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FRONT COVER

One of the rarest palms in habitat, *Saribus jeanneneyi* is known from only one or two adults and several saplings in the Prony area of new Caledonia. See article by D.R. Hodel, p. 88. Photo by D.R. Hodel.

BACK COVER

Euterpe precatoria, Amacayacu National Park, Colombia. Photo by William J. Baker.

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Commercial date production in the Abu Dhabi, UAE. Photo by Jan Smith CC BY 2.0.

PALM NEWS



A recent paper by S Carvalho-Madrigal and MJ Sanín examined genetic markers across populations of six species of *Ceroxylon* and found evidence of **natural selection in isolated populations adapting to different environments, but they also found evidence of introgression among populations following secondary contact**. The species have inefficient barriers to hybridization, which allows gene flow to sustain genetic diversity. The results suggest that species boundaries are somewhat “leaky” and that introgression injects new genetic diversity in otherwise inbred species. The paper is: Carvalho-Madrigal and Sanín. 2024. The role of introgressive hybridization in shaping the geographically isolated gene pools of wax palm populations (genus *Ceroxylon*) published in *Molecular Phylogenetics and Evolution* <https://doi.org/10.1016/j.ympev.2024.108013>.

Palm tissues are famously packed with silica bodies, which persist in the environment long after the surrounding tissues have decayed. These microscopic silica bodies, called phytoliths, are important clues to past environments and plant communities. A team of researchers, led by W.H. Brightly **examined the phytoliths from the major lineages within the palm family** and related families. While they identified some morphological diversity among phytoliths and could distinguish palms from other families, they could identify species from their phytoliths only 58% of the time. Few palm lineages had distinctive phytoliths, and phytolith morphology was only weakly correlated with the palms’ habitat preferences. The paper is: Brightly et al. 2024. Palms of the past: can morphometric phytolith analysis inform deep time evolution and palaeoecology of Arecaceae? *Annals of Botany* <https://doi.org/10.1093/aob/mcae068>.



The two endemic species of *Sabal* in Curaçao and Bonaire were named only a few years ago, but their restricted distributions and pressures from human populations and their livestock are cause for conservation concern. In a new paper, JAR Clugston and colleagues examined the molecular diversity of these species and found that **the species are distinct but that populations have low genetic diversity and show signs of inbreeding**. The team also examined the diversity of *ex situ* collections and found that, while existing collections capture much of the genetic diversity, more collections are needed. The paper is: Clugston et al. 2024. Genomic patterns of native palms from the Leeward Antilles confirm single-island endemism and guide conservation priorities. *Conservation Genetics* <https://doi.org/10.1007/s10592-024-01618-6>.

Two New Species and a New Variety of Palms from New Caledonia

DONALD R. HODEL¹ AND GILLES PIERSON²

We had long suspected that two red-fruited *Basselinia* from Mt. Panié and cultivated at the Lavoix family mountain house on Mt. Koghi near Nouméa were undescribed species new to science. Because they were mature and produced flowers and fruits and were easily accessible along a well-maintained road, we were able to make good collections and name, describe and document these novelties. Also, co-author Pierson had found a *Chambeyronia divaricata* with a “watermelon” (with cream-yellow longitudinally streaks) crownshaft in the Koua Valley, which we also named, described and documented as a new variety. See our article naming and describing the two new species and new variety in the online e-journal PalmArbor (Hodel & Pierson 2024).

Nouméa businessperson Lucien Lavoix, perhaps the best known collector and champion of New Caledonia palms of his era in the middle 20th century, frequently accompanied and/or was connected with well-known personages who were studying New Caledonia’s palms, including botanists and

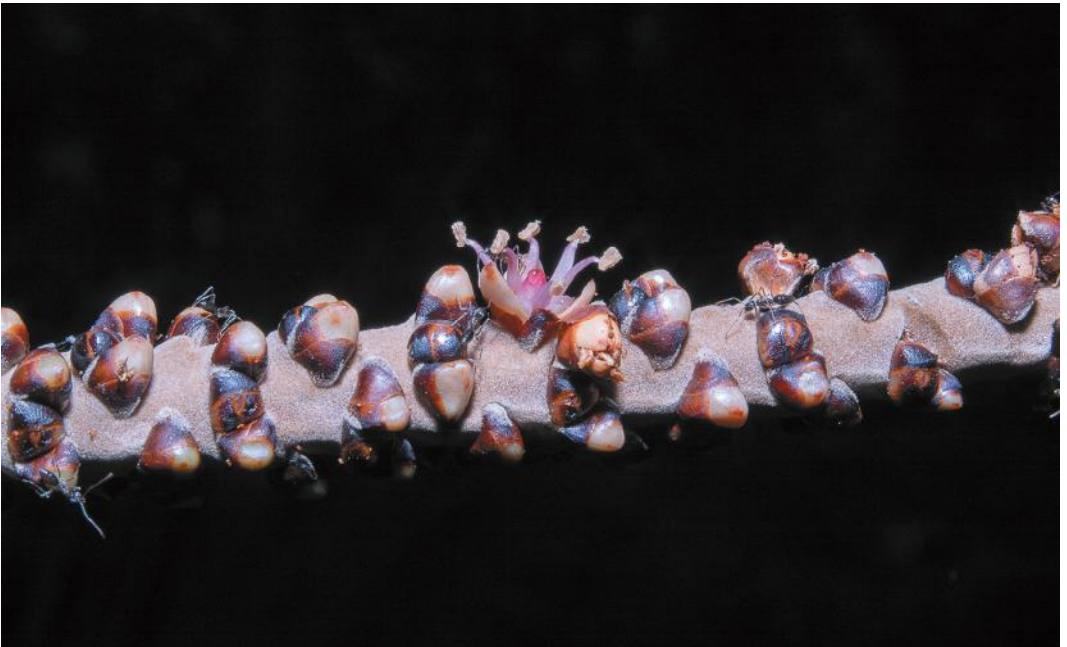
plantspeople M. Schmid, J.-M. Veillon, H. S. MacKee, T. Jaffré and L. Chavalier in New Caledonia, D. Barry of Los Angeles, California and especially H. E. Moore, Jr. of Cornell University in New York. As Lavoix traveled throughout New Caledonia with these associates, he likely mostly collected seedlings rather than seeds because the latter were typically scarce. He planted his collections along the road up to his mountain-side retreat, where most have attained maturity. Lavoix made several trips to the legendary Mt. Panié, perhaps even discovering or assisting in the discovery of the famous, elusive and rare “palmier á gros fruits,” *Lavoxia macrocarpa* (now *Clinosperma macrocarpa*), which Moore named in his honor. Two species with which

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1. A solitary habit, ringed trunk, prominent and swollen crownshaft, and handsome crown of spreading-arching pinnate leaves make *Basselinia pseudovelutina* a quintessential palm of New Caledonia. Lavoix estate, Mt. Koghi. (All photos by D. R. Hodel)



2 (top). Inflorescences of *Basselinia pseudovelutina* are erect-spreading. Lavoix estate, Mt. Koghi. 3 (bottom). Staminate flowers of *Basselinia pseudovelutina* have stamens with pinkish purple filaments and a dark pink pistillode. Lavoix estate, Mt. Koghi.

Lavoix returned from Mt. Panié were two red-fruited *Basselinia* from low and middle elevations, one with strikingly pendulous inflorescences and the other with erect to spreading inflorescences.

Because all *Basselinia* have black fruits except *B. moorei*, these red-fruited species caught the attention of co-author Pierson when he visited the Lavoix estate several times over two years. Equally important, Pierson found them both



4. *Basselinia pendulina* is another quintessential New Caledonia palm with a solitary habit, ringed trunk, prominent and swollen crownshaft and handsome crown of spreading-arching pinnate leaves. Note the pendulous inflorescences and mature, red-ripe fruits. Lavoix estate, Mt. Koghi.



5. Inflorescences and infructescences of *Basselinia pendulina* are strikingly pendulous and hang down against the trunk. Note the red fruits. Lavoix estate, Mt. Koghi.

in habitat on Mt. Panié, the one with pendulous inflorescences from 200 to 500 m elevation and the one with erect to spreading inflorescences from 300 to 800 m elevation. He compared both with *B. moorei*, the known red-fruited species, and realized they were different.

Pierson sent photographs of these two *Basselinia* species to co-author Hodel, emphasising the differences between them and the other red-fruited *Basselinia*. Hodel immediately recognized the one with the strikingly pendulous inflorescences because he and the late Jean-Christophe Pintaud, co-author of their book, *The Palms of New Caledonia* (Hodel & Pintaud 1998), had discussed this taxon when preparing the book and uneasily referred it to *B. velutina*, based on determinations by others. Indeed, Hodel and Pintaud (1998) even illustrated this taxon with strikingly pendulous inflorescences as *B. velutina* (see p. 59, Plate 22 C).

The other red-fruited *Basselinia* with erect to spreading inflorescences seemed not so distinct and Hodel was less confident that it was a new species. Nonetheless, Pierson persisted, and the opportunity presented itself for a short, whirlwind trip from Tahiti, where Hodel was staying with family, to New Caledonia to study these palms.

The second day after Hodel's arrival in New Caledonia, we headed up to the Lavoix estate on Mt. Koghi just outside of Nouméa with Gilles' partner Ayu Warlina and Gilles' son Thomas. Several plants of the two new *Basselinia* were right along the road, making for easy collecting, which was especially helpful for Hodel, who recently had total replacement of both knees, much reducing his mobility. Also, having both new species so close to Nouméa, precluded a days-long trip to the north to Mt. Panié and an arduous climb (at least for Hodel) up this fabled mountain to observe and collect them in the wild.

Both *Basselinia* are the quintessential New Caledonia palms: A solitary habit, ringed but fairly smooth trunk, prominently swollen crownshaft, and handsome crown of spreading to arching, pinnate leaves. The first new *Basselinia* we stopped to collect was the one with erect to spreading inflorescences (Figs. 1–3). It much reminded us of *B. velutina* but differed in its leathery rather than woody peduncular bract, the shorter rachillae (52 vs. 66 cm), the articulated rather than non-articulated filaments, the non-truncate rather than truncate pistillode much shorter than the stamens, and, most conspicuously, its red rather than black fruits. Because it resembled *B. velutina*, especially when mature fruits are

6. *Chambeyronia divaricata* var. *flavolineata* is a small, solitary, few-leaved palm. Koua Valley.





7. The leaf bases of *Chambeyronia divaricata* var. *flavolineata* have cream-yellow, vertical streaks, making a mottled or "watermelon" crownshaft. Koua Valley.

lacking, which is often, we named it *B. pseudovelutina*, which means similar to or confused with *B. velutina* but different. Making the collection was fast and easy; what took time was for Hodel to take extensive notes and photographs. As Hodel did this, the others explored farther up the road to find the second new *Basselinia*, this one with pendulous inflorescences.

The second new *Basselinia* was in full, red-ripe fruit, making for a glorious sight. The strikingly pendulous inflorescences are distinctive, and immediately set it apart from all other *Basselinia* (Figs.4 & 5). Everything about the inflorescence is pendulous, from the downward-curved peduncle to the pendulous rachis, branches, and rachillae. The narrow branch and rachillae attachment angles and their pendulous nature make the rachillae hang parallel to each other. Eventually, the entire structure hangs down against the trunk. We named this species *B. pendulina*, which means pendulous or hanging, describing the inflorescence of this species perfectly.

A question that we asked ourselves is how did two distinct *Basselinia* taxa escape detection for so long when both are along the well traversed trail up Mt. Panié, where so many palm researchers had trod over the years? Part

of the answer might be that in the past, these two new species had been confused with black-fruited *B. velutina*. But wait, black fruits are conspicuously different from red fruits, so how could they be confused? The answer to that question is that mature, ripe fruits of New Caledonia palms are scarce or even rarely encountered; thus, without the red fruits, these species could have been mistaken for *B. velutina*. Indeed, that is what Pintaud and Stauffer (2011) suggested had occurred up until they named and described the red-fruited *B. moorei* from the upper reaches of Mt. Panié, above 800 m elevation, where it, too, had escaped detection for years in a well-studied location, likely because its red fruits were seldom seen. Perhaps if these two new *Basselinia* had been encountered with mature, red-ripe fruits, they would have been recognized as different long ago and even already named and described, ending this mystery. That cultivated plants of these two species existed at the Lavoix estate on Mt. Koghi and we saw them with red fruits and knew their provenance on Mt. Panié, were sufficient for us to document them as new species. Indeed, as noted earlier, Hodel and Pintaud (1998) had recognized the *Basselinia* with pendulous inflorescences and were suspicious that others had determined it to be

8. Co-author Gilles Pierson holds the infructescence of *Chambeyronia divaricata* var. *flavolineata* heavily laden with bright red fruits. Koua Valley.



B. velutina; nonetheless, they went with determinations made by others.

Thus, we suspect that *Basselinia velutina* does not occur on Mt. Panié or, if it does, it is extremely rare. Rather, the few collections labeled as such from Mt. Panié at the herbaria at Nouméa, Paris, and Cornell University can mostly be assigned to *B. pendulina* (lower elevations), *B. pseudovelutina* (middle elevations), and *B. moorei* (upper elevations and to the summit).

The next day we were on our way north to Koua Valley on the east coast, the home of *Chambeyronia houailouensis*, where Pierson had seen the *Chambeyronia divaricata* with a “watermelon” crownshaft, similar to that of *C. macrocapa* var. *flavopicta*. Several kilometers up the valley, we left the main track and crossed the Koua River, arriving at a patch of forest nestled at the bottom of a hill. Here, *C. houailouensis* was magnificent and a dominant species, and along with a few *C. oliviformis*, providing shade with a mix of some broad-leaved trees for several *Basselinia pancheri* and *C. divaricata*, the latter a small, solitary, slender, few-leaved palm with a new leaf that emerges and unfurls red and leaf bases with vertical, cream-yellow streaks, creating a mottled or “watermelon” crownshaft (Figs. 6–8). The “watermelon” crownshaft is another asset to this already attractive palm.

We spent several hours at the site making collections and taking notes before heading across New Caledonia to the west to check on other populations of this variety, which we named *Chambeyronia divaricata* var. *flavolineata*, meaning lined or streaked with yellow, alluding to the “watermelon”

crownshaft. This new variety seems restricted to a narrow band extending from the Koua Valley on the east to Rivière du Cap on the west. Upon our return to Nouméa the next day, we deposited all our collections from the Lavoix estate and Koua Valley at the herbarium.

We feel fortunate to have these two new species and new variety named, described, and documented prior to the International Palm Society Biennial Meeting, which will take place in New Caledonia in September 2024. During the course of the meeting, attendees will likely visit the Lavoix estate on Mt. Koghi and see *Basselinia pendulina* and *B. pseudovelutina*, as well as other New Caledonian palms on the property, and the Koua Valley and see *Chambeyronia divaricata* var. *flavolineata*, as well as *B. pancheri*, *C. houailouensis* and *C. oliviformis*, among the many places with fabulous palms that they will be fortunate to visit around New Caledonia.

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Living Artifacts of Past Date Palm Cultivation in Arizona and California

DENNIS V. JOHNSON AND JANE C. MACKNIGHT

Date palms (*Phoenix dactylifera*) planted as an exotic fruit crop and later abandoned can impart living artifacts to the landscape. The date palm has a long lifespan, and relict plants may endure for a century or more if not removed. Here we provide examples from Arizona and California and explain how living artifacts can be interpreted.

The date palm (*Phoenix dactylifera*) was introduced by seed and offshoots from its homeland in the Middle East and North Africa for fruit production in various countries in South Asia, southern Europe, southern Africa, the Americas, Australia and the Pacific Islands (Johnson 2010).

Abandoned relictual stands of date palm agricultural endeavors often extend back a century or more. Date palms can live for 100–150 years. A tough species, the palms persist where planted and are mostly able to tolerate existing environmental conditions and

spontaneously reproduce by seed and/or offshoots. Relict date palm populations represent an initial stage toward naturalization over successive generations. In areas of commercial date plantations where the palm is exotic, natural date seed dispersal may occur by zoochory (animals) or hydrochory (water), leading to the growth of isolated feral date groves; these are distinct from a relictual grove which begins with intentional cultivation.

It is a research challenge to investigate when and under what circumstances date palms were introduced to a location, and the farther back in time one goes, the more difficult it becomes. Records often consist of little more than passing mention in reports about date plantings or historic photographs of uncertain chronology. At times, the relictual date palms themselves are the only evidence. In such an

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1. Death Valley, California. Furnace Creek Ranch. View of unworked date grove (Photo by Jane C. MacKnight. May 2014).

instance, it is possible to approximate the age of the palms by calculating the length of the trunk which is proportional to its age in most cases (Rivera et al. 2013). In other instances, documentation of past date plantings exists, but no relict palms survive.

The emergent phase of the modern American date industry began in the 1890s with offshoot imports of elite varieties from North Africa and the Middle East and continued through the 1920s (Hodel & Johnson 2007). Experimental irrigated trial plantings revealed that the two most suitable climatic areas for commercial date growing were in and around Indio, California in the Coachella Valley, and the area of Yuma, Arizona, and Bard, California, astride the Colorado River near the Mexican border. A century later, these two locations in the Sonoran Desert remain the centers of nearly all of America's date fruit production.

Research over two decades into attempts to grow date palms off the beaten trail in the United States brought into focus that living artifacts of those undertakings were worthy of study. At six scattered locations in Arizona and California, experimental and commercial date plantings were conducted in the 1910–1920s, but subsequently abandoned. Fruit production appears to have been stymied by remoteness from markets, a lack of specialized agricultural laborers and rainfall during the lengthy

ripening period, which leads to fruit spoilage. Also, small operations enjoy no economy-of-scale benefits.

This study aims to recount the history behind six examples of century-old relict date palms and to reassess the environmental conditions of each site. To the north, Death Valley, California, Needles, California and Parker, Arizona are within the Mojave Desert; Borrego Springs, California, Sacaton, Arizona and Sells, Arizona in the Sonoran Desert to the south. The approach described here may be applied in other locations to help understand the current presence of exotic palms from a prior agricultural landscape. As of early 2014, the relict stands of dates in this study were confirmed to be extant.

1. Death Valley, Furnace Creek Ranch, California. 36.46 N, 116.87 W. Elevation -190 ft (-58 m). Hottest months, May–Sep. Average annual precipitation (AAP) 2.2 in (56 mm). Wettest months, Dec–May.

Death Valley is a geological depression dipping below sea level and renowned for its extremely high summer temperatures. Seedling dates were first planted at the Furnace Creek Ranch for fruit in the 1910s, followed by offshoot plantings of elite varieties in the ensuing decade. Deglet Noor variety dates were predominant and produced well. Some ten other imported varieties were also grown.



2. Needles, California. Abandoned Mansker date garden. View from Desmok Street. (Photo by Jane C. MacKnight. May 2017).

Harvested dates were consumed and sold locally from the late 1930s; peaking in 1955 when 35 acres (14 ha) of bearing palms were recorded. Working of the grove for fruit

production ended in 1990. Surviving palms benefitted from general irrigation practices on the ranch. Hampering expansion of date growing in Death Valley was the designation

3. Parker, Arizona. Colorado River Indian Tribes Reservation. View from A 2nd Road of unworked date garden (Photo by Jane C. MacKnight. May 2017).





4. Borrego Springs, California. View from Foresome Drive of abandoned Ensign Ranch date garden (Photo by Jane C. MacKnight. January 2019).

of the area as a national monument in 1933, elevated to a national park in 1994, with Furnace Creek Ranch set-aside as a fully enclosed private in-holding. The relict palms in Death Valley are on private property. Limited water resources also precluded expanded agricultural production at Furnace Creek. Johnson et al. (2016) provided more details about date growing in Death Valley. A sense of the disorderly conditions in an abandoned date grove is shown in Figure 1.

2. Needles, California. 34.85 N, 114.61 W. Elevation 495 ft (151 m). Hottest months, May–Sep. AAP 4.32 in (102 mm). Wettest months, Jan –Mar.

E.A. “Dick” Mansker was a railroad man who lived on a 22-acre (9 ha) farm located on the Colorado River floodplain in the City of Needles. In 1934–1937, Mansker started a commercial date grove with 800 young, bearing date palms bought in Indio and

5. Sacaton, Arizona. Former USDA Cooperative Testing Station. View of relict seedling date palms along Little Gila River Canal (Photo by Chris English. Wikimedia Commons. March 2012).





6. Sells, Arizona. View from Hill Street of relict date palms at the presumed site of former Federal Experimental Farm (Google Street View image capture. February 2023).

shipped by truck to Needles. Deglet Noor and five other date varieties were planted; how the respective varieties performed is unknown. The date garden was irrigated from a pumped well. Annual date production in Needles was uneven; in 1939 the entire crop was lost because of a freak September rainstorm. Peak harvests were achieved in the early 1950s reaching about 3 tons of fruit per year, sold from the farm and to local retailers. By the mid-1950s Mansker fell ill, and commercial date production ceased, but he continued to live on the property. The family sold the farm in 2005, but it remains undeveloped, still exhibiting relict date palms; the major reason they persist is stagnant economic growth in Needles and little pressure for land use change. Living and dead date palms on the former Mansker farm are pictured in Figure 2.

3. Parker, Arizona. 34.15 N, 114.29 W. Elevation 423 ft (129 m). Hottest months, Jun–Sep. AAP 4.57 in (116 mm). Wettest months, Jan–Mar.

On Colorado River Indian tribal land just southwest of the Town of Parker, a small experimental date palm grove was established around 1930, probably by the Bureau of Reclamation. Like the Mansker Farm in Needles, the Parker date grove is located on the floodplain of the Colorado River. Little else is known about the date grove, save that it was used in the mid-1930s for a vocational agriculture class. Students grew annual crops and cared for the date palms. The relict palms are neglected yet appear to benefit from irrigation activity on adjoining plots. Fallen fruits found in the grove resemble the Deglet Noor variety. The Tribe has considered alternate use of the date grove site, but no change has yet occurred. Figure 3 illustrates the relict date palms in Parker.

Johnson and MacKnight (2019) provide further historical information about dates in Needles and Parker.

4. Borrego Springs, California. 33.26 N, 116.38 W. Elevation 597 ft (182 m). Hottest months, Jun–Sep. AAP 5.21 in (132 mm). Wettest months, Dec–Feb.

The Borrego Valley is an interior drainage basin, bereft of perennial streams and almost totally reliant on groundwater resources to support the village and its agriculture. Seedling dates were first planted in 1917, a few years after homesteading of the valley began. Commercial date cultivation started in 1927–1928 when O.H. Ensign purchased 500 offshoots of varietal dates from the Coachella Valley and Yuma. Additional offshoots were acquired, and the date grove reached a peak of 35 acres (14 ha). Deglet Noor and ten other major varieties were planted on the Ranch. Commercial date production was reported for the years 1940–1955. A fruit stand was operated at the Ensign Ranch to sell dates in season, but most of the fruit went to the Coachella Valley wholesale market, about 60 miles away. Commercial date production ended around 1956 and the property was sold. Today living and dead date palms can be seen on undeveloped land east of the current Borrego Springs Resort (Fig. 4). Like Furnace Creek Ranch, the Village of Borrego Springs is surrounded by a protected area, in this instance Anza-Borrego Desert State Park. More information on this site can be found in Johnson and MacKnight (2019).

5. Sacaton, Arizona. 33.08 N, 111.74 W. Elevation 1283 ft (391 m). Hottest months, Jun–Sep. AAP 8.9 in (226 mm). Wettest months, Jul–Aug.

A field station of the U.S. Department of Agriculture was founded in 1907 at Sacaton to evaluate arid land crops and to benefit the Gila River Indian Community. The river provided irrigation water. Famed Pima cotton was developed in Sacaton. A dozen other annual crops were planted, along with perennial fruit and nut crops including date palm. Initially in the 1910s, seedling palms were planted, followed by offshoots of about 27 different varieties. In 1938, 6 acres (2.4 ha) of varietal and seedling dates were growing at the station. Results of date experiments at Sacaton were not favorable because of the rainfall-caused fruit spoilage during the ripening season. The Sacaton field station land reverted to the Tribe after WWII, all

experimentation ceased and most of the land was cleared. A few seedling date palms persist along the Gila River Canal in Sacaton (Fig. 5), transplanted there in 1920–1921. Some relict date palms are also present around Sacaton and the site of the former field station.

King et al. (1923, 1926, 1932, 1938) and Ramsey (2004) provide details about the date experiments.

6. Sells, Arizona. 31.91 N, 111.88 W. Elevation 2392 ft (729 m). Hottest months, Jun–Jul. AAP 12.3 in (312 mm). Wettest months Jul–Aug.

Scant information is available about the date palms in Sells, a desert area without perennial streams. The rainfall regime is unfavorable for date fruit ripening and desert groundwater resources limit agriculture. Nevertheless, an experimental planting was made there in the mid-1920s under the supervision of Frank Thackery of the USDA in Indio (Ajo Copper News, 7 Nov. 1925) and mentioned by Swingle (1928). Physical evidence of relict date palms at the presumed field site is shown in Figure 6.

Reassessments of the six sites described above in terms of their potential for commercial date fruit production reveal some interesting facts.

Needles and Parker are suited for date growing because they both have ideal high ripening-season temperatures combined with exceptionally low rainfall and reliable sources of irrigation water. With adequate investment, a date industry infrastructure could be created.

Death Valley's Furnace Creek Ranch and Borrego Springs have suitable climatic conditions for date growing, but inadequate water resources to support large-scale date growing.

At both Sacaton and Sells, the occurrence of rainfall during the ripening season makes commercial date production unfeasible.

In landscape terms, this study documents the presence of date palms in local landscapes even a century after they were abandoned. Other American examples of this phenomenon are documented in Texas, at a few locations in and around Carrizo Springs, and on the Rio Grande floodplain at the Richter Ranch in Laredo and in Big Bend National Park (Johnson & MacKnight 2022, 2023).

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The Guyanese Palms of Edward Angelo Goodall

SCOTT ZONA¹ AND WILLIAM SCHUPBACH²

A collection of 11 sketches, held in the Wellcome Collection in London and documenting palms seen during the 19th-century expedition to British Guiana, is correctly attributed to Edward Angelo Goodall. Most of the sketches are accurate enough to allow identification of the palms. They provide an insight into the palm flora from a time when the region was still poorly explored.

In 1841–1843, the botanist-explorer Robert Schomburgk led an expedition to establish the boundary between British Guiana (now Guyana) and Venezuela. Robert was accompanied by his brother, Richard Schomburgk, who was also a botanist and who made collections for the Altes Museum and the Botanical Gardens of Berlin. Both brothers wrote reports or memoirs of the expedition (Schomburgk 1843, 1845, 1876; Roth 1922–1923; Rivi re 2006). The Schomburgk brothers and their discoveries, along with the border dispute that continues to this day, overshadowed the work of expedition artist, Edward A. Goodall, and his illustrations of the region's palms.

Edward Angelo Goodall was born on 8 June 1819 in London, England. That he eventually became an artist might appear a forgone conclusion: His father was Edward Goodall (Goodall, R. ongoing), a well-known engraver, and four of his nine siblings were artists (St John-McAlister 2010), including the celebrated Frederick Goodall (1822–1904), a Royal Academician, and Eliza (*n e* Goodall) Wild, who exhibited at the Royal Academy between 1846 and 1855. In 1841, when Edward was only 22 years old, he was tapped to join Robert Schomburgk's expedition after the original artist left the expedition out of fear of the yellow fever epidemic that was sweeping through Georgetown. Soon after Edward arrived in Georgetown, he fell ill with the often-fatal disease but recovered. On 23 Dec 1841, the expedition set out for the interior of British Guiana, and Goodall soon began documenting the people, plants and places they encountered.

During the two years of the expedition, he produced dozens of sketches and portraits of the expedition's findings, often under difficult conditions, such as wet paper and hands

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1. An unidentified palm tree found on the Wenamu River, Guyana. Wellcome Collection Library Reference: 21753i.

numb with cold (Schomburgk 1876, Menezes in Goodall 1977). After the conclusion of the expedition in October 1843, Goodall returned to England in 1844. The paintings and

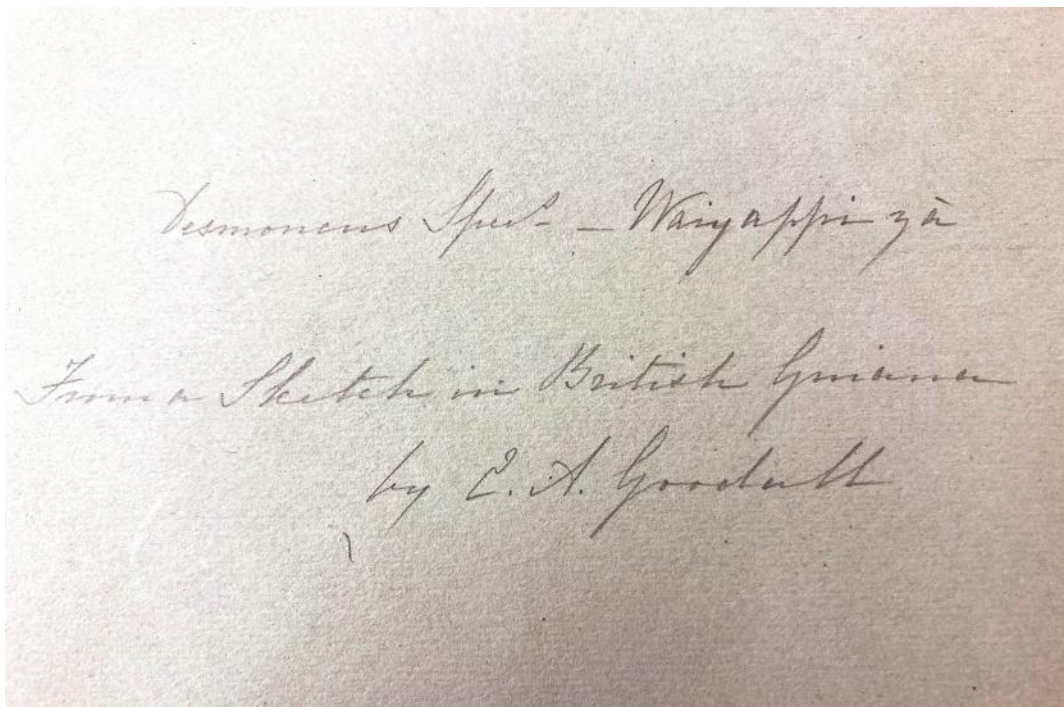
drawings from the expedition were donated to the Colonial Office, which gave them to the British Museum, from which in turn they passed to the British Library, where most of



2. A structure with unidentified palm trees, Guyana. (WCLR: 21772i).

Goodall's paintings reside. Schomburgk and Goodall attempted to have the portraits of people published, but they were unsuccessful in raising funds. A selection of 70 paintings was finally published in 1977, more than a century after the artist's death (Goodall 1977).

Although much has been written about Goodall's portraits of long-vanished peoples and customs (Menezes in Goodall 1977, Mowat 1993, St John-McAlister 2010), his botanical illustrations have received less attention. Goodall is suspected of being



3. Image of the verso inscription on WCLR 21767i (with enhanced contrast) showing the challenging handwriting and the unknown abbreviation ("z à").

responsible for illustrations of orchids published by Robert Schomburgk (Romero-González 2005), but those illustrations are unsigned. A cache of 11 palm watercolors in the Wellcome Collection (London, UK) was mistakenly attributed to "C.A. Goodall" on the basis of the indistinct inscriptions that they bear, but they are here re-identified as works by Edward Angelo Goodall. Other botanical illustrations by Goodall may exist in public and private collections, and the proper attribution of his sketches in the Wellcome Collection might elicit discoveries elsewhere.

All the watercolors will be referenced by their Wellcome Collection Library Reference numbers. The watercolors can be found in the Wellcome Collections online catalog (<https://wellcomecollection.org/collections>) by using these reference numbers in the search field.

The Artwork

The 11 watercolors have no text or signature on the front, but nearly all (the exception being 21774i) have handwritten inscriptions written faintly in pencil on the back. The inscriptions refer to Goodall in the third person, raising the possibility that they were not inscribed by him. All are watercolor

paintings, some with pencil or gouache. They are dated between September and November 1846, which is well after the conclusion of the boundary survey expedition. Each inscription notes that the illustration is "from a sketch in British Guiana by E.A. Goodall." Goodall's published diary (Goodall 1962) made only one mention of sketching a palm: "Wednesday 4th May 1842. Bought a few curiosities and made a small sketch of a palm."

The only other botanical illustration by Goodall in the Wellcome Collection (21775i) is one of banana plants. Its inscription gives the date of the sketch as 1842 and the date of the watercolor as 1846, showing a two-stage process: sketched in British Guiana in 1842 then worked up into a finished watercolor in 1846. We believe the palm illustrations were made in the same way. The watercolors are painted with the fluency expected of a professional watercolorist. Dappled blue-gray patches representing sky and clouds are made with rapid sweeps of the brush to give a sense of time, change, and air, while brown shadows are added on the ground to emphasize three-dimensionality.

The location in which the watercolors were painted is given in the inscriptions as "Serge Hill," which is a country estate in Hertford-



4. *Astrocaryum jauari* Mart. (Wellcome Collection Library Reference: 21769i).

shire, northwest of London. The estate is currently a non-profit garden and therapy center. Goodall lived in London when not on a voyage, so his work at Serge Hill would have

been supported by the then-owner of the estate, Samuel Reynolds Solly (1781–1866). Solly had a double reason to support Goodall's work. In the first place, he was a collector of



5. *Mauritiella armata* (Mart.) Burret (WCLR: 21762i).

watercolors, which were eventually sold at Christie's auction house in London on 11 and 12 April 1867. Christie's advertised the sale as containing "works of the best painters in

watercolours, chiefly obtained direct from the artists" (Athenaeum, 1867). Secondly, he was a member of a family of merchants in the City of London who took an active part in scientific



6. *Euterpe* sp. (WCLR: 21765i).

activities. At least three members of the Solly family were Fellows of the Royal Society, the UK's academy for the natural sciences, including Samuel Reynolds Solly.

When Goodall made the initial sketches in British Guiana, the Schomburgk brothers most likely provided the identifications of the palms, as the names in the inscriptions



7. *Geonoma* sp. (WCLR: 21758i).

correspond to those mentioned by Schomburgk (1843, 1845). None of the illustrations show any of the uses of the palms,

even though palms were much used by the region's indigenous people (Schomburgk 1845, 1876; Goodall 1962).



8. *Astrocaryum murumuru* Mart. (WCLR: 21754i).

Six illustrations give geographic detail, but the local names are difficult to decipher and match with modern places. The inscription on 21753i (Fig. 1) is “along the River Wenamu near its

confluence with the Caphiuin.” On modern maps, the first-named river is on the disputed border between Guyana and Venezuela, but the Caphiuin River does not appear. In



9. *Bactris* sp. (WCLR: 21764i).

Goodall (1977, p. 10), the map shows both rivers in the southeastern region, near the border with Suriname. The inscription on 21772i (Fig. 2) reads "Indian hut at Drio

[village]." The Drio indigenous people inhabited southeastern Guiana and were frequently mentioned by Schomburgk (1845), but the people and their villages are now

extinct (Menezes in Goodall 1977). Several inscriptions include a two-letter abbreviation, which we transcribed as “z à” (or perhaps “g à”), the meaning of which is unknown to us (Fig. 3).

Most of the palms are depicted in idealized isolation, without any adjacent vegetation other than small, grassy plants growing at the bases of the trunks. The exceptions are *Astrocaryum jauari* (21769i; Fig. 4), which is depicted on a riverbank with the opposite bank in the background, *Mauritiella armata* (21762i; Fig. 5), which is shown with a second plant and a human figure in the background, and the unidentified palm (21772i; Fig. 2) depicted in the context of village life, with humans and structures in the composition. The human figures in the watercolors are useful for establishing the relative size of the palm. There is no other indication of scale. All of the illustrations show the entire palm from the soil line to the crown, except for *Euterpe* sp. (21765i; Fig. 6) and *Geonoma* sp. (21758i; Fig. 7), which are each illustrated in two sections. This is, of course, a common practice among botanical artists that allows a large subject to fit on a relatively small canvas or paper.

Only four of the 11 watercolors show the reproductive parts of the palms. These four show palms with fruits rather than flowers. The unidentified palms with the hut (21772i; Fig. 2) may have unexpanded inflorescences in their crowns, or they may be old leaves. The sketch is lacking in enough clear detail to identify the structures.

The Illustrated Palms

Indet. 1. A palm tree found on the Wenamu River, Guyana. (WCLR: 21753i) (Fig. 1).

Verso: “Palm found on the river Wenamu near its confluence with the Caphiwiuin. From a sketch by E.A. Goodall, British Guiana. Serge Hill Oct.r 27th 1846”

This painting illustrates a medium to large, unarmed pinnate palm with open leaf sheaths and no crownshaft. The pinnae appear irregularly arranged on the rachis but in one plane. This is possibly a species of *Oenocarpus*, but the distinctive inflorescences of *Oenocarpus* are lacking.

Indet 2. Indian hut with palm trees, Guyana. (WCLR: 21772i) (Fig. 2).

Verso: “Indian hut at Drio, British Guiana. From a sketch by E.A. Goodall. Serge Hill Nov.r 12th 1846”

A pair of very tall palms, no stilt roots, unarmed, with broad leaflets. There may be horn-shaped unopened inflorescences in the crown. A crownshaft present. As the palms are depicted growing near habitations, they may be cultivated. There is insufficient detail in this illustration to identify the palms. This is the only illustration that had been published, as the frontispiece to Goodall (1977) “Sketches of Amerindian Tribes....” (British Lib. Add. Mss. 16939, f. 1).

***Astrocaryum jauari* Mart.** (Wellcome Collection Library Reference: 21769i) (Fig. 4).

Verso: “The Sawarai palm Macusi [Macushi] z à [?] *Astrocaryum Jauari* Mart. From a sketch in British Guiana by E.A. Goodall. Serge Hill Nov.r 3rd”

This watercolor sketch shows a clustering palm with pinnate leaves. A crownshaft is absent, and the leaves are erect in the crown. Prickles are visible on the leaf bases. On the suckering shoots, Goodall faithfully captured the pinnae of juveniles that are wider than the pinnae of mature leaves. Pinnae are spreading in many planes, a characteristic of this species. The habit depicted, the bank of a river, is also accurate for the species.

The common name, *sawarai*, is the name used by the Macushi people, several of whom accompanied the expedition as guides (Schomburgk 1843, 1845). It corresponds to the name *sauari* used by the Wapisiana people (Henderson 1995).

***Mauritiella armata* (Mart.) Burret** (WCLR: 21762i) (Fig. 5).

Verso: “The prickly Ita palm *Mauritia armata*. From a sketch by E.A. Goodall in British Guiana. Serge Hill Oct.r 19th 1846”

This drawing depicts a clustering palm with armed stems and deeply divided, fan-shaped leaves. A figure holding a spear or staff and the outline of a smaller cluster of palms are in the background. The identification of the palm in this illustration is unproblematic. Although the genus now comprises four species (Torres Jiménez et al. 2022), *M. armata* is the only one that occurs in Guyana (Henderson et al. 1995).

***Euterpe* sp.** (WCLR: 21765i) (Fig. 6).

Verso: “*Oenocarpus* spec.s. From a sketch in British Guiana by E.A. Goodall. Serge Hill Oct.r 29th 1846” “?*Astrocaryum Jauari*”

The inscription identifies the plant as “*Oenocarpus* species,” but we note that the



10. *Desmoncus horridus* Splitg. ex Mart. ssp. *horridus* (WCLR: 21767i).

inflorescence lacks the characteristic horse-tail form that characterizes *Oenocarpus*. Another note, written by another hand, identifies the

palm as "*Astrocaryum* species," which is how it was listed in the Wellcome Collection catalog. The morphology of the depicted palm



8. *Iriartella setigera* (Mart.) H. Wendl. (WCLR: 21774i).

(solitary, slender, unarmed stem, exposed roots, distinct crownshaft, regularly pinnate leaves, and infructescence without a persistent

peduncular bract) points to Euterpe. The missing section from the middle of the stem suggests that this was a tall, slender palm. Four



12. *Socratea exorrhiza* (Mart.) H. Wendl. (WCLR: 21761i).

Euterpe taxa occur in Guyana (Henderson & Galeano 1996). The spreading, not pendulous, pinnae are suggestive of *E. catinga* var. *roraimae*,

but without knowledge of the endosperm condition and other details, we cannot confirm this identification.

***Geonoma* sp.** (WCLR: 21758i) (Fig. 7).

Verso: “*Geonoma* spec. Jacunaia [?] z à From a sketch in British Guiana by E.A. Goodall. Serge Hill Oct.r 14th 1846”

The palm illustrated in this painting is a single-stem palm with ten simple green leaves and three collapsed dead leaves. The stem is illustrated in two sections, thus suggesting that a long segment of the stem had to be virtually removed to fit the composition on the paper. A long peduncle holds four rachillae that bear red fruits. An immature, interfoliar inflorescence emerges from among the leaves. *Geonoma* species are notoriously polymorphic and difficult to identify, even with physical specimens. Goodall's painting cannot be determined to species.

Astrocaryum murumuru Mart. (WCLR: 21754i) (Fig. 8).

Verso: “Murumari palm, British Guiana, from E.A. Goodall. Serge Hill Sept. 1846”

Goodall painted a portrait of a solitary palm with a trunk covered in old leaf bases, no crownshaft, and evenly spaced pinnae in a single plane. Clusters of prickles are prominent on the leaf bases, petioles and rachises. Although there is nothing to provide scale, the palm appears to be large.

***Bactris* sp.** (WCLR: 21764i) (Fig. 9).

Verso: “*Martinezia* perhaps *Bactris* from a sketch in British Guiana by E.A. Goodall. Serge Hill Oct.r 23rd 1846”

This painting shows a cluster of three, slender stems with rings of prickles at the nodes and wide internodes. A crownshaft is absent. The pinnate leaves have pinnae that are widest in the middle and narrower at their bases and apices. Prickles are evident on the leaf base, rachis and petiole. *Martinezia* has been misapplied to species of *Aiphanes*, but the palm in this illustration lacks the erose leaflet apices that are typical of *Aiphanes*. The palm appears to be a species of *Bactris*, of which there are at least 16 taxa of *Bactris* in Guyana (Henderson 2001). Without details of the flowers and fruits, we are unable to identify the species.

Desmoncus horridus Splitg. ex Mart. **ssp. *horridus*** (WCLR: 21767i) (Fig. 10).

Verso: “*Desmoncus* spec.s. Waiyappi [Wayampi] z à. From a sketch in British Guiana by E.A. Goodall. Serge Hill Oct.r 31st 1846”

The palm in Goodall's painting is unambiguously a species of *Desmoncus*. He

painted a palm with a slightly flexuous stem bearing leaves along most of its length, an infructescence with a spiny peduncular bract, and most importantly, leaves with cirri. The cirrus is the extension of the tip of the leafy rachis bearing grappling-modified leaflets and sometimes prickles. The long straight prickles on the rachises and the absence of prickles on the cirri are characteristics of *D. horridus* ssp. *horridus* (Henderson 2011).

Iriartella setigera (Mart.) H. Wendl. (WCLR: 21774i) (Fig. 11).

Verso: blank.

The painting is of a slender, small palm with large internodes and bearing a crown of four pinnate leaves and two, infrafoliar, long-peduncle infructescences. There are no stilt roots. The leaf bases are depicted with short, dark bristles. The shape of the leaflets is rhomboidal. The peduncles appear to have three closely appressed peduncular bracts. The fruits are ovoid and red at maturity. The details of the sketch are sufficient to determine this palm as *I. setigera*, which may be solitary and may not always have obvious stilt roots (Henderson 1995).

Socratea exorrhiza (Mart.) H. Wendl. (WCLR: 21761i) (Fig. 12).

Verso: “*Iriartea* spec.s [indistinct characters] z à From a sketch by E.A. Goodall in British Guiana. Serge Hill Oct.r 15th 1846”

This image was identified in the Wellcome Library collection as “*Iriartea* species,” but the morphology of the root cone (sparse, widely spaced, spinose roots) is indicative of *Socratea*. A single species occurs in Guyana, *Socratea exorrhiza*. The uniform shape of the trunk (lacking any bulge), the crownshaft and the shape of the pinnae are concordant with *S. exorrhiza* (Henderson 1995).

Conclusion

The Schomburgk expedition firmly established Goodall's reputation as an excellent field artist and reliable documentarian. He went on to become a war artist for the Illustrated London News during the Crimean War (St John-McAlister 2010). Goodall continued to exhibit and sell his work, further burnishing his reputation as an artist. In his later years, Goodall became known for his Orientalist paintings of scenes from Egypt and Morocco, a genre in which his brother Frederick excelled. Many of Edward's works now in public collections come from this period in his life.

His work in Guiana and Crimea marked Edward Angelo Goodall as a distinctive figure among the seven artists of the Goodall family. Goodall passed away on 17 Apr 1908, bringing to a close a life devoted to art.

Goodall's Guyanese palm illustrations offer a long-forgotten glimpse of the rich flora of the region. At present one can only speculate as to why Goodall painted them so long after he returned from Guyana. Were the paintings made for the mass market, taking advantage of the Victorians' love for tropical palms and other exotica? If he returned with pencil drawings of palms annotated with color notes, he would have needed to work them up into watercolors to be able to use them in finished products. Such products included color prints made using the Baxter process. Baxter prints of Goodall's Guiana scenes (which includes some palms) were published in 1847 and 1850 (Lewis, p. 139, nos. 156 (1847) and 157 (1850)). These Baxter prints, however, are more decorative and scenic, and the palms lack the detail found in the Wellcome sketches. The watercolors could have been commissioned by Samuel R. Solly to add to his collection. Were they made as studies or sketches for a planned work on the flora? Or were they made simply because Goodall enjoyed reminiscing about the palms and his adventures in the tropics? Goodall is silent on his motives, but whatever they were, we can be grateful that the illustrations survived and, thanks to technology beyond the wildest dreams of the artist, are available for all to enjoy.

Acknowledgments

We thank the Wellcome Collection for placing these images in the public domain, and we thank Drs. Bill Baker and John Dowe for their critical comments and helpful suggestions.

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The Five Cs and *Saribus* and *Veillonias*

DONALD R. HODEL¹

This last installment of the overview of the New Caledonia palm genera covers the genera with only one or a few species. Five of these genera begin with the letter “C” and several are phonetic wonders with the same prefix, *Cypho-*, including *Cyphophoenix*, *Cyphokentia*, and *Cyphosperma*. Rounding out the Cs are *Campecarpus* and *Clinosperma*. The remaining genera include *Veillonias* and the only coryphoid (palmate-leaved) palm on the Island, *Saribus*. All are the quintessential New Caledonia palm with a solitary, ringed trunk, prominent crownshaft, and pinnate leaves, except for *Cyphosperma*, which lacks a crownshaft, and *Saribus*, of course, which has palmate leaves.

I have visited the fabulous plant paradise of New Caledonia seven times, all primarily looking at palms, first nearly a half-century ago in 1976 and the most recent a whirlwind of a trip early this year to investigate and write up with Gilles Pierson two new species of *Basselinia* and a new variety of *Chambeyronia*

divaricata (var. *flavolineata*) (see companion article, p. 57). Those who are fortunate to attend the 2024 Biennial and its pre- and post-tours will not be disappointed; you will be able to visit places to which I have never been.

Campecarpus

Very recently resurrected from the genus *Cyphophoenix* (Pérez-Calle et al. 2024), where it was for 15 years, *Campecarpus fulcitus* is well known and easily recognized for its striking cone of stilt roots (Fig. 1), which supports a green trunk with prominently ringed and indented leaf scars topped by a crown of green, spreading leaves and a white crownshaft (Fig. 2). Look for it at the Rivière Bleue Botanical Reserve and Park and at the Forêt Cachée, both in the southeast part of the Island.

Clinosperma

Until 2008, *Clinosperma* was a one-species genus, having *C. bracteale*, a slender, smallish, few-leaved palm looking like a white-

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Editors' Note: This is the last of four commissioned articles highlighting the exceptional palm diversity of New Caledonia, the destination for the IPS Biennial in 2024.



1. *Campecarpus fulcitus* is well known and easily recognized for its striking cone of stilt roots, here with the late Jean-Christophe Pintaud at the Rivière Bleue Botanical Reserve and Park.



2. *Campecarpus fulcitus* has a green trunk with prominently ringed and indented leaf scars topped by a crown of green, spreading leaves and a white crownshaft, as here at the Forêt Cachée.



3. *Clinosperma bracteale* is a slender, smallish, few-leaved palm with a white-crownshaft, southeast coastal road beyond Yaté.



4. *Clinosperma lanuginosa* has spreading leaves, a fuzzy red crownshaft, and a shorter, robust inflorescence, 700 m elevation on Mt. Panié.



5. *Clinosperma vaginata* has gracefully arching leaves and a smaller inflorescence on a slender, long peduncle, Rivière Bleue Botanical Reserve and Park.



6. The rare *Clinosperma macrocarpa* is famous for its elusive nature as well as its large fruits, 500 m elevation on Mt. Panié.



7. *Cyphokentia cerifera* has orange leaf bases under the white-waxy covering of the crownshaft and a spreading inflorescence, 500 m elevation on Mt. Panié.



8. *Cyphokentia macrostachya* has green leaf bases under the white-waxy powder of the crownshaft and pendulous inflorescences, Rivière Bleue Botanical Reserve and Park.



9. The handsome *Cyphophoenix elegans* has prominently recurved leaves, a swollen crownshaft, and green, indented trunk, Col d'Amos.



10. On low-elevation limestone substate on Lifou Island, *Cyphophoenix nucele* has ascending to spreading leaves, a green, slightly indented trunk, and a white-patched crownshaft.



11. *Cyphosperma balansae* lacks a crownshaft and has ascending to spreading leaves and inflorescences composed of a short, small panicle at the end of an exceptionally long peduncle, Col d'Amieu.

crownshafted version of *Chambeyronia divaricata* as its only species (Fig. 3). Then the two *Brongniartikentia*, *B. lanuginosa*, with spreading leaves, a fuzzy red crownshaft, and a shorter, robust inflorescence (Fig. 4), and *B. vaginata*, with gracefully arching leaves and a smaller inflorescence on a slender, long

peduncle (Fig. 5), as well as the elusive and rare *Lavoixia macrocarpa* (Fig. 6), a holy grail of the palm family and affectionately known as the "*palmier á gros fruits*," were sunk into *Clinosperma*. Look for *C. bracteale* along the southeast coastal road beyond Yaté, *C. vaginata* at the Rivière Bleue Botanical Reserve and Park



12. *Cyphosperma balansae* is known for its dark, sometimes nearly black trunk with white rings, earning the moniker zebra palm. Here it is with Chantal Pierson on Mt. Aoupinié.



13. *Veillonina alba* is a colorful palm with a stunning trunk, inflorescence bracts and crownshaft, 500 m elevation on Mt. Panié.

in the south, and *C. macrocarpa* and *C. lanuginosa* at about 500 and 700 m elevation, respectively, on Mt. Panié.

Cyphokentia

Cyphokentia, which is typically easily identified by its crown of recurved leaves and powdery, white-waxy crownshafts, was another one-species genus until 2008 when *Moratia cerifera* was sunk into it. Of the two species, *C. cerifera* has orange leaf bases under the white-waxy powder and spreading inflorescences (Fig. 7) while *C. macrostachya* has green leaf bases under the white-waxy powder and pendulous inflorescences (Fig. 8). Look for the former at Col d'Amos in the north and on Mt. Panié at about 500 m elevation while the latter can be easily seen at the Rivière Bleue Botanical Reserve and Park in the south and on Mt. Aoupinié in the central-east part of the Island.

Cyphophoenix

Cyphophoenix had only two species until 2008, *C. elegans*, with its crown of handsome, prominently recurved leaves, swollen crownshaft, and green, indented trunk (Fig. 9) from the north of the Island, and *C. nucele*, with its ascending to spreading leaves, green, slightly indented trunk, and white-patched crownshaft (Fig. 10), a denizen of low elevation, limestone substrate on Lifou Island off the southeast coast of New Caledonia. Then *Campecarpus* and *Veillonia* were sunk into *Cyphophoenix* but very recently both were resurrected. Look for *C. elegans* at Col d'Amos in the north.

Cyphosperma

The only one of two non-endemic genera of palms on New Caledonia, *Cyphosperma* also is found in Fiji and Vanuatu. On New Caledonia, *C. balansae* is known for its dark, sometimes

nearly black trunk with white rings, earning the moniker zebra palm (Fig. 11), lack of a crownshaft, ascending to spreading leaves, and inflorescences composed of a short, small panicle at the end on an exceptionally long peduncle (Fig. 12). You can see it at Col d'Amieu and on Mt. Aoupinié, both in the central part of the Island.

Saribus

The only fan palm and second non-endemic genus on the Island and long-known as *Pritchardiopsis*, *Saribus jeanneneyi* was once thought to be extinct. One of the rarest palms in habitat, known from only one or two adults and several saplings (Front Cover), it was long-thought to be extinct but was rediscovered in 1980 near Prony in the southeast part of the Island. As part of the effort to save this species, the government in the 1990s and early 2000s collected seeds to grow and replant into the wild. They also distributed seeds to local palm collectors, many of whom now have it in their gardens.

Veillonia

Veillonia alba is likely the most colorful palm on the Island (Fig. 13). It has a stunning combination of a white-waxy trunk with brown, indented leaf scars, yellowish inflorescence, and white bracts against the reddish brown crownshaft. It was sunk into *Cyphophoenix* in 2008 but very recently was resurrected (Pérez-Calle et al. 2024). Look for it on Mt. Panié at about 500 m elevation.

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