and buds out again close to the ground.

This palm, according to Theophrastus, Pliny, Mattiolo, Castor Durante, Remberto Dodoneo, and Giovanni Bavino, is often found in Crete, Spain, Mount Argentaro, and in Sicily, where, as in Naples, its brain retains nearly its original Greek name, being called *Cefaglione* (9).

On the other hand, the heart or brain of the date palm is called *Jummaar* by the Arabs; and, when Abul Gheith mentioned the name to me, I called to mind that G. Emlacin, an Arab author, wrote that a certain doctor administered the palm-heart to one of the Abbasids. Emlacin writes, according to Erpinius's" translation:

Haronem Raschidum laborasse aliquando profluvio sanguinis, medicum autem suasisse esum Giummari palmarum;

(7) Stat. 1.5. Selva ult. *Thebaicae* means *palmulae,* that is dates.—F.R.

(h) (The author now seems to confuse the date with the fruit of *Hyphaene thebaica* Mart., the Theban or Duum Palm (Fr. *Doum,* Ar. *Daum*).—V.H.W.D.)

(8) Cicero. *De Divin.* I apprehend here a double meaning. The seller of Caunus dried figs cried *Cauneas,* as who should say *Cave ne eas.*—F.R.

(9) The *Chaemaeriphes* of Pliny, a small, low, recumbent palm, *Cefaglione* (big head), *kephalion* is, in Latin, *Capitulum.*—F.R.

and he adds:

Cum Giummarum Palmae edit, convaluisse.

The erudite Tommaso Reinesio was quite incorrect when, explaining this passage from Elmacin, and endeavouring to specify what part of the palm is the *jummaar* ([10]), he states that it is the palm inflorescence before issuing from its spathe.

If, however, Reinesio has made a mistake, the ancient commentator on some of the Arab authors has done no less, for according to him, the *jummaar* is the medlar.

This same *jammaar* is what G. Chermonese, in the Latin translation of Avicenna, Lib. 2, cap. 359, called *Jumar*, and what A. Alpago in the notes called *Giemar*. In my opinion, the *jummaar*, as I have already suggested, is the same thing as that which the Greeks called *enkephalos tes phoinikos* 'the brain of the palm' of which Plutarch in his *Dialogue on the Preservation of Health*, says that eating it gives one a headache.

The learned doctor T. Reinesio in his *Various Lessons* notices a serious error on the part of the translator of that particular dialogue of Plutarch, who because in Greek the word *phoinix* means both *palm* and *phoenix*, translating into Latin the phrase *enkephalos tes phoinikos*, writes 'brain of the phoenix' instead of 'brain of the palm.' The great Tertullian makes a similar mistake in his commentary on Psalm 92, *dikaios hos phoinix anthysei* (The just shall flourish as the palm), believing that David was speaking not of the palm but of the bird called phoenix; but what is worse is that he goes on to use the Scriptures as grounds for belief in the fable and uses the fable to persuade himself to believe in the profound mystery of the resurrection of the flesh. The truth of our blessed Faith does not need such frivolities and false bases; and I wonder greatly that the great Tertullian should have paid attention to such trifling. The Greek G. Pisida also used the fable of the phoenix as support for the belief in the resurrection of the body at the end of the world ([11]). Furthermore, Sig. de Digbi adduces the argument of certain crayfish fabulously reborn by means of their salt mixed with a prepared chemical. Enough, however, of this: it is not worth the time taken to confute such puerilities.

I must not forget to mention that there is a certain liquor which issues from the trunk of the palm, which round Tripoli is called *Aghibi* ([i]), but the Arabs in other places usually call it *Haliib en-Nakhl*, that is date-palm milk, from its resemblance to milk both in colour and flavour.

In order to obtain the *lagbi* the fronds are stripped from the palm and the trunk is cut into in several places with a knife, the vessels are placed there to catch the liquor that oozes out. This liquor is refreshing and excellent for quenching the thirst, and is therefore widely used in medicine, more particularly for scalding urine. This tree milk little by little acidifies; and G. Eusebio Nierembergio states that the people of the Congo use it instead of vinegar ([j]).

In that very hot country many kinds of palms are found, some of which bear dates from whose stones there is obtain-

([10]) Perhaps Reinesio thought that *jummaar* was from the Latin *gemmula*.—F.R.

([11]) The sages of antiquity held that the phoenix lived for about five hundred years, as Dante affirms in cant. 24 of the *Inferno*, saying:

'Of the phoenix do wise doctors say
When its five hundredth year it do attain
It dies and is reborn'.—F.R.

(i) (Lagbi.—V.H.W.D.)

(j) (This must be the sap of another palm.—V.H.W.D.)

ed a butter-like oil used for food and light. Another kind of palm, a wild one, grows only in the Congo, having fronds very suitable for being woven into mats, baskets and such like. From these fronds, macerated like our flax and spun, are made with great skill various kinds of cloth, some of which are as good as our plain and flowered velvets or our damasks. I remember having seen some of the strongest and most highly coloured pieces of this cloth given to His Serene Highness the Duke by some Capuchin fathers, who had returned from the Congo, and who stated that it was sometimes worn by the people of that place. A less important product, but perhaps one more worthy of regard, is the clothes woven out of coarse palms by the ancient solitaries in the holy caves of Nitria, Syria, and the Thebaid, in imitation of Paul the first hermit.

This is the information that, amongst much other, I have obtained from Khawaaja Abul Gheith. The rest I do not transcribe because it is easily accessible in the works of the writers on natural history ([12]), especially G. Bavino, who has dwelt at length on the palms.

Therefore, having nothing more to add I make Your Excellency a deep reverence, and remain

Your Excellency's Most
Humble Servant,
Francesco Redi.
From his house, 1 May 1666.

References

[1]Redi, F. (1745). *Opere* pp. 185-196 Vol. VI. Hertz: Venice

[2]Gauba, E. (1952-3). *Botanische Reisen in der persichen Dattelreyion. Ann. naturh. (Mus.) Hofmus., Wien* 59, 122

([12]) For a full account of the palms see the second book of the *Astrologia*, written by G. Pontadera, the celebrated lecturer in botany at the University of Padua.—F.R.

A Note on the Pollination of Date Palms

In Redi's account of the date palm, published in *Trop. Agriculture, Trin.* 33, 207, 1956, the translator in his first note stated that this contained the first rational account he had come across in a European language of (amongst other things) the pollination of the date palm. He now wishes to add that since the translation was published he has rediscovered an earlier reference to pollination. This is in George Sandy's *A Relation of a Iourney begun An. Dom.* 1610, Allott, London, 1632, in which on page 101 the author states:

'Of these [date palms in Egypt where Sandys was in 1611] there be male and female: both thrust forth cods (which are full of seeds like knotted strings) at the roote of their branches, but the female is onely fruitful: and not so, unless growing by the male, (towards whose upright growth she inclines her crowne) and haue of his seeds commixed with hers; which in the beginning of March they no more faile to do, than to sow the earth at accustomed seasons.'

The female's inclining her crown to the male is, of course, nonsense, but the reference to the cultivator's not failing to pollinate in March is accurate. The comparison of the spikelets to knotted cords is apt.

PALMS AT THE ROYAL BOTANIC GARDENS, TRINIDAD

S. BHARATH

The Royal Botanic Gardens of Trinidad are situated in the city of Port-au-Spain, about two miles north of the wharves at an elevation of a hundred and thirty to two hundred and fifty feet above sea level. They are about sixty acres in extent and were established in 1818 to introduce, propagate, and

distribute plants of economic and ornamental value. The Gardens are the oldest botanic gardens in the West Indies that have had a continuous existence. At the present time, these gardens are maintained solely as a public park and gardens.

The palms are grown mainly in an avenue some three hundred feet long, but many specimens are scattered over an area some twenty acres in extent. Nearly seventy species are represented; seeds of all the species are available on request. The tropical climate of Trinidad is favorable for growing a large number of unusual species of palms not ordinarily seen in botanical gardens of subtropical areas: Some examples of these palms are the following: *Areca Catechu; Bactris Gasipaes (Guilielma Gasipaes), Calamus Rotang, Deckenia nobilis, Mauritia setigera, Maximiliana caribaea, Orbignya Cohune, Phoenicophorium Borsigianum (Stevensonia grandifolia), Phytelephas macrocarpa, Pinanga Kuhlii, Polyandrococos caudescens (Diplothemium caudescens), Ptychoraphis augusta and Scheelea Urbaniana.*

[Palms, handsome as they are to the eye, may at times be of interest in other less obvious respects. Mrs. Eileen H. Butts called attention to letters of her uncle which concern a very large beetle closely associated with *Washingtonia.* (Fig. 72). The letters with footnotes are reprinted from *Entomological News and Proceedings of the Entomological Section, Academy of Natural Sciences, Philadelphia* 10: 83-89, 1899, in the hope that they will be of some general interest and perhaps of particular interest to California members. Ed.]

Letters from the Southwest

H. G. Hubbard*

THE HOME OF DINAPATE WRIGHTII HORN

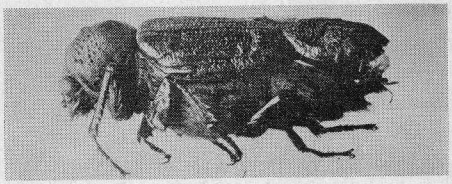
Palm Springs, Cala., February 8, 1897.

I have just returned this afternoon from a visit to Palm cañon and am somewhat sore and tired from contact with the saddle and also from my frantic exertions to find a specimen of *Dinapate wrightii.* The Washingtonia palms (*Neowashingtonia filifera*) in this small cañon are few in number, several hundreds perhaps strung along in a straggling line and most of them burned by the Indians who set fire to the fans as a smoke offering to their dead. There are very few young palms, as the freshets wash away most of the seed. However there are occasional clumps of not very old plants on the higher benches and these are sheathed with immense accumulations of dead fans. Every part of this tree is so huge and tough that I, with my small hatchet, can make but little impression upon it. Even to cut through one of the handles of the dead leaves is almost beyond my strength, and where there are accumlations of leaves upon the ground, the long handles armed with knife-like points are so interwoven, that it is a severe task to overturn them. I found no living specimen of *Dinapate* in any stage, but I uncovered a dead and disintegrated specimen of this gigantic Bostrychid beetle lying between dead fans at the foot of a young palm. Many of the old palms are uprooted by the flood waters, and I saw probably 50 of these prostrate trunks upon the ground. Almost all of them are perforated all over, with round open holes, into most of which I can insert the end of my thumb. Some of the holes will however only admit the little finger.

*[These letters were addressed to the undersigned at Washington D.C., and are now, after the death of the author, published without any alterations.—E. A. Schwarz].

These holes evidently made by *Dinapate* larvae open directly into a huge pupa chamber which is two inches long and lies vertically with the grain not more than one or two inches from the surface. The remainder of the gallery is solidly packed with sawdust and leads into such a labyrinth of borings into the interior that most of the attacked logs are completely riddled, and at the heart there is very little of the original texture left. So solid is the sawdust, however, that these bored logs hardly lose any of their strength and, in fact, are used as gate posts at several of the ranches and at the hotel at the Springs, where the people think the holes are *made* by carpenter bees (Xylocopa). It is very certain that a log once vacated by a colony of *Dinapate* is never afterwards entered or again attacked by them. I should say that most of the logs showed from 100 to 250 exit holes of the beetle, and, at the time of emergence, the person lucky enough to discover such a colony would find no difficulty in filling several Mason jars with the beetles. Of course, until they begin to emerge, there is no sign upon the outside of the presence of the insects within a palm trunk. I could find no trace of the living larvae and heard no sound of them in unperforated logs.

Dr. Murray, the landlord of this little hotel, tells me that Mr. Wright comes almost every year in September to this place and always goes without a word up the cañon, so that no one here has ever heard of the existence of *Dinapate*. I could easily trace the operations of Mr. Wright among the fallen palm trunks. He has even cut down a number of the largest and tallest trees, no doubt in the hope of attracting the beetles to the fresh cut timber. But these logs lay upon the ground untouched except for the marks of Mr. W. are where he has



72. *Dinapate wrightii* reproduced from *Annales de la Société Entomologique de France* 78: *pl. 14, fig. 1*, 1909-10, *at* approximately natural size.

subsequently cut into them, in the vain search for live beetles. I would almost suspect that they had become extinct here if it were not for my discovery of a dead specimen, which from its position between leaves still attached to the tree, could not have been there much over a year and probably not many months.

Several logs, which Mr. W. has laid open to the heart, gave me an excellent chance of examining the old borings of the beetle, and I found some dead larvae and always, in each gallery examined, the pair of great jaws and the clypeus of the larva packed in the sawdust at the bottom of what was the pupa cell.

I think, from my own observations and the evidently fruitless visits of Mr. Wright, that colonies of the beetle are rare and very hard to find. This is probably its northern limit, but in Baja California it may possibly be more abundant.

PALM SPRINGS, CALA., Feb. 27, 1897.

I have searched far and wide for a living brood of *Dinapate*, as I have made an arrangement with Dr. Murray to secure the beetles later on in the season in case I find a colony of the larvae. With this object I explored Andreas cañon on the 16th but did not go far enough and found only a few vigorous young trees. On the 24th I again visited this cañon, but did not reach the best part of it, being stopped by precipitous side walls and by the stream, which is now swollen to a dangerous

torrent by heavy snows in the San Jacinto Mts. The bottom of these small cañons is always nearly impassable by reason of huge boulders and tangles of grape vines, mesquite, cat's claw acacias together with, in the case of Andreas cañon, thickets of quite large Alder trees, Cottonwoods, Sycamores and piles of dead brush from the same, through which there is no forcing a passage. It is necessary to make one's way along the steep slopes, often 200 feet above the valley, and often to cross over and ascend the other wall in order to pass some vertical face of rocks. All this takes time and strength. I found however in Andreas cañon a thorax of *Dinapate*, in a pile of stream drift, showing that the beetle occurs there. I finally left the main cañon and crawled over a divide into a still smaller valley, also very difficult, but within half a mile I found a group of seven of the most magnificent palms, 70 to 80 feet high, and clothed with dead fans from foot to crown so that they looked like huge towers. It is the first time I have seen this magnificent tree in full size and with all the fans still clinging to it. It seems almost beyond the strength of man to penetrate these dense coverings of dead fans which cover the trunks 8 or 10 feet thick on every side so that the diameter of the covered trunk is often 20 feet. I found in this little side cañon among the group of living palms a single huge dead fallen trunk which had lain prostrate many years and had been covered up with grape vines and leaves of the cottonwoods. This trunk was so entirely disintegrated that I was able to pull it away in pieces with my hands. It was bored in every direction with *Dinapate* galleries, and I had at last the good fortune to find, still in its pupa cell, a dead specimen of the beetle, the chitin of which was still perfect, but every ligament dissolved away so that the different sclerites adhered loosely in the surrounding sawdust. I found the specimen to be a male and preserved two small curiously twisted chitinous claspers which were within the abodomen.

Yesterday accompanied by an Indian I visited again Palm cañon and made straight for a certain palm tree which I had observed on my first visit, but too late in the day for a close examination. This is a young tree, not over 20 feet high, and still retains its clothing of fans. It is dead but the bud leaves are still in place. It has evidently been killed by something, and I cannot help suspecting that this has been done by the females of *Dinapate* before depositing their eggs. No *living* tree is ever attacked by them, nor do they enter any trunk that has been long dead or fallen or cut down. I suspect that the female cannot deposit her eggs in any trunk deprived of leaf bases.

In this young palm examined by me the trunk was of very large diameter, and the first chips we removed with our axes showed galleries of *Dinapate* of full size and filled with frass quite fresh and light in color, together with evidently much older galleries of smaller size in which the frass had turned dark with age. I found some of the small borings at their beginning under the fibres of the leaf bases, where they were not larger than a friction match. We finally uncovered a living larva of *Dinapate*, full-grown and apparently forming its pupa cell or preparing to do so. After several hours' work we secured four specimens only one of which could be taken out uninjured, the other three specimens being more or less cut to pieces or crushed between the tough fibres. All these larvae were thoroughly dormant and very flaccid; evidently they had eaten nothing for some months.

I feel sure that they are more than one year and probably more than two years old, but no doubt they would have issued by July or August of this year. All the larvae in this trunk appear to lie not deeper than one or two inches beneath the surface of the wood. It is possible however, that they may not issue until next year, and for this reason I hesitate to have the tree cut down. The fibres of the wood are still moist and very light in color showing very slight fermentation except where the juvenile galleries of a year or two ago have penetrated. There are no young larvae, and evidently all are of the same age and nearly or quite adult, and there are no exit holes in the tree. There may be 50 to 100 larvae in the trunk, but of course this is only a surmise. Dr. Murray promises to watch the tree during the summer and will try to secure specimens of the beetle as they emerge.

I feel quite certain now that there are comparatively few broods of *Dinapate* existing in this region, and unless it exists also in Baja California or on the southern slope of the San Bernardino range, any year may witness its complete extinction; because unless the females, in imago, feed upon and kill the buds of living palms in which they then oviposit, the number of trees in fit condition to rear the young is exceedingly limited. I have in fact seen but this one tree in any of the cañons I have visited. It is absolutely certain that only the Washingtonia palm is capable of supporting the large broods of this gigantic borer, and if the females should fail to find a suitable tree in any year, they must inevitably perish without issue. When I consider the limited number of these trees in existence in a wild state, and the slender chance the female beetle must have of finding a dying tree in the right condition and at the right time, I am more than ever inclined to suspect that the beetles deliberately kill the tree in which they oviposit. If they killed the tree merely by feeding as adults upon the buds, there would be many trees killed; for often more than 200 adults issue from a single infested trunk. In the case of the tree I have examined, it is probably not the presence of the larvae that have killed it as they have not apparently penetrated deeply into the interior and their galleries are not sufficiently numerous to seriously impede the circulation of the sap, even in the outer portion of the trunk.

I feel highly elated at having discovered a living brood, and I think there is no doubt that Dr. Murray will be able to secure living specimens of the imago. It is so difficult to cut out large or small chunks of the wood without injuring the larvae that I have not thought it advisable to secure any in this way.

PALM SPRINGS, CALA., March 13, 1897.

On March 5 I made a serious expedition with a wagon and mules and an Indian to help, to Palm cañon where I spent the day getting out more pieces of palm wood containing *Dinapate* larvae. I secured four pieces weighing each from 2 or 3 to 6 or 8 lbs., and each containing one or two living larvae. The largest piece undoubtedly contains several of the larvae. These pieces I now have in my bedroom and I can occasionally hear the larvae cutting the fibre with a snap like a pair of shears.

I discovered much to my surprise that the interior of the palm trunk is entirely filled with galleries. I had before concluded that all the work had been done nearer the surface, the trunk like all the rest, has the interior entirely riddled with burrows and very little solid wood left by the larvae. Many of the larvae are still in the interior, although some

of them are already forming cells near the exterior. We cut into a great many of the grubs in getting out these chunks of wood, and I secured several good additional specimens in alcohol.

It is hard to realize the enormous extent and dimensions of the *Dinapate* galleries. Not the largest of our Florida palmettos could support more than three or four of these larvae; they would eat it all up and then die of starvation. If there are 20 or 30 holes in one of the Washingtonia palms, one finds the interior entirely eaten out from end to end, and one can follow the galleries, over one inch in diameter for 20 feet up and down the trunk following the grain and without diminishing sensibly in diameter. Then think of the yards and yards of smaller galleries made by the larva while still young. Such extensive and prodigious borings cannot be made in one or two years, and certainly not in any tree trunk of moderate size. There is certainly no other plant here than this Washingtonia palm that is capable of supporting a brood of these huge and voracious grubs. Therefore, I do not hesitate to assert that they exist only in the Washingtonia, and that they are very certain soon to become extinct. I regard the discovery of a colony as one of the most interesting entomological events of my life and I can assure you that if we breed the imagos this year from this trunk, they will not soon be duplicated by others.

There are some thousands of the trees left, but they are in small groups scattered miles apart in a few of the most inaccessible cañons of the San Jacinto range. Here the beetles are nearly extinct, but it is possible that in Baja California they may survive a few centuries longer. In times past they were abundant here, as evidenced by the numerous old trunks riddled with their burrows. But the trunks that have fallen in recent years are all free from their attacks, and as the Indians have burned all the trees that are accessible, so that their trunks are now bare of fronds, it must be now quite difficult for the female beetle to find a fit receptacle for her eggs. I am sure now that they do not oviposit in bare trunks or in healthy trees, although it is possible that the beetles kill the tree in which they ovipost their eggs.*

*[Subsequently, in June, Mr. Hubbard forwarded to Washington the pieces of palm wood; and, after some unforeseen accidents and misfortunes, a small number of imago beetles were bred from the wood at the Department of Agriculture during the latter part of August. In October, 1897, Mr. Hubbard received a letter from Dr. Murray, of Palm Springs, stating that, owing to the excessive heat in August, he had been unable to visit Palm cañon, and that, for the same reason, none of his Indians had been willing to undertake the trip. The imago and larva of *Dinapate* have been described and figured by the late Dr. G. H. Horn (Trans. Amer. Ent. Soc. 13, 1886, Pp 1-4, plate I). While at San Diego, Cala., Mr. Hubbard ascertained that the type locality of *Dinapate wrightii* is Palm Springs, Cala., and not the Mojave Desert, as stated by Dr. Horn. The full-grown larvae collected by Mr. Hubbard are fully twice larger than that figured by Dr. Horn. Mr. W. G. Wright the discover of *Dinapate*, has, as far as known to me, never published anything on the food-plant or habits of this remarkable species.—E. A. S.]

WHAT'S IN A NAME?

Mauritia (maw rísh ee a) was the creation of the younger Linnaeus who described the *M. flexuosa* of Brazil in 1781. The name commemorates Count Johan Mauritz van Nassau-Siegen (1604-1679), a Dutch field marshal and once governor of the Netherlands West India Company in Brazil. About 16 species of these diversiform fan palms are known to science, all natives of tropical South America with the exception of one found in Trinidad.

BRUCE H. BEELER

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Figures in *Italic* indicate pages with photographs or other illustrations

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