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FRONT COVER

Burretiokentia vieillardii emerges from the forest canopy in New Caledonia. See article by B. Henry, p. 132.

BACK COVER

Chambeyronia houailouensis, cultivated near Ba, north of Houailou, New Caledonia. See article by Hodel et al., p. 109. Photo by D.R. Hodel.



Basselinia eriostachys has colorful leafbases. See article by B. Henry, p. 132.

PALM NEWS

New research is revealing the **changes imposed by artificial (human) selection on the edible inflorescences of pacaya, *Chamaedorea tepejilote***. Only the male inflorescences of *C. tepejilote* are harvested, and centuries of selection by indigenous people have resulted in semi-domesticated, cultivated types of pacaya that have larger inflorescences. A recent study by H. Hosni and colleagues (*Annals of Botany*, <https://doi.org/10.1093/aob/mcab060>) compared how genes were expressed in cultivated vs. wild-type pacaya in Guatemala to see which genes were affecting the inflorescence. Some of the expressed genes controlled the production of sugars, which were found to accumulate at higher levels in inflorescences of the cultivated types.



Palms 2021, the VII World Palm Symposium, was originally scheduled to convene in Rio de Janeiro, Brazil, but due to the COVID-19 pandemic, the conference was virtual last June. About 150 scientists from 26 countries in Africa, Asia, Europe and the Americas presented their work, either as posters or recorded video presentations. Live Q&A sessions were scheduled each day. The following participants were

recognized with awards: Angela Cano (Best Oral Presentation Winner), Amanda Cerqueira (Best Oral Presentation Runner-up); Davi Franchi (Best Poster Winner), Gabriela Akemi Oda (Best Poster Runner-up). All presentations will be available in the event's Youtube channel (<https://www.youtube.com/channel/UCZel-hH5QITLqnBkCIKdYnA>). The IPS was a co-sponsor of the VII World Palm Symposium, along with the Montgomery Botanical Center and Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro.

***Butia buenopolensis*, a new, grass-like, dwarf species, was recently described from the Serra do Cabral of Minas Gerais, Brazil.** The new species is believed to be closely related to *B. archeri*, based on morphology, flowering time and habitat, but is smaller in overall size. The new palm is restricted to a single population just outside Serra do Cabral State Park and is vulnerable to human disturbance. The author recommends that the borders of the park be extended to include the population of this unique palm. The publication, by B.F. Sant'Anna-Santos, is freely accessible from *Plant Systematics and Evolution* <https://doi.org/10.1007/s00606-020-01729-w> in PDF format.

***Butia capitata* seeds break dormancy faster when subjected to three cycles of hydration/dehydration at a constant 25°C.** That is the finding in a new publication by J.R. Soares and colleagues published in *Trees* at <https://doi.org/10.1007/s00468-021-02132-9>. The researchers measured embryo growth, not germination, and found that, after cycles of irrigation, embryos elongated more than those kept at a constant moisture level.

Reassessment of the Archontophoenicinae of New Caledonia and Description of a New Species

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CRAIG F. BARRETT⁴

The subtribe Archontophoenicinae and its three endemic genera of handsome, single-stemmed, crownshafted palms in New Caledonia, *Actinokentia*, *Chambeyronia* and *Kentiopsis*, have long attracted the attention of taxonomists as well as growers and collectors. Numerous taxonomic changes have occurred in these genera over the last 25 years as our knowledge of them has increased. Based on new information, we reassess and propose a new alignment for these three genera that better reflects their relationships.

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The island of New Caledonia has long been recognized for its extraordinary and rich assemblage of palms (Beccari 1920, Moore & Uhl 1984, Hodel & Pintaud 1998). Of the 10 genera and 38 species currently recognized for the island, nearly all are in subfamily Arecoideae, tribe Areceae (Pintaud & Baker 2008); only *Saribus jeanneneyi* (formerly *Pritchardiopsis jeanneneyi*) occurs in subfamily Coryphoideae, tribe Trachycarpeae (Bacon & Baker 2011, Pintaud & Baker 2008). All 38 species and 9 of the 10 genera are endemic; only *Cyphosperma* is shared with Fiji and Vanuatu.

The taxonomic alignment of the palm genera of New Caledonia, in particular tribe Areceae, has evolved greatly over the last 100 years as more and better morphological, anatomical, ecological and molecular data have become available. Pintaud and Baker (2008) provided

the most recent alignment of genera, classifying the New Caledonia Areceae in three subtribes (and nine genera): Archontophoenicinae (*Actinokentia*, *Chambeyronia* and *Kentiopsis*); Basseliniinae (*Basselinia*, *Burretiokentia*, *Cyphophoenix* and *Cyphosperma*); and Clinospermatinae (*Clinosperma* and *Cyphokentia*). This arrangement is accepted in the prevailing classification of palms (Dransfield et al. 2008, Baker & Dransfield 2016)

The impetus for this paper arose when co-author Hodel began investigating a taxon of *Chambeyronia* referred to in horticulture as *C. macrocarpa* 'Houailou' or simply *Chambeyronia* 'Houailou.' Based on purely morphological data, Hodel suspected that this entity was an undescribed species, but he sought molecular data to support his supposition. Teaming up with co-author Barrett, they performed molecular analyses using multiple leaf samples gathered from cultivated plants in California and Hawaii of the suspected new species and nearly all species of New Caledonia Archontophoenicinae as well as a few species of the subtribe that occurred outside of New Caledonia.

Building on earlier genetic studies of tribe Areceae (Norup et al. 2006, Baker et al. 2011, Domenech et al. 2014), Barrett sequenced two DNA regions (PRK and RPB2) for 57 accessions collected by Hodel and colleagues comprising five currently recognized genera and 16 species (*Actinorhytis* [1], *Archontophoenix* [6], *Actinokentia* [2], *Kentiopsis* [4] and *Chambeyronia* [3]). All species included multiple accessions, with the exception of *K. piersoniorum*. Sequences were aligned with a genus-level dataset from the arecoid palms (Baker et al. 2011), and phylogenetic trees were constructed. We did not expect full resolution and support for all relationships, as this tree is based on only two nuclear loci. Hence, some accessions of the same species or intraspecific taxa do not group together. Examples include *C. lepidota*, *C. macrocarpa* var. *hookeri*, and *K. piersoniorum*, but in most cases this can be attributed to a lack of resolution from limited character information.

Surprisingly, members of *Chambeyronia* fell in two distinct groups (Fig. 1A). *Chambeyronia macrocarpa* (including var. *hookeri*) and *C. lepidota* were placed as the closest relatives of two accessions of *Kentiopsis magnifica*. All accessions of *C. macrocarpa* 'Houailou' instead grouped with three accessions of *K. oliviformis*, with moderate support, though overall support

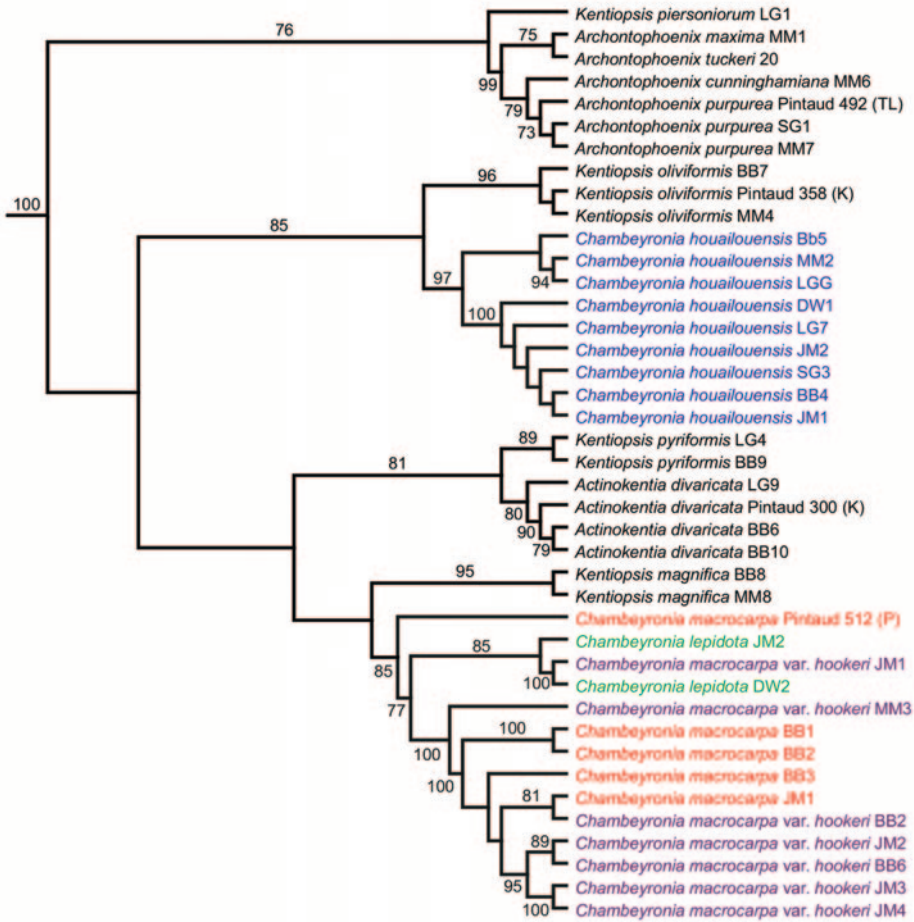
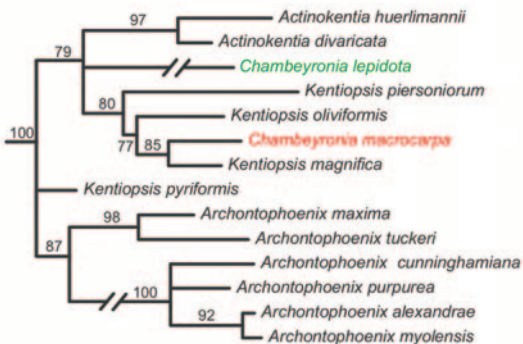
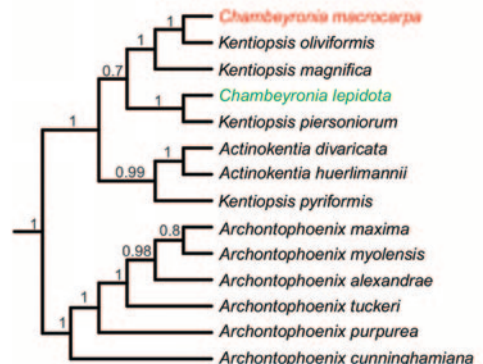
in the tree was generally low. All sampled accessions of *C. macrocarpa* 'Houailou' were obtained from cultivated plants, some of which might have been grown from wild-collected seeds although others might be from first generation cultivated plants. Although grouped together, some of the accessions of this species were on a different and long branch from the others, which might be due to their cultivated origin and the possibility that these could even be from the same seed parent although we were unable to determine their precise origin.

Equally striking was the observation that *Chambeyronia* and *Kentiopsis* displayed a pattern of paraphyly with *Actinokentia* nested within them, in some cases with high branch support. In other words, they did not resolve as well-defined, distinct genera. Earlier indications of this issue were presented in a previous study with fewer samples (Domenech et al. 2014; Fig. 1B).

Importantly, these findings are also substantiated by a study of New Caledonian palms currently in progress (Pérez-Calle et al., in prep.). In this study, co-authors Baker, Bellot and Pérez-Calle sequenced 151 nuclear genes from one representative of each Archontophoenicinae species, built a phylogenetic tree from each gene, and then summarized all gene trees in a final summary tree. In this summary tree, *Kentiopsis pyriformis* grouped with *Actinokentia*, *K. piersoniorum* grouped with *Chambeyronia lepidota*, and *K. oliviformis* and *K. magnifica* grouped with *C. macrocarpa*, all with high support (Fig. 1C). Also, relationships between these three groups were not resolved with high support, but the support was maximal for placing these three groups together at the exclusion of other Archontophoenicinae (Fig. 1C).

In summary, the results of Barrett's study supported Hodel's supposition that *Chambeyronia* 'Houailou' is an undescribed species. Equally revealing was that the data placed *C. 'Houailou'* intermediate between *Chambeyronia* and *Kentiopsis*. Furthermore, the generic limits of *Actinokentia*, *Chambeyronia* and *Kentiopsis* were overturned, leading to the unavoidable conclusion that maintaining three separate genera of Archontophoenicinae in New Caledonia is untenable.

Here we propose a new alignment of the New Caledonia Archontophoenicinae, collapsing the three genera into one, *Chambeyronia*, provide an amended description of this now-

A**B****C**

1. Relationships among New Caledonian Archontophoenicinae based on three molecular studies. **A.** Maximum likelihood phylogeny based on the PRK and RPB2 nuclear genes, inferred by co-authors Barret and Cumberledge. **B.** Maximum likelihood phylogeny based on nine plastid and five nuclear loci, inferred by Domenech et al. (2014). Transversal bars indicate branches that have been shortened for easier visualization. **C.** Multispecies coalescent summary tree (Zhang et al. 2018) of 151 maximum likelihood (Stamatakis 2014) nuclear gene trees, inferred by co-authors Baker, Bellot and Pérez-Calle (in prep.). Numbers indicate branch support in percentage of bootstrap replicates (maximal support = 100; A and B) or local posterior probabilities (maximal support = 1; C), when support is higher than 70%/0.7.

expanded genus and a key to the species, update the nomenclature and name and describe a new species. Hodel and Moya López (2021), who made no taxonomic changes, updated the nomenclature and typification for the New Caledonia Archontophoenicinae and we follow their findings here. The amended description of the genus is based on Dransfield et al (2008) and is a consolidation of descriptions of the three genera and supplemented from our examination of living plants.

Chambeyronia Vieill., Bull. Soc. Linn. Normandie, sér. 2(6): 229. 1873.

Type species: *Chambeyronia macrocarpa* Becc.

Kentiopsis Brongn., Compt. Rend. Hebd. Séances Acad. Sci. 77(6): 398. 1873., synonym. nov.

Type species: *Kentiopsis oliviformis* (Brongn. & Gris) Brongn.

Actinokentia Dammer, Bot. Jahrb. Syst. 39: 20. 1906., synonym. nov.

Type species: *Actinokentia divaricata* Dammer.

At first glance the selection of *Chambeyronia* rather than *Kentiopsis* as the accepted genus appears troublesome or arbitrary because they were both published in 1873. However, a search in the journals and close examination of the publication dates shows that *Chambeyronia* was published 11 June while *Kentiopsis* was published after 29 December although the precise date is unclear (Brongniart 1873, Vieillard 1873). Thus, *Chambeyronia* has priority, as it is the older name.

Solitary, small to medium, short to tall, unarmed, pleoanthic, pinnate-leaved, understory to emergent tree palms 3–25 m tall. Stem slender to moderate, rarely stout, erect, mostly smooth, conspicuously ringed especially distally, sometimes sunken, internodes gray to brown and becoming longitudinally fissured, enlarged at base and roots visible or not, these rarely prickly. Leaves erect to spreading, mostly neatly abscising, nearly straight to strongly recurved, often bronze colored to bright red when newly opening; base tubular, thick, forming a conspicuous often swollen crownshaft, with or lacking a notch opposite petiole, glabrous adaxially, glabrous to variously covered

abaxially with scale-like hairs and or a waxy bloom; petiole short to elongate, green to variously colored pinkish to reddish brown, channeled to nearly flat adaxially, rounded abaxially with scattered small, brown, scale-like hairs, or sometimes terete; pinnae regularly arranged, variously lanceolate, singled-fold, thick, sometimes leathery, contracted at the base, acute to acuminate, glabrous and/or waxy adaxially, abaxially glabrous to sometimes covered with minute punctiform scale-like hairs, sometimes waxy tomentose, with large, somewhat deciduous, brown to whitish, scattered to contiguous, ramenta on midrib and primary nerves especially proximally, midrib and marginal nerves prominent, large, primary nerves 0–6 on either side of midrib, secondary and tertiary nerves visible but inconspicuous, transverse veinlets obscure or evident. Inflorescences infrafoliar, protandrous, branched 1–3(–4) orders, sometimes divaricately, peduncle short, glabrous to variously tomentose, prophyll completely encircling peduncle at insertion and enclosing peduncular bract, caducous, thin-papery to papery, pointed apically, flattened dorsiventrally, 2-keeled laterally, glabrous to densely covered with deciduous, whitish, scale-like hairs adaxially, glabrous to variably covered with sometimes deciduous scale-like hairs abaxially, peduncular bract similar to prophyll but often with a more definite beak and lacking keels; rachis longer than peduncle, bearing spirally arranged, low to prominent, rounded to acute, sometimes ruffled bracts subtending branches and rachillae; rachillae slender to stout, tapering, straight to curved, sinuous, glabrous to variably covered with scale-like hairs, bracts subtending floral triads proximally and paired or solitary staminate flowers distally or triads nearly throughout the rachilla prominent, spirally arranged, spreading, rounded and lip-like to triangular and acute, shorter than to greatly exceeding flowers, triads remote, sometimes sunken; bracteoles surrounding pistillate flower unequal, sepal-like or not, unevenly sized, low to larger one sometimes exceeding triad bract. Staminate flowers symmetric to asymmetric; sepals 3, distinct, imbricate, triangular to rounded-mucronate, acute to acuminate, sometimes conspicuously keeled distally; petals 3, distinct, valvate, asymmetric, broadly to narrowly ovate or boat-shaped, angled, and sometimes strongly nerved to nearly symmetric and smooth when dry; stamens 11–55, shorter than, equaling, or

exceeding petals, filaments elongate to awl-shaped, free to briefly connate basally and forming a lower, bowl-like structure, erect to briefly inflexed, anthers erect in bud, linear, dorsifixed near base, conspicuously to briefly bifid basally, emarginate apically, latrorse, connective elongate; pistillode lacking to exceeding stamens, conic to columnar, sometimes widened proximally and tapering to slender tip. Pollen grains ellipsoid to pyriform to oblate-triangular, nearly symmetric to conspicuously asymmetric; aperture a distal sulcus or trichotomosulcus; ectexine tectate, perforate to perforate-rugulate, aperture margin similar to slightly finer; infratectum columellate; longest axis 39–75 μm . Pistillate flowers symmetric; sepals 3, distinct, broadly imbricate, rounded to acute; petals 3, distinct, broadly imbricate but with briefly to conspicuously valvate tips; staminodes 3, small, tooth-like, borne on one side of gynoecium or 6 and connate in a ring; gynoecium pseudomonomerous, composed of 3 stigmas, these prominent, spreading, recurved, unilocular, uniovulate, ovule laterally attached, pendulous, hemianatropous. Fruits small to large, ellipsoid to subglobose to ovoid, red or rarely purplish when mature ripe, apical stigmatic remains conspicuous; epicarp smooth, sometimes drying minutely pebbled; mesocarp composed of short, oblique, pale sclerieds over parenchyma with scattered to lacking tannin cells and stout, flat, anastomosing fibers adnate to endocarp; endocarp thin, fragile, not operculate. Seed ellipsoid to subglobose to ovoid or pyriform, with elongate, lateral hilum; raphe branches numerous, anastomosing; endosperm homogeneous; embryo basal. Germination adjacent-ligular, eophyll bifid. Cytology incompletely known, $2n = 32$ for some species.

Distribution and Ecology: Nine species, all endemic to New Caledonia, occurring in mostly moist to wet forests, or gallery forests in drier areas, on schistose, serpentine or ultramafic soils, 50–1600 m elevation. Most are forest species but a few occur in exposed situations on mountain ridges. Most are found as scattered individuals although some occur gregariously, forming large, spectacular colonies.

Key to the Species of *Chambeyronia*

1a. Petioles terete or adaxially shallowly channeled proximally; pinnae lacking prominent lateral nerves; stems less than 10 cm diam.; inflorescences small, 40 cm long or less 2

2a. Petioles spreading and arching, terete; emerging leaf red; pinnae flat to drooping; rachillae 2–3 mm diam., divaricately branched; bracts subtending rachillae and floral pits rounded *C. divaricata*

2b. Petioles ascending to straight, shallowly channeled adaxially; emerging leaf green; pinnae stiffly ascending; rachillae 4–6 mm diam., straight; bracts subtending rachillae and floral pits acuminate *C. huerlimannii*

1b. Petiole prominently channeled adaxially; pinnae with prominent lateral nerves; stems more than 10 cm diam.; inflorescences large, 50–100 cm long 3

3a. Pinnae with 4–6 primary nerves on either side of midrib 4

4a. Leaves recurved; pinnae ascending to erect, stiff; leaf bases waxy, lacking other indument; fruits purplish *C. pyriformis*

4b. Leaves not recurved; pinnae in one plane, flat to slightly drooping; leaf base with felt-like or scaly indument; fruits red. 5

5a. Leaf base, petiole, and rachis with deciduous, white to grayish, felt-like indument; inflorescences erect; fruits 14–17 mm long *C. oliviformis*

5b. Leaf base grayish with blackish, scaly indument; petiole and rachis with persistent, reddish brown felt-like indument; inflorescences spreading; fruits ca. 2.2 cm long *C. magnifica*

3b. Pinnae with 0–2 primary nerves on either side of midrib 6

6a. Rammenta on pinnae abaxial midrib whitish and connate in ridge-like structures up to 40 cm long *C. houailouensis*

6b. Rammenta on pinnae abaxial midrib brown and scattered, not connate into long, ridge-like structures 7

7a. Pistillode present *C. piersoniorum*

7b. Pistillode lacking 8

8a. Leaf bases densely covered with brown, felt-like indument, conspicuously diagonal-nerved; inflorescences densely covered with brown, felt-like indument; fruits 2.5–3.4 cm long *C. lepidota*

8b. Leaf bases mostly glabrous or rarely with short, white felt-like indument, obscurely nerved; inflorescences mostly glabrous, fruits 3.8–5 cm long *C. macrocarpa*



2. *Chambeyronia divaricata*, habit, cultivated in Wahiawa Botanical Garden, Honolulu. (Photos by D. R. Hodel except where noted otherwise.)

***Chambeyronia divaricata* (Dammer) Hodel & Barrett, comb. nov.**

Actinokentia divaricata Dammer, Bot. Jahrb. Syst. 39: 21. 1906.

Type: New Caledonia. [Province Sud, commune Nouméa], “mont Conghi [Koghi],” fl., ft., no date, *Pancher 765* (lectotype [Hodel & Moya López 2021]: P; isoelectotypes: P).

Actinokentia schlechteri Dammer, Bot. Jahrb. Syst. 39: 21. 1906.

Type. New Caledonia. [Province Sud, commune Ngoye], “Auf den Bergen am Ngoye,” 200 m, fl., ft., 18 Nov. 1902, *Schlechter 15373* (holotype: B, destroyed; lectotype [Moore & Uhl 1984, Hodel & Moya López 2021]: P; isoelectotypes: BRU, HBG, K).

This species grows to 9 m tall and has a slender stem 5–9 cm in diameter (Fig. 2). The newly emerging leaves open strikingly bright red to purplish red, are mostly spreading, and have tubular, reddish leaf bases forming a prominent crownshaft. The terete petioles are reddish to pinkish while the flatly held to drooping pinnae have a prominent midrib, thickened marginal nerves, but lack primary nerves. Inflorescences are small, 25–40 cm long, and the slender (2–3 mm diameter), divaricately branched rachillae have rounded bracts subtending rachillae and floral pits. Fruits are 1.8–3 × 0.8–1.4 cm and dull purple to bright red.

It is widespread in mostly primary, wet forests on soils derived from ultramafic rocks from 10–1100 m elevation from southeast to central New Caledonia.

***Chambeyronia houailouensis* Hodel and Barrett, sp. nov. (Figs. 3–10)**

Type: New Caledonia. [Province Nord, commune Kouakoua], Poro, “Basse vallée de la Kua [Koua]. Forme des populations assez importantes en forêt dense sur substrat ultrabasique rocheux en mélange avec *Kentiopsis oliviformis*,” 21° 21'S, 165° 43'E, 30 m, 18 Jan. 2000, J.-C. Pintaud 537, with H. Leveque, I. Letocart, and J.-P. Tivollier (holotype: NOU [Fig. 3]; isotype: P).

Chambeyronia houailouensis is distinct from all other species in the genus in the whitish ramenta connate in ridge-like structures up to 40 cm long on the pinnae abaxial midrib. Furthermore, the adaxially prominently

channeled petioles distinguish it from species of *C. divaricata* and *C. huerlimannii*; the pinnae with 1 or 2 prominent lateral nerves on either side of the midvein distinguish it from *C. magnifica*, *C. oliviformis* and *C. pyriformis*; and the well developed pistillode distinguishes it from *C. lepidota* and *C. macrocarpa*. It might be closest to *C. piersoniorum* but can be distinguished from this species by its yellowish, cream-colored crownshaft and the distinctive ramenta on the pinnae abaxial midrib.

Solitary, moderate, emergent tree palm, 10–25 m tall (Figs. 4 & 5). Trunk to ca. 12 m tall, 15–25 cm diam., flared slightly at base with adventitious roots, smooth but ringed with conspicuous leaf scars distally (Fig. 5), scars ca. 2.5 cm wide, internodes 2.5–15 cm, grayish brown, longitudinally fissured. Leaves 8–12, pinnate, stiff, arching-recurved, recurved (Figs. 4 & 5), emerging green or rarely bronzy; leaf bases 70–110 cm long, yellow-green, tubular, thick, forming a distinct and well developed crownshaft (Fig. 5), sparsely to densely covered abaxially with mostly deciduous, irregularly shaped, dark- to white-centered, white, cottony tomentum; petioles short, 8–20 cm long, 7–7.5 × 4.5–6 cm diam., flat adaxially, rounded abaxially, yellowish green; leaf blade 2.75–3.5 × 2.1–2.3 m; rachis 2.75–3.25 m long, at base ca. 7 cm wide and 4.5 cm thick, tapering to ca. 3 mm diam. at apex, recurved, moderately to densely covered with scattered, whitish, scale-like hairs on abaxial margins; pinnae 35–45 per side, proximal 35 × 1–3 cm, middle 110–118 × 7–10 cm, distal 19–25 × 5–15 cm, ascending off rachis to make a v-shaped blade, narrowly lanceolate, slightly contracted at base, acute, thick, leathery, stiff, downward-cupped, alternate to subopposite, margins thickened, densely and minutely white-punctate abaxially, prominently raised yellow-green midrib adaxially, 1 primary nerve on either side, 1 secondary between midrib and primary, tertiaries numerous, faint, abaxially midrib and primary and secondary nerves conspicuous and slightly raised, tertiaries numerous and conspicuous, abaxially midrib and primary nerves with ramenta 10 × 1.5 mm, these whitish aging brownish, with thin, ragged apical margins, connate to form a continuous structure to 40 cm long proximally (Fig. 6) and then scattered distally. Inflorescences 3–5, infrapinnate, branched to 3 orders, typically pushing off senescing or senescent leaves or leaf bases as they develop; peduncle 13 cm long, 8 cm wide and swollen at base, 5 cm wide at apex; prophyll inserted 5 cm distal



3. Part of the holotype of *Chambeyronia houailouensis*, Pintaud 537 (NOU 059906).

of base, 50–80 cm long, ca. 15 cm wide (Fig. 7), bicarinate, green to brown adaxially, lightly to moderately covered with dark-centered,

white-margined, deciduous, scale-like hairs interspersed with some cottony, white tomentum, creamy yellow to yellowish green



4. *Chambeyronia houailouensis*, with strongly recurved leaves, in habitat, Kouakoua, Poro, New Caledonia (Courtesy of Tobias Spanner).

and glabrous abaxially; 1st peduncular bract enclosed within prophyll in bud, inserted 2.5 cm distal of prophyll insertion, 45–75 cm long, 8–11 cm wide (Fig. 7), not bicarinate, longitudinally grooved, short-rostrate, olive-green abaxially and moderately to densely covered with short, branched, white-centered, scale-like hairs and white cottony tomentum, pale yellow-green abaxially and mostly glabrous except for cottony tomentum in longitudinal grooves; rachis ca. 35 cm long with 6–8 1st-order branches; rachillae 40–50, to 60 cm long, 5–7 × 7.5–8 mm at base, tapering to ca. 3 × 3 mm apically, longitudinally angled, flexuous from prominent floral clefts, terete, 4-sided, green, lightly to moderately minutely white- to brown-spotted, bracts subtending rachillae to 7 × 13 mm, broadly triangular, rounded or with a long-acuminate appendage. Flowers in proximal 4/5 in triads of a center, later-opening pistillate flanked on each of two sides by earlier-opening staminate, in distal 1/5 in staminate dyads or solitary staminate flower, triads, dyads and solitary staminate flowers slightly sunken in cleft-like depressions to 10–12 × 7–9 × 3–3.5 mm, subtended proximally by bracteole 4–6 × 7–8 mm, crescent-shape to

triangular, sharp-pointed, thin, erect to ascending, clear-colored adaxially, light green abaxially in proximal 3/4 and brown distally; pistillate flower subtended by 2 bracteoles, these to 3 × 2 × 3.5 mm, toothlike to crescent-shaped, imbricate basally, clear-colored, back (distal) wall of cleft with greenish brown, knobby protuberance 5 × 8 × 3 mm; staminate flowers in bud ca. 16 × 6 mm, long-ovoid, short-acuminate, greenish, at anthesis 10–14 × 18–30 mm (Fig. 8); calyx ca. 5 × 6 mm, cupular, shallowly lobed, sepals imbricate nearly to apex and there truncate, green in proximal 1/3–1/2, brown in distal 1/2–2/3; petals 3, ca. 13 × 6.5, long-ovate, slightly asymmetrical with one margin curved more than the other, acuminate, sharp-pointed, valvate, free to base or nearly so, spreading, cream-colored, drying rigid and nearly woody with thickened margins, prominently nerved adaxially; stamens 35–45, ca. 7.5 mm high, filaments ca. 3 mm long, anthers ca. 5 mm long, dorsifixed ca. 2 mm distal of base; pistillode 9–10 × 1–1.5 mm, exceeding stamens but shorter than petals, columnar, rounded apically; filaments and pistillode attached to a conic to pyramidal base 4 mm high; pistillate flowers 14–16 × 8–9 mm, broadly ovoid (Fig.



5. *Chambeyronia houailouensis*, with strongly recurved leaves, in habitat, Kouakoua, Poro, New Caledonia (Courtesy of Tobias Spanner).

9); calyx 6–7 × 8–9 mm, crown-like, sepals bowl-like, thick, imbricate in proximal 5 mm, broadly rounded-triangular apically, greenish to cream-colored in proximal 1/2–3/4, brown distally; petals 10.5–11 × 9–10 mm, broadly ovate to bowl-like, lightly nerved, green to

brown, rounded-acute; staminodes 4–6, ca. 1 × 0.5 mm, apex rounded, green; pistil 14–16 × 7–8 mm, ovoid, stigma lobes well differentiated, large, thick, exserted ca. 3 mm above petals, erect, white. Fruits 3.3–4.4 × 2.7–2.9 cm, ovoid to long-ovoid, red (Fig. 10);



6. Ramenta on the pinna abaxial midrib of *Chambeyronia houailouensis* are whitish aging brownish, with thin, ragged apical margins, connate to form a continuous structure to 40 cm long, and diagnostic for this species, cultivated, garden of Judy and Bob Burtcher, Fullerton, California, U.S.A. (Hodel 3995).

mesocarp 2–3 mm thick, composed of a smooth, even layer of long, slender fibers; perianth 2.3×2 cm, sepals 10×8 mm, petals 13×13 mm; stigmatic remains 5 mm high, deeply 3-lobed, erect, sharp-pointed; seed $2.2\text{--}2.8 \times 2.3\text{--}2.5$ cm; endosperm homogeneous, embryo basal. Eophyll bifid.

Additional Specimen Examined. CULTIVATED. USA. California. Orange County: Fullerton,

garden of Judy and Bob Burtcher, 25 June 2019, Hodel 3995 (BH).

Chambeyronia houailouensis is restricted to the Poro region in the central-eastern part of the island, from roughly Houailou in the north to Kouaoua in the south and grows in ravines and slopes of hills composed of ultrabasic soils and in flat alluvial areas, for example, of the Koua River. Occurring at low elevations, it

7. The prophyll (bottom, green) and first peduncular bract (top, brown) of *Chambeyronia houailouensis*, cultivated, garden of Judy and Bob Burtcher, Fullerton, California, U.S.A. (Hodel 3995).





Chambeyronia houailouensis, cultivated, Montgomery Botanical Center, Coral Gables, Florida, U.S.A. (20001199*A). 8 (top). Staminate flowers. 9 (bottom). Pistillate flowers.

eventually becomes an emergent above moist forest that has a ragged canopy 10–12 m tall. It is cultivated in east coast villages, including Houailou, Poindimié and Ponerihouen. Indeed, Hodel and Pintaud (1998, p. 81, fig. 34B) illustrated a cultivated *C. houailouensis* (erroneously as *C. macrocarpa*) at Ba north of Houailou. It might occur farther south (but still on the east coast) in the Yate and Goro region (G. Pierson, pers. comm.).

The epithet refers to the village of Houailou where well known trees are cultivated that initially sparked interest in this species and provided seeds for the horticultural trade. Perhaps more importantly, the epithet, which is one that most people who collect and/or grow this palm or otherwise work with it will readily recognize, provides nomenclatural continuity and stability and will not be disruptive or nettlesome.



10. Inflorescence and ripe, red, fruit of *Chambeyronia houailouensis*, in habitat, Kouakoua, Poro, New Caledonia (Courtesy of Tobias Spanner).



11. *Chambeyronia lepidota*, in habitat, Mt. Panié, 1400 m elevation, December 1995, New Caledonia.

Chambeyronia houailouensis has a well-developed pistillode and one primary nerve on either side of the midrib, like the former *Kentiopsis piersoniorum*, but has the large fruit and general appearance of *C. macrocarpa*, so much so that it was always referred to as a *Chambeyronia* rather than a *Kentiopsis*. In other diagnostic characters it is intermediate among the other species, sharing some characters and lacking others.

The unusual ramenta on the abaxial midrib and primary pinnae nerves, connate to form a continuous thin, ragged crest-like ridge for up to 40 cm long in the proximal portions of the pinna, are distinctive and diagnostic and best viewed on a newly unfolded leaf. Seedling leaves remain simple and bifid for quite some time, possessing leaf blades to 45 cm long before becoming pinnate.

Its conservation status has not been thoroughly assessed. However, it is locally distributed, known in the wild only from the type locality at the base of Koua Valley near Poro, Kouakoua, an area of about 10 × 10 km, where it forms locally abundant, gregarious stands. The area is surrounded by extensive, mountain-top strip mining. Its restricted distribution, where it could be subjected to a catastrophic event like fire or tropical cyclonic storm, should likely qualify it for vulnerable or endangered status.

A handsome palm, it has been introduced into cultivation and has attained maturity in California, Florida, and Hawaii in the USA, and is also cultivated in Tahiti, French Polynesia, Australia, the Mediterranean region, the Canary Islands, and likely elsewhere.

Chambeyronia huerlimannii (H.E. Moore)
Hodel & Barrett, **comb. nov.**

Actinokentia huerlimannii H.E. Moore,
Gentes Herbarum 12: 17. f. 1B. 1980.

Type. New Caledonia. [Province Nord],
“au-dessus de la terre. Forêt méso-
hygrophile de montagne sur serpentine,
pente d’une vallée latérale de la haute
Ni,” 880 m, fl., fr., 25 Jun. 1951,
Hüerlimann 1712 (holotype: BH [n.v.];
isotypes: K, P, Z).

This species grows to 9 m tall and has a slender stem 6–9 cm in diameter. The newly emerging leaves open green, are mostly ascending and recurving, and have tubular, reddish to dark green leaf bases forming a prominent crownshaft. The petioles are slightly channeled

adaxially, straight, and reddish. Pinnae have a prominent midrib, thickened marginal nerves, and 1 primary nerve on either side of the midrib. In-florescences are small, 25–40 cm long, and the straight rachillae are 4–6 mm diameter and have large, distinctively acuminate bracts subtending rachillae and floral pits. Fruits are ca. 3 × 1.3 cm.

This rather rare species is restricted to low, dense, wet forest or exposed, shrubby ridge forest on soils derived from ultramafic rock from 700–900 m elevation in a limited area of southeast New Caledonia on Mt. Nékando and the upper valley of the Ni River.

Chambeyronia lepidota H.E. Moore, Gentes
Herbarum 11: 291. 1978.

Type: New Caledonia [Province Nord, commune Pouébo], “Wet forest, Roches de Ouaième, between Hienghène and Tao,” 900 m, fl., fr., 21 Jun. 1971, *Moore, Brinon, Schmid & Veillon 9960* (holotype: BH [n.v.] isotypes: NOU, P).

This species grows to 15 m tall and has a moderate stem 13–15 cm in diameter (Fig. 11). The newly emerging leaves open reddish brown, are stiffly ascending to spreading and recurved, and have tubular leaf bases densely covered with brown, felt-like indument and forming a prominent crownshaft. Petioles are prominently channeled adaxially while the stiffly ascending to erect pinnae have a prominent midrib, thickened marginal nerves, 2 primary nerves on either side of the midrib, and scattered, brown ramenta on the midrib abaxially. In-florescences are large, 45–55 cm long, and the peduncle, rachis, and stiffly spreading rachillae are densely covered with grayish to brown, felt-like indument. Fruits are 2.5–3.4 × 1.5–2.3 cm and bright red.

This understory to emergent species is restricted to very wet forests on soils derived from schistose rocks from 400–1500 m elevation in east-central to northeast New Caledonia.

Chambeyronia macrocarpa Becc., *Palme*
Nuova Caledonia: 13. 1920.

Type: New Caledonia [Province Sud, commune Noumea], “forêts situées au-dessus de la Ferme-modèle,” 500 m, fl., fr., Feb. 1870, *Balansa 2911* (lectotype [Hodel & Moya López 2021]: P; isolectotypes: P).

Kentiopsis macrocarpa Brongn., *Compt. Rend. Hebd. Séances Acad. Sci.* 77: 398. 1873.



12. *Chambeyronia macrocarpa*, in habitat, Col d'Amieu, December 1995, New Caledonia.

Type: New Caledonia [Province Sud, commune Bourail], "Mont Nékou, au-dessus du village de Nékou (circumscription de Bourail)," 500 m, fl., Mar. 1869, *Balansa 771a* (lectotype [Hodel & Moya López 2021]: P; isolectotype: P).

Kentia rubricaulis hort. Van Geert, Gard. Chron., n.s., 5: 603. 1876.

Type. [Cultivated], [1876], unknown locality.

Kentia lindenii hort. Linden ex André, Illustr. Hortic. 24: 61. 1877. "*lindenii*."

Cyphokentia macrocarpa Brongn. hort., Gard. Chron., n.s., 9: 440. 1878.

Type: New Caledonia. [Cultivated], [1875], unknown locality, *Linden s.n.*, (lectotype [Hodel & Moya López 2021]: t. 276, in André [1877]).

Kentiopsis lucianii hort. Rodigas, Illustr. Hortic. 29: 77. 1882. "*luciani*."

Type. New Caledonia. [Cultivated], [1877], unknown locality, *Linden s.n.*, (lectotype [Hodel & Moya López 2021]: t. 451, in Rodigas [1882]).

This species grows to 20 m tall and has a robust stem 18–27 cm in diameter (Fig. 12). The newly emerging leaves open bright red, eventually are flat to moderately recurved, and have tubular leaf bases, the latter solid green to yellow or streaked with yellow or sometimes thinly covered with white, felt-like indument and forming a prominent crownshaft. Petioles are prominently channeled adaxially while the thick, waxy, glossy green pinnae have a prominent midrib, thickened marginal nerves, but lack primary nerves. Scattered, brown ramenta are on the midrib abaxially. Inflorescences are large, 80–100 cm long, with conspicuously zigzag rachillae in fruit and staminate flowers lack a pistillode. Fruits, the largest of the genus, are 3.8–6 × 2.4–3.5 cm and bright red.

One of the most widespread palms in New Caledonia, this subcanopy to emergent rarely gregarious species shows no preference for soil type and occurs in moist to wet forests from near sea level to 600 m elevation but sometimes as high as 1000 m elevation mostly in the southern part of the Island. It is the only palm found in gallery forests at low elevations on the drier west-central coast.

Hodel and Pintaud (2021) described and illustrated four varieties of *Chambeyronia macrocarpa*.

***Chambeyronia magnifica* (H.E. Moore) Hodel & Barrett, comb. nov.**

Mackeeia magnifica H.E. Moore, Gentes Herb. 11: 304. 1978.

Type. New Caledonia. [Province Nord, commune Ouégoa], "Col d'Amos, Haute Mayavetch, reste de forêt humide sur terrain schisteux," 500 m, fl. 24 Mar. 1973, *MacKee 26471* (holotype: BH [n.v.]; isotypes: K, MO, P).

Kentiopsis magnifica (H.E. Moore) Pintaud & Hodel, Principes 42: 42. 1998.

This species grows to 25 m tall and has a robust stem to 25 cm in diameter (Fig. 13). The newly emerging leaves sometimes open red, eventually are mostly straight, and have tubular leaf bases covered with blackish, scale-like indument and forming a prominent crownshaft. Petioles are prominently channeled adaxially and densely covered with reddish brown, felt-like indument while the flatly held pinnae have a prominent midrib, thickened marginal nerves, and 4–6 primary nerves on either side of the midrib. Scattered, brown ramenta are on the midrib abaxially. Inflorescences are large, 45–55 cm long, with stiffly spreading rachillae. Fruits are ca. 2.2 × 1.2 cm and red.

A tall, emergent palm, restricted to a small area near Col d'Amos at the northeast end of New Caledonia, this species occurs in remnant patches of moist to wet forest on soils derived from schistose rocks from 300–600 m elevation.

***Chambeyronia oliviformis* (Brongn. & Gris) Hodel & Barrett, comb. nov.**

Kentiopsis oliviformis (Brongn. & Gris) Brongn., Compt. Rend. Hebd. Séances Acad. Sci. 77(6): 398. 1873.

Kentia oliviformis Brongn. & Gris, Ann. Sci. Nat., Bot. 5(2): 161. 1864. "*olivæformis*."

Type. New Caledonia. [Province Nord, commune Canala], "circa Kanala vigens" [Canala], ft., 1855–1860, *Vieillard 1281* (lectotype [Hodel & Moya López 2021]: P; isolectotypes: P).

This species grows to 30 m tall and has a robust stem to 25–28 cm in diameter (Fig. 14). Leaves



13. *Chambeyronia magnifica*, in habitat, Haute Mayavetch, Col d'Amos, December 1995, New Caledonia.



14. *Chambeyronia oliviformis*, in habitat, Col de Koh, March 1996, New Caledonia.



15. *Chambeyronia piersoniorum*, in habitat, Mt. Panié, March 1996, New Caledonia.

are mostly straight and have tubular leaf bases densely covered initially with whitish indument and forming a crownshaft. Petioles are prominently channeled adaxially while the flatly held pinnae have a prominent midrib, thickened marginal nerves, and 4–6 primary nerves on either side of the midrib. Scattered, brown ramenta are on the midrib abaxially. Inflorescences are large, 60–70 cm long, with stiffly ascending rachillae lending a broom-like appearance. Fruits are 14–17 × 8–9 mm and red.

This gregarious, tall, emergent palm is restricted to a moist forest on soils derived from schistose rocks or basalt mixed with serpentine materials from near sea level to 300 m elevation in central New Caledonia from Farino to Bourail on the west and Canala to Kouaoua on the east.

Chambeyronia piersoniorum (Pintaud & Hodel) Hodel & Barrett, **comb. nov.**

Kentiopsis piersoniorum Pintaud & Hodel, *Principes* 42: 45. 1998.

Type. New Caledonia. [Province Nord], Mt. Panié, “sur le sentier du sommet,” 20°34' S, 164°47' E, 570 m, 29 Dec. 1995, *Pintaud* 309 (lectotype [Hodel & Moya López 2021]: P; isoelectotypes: BH [n.v.], P).

This species grows to 15 m tall and has a robust stem to 18–25 cm in diameter (Fig. 15). Leaves are strongly recurving and have tubular, purplish leaf bases densely covered wax and forming a prominent crownshaft. Petioles are prominently channeled adaxially while the stiffly ascending pinnae have a prominent midrib, thickened marginal nerves, and 1 or 2 primary nerves on either side of the midrib. Scattered, brown ramenta are on the midrib abaxially. The waxy glaucous inflorescences are large, 70–80 cm long, with straight to reflexed rachillae. Fruits are 17–23 × 9–10 mm and purplish.

This gregarious, emergent palm is restricted to a limited area of very wet, shrubby forest on steep slopes and ridges on soils derived from schistose rocks from 400–1000 m elevation on the east slope of Mt. Panié in northeast New Caledonia.

Chambeyronia pyriformis (Pintaud & Hodel) Hodel & Barrett, **comb. nov.**

Kentiopsis pyriformis Pintaud & Hodel, *Principes* 42: 49. 1998.

Type. New Caledonia. [Province Sud, commune Goro], “embouchure de la Kuebini, poussant de façon assez grégaire dans une forêt dense relictuelle perturbée sur sol ultrabasique rocheux,”



16. *Chambeyronia pyriformis*, cultivated, garden of Judy and Bob Burtcher, Fullerton, California, USA.

22°16' S, 167° E, 50 m, 6 December 1995, Pintaud & Hodel 303 (lectotype [Hodel & Moya López 2021]: P; isoelectotypes: BH [n.v.], BRI, K, NOU, NY, P).

This species grows to 18 m tall and has a robust stem to 18–22 cm in diameter (Fig. 16). Leaves are moderately recurving and have tubular, purplish red to purple or copper-colored leaf bases densely covered wax and forming a prominent crownshaft. Petioles are prominently channeled adaxially while the stiffly ascending pinnae have a prominent midrib, thickened marginal nerves, and 4 primary nerves on either side of the midrib. Scattered, brown rammenta are on the midrib abaxially. Inflorescences are large, 60–80 cm long, with stiff, slender rachillae. Fruits are ca. 17 × 7 mm and purplish pink.

This emergent palm occurs in wet forest on soils derived from ultramafic rock schistose rocks from near sea level to 200 m elevation in extreme southeast New Caledonia.

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LITERATURE CITED

- BACON, C.D. AND W.J. BAKER. 2011. *Saribus* resurrected. *Palms* 55: 109–116.
- BECCARI, O. 1920. Le palme della Nuova Caledonia. M. Ricci, Firenze, Italy.
- BRONGNIART, A. 1873. Notice sur les palmiers de la Nouvelle-Calédonie. *Compt. Rend. Hebd. Séances Acad. Sci.* 77: 396–402.
- BAKER, W.J., M.V. NORUP, J.J. CLARKSON, T.L.P. COUVREUR, J.L. DOWE, C.E. LEWIS, J.-C. PINTAUD, V. SAVOLAINEN, T. WILMOT AND M.W. CHASE. 2011. Phylogenetic relationships among arecoid palms (Arecaceae: Arecoideae). *Annals of Botany* 108: 1417–1432.
- BAKER, W.J. AND J. DRANSFIELD. 2016. Beyond Genera Palmarum: progress and prospects in palm systematics. *Botanical Journal of the Linnean Society* 182: 207–233.
- DOMENECH, B., C.B. ASMUSSEN-LANGE, W.J. BAKER, E. ALAPETTE, J.-C. PINTAUD AND S. NADOT. 2014. A phylogenetic analysis of palm subtribe Archontophoenicinae (Arecaceae) based on 14 DNA regions. *Botanical Journal of the Linnean Society* 175: 469–481.
- DRANSFIELD, J., N.W. UHL, C.B. ASMUSSEN, W.J. BAKER, M.H. HARLEY AND C.E. LEWIS. 2008. *Genera Palmarum. The Evolution and Classification of Palms*. Kew Publishing, Royal Botanic Gardens, Kew.
- HODEL, D.R. AND C. MOYA LÓPEZ. 2021. The typification and nomenclature of the genera and species of the subtribe Archontophoenicinae (Arecaceae) in New Caledonia. *PalmArbor* 2021-04: 1–27. On-line: <https://ucanr.edu/sites/HodelPalmsTrees/files/346378.pdf>
- HODEL, D.R. AND J.-C. PINTAUD. 1998. *The Palms of New Caledonia*. International Palm Society, Lawrence, Kansas, USA.
- HODEL, D.R. AND J.-C. PINTAUD. 2021. The varieties of *Chambeyronia macrocarpa* (Arecaceae). *PalmArbor* 2021-05: 1–20. On-line: <https://ucanr.edu/sites/HodelPalmsTrees/files/347279.pdf>
- MOORE, H.E., JR. AND N.W. UHL. 1984. The indigenous palms of New Caledonia. *Allertonia* 3: 313–402.
- NORUP, M.V., J. DRANSFIELD, M.W. CHASE, A.S. BARFOD, E.S. FERNANDO AND W.J. BAKER. 2006. Homoplasious character combinations and generic delimitation: a case study from the Indo-Pacific arecoid palms (Arecaceae). *American Journal of Botany* 93: 1065–1080.
- PINTAUD, J.-C. AND W.J. BAKER. 2008. A revision of the palm genera (Arecaceae) of New Caledonia. *Kew Bulletin* 63: 61–73.

- STAMATAKIS, A. 2014. RAxML Version 8: A tool for phylogenetic analysis and post-analysis of large phylogenies. *Bioinformatics* 30: 1312–1313.
- VIEILLARD, E. 1873. Etude sur les palmiers de la Nouvelle-Calédonie. *Bulletin de la Société linnéenne de Normandie*, II 6: 226–233.
- ZHANG, C.M., M. RABIEE, E. SAYYARI AND S. MIRARAB. 2018. ASTRAL-III: Polynomial time species tree reconstruction from partially resolved gene trees. *BMC Bioinformatics* 19: 153.
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New Caledonia, a Jewel of Palm Biodiversity

BENOÎT HENRY¹

The flora of New Caledonia is legendary for its uniqueness. Interesting and endemic species are found throughout the islands. What follows is a narrative of a pre-pandemic expedition with some friends. I shall focus here in particular on the few species of palms encountered during a three-day expedition in search of interesting, native plants.

Located in the South Pacific, west of Australia and north of New Zealand, New Caledonia is a French community of approximately 18,000 km² with a population of approximately 270,000 inhabitants. The archipelago is made up of a set of islands, including the main island of Grande Terre. Thanks to the richness and diversity of its floral heritage, New Caledonia's biodiversity is thus one of the most important on the planet, made up of more than 3,600 species of native plants, distributed across five distinct natural environments: humid forest, dry forest, scrub, savannah and mangrove. With a high rate of endemism of 75%, New Caledonia ranks third in the world for island endemism, after Hawaii and New Zealand.

Passionate about all the diversity of Caledonian flora, I regularly see endemic species in their natural environment, an environment in which they flourish in the most beautiful way possible. I particularly appreciate the humid forests and shrubby scrublands in which the rate of endemism is around 90%. It is always impressive to realize that if you pick any plant at random with your

eyes closed, there is a nine in ten chance that it does not grow anywhere else on the planet! New Caledonia is also characterized by the phenomenon of micro-endemism, in which certain species are restricted to only a few localities.

In the Caledonian flora, certain families are particularly well represented: Araliaceae, Araucariaceae, Cunoniaceae, Myrtaceae, Nothofagaceae, Orchidaceae, Pittosporaceae, Proteaceae, Rubiaceae, as well as many families of ferns, most notably, the famous tree ferns of the Cyatheaceae. The family, however, that is of particular interest to us is the Arecaceae, which in New Caledonia includes 9 genera (including 6 endemic) and 41 species (of which only *Cocos nucifera* is found elsewhere). These 9 genera are: *Basselinia*, *Burretiokentia*, *Chambeyronia*, *Clinosperma*, *Cocos*, *Cyphokentia*, *Cyphophoenix*, *Cyphosperma* and *Saribus*. The genera *Acitnokentia* and *Kentiopsis* are now included in *Chambeyronia* (Hodel et al. 2021). Allow me to take advantage of writing this article to pay tribute to the French botanist Jean-Christophe Pintaud (1970–2015), who worked so hard for the knowledge of the palms of New Caledonia (Hodel & Pintaud 1998, Pintaud 2000, Pintaud & Baker 2008, Pintaud & Hodel 1998, Pintaud & Stauffer 2011).

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1. *Basselinia pancheri*.

For this first day, we leave Païta, a peripheral town near Nouméa, in the south of Grande Terre. We travel a few tens of kilometers on roads on the west coast. These are environments of little botanical interest because they are mainly vast agricultural fields, where wooded areas are often made up of exotic species, some of which are particularly invasive (e.g., *Leucaena leucocephala*). We do not linger there in order to reach more quickly the east coast, which is wetter, and we cross the central chain in the direction of Kouaoua.

We arrive in the region of the Poro plateau, and a little further along, the first species of palm presents itself: *Basselinia pancheri*. With 14 species, the endemic genus *Basselinia* is the richest of the palm genera present in New Caledonia (Pintaud & Baker 2008). The name of the genus honors a 19th century French poet, Olivier Basselin. The epithet pays homage to the French botanist and explorer Jean Armand Isidore Pancher (1814–1877), who contributed to the discovery of a very large number of species of flora in New Caledonia. In the Caledonian flora, there are several dozen species in various genera called *pancheri*, as well as the endemic genus *Pancheria* (Cunoniaceae). *Basselinia pancheri* is a palm widely distributed throughout Grande Terre. It occurs in dense humid forest or secondary

forest, on ultramafic substrate. It is also present in a sunny position in the scrub. The small population we meet today is truly beautiful, and the crowns of foliage emerge above the shrub forest, seeming to seek the sun (Fig. 1). The orange-black sheath and its ringed stem make it a particularly attractive species. I also observe the pretty, black, bilobed fruits and superb foliage. The degree of splitting of the leaflets depends on the exposure (Fig. 2).

A little further on, we meet *Chambeyronia divaricata*. The genus *Chambeyronia* is endemic and includes nine species (Hodel et al. 2021). *Chambeyronia divaricata* is common up to 1100 m altitude, in a large southern part of Grande Terre, in most dense humid forests or on the edge of forests, often in rocky habitats. *Chambeyronia divaricata* can be 4–9 m in height. It is easily recognizable with its slender, ringed, gray-brown trunk and strongly arched leaves with long, brown rachises (Fig. 3). It is also characterized by its young leaves that emerge bright red (Fig. 4). As with *C. macrocarpa*, this color remains only a few days. In the undergrowth, where green strongly dominates, the discovery of a bright red palm, even if it is not exceptional, is always beautiful. In the afternoon, we reach the Tchamba valley, between Ponérihouen and Poindimié, where we shall spend the night.



2. *Basselinia pancheri*.

The second day begins under a beautiful sun, and we leave early in order to make the most of it to explore the forests of the region. Here again, great discoveries, such as the

emblematic *Amborella trichopoda* (Fig. 5), are very common along the way. This species, the only representative of the Amborellaceae, is considered the sister species to all other

flowering plants. Its reputation, known to most botanists around the world, reinforces the uniqueness of our flora, and it is with all humility that we take time to observe it.

At the edge of the forest, we meet a second species of *Basselinia*, *Basselinia eriostachys* (Fig. 6). This species was named *Basselinia gracilis*

for a long time, until Jean-Christophe Pintaud and co-workers clarified the taxonomy (Pintaud & Hodel 2008). It turns out that the true *B. gracilis* is a very rare species endemic to the region of Balade and Touho in the northeast of the country. The common species, which was called *B. gracilis* and which is present all over Grande Terre, is correctly

Chambeyronia divaricata. 3 (top). The chestnut-colored leafbases and petiole. 4 (bottom). The bright, red new leaf.





5. The famous *Amborella trichopoda*, the only member of a lineage that is sister to all other flowering plants.

called *B. eriostachys*. *Basselinia eriostachys* is, together with *B. pancheri*, one of the most common species of *Basselinia*. The populations that we meet are mainly cespitose and consist of palms of medium size. The colorful sheaths are particularly elegant, as are the leaves, showing some very beautiful brown mottling (Fig. 7). We also observe many seedlings signaling that the species is recruiting and regenerating, and we must be careful not to trample on them because they are so ubiquitous.

This day will end in style with the meeting of spectacular populations of *Burretio kentia vieillardii*. This species is one of five in the genus. It is by far the most common of its kind and is found in humid forests throughout the country, the others having much more restricted ranges. The epithet pays homage to Eugène Vieillard (1819–1896), a 19th century French naturalist, explorer and botanist. *Burretio kentia vieillardii* stands out with its particularly elegant swollen leaf sheath, its stem marked by very pronounced leaf scars and its numerous adventitious roots forming

a cone. Above all, its beautiful leaf crown sets this species apart from others (Fig. 8). When abundant, in central Grande Terre, it is truly emblematic of humid forests, where it most often competes with another famous Caledonian endemic species, *Chambeyronia macrocarpa*.

We have encountered plenty of species already, and our camera memory cards are well filled, but it is with just as much enthusiasm that we begin our third and final day of the trip. As often in Caledonian hikes, the landscapes alternate between dense humid forests and more or less open scrub.

At the heart of the central chain, we continue our advance on the track, towards the Aoupinié massif (1006 m), and then observe on a fairly open habitat a few *Cyphokentia macrostachya*. At these altitudes, the temperature is much lower than at sea level, and the species seems to tolerate sunny situations very well. In general, Caledonian palms have a reputation for appreciating shady situations, but it is always interesting to note



6. *Basselinia eriostachys*.

that in their natural environment, with high humidity and lower temperatures than in the

plains, these species often withstand full sun when adults (Fig. 9). The genus *Cyphokentia*



7 (top). *Basselinia eriostachys* with mottled leaves. 8 (bottom). *Burretio kentia vieillardii*.



9. *Cyphokentia macrostachya*.



Cyphokentia macrostachya. 10 (top). The distinctive, white, waxy crownshaft. 11 (bottom). Staminate flowers.



12. *Cyphosperma balansae* with its distinctively long peduncles.

includes two species: *C. cerifera* and *C. macrostachya*. *Cyphokentia macrostachya* is a large palm, up to 15 m high, which occurs from the center to the south of the country.

This species is easily recognizable with its sheath covered with a whitish and powdery wax forming a well marked crownshaft (Fig. 10), its stem with its characteristic flared base

13. *Cyphosperma balansae* has open leaf sheaths.



and its whitish inflorescences. We take the time to linger for a while to photograph the details of these beautiful inflorescences (Fig. 11).

The forest becomes denser as we progress through the vegetation. A new species of palm presents itself with very long arched inflorescences (about 2 m long) (Fig. 12) and a remarkable, almost black stem, strongly ringed and punctuated by well marked white leaf scars. We also notice at first glance that the leaf sheaths are open (Fig. 13) and do not form a closed crownshaft, unlike most endemic Caledonian species. With these characteristics, this atypical species is easily recognizable. No doubt, it is *Cyphosperma balansae*, which occurs in central and northeastern Grande Terre. It is one of five species of the genus *Cyphosperma*, three other species being native to Fiji, and one from Vanuatu. Here again, the epithet honors a 19th century French botanist and explorer: Benjamin Balansa (1825–1891), who was director of the Nouméa acclimatization garden from 1868 to 1872.

It is time to think about going down to the south of the country via the west coast. Our

last stop will be at the Nodela special reserve, near the town of Bourail in the center of the country. Many interesting species stay there, but it is especially the remarkable populations of *Chambeyronia macrocarpa* that will be on our minds (Fig. 14). This endemic species is undoubtedly the best known and most emblematic of all Caledonian palms, much more than the other species *Chambeyronia lepidota* with its restricted geographical distribution. *Chambeyronia macrocarpa* is very elegant with its beautiful crown of leaves, its beautifully ringed trunk, and its famous new red leaf. Thus, this species is now present in many botanical gardens and private collections around the world, in tropical or subtropical regions. *Chambeyronia macrocarpa* is a large palm that can reach 20 m high (Fig. 15).

This species is very polymorphic. The recent publication, “The varieties of *Chambeyronia macrocarpa*” (Hodel & Pintaud 2021), now makes it possible to distinguish five varieties according to the following characteristics: sheath with an indument (var. *roxanniae*) or glabrous, sheath of uniform dark green color (var. *macrocarpa*) or yellow (var. *hookeri*), green sleeve streaked with yellow with red new leaf (var. *flavopicta*) or green new leaf (var. *viridis*).

14. *Chambeyronia macrocarpa* var. *flavopicta*.





15. *Chambeyronia macrocarpa* var. *flavopicta*.



16. The colorful yellow-striped young stem and leafbase of *Chambeyronia macrocarpa* var. *flavopicta*.

In the Bourail region, it is the variety *Chambeyronia macrocarpa* var. *flavopicta* which dominates. Its green sheath, vertically streaked with elongated yellowish spots (Fig. 16), is truly remarkable, one of the most beautiful I have ever seen, and I never tire of gazing at it. This species is present in gregarious populations along streams, where the habitat is to its liking it is abundant almost to the point of seeming invasive! We linger there for a while and enthusiastically photograph this remarkable population.

This is how our expedition ends. It is now time to return to civilization. We leave the botanical reserve and take the road south. We shall keep fond memories of our time with the palms, along with images in our cameras and in our minds.

LITERATURE CITED

- HODEL, D.R., W.J. BAKER, S. BELLOT, V. PÉREZ-CALLE, A. CUMBERLEDGE AND C.F. BARRET. 2021. Reassessment of the Archontophoenicinae of New Caledonia and description of a new species. *Palms* 65: 109–131.
- HODEL, D. R. AND J.-C. PINTAUD. 1998. The palms of New Caledonia / Les palmiers de Nouvelle-Calédonie. International Palm Society.
- HODEL, D. R. AND J.-C. PINTAUD. 2021. The varieties of *Chambeyronia macrocarpa* (Arecaceae). *PalmArbor* 2021-05: 1–20.
- PINTAUD, J.-C. 2000. An introduction to the palms of New Caledonia. *Palms* 44: 132–140.
- PINTAUD, J.-C. AND W. J. BAKER. 2008. A revision of the palm genera (Arecaceae) of New Caledonia. *Kew Bulletin* 63: 61–73.
- PINTAUD, J.-C. AND D. R. HODEL. 1998. Three new species of *Burretio kentia*. *Principes* 42: 152–155.
- PINTAUD, J.-C. AND D.R. HODEL 2008. A reassessment of *Basselinia gracilis*, a rare palm from northeastern New Caledonia. *The Palm Journal* 190: 32–37.
- PINTAUD, J.-C. AND F. W. STAUFFER. 2011. A revision of the large-flowered group of *Basselinia* Vieill. sect. *Taloua* H. E. Moore & Uhl (Arecaceae). *Candollea* 66: 147–154.

Historic Cultivation of Date Palm (*Phoenix dactylifera* L.) in Florida and Georgia

DENNIS V. JOHNSON¹ AND JANE C. MACKNIGHT¹

An early Spanish introduction into the New World, the date palm (*Phoenix dactylifera*) was first recorded in Cuba in 1526 and on the Mexican mainland around 1550. Subsequently it was spread to South America and northward from Central Mexico (Rivera et al. 2013).

Seeking to gain control of the lands they claimed in North America, the Spanish established mission settlements with forts to defend against indigenous groups, and churches to convert local indigenous people to Roman Catholicism and to provide necessary agricultural labor. Food production was a priority with the cultivation of introduced European grains such as wheat as well as indigenous crops like maize, along with livestock. Exotic fruit trees were also planted at the missions, including figs, oranges, peaches, pomegranates, olives, grapes and dates (Dunmire 2004).

Toumey (1898) mentioned date palm among the fruit trees introduced by the Spanish into the present United States, and likely planted wherever climatic conditions appeared favorable. Because growing requirements of the introduced plants and local climatic conditions were unknown at the time, fruit-tree trials appear to have been undertaken at

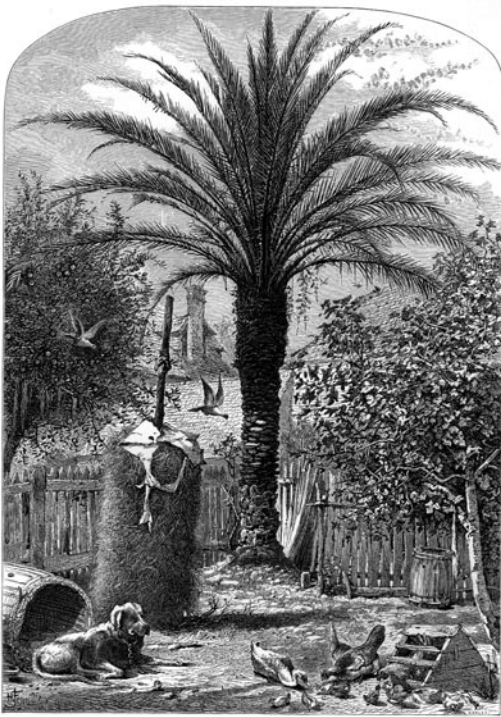
new Spanish mission sites from Florida to Texas to California. Although failing as a viable fruit source in Florida, date palms may have been retained as ornamentals, possibly as a source of leaves traditionally carried by observants of Palm Sunday.

This paper presents historical accounts of early seed cultivation of date palms in Spanish Florida and the private importation of date palm offshoots into the British Colony of Georgia, mostly in the 17th through the 19th centuries. These results add detail to the history of date palm cultivation in the current United States.

Florida

In the late 16th century, the Spanish introduced numerous fruit trees to St. Augustine, the capital of Spanish Florida founded in 1565, but date palm is not recorded among them (Dunmire 2004); perhaps as a minor potential fruit source, it simply did not warrant mention. Apart from any intentional introduction of the date palm from Cuba – La Florida was administered from Havana – the fruits were among the provisions carried by ships for Spanish Florida in the 16th century

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1. Wood engraving of a St. Augustine garden date palm. Source: *Picturesque America* Vol. 1, Appleton, New York, 1872.

(Reitz & Scarry 1985). The viable date pits readily germinate to produce seedling palms, in generally equal numbers of staminate (male, pollen-bearing) and pistillate (female, fruit-

bearing) plants. Only pistillate palms bear fruit, but they require a staminate palm for pollination. Documentation was not found to confirm precisely when the first date palm was planted in Spanish Florida.

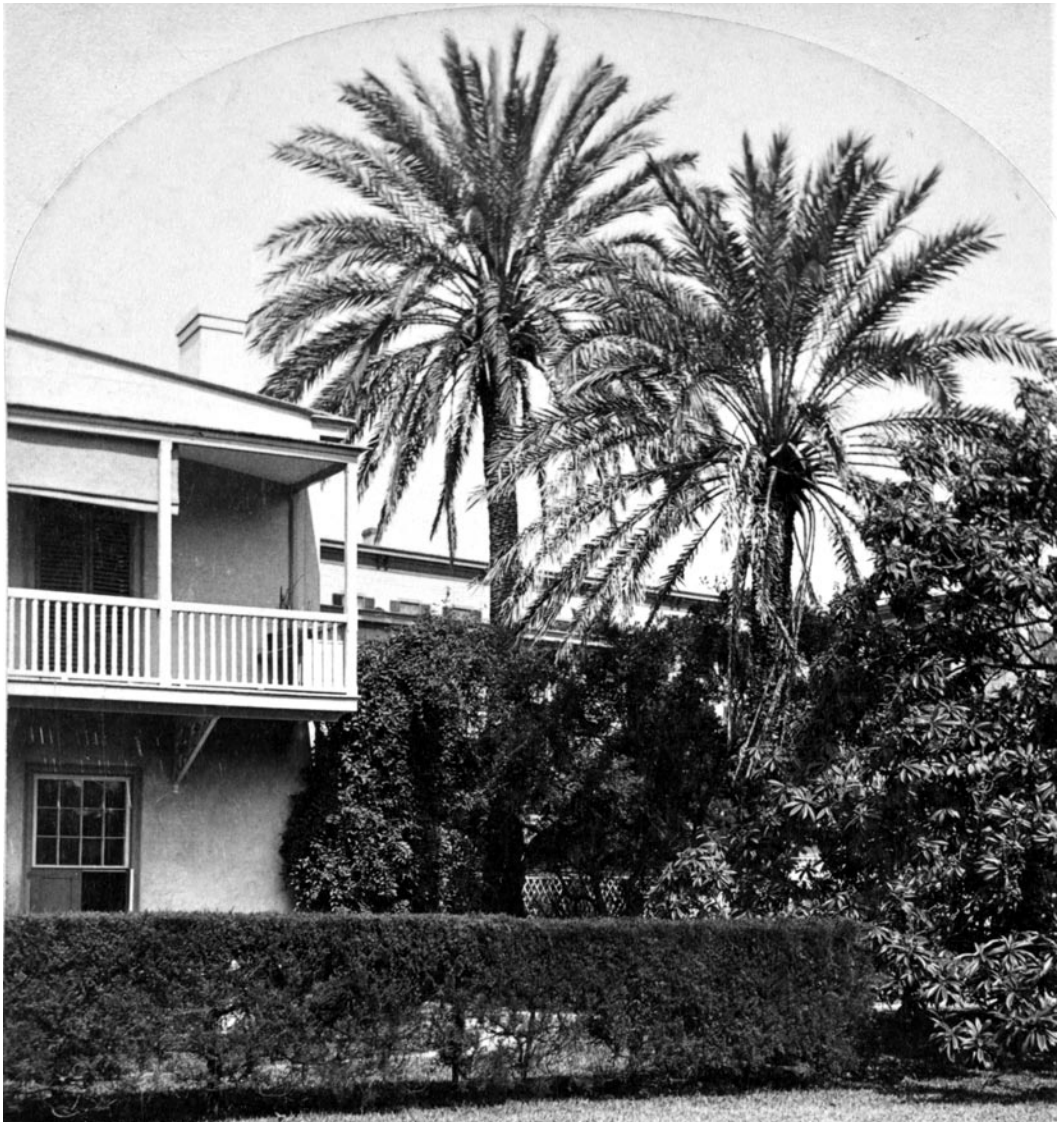
The main objective of the Spanish Florida Colony was to secure control of the area by setting up a chain of about 70 missions extending westward from St. Augustine to Pensacola in the Florida Panhandle. As mentioned, new annual and perennial crops were introduced to sustain these missions. In Florida, oranges and peaches grew well and were readily adopted and grown by local indigenous groups. Date palms may have been among the fruit trees at the mission sites. The Spanish missions were not very successful and often short-lived because indigenous tribes were uncooperative and often hostile to colonizers, and the settlements themselves rudimentary. Even today, the exact location of some missions is not known with certainty (McEvan 1993, Dunmire 2004).

From the start of the American date palm industry, around 1900, it was an accepted fact that the first introduction of the palm from seed into what is now the United States, took place in San Diego, California in 1769, in association with the founding of a Spanish mission at that location (Popenoe 1973, Hodel & Johnson 2007, Trent & Seymour 2010).

Historical documentation validates that Florida has a record of date palm cultivation earlier

2. Date palm in the St. Francis Street garden of the supposed oldest house in St. Augustine, originally constructed early 1700s. Postcard ca. 1914.





3. A St. Augustine house with two date palms in its garden. Left half of stereograph from 1891. Source: Library of Congress.

than California. In the spring of 1788, during the Second Spanish Period of Florida history (1784–1821), the French botanist André Michaux visited northeastern Florida. In addition to collecting many local plant species new to science, he confirmed the presence of a single, pistillate date palm in St. Augustine, described as being 40 feet in height. There is no doubt about this identification; Michaux knew date palms from prior botanical exploration in the Middle East (Deleuze 1805, Taylor & Norman 2002).

Date palms typically grow at a rate of about one foot of trunk per year. Planted from seed, which would have been the case in St. Augustine, the young plant would have

required a few years before forming a trunk. Therefore, the date palm Michaux identified would have been about 40–50 years old in 1788, indicating it was germinated circa 1740, within the First Spanish Period of Florida history (1565–1763).

Two other historical references tend to support the early existence of the date palm in northeastern Florida, although the chronology is imprecise. The American naturalist William Bartram botanized in 1774 along the St. Marys River, now part of the Florida-Georgia border. His travels were financed by the wealthy English merchant John Fothergill and facilitated by the brief British Period (1763–1784) of control over Florida. Bartram encoun-



4. A mature date palm in the yard of a Jacksonville house. Left half of stereograph from ca. 1864. Source: Library of Congress.

tered Muskogee Creek indigenous people in their original homeland on the savannas of the St Marys River. They related to him a tale of attractive indigenous women providing lost hunters with provisions of oranges, dates and corn cakes so they could safely find their way out of the dense Okefenokee Swamp (Bartram 1791). Francis Harper, in his scrupulously annotated naturalist edition of Bartram's travels, states that the reference to date palms growing in the Okefenokee Swamp was in error (Bartram 1998). Nevertheless, it does not rule out the possibility that the dates in question came from elsewhere in northeastern Florida. Interestingly, in the Muskogee language, the word *sevapho*, referring to fruit of the native saw palmetto, is also applied to the date fruit (Austin 2004). These references suggest that the indigenous agriculturist people of northeastern Florida knew of the date palm and possibly had planted it to a minor degree, along with their documented cultivation of orange and peach trees (Bartram 1791, Gremillion 1993).

The earliest illustration of a date palm in St. Augustine, Florida is from 1872 (Fig. 1). Stereographic images from the late 1800s show a date palm in the garden of the city's purported oldest house (Fig. 2) and a pair of date palms in another private garden (Fig. 3). Forty miles to the north, in Jacksonville, another garden date palm was photographed in 1864 (Fig. 4).

Florida horticulturists in the early 1900s expressed a resurgence of interest in date palm as a fruit crop, which was likely stimulated by the U.S. Department of Agriculture program importing offshoots of known date varieties from the Middle East and North Africa for trials in Arizona and California. A comprehensive review of Florida ornamental palms mentions that the date palm grew well, and that many large palms were present in gardens, grown earlier by settlers from seeds of imported dates. However, it was acknowledged that the humid climate precluded proper fruit ripening (Nehrling 1909). About a decade later, Krome (1921) stated that dates were produced on Key West and nearby islands and sold at local fruit



5. Old Spanish Treasury, St. Augustine. Originally built 1690 as a private residence, later became Spanish Treasury, current site of the Woman's Exchange. Postcard 1930–1945.

stands. It was believed that lower rainfall and humidity in Key West permitted fruit ripening and, hence, commercial production might be possible there, although that proved to be optimistic.

Postcards of the Old Spanish Treasury building (Fig. 5), Ponce de Leon Hotel (Fig. 6) and the Zorayda Club (Fig. 7) show the popularity of date palms in St Augustine landscaping over time.

6. Moorish Revival style Ponce de Leon Hotel, St. Augustine. Opened in 1888, it closed permanently in 1967 and became Flagler College the following year. Postcard from 1960s.





7. Villa Zorayda, St. Augustine. Replica of Alhambra Palace in Spain. Built as a private home in 1883, later became the Zoradya Club and currently the Zoradya Museum. Postcard from 1920s.

Georgia

The lands north of Spanish Florida were legally a part of the British Colony of Georgia but remained unsettled for a century. Taking advantage of the so-called debatable land status in southern Georgia, the Spanish expanded their hegemony and founded another chain of some 18 missions on the barrier islands of the Georgia Coast. The Spanish missions reached to Parris Island, South Carolina, about 130 miles into British territory (Lanning 1935).

Spanish missions in Georgia persisted for over a century, following the same model as described for northern Florida. As in Florida, the Spanish encountered fierce resistance from indigenous peoples to conversion to Roman Catholicism. And like in Florida, the missions consisted of simple, impermanent structures. A legacy of the Spanish missions in Georgia, as in Florida, was the introduction of oranges and peaches and their adoption by local farmers, both indigenous and European. Spanish activities ceased around 1733 with the formal organization of the Georgia Colony by James Oglethorpe, with Savannah as its capital. British plantations were established on the barrier islands, chiefly to produce cotton, and often included a fruit garden.

Along the Georgia coast, where Spanish missions once stood, the first confirmation of date palm cultivation was not until 1832. John Legaré (1833), editor of the *Southern Agriculturist* magazine, traveled to Sapelo Island to visit the Thomas Spalding Plantation and observed that the date palms and orange trees were in poor condition because of recent severe frosts.

A few years later, in 1839, Fanny Kemble (1864), a popular British actress and writer, travelled to St. Simons Island to call on John Couper, legendary plantsman and owner of the Cannons Point Plantation. The garden contained "a fine and flourishing date palm tree, which [Couper] said bore its fruits as prosperously here as it would in Asia." The noted Scottish geologist Charles Lyell also visited John Couper in 1846 and described seeing five fruit-bearing date palms that Couper had imported as offshoots from Persia (Iran) (Lyell 1848, Ferguson 1994). This introduction probably took place in the 1820s at the latest, marking the first instance of varietal date palm offshoots being brought into the United States. In a pictorial survey of St. Simons Island in 1936, Cate and Wightman (1955) photographed a date palm specimen near the Couper plantation house, noting that it was a descendent from an older tree that



8. Mature date palm in Savannah. Left half of a stereograph from 1880s. Source: Getty Museum, Los Angeles.

had died in 1885. Hurricane Dora killed the offspring in 1964, but its stump remains. The St. Simons Land Trust operates the former family plantation as the Cannons Point Preserve. No date palms remain on the property (Stephanie Cox, pers. com.).

On Cumberland Island, Davidson (1889) reported that date palms had produced fruit there, without naming a location. Ober (1880), from secondary sources, mentioned the date palm as one of the fruit trees in the Dungeness Plantation garden early in the 19th century, but none are present there today. Elsewhere on the island, the Plum Orchard Plantation boasts a living date palm which is tall and apparently quite old.

Shortly after Savannah's founding in 1733, the Trustees' Garden was created as a testing facility to determine which crops could be

grown in Georgia. It represents the first agricultural experiment site in America. Primarily, the facility focused on cotton and mulberry for silk production, and other tree crops mentioned were oranges and olives. The Garden was abandoned in 1755. No complete listing of the plants investigated is available to determine whether date palm trials were attempted. A photograph from the 1880s shows a mature date palm growing in Savannah (Fig. 8).

Conclusions

It is no surprise that the date palm's history in Florida and Georgia is poorly documented because it never achieved stature as a commercial tree crop due to unfavorable climatic conditions. However, date palms grow well as an ornamental in both states. Confirmation of the date palm's existence in

St. Augustine from at least the 1740s is probably why it became an ornamental there and elsewhere in Florida. In Coastal Georgia, the presence of date palms may be a legacy of the Spanish Missions, but more likely came from John Couper's introductions of offshoots in the early decades of 1800.

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LITERATURE CITED

- AUSTIN, D.F. 2004. Florida Ethnobotany. CRC Press, Boca Raton, Florida.
- BARTRAM, W. 1791. Travels Through North and South Carolina, Georgia, East and West Florida. James & Johnson, Philadelphia.
- BARTRAM, W. 1998. The Travels of William Bartram. Francis Harper's Naturalist Edition. University of Georgia Press, Athens, Georgia.
- CATE, M.D. AND O.S. WICHTMAN. 1955. Early Days of Coastal Georgia. Fort Frederica Association, St. Simons Island, Georgia.
- DAVIDSON, J.W. 1889. The Florida of To-Day: A Guide for Tourists and Settlers. D. Appleton, New York.
- DELEUZE, J.P.F. 1804. Notice historique sur André Michaux. Annales Historiques du Muséum d'Histoire Naturelle 3:191–227.
- DUNMIRE, W.M. 2004. Gardens of New Spain. University of Texas Press, Austin.
- FERGUSON, T.R. 1994. The John Couper family at Cannon's Point. Mercer University Press, Macon, Georgia.
- GREMILLION, K.J. 1993. Adoption of old world crops and processes of cultural change in the historic southeast. Southeastern Archaeology 12:15–20.
- HODEL D.R. AND D.V. JOHNSON. 2007. Imported and American varieties of date palms (*Phoenix dactylifera*) in the United States. Publication 3498. University of California Agriculture and Natural Resources, Oakland California.
- KEMBLE, F.A. 1864. Journal of a Residence on a Georgian Plantation in 1838–1839. Harper Bros., New York.
- KROME, W.J. 1921. Recent development in subtropical horticulture. Proceedings of the Florida State Horticultural Society 34:56–59.
- LANNING, J.T. 1935. The Spanish Missions of Georgia. University of North Carolina Press, Chapel Hill.
- LEGARÉ, J.D. 1833. Account of an agricultural excursion made into the south of Georgia in the winter of 1832. Southern Agriculturalist and Register of Rural Affairs 6:138–147.
- LYELL, C. 1849. A Second Visit to the United States of North America. J. Murray, London.
- MC EWAN, B.C. 1993. The Spanish Missions of La Florida. University Press of Florida, Gainesville.
- NEHRLING, H. 1909. The princes of the vegetable kingdom in our Florida gardens. Proceedings of the Florida State Horticultural Society 22:145–185.
- OBBER, F.N. 1880. Dungeness, General Green's Sea-Island plantation. Lippincott's Monthly Magazine August 1880: 241–249.
- POPENOE, P. 1973. The Date Palm. Field Research Projects, Miami, Florida.
- REITZ, E.J. AND C.M. SCARRY. 1985. Reconstructing historic subsistence with an example from sixteenth century Spanish Florida. Society for Historical Archaeology, Special Publication Ser. #3, Ann Arbor, Michigan.
- RIVERA, D., D. JOHNSON, J. DELGADILLO, M.H. CARILLO, C. OBÓN, R. KRUEGER, F. ALCARAZ, S. RÍOS AND E. CARREÑO. 2013. Historical evidence of the Spanish introduction of date palm (*Phoenix dactylifera* L., Arecaceae) into the Americas. Genetic Resources and Crop Evolution 60: 1433–1452.
- TAYLOR, W.K. AND E.M. NORMAN. 2002. André Michaux in Florida: an Eighteenth-Century Botanical Journey. University Press of Florida, Gainesville.
- TOUMEY, J. W. 1898. The Date Palm. University of Arizona, Agricultural Experiment Station Bulletin 29, Tucson, Arizona.
- TRENT, H. AND J. SEYMOUR. 2010. Examining California's first palm tree: the Serra palm. Journal of San Diego History 56: 105–120.

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