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

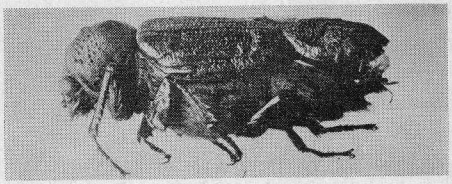
Palm Springs, Cala., February 8, 1897.

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