

***Katot yan panao*: A case study of indigenous botanical nomenclature in the scientific literature¹**

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Abstract— This paper explores how indigenous plant names have been referenced in the botanical literature. There are two species of trees in the Mariana Islands known in the indigenous language Chamoru as **katot**, a word referencing their irritating hairs and bark, *Dendrocnide latifolia* (Gaudich.) Chew (Urticaceae) and *Claoxylon marianum* Muell.Arg. (Euphorbiaceae). At least some speakers additionally distinguish between the two species, respectively, via the terms **katot palao'an** (“female katot”) and **katot lâhi**, (“male katot”). The latter species, *C. marianum* and at least one unidentified species has also been recorded in the literature as **panao**, an untranslatable term with many Austronesian cognates that is also applied to another tree *Guettarda speciosa* L. (Rubiaceae). Despite its early provenance, this name's application to *C. marianum* appears in error and in the Marianas the name **panao** (or **pãnao**) has likely only referred to *G. speciosa* just as it does today.

Sumària— Guini, hu tattiyi dos na nã'an tinanom fino' hãya gi amko' na tinigi' fino' lâgu siha. Guaha dos na klâsen tronku mafana'an katot sa' pápago' siha annai ma pacha': *Dendrocnide latifolia* (Gaudich.) Chew (Urticaceae) yan *Claoxylon marianum* Muell.Arg. (Euphorbiaceae). Para distengge ma usa palu taotao i na'an siha katot palao'an yan katot lâhi. I mina'dos na tronku *C. marianum* mafana'an panao gi lepblo siha kumu unu pat dos mãs na tronku, lokkue': *Guettarda speciosa* L. (Rubiaceae) yan puedi otru na klâsi ni ma tugi' na maolek para maderas yan tâpbla lao ti ma tungo' i na'an gi fino' lâgu. Yanggen *G. speciosa* i klâsen tronku ni ti ma tungo', guse'ña este ha' na tronku gi iya Mariãnas ni mafana'an panao pat pãnao ântes di i tiempon Españót esta pã'go.

Introduction

The botanical literature of the Mariana Islands in western Micronesia spans more than two centuries, beginning with the botanists of the Spanish Malaspina expedition who briefly collected plants on the southernmost island of Guam in the late 18th century (Madulid 1982, 1983, 1989; Mallada and Driver 1990, Fernández-Alonso & Morales 2013). The extensive history of botanizing in the archipelago has been reviewed in Merrill (1914), Glassman (1948), Stone (1970), and Fosberg et al. (1975). During these investigations in the Marianas, botanists have recorded over 500 names of plants in Chamoru, the indigenous language of the archipelago (Stone 1970). More recent, popular, and profusely illustrated regional plant guides continue to include Chamoru names (Moore & McMakin 1979, Moore & Krizman 1981, Raulerson & Rinehart 1991, 1992, 2018, Whistler 1992, 1995, Vogt & Williams 2004, McConnell & Gutierrez 2006).

These accounts are becoming increasingly valuable as components of university and school curricula in the revitalization of Chamoru language and culture (Falanruw 1976, Underwood 1984, Nandwani et al. 2008, Garrido 2022). Nevertheless, indigenous names of numerous plants are either absent from contemporary guides or, when present, conflict even within the same volume, are at

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variance with unpublished terms or present use, or are of unstated or dubious provenance. Further, while the Chamoru names of many plants remain in everyday use in the Marianas (Workman et al. 1994, Mendiola 2009, Borja & Roppul 2022), those for uncommon species may lack widespread application even among elder native speakers if they are not specialists in medicinal plants or engaged in agriculture.

Also, developing within the global scientific community is a conversation about the merits of incorporating indigenous nomina into a revised system of Linnean biological classification (Gillman & Wright 2020). Here, established indigenous terms for organisms would gain precedence as specific epithets in proposed Latin binomials according to a revised principle of priority. Debate is ongoing (Rummy & Rummy 2021, Mosyakin 2022, Wright & Gillman 2023) and submission of a formal proposal for such changes remains a future consideration. However, discussion at all stages must include an assessment of the availability and stability of the indigenous terms themselves. While many indigenous names for widespread and abundant species gain currency outside their original language, becoming loanwords (e.g., “jaguar” from Tupi-Guarani and “kangaroo” from Guugu Yimidhirr), many others denoting regionalized taxa are curated by few traditional knowledge keepers. Still other terms may no longer be in use, surviving only in the written record, particularly those supplanted by colonial interference in cultural transmission (Diaz 2011).

Hence, as an exercise in exploring and clarifying the historical record of indigenous biological nomenclature, in this note I trace the occurrence and citation of ostensible Chamoru names for three occasional and widely distributed native trees as recorded in published botanical accounts, associated unpublished (“gray”) literature, and herbaria specimen sheets. Works referenced in the aforementioned reviews when available to me are covered here. I render Chamoru plant names in bold as spelled in the original sources and, if different, follow in the current Guam orthography (Kumisión I Fino' CHamoru 2020, see also Chung 2020). Names in other Austronesian languages are likewise rendered in bold and spelled as encountered, while terminological reconstructions (*sensu* Ross et al. 2008: 4) for a language subgroup, e.g., Proto-Oceanic, are also preceded by an asterisk. Words in other non-English languages (French, German, Greek, Latin, Spanish) are italicized. Parenthetical alphanumeric references following localities are collection numbers of specimens housed in the Bernice P. Bishop Museum's Herbarium Pacificum, Honolulu (BISH), Conservatoire et Jardin botaniques de la Ville de Genève (G), Muséum national d'Histoire naturelle, Paris (MNHN), New York Botanical Gardens Herbarium (NY), University of Guam Herbarium (GUAM), and U.S. National Herbarium, Washington, D.C. (US).

The Trees

DENDROCNIDE LATIFOLIA (GAUD.) CHEW

The Urticaceae Juss. or nettles is a family of dicot angiosperms comprised of over 2600 species arrayed in 59 genera (POWO 2023) and distributed globally, excepting polar regions. Many present urticating or stinging hairs on their leaves, stems, or inflorescences. One genus, the tropical to subtropical Asian *Dendrocnide* Miq., consists of about 36 species (POWO 2023) and includes *D. latifolia*, which is found on islands of the tropical western Pacific, including the Mariana Archipelago.

Growing to a small tree, *D. latifolia* can be found on four of the five southernmost islands of the Marianas, Guam, Rota, Saipan, and Tinian (Fosberg et al. 1979), where it inhabits primary and secondary limestone forests, tolerating open canopy and poor soils, such as cliff edges and heavily karstic terrain. Some authors (e.g., Kanehira 1931, Stone 1970, Vogt & Williams 2004) have considered the tree less common on the southernmost island of Guam. The plant is often encountered as a tall shrub with irregular sinuous branching (Fig. 1A). However, the species is most easily identified by its large (to 20 cm in length), lanceolate to elliptic and glabrous leaves with entire

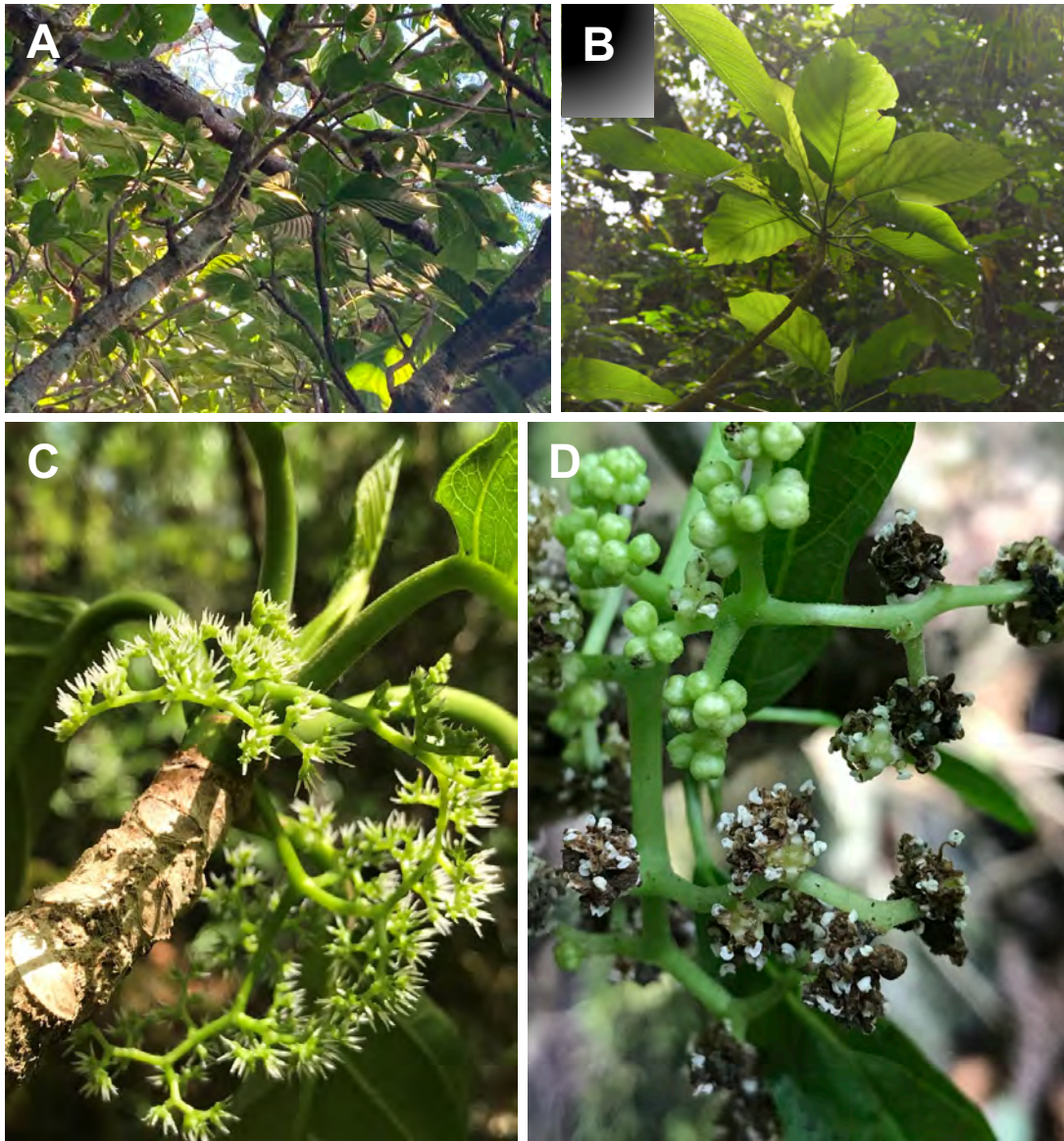


Figure 1. *Dendrocnide latifolia* (Gaud.) Chew (Urticaceae). A) Common habitus as shrubby tree, Saipan (104853909). B) Leaves crowded at branch terminus, Rota (12946963). C) Female flowers and leaf abscission scars on branches, Guam (34476422). D) Male flowers, Guam (34476420). Image numbers from iNaturalist (www.inaturalist.org); photographers: H. Rogers (A), M. Freedman (B), PACN Vegetation Program (C–D); licensing: © the author with permission (A), CC BY-NC (B–D).

margins and about a dozen pairs of impressed, evenly spaced curving lateral veins and a long (to 10 cm) petiole with which the leaves are arrayed in terminal whorls atop smooth, grey, and terete branches bearing prominent abscission scars (Fig. 1B). Inflorescences are unisexual, axillary, and in dense racemes of green florets, the pistillate form (Fig. 1C) wielding the family's characteristic irritating hairs (Chew 1969), even when dropped and decomposing (Vogt & Williams 2004), the staminate flowers appearing differently (Fig. 1D). The fruits are fleshy, greenish white, and drooping. Seedlings also present urticating hairs (M. Martinez 2023, pers. comm.).

Dendrocnide latifolia was originally described by Charles Gaudichaud-Beaupré (1844) from specimens he collected in Vanuatu in 1837 during his second circumglobal voyage, aboard the *Bonite*, Auguste-Nicolas Vaillant commanding. However, the botanist may have collected *D. latifolia* and conceivably recorded its Chamoru name in the Marianas in 1819 during his extended visit there of 12 weeks while aboard the *Uranie*, Louis Claude de Saulces de Freycinet commanding. During this time, he explored three of the islands inhabited by the species (L. Freycinet 1829: 155). Unfortunately, their ship later struck a submerged reef in the Falkland Islands (R. Freycinet 1927: 127, Rivière 2003: 125) and about a third of his specimens were lost (Bauchot et al. 1990: 36). However, in his summary notes of the expedition transcribed upon his return to France (Wamprechts 2011), Gaudichaud does not list among his 17 specimens of *Urticeae* (= *Urticaceae*) collected in the Marianas exemplars of *Laportea*, the genus he erected (Gaudichaud 1826: 498) to accommodate his new Vanuatuan species *L. latifolia*, later transferred to *Dendrocnide* by Chew (1965).

CLAOXYLON MARIANUM MUELL. ARG.

The second species considered here is a member of the large dicot family Euphorbiaceae, the spurges, with over 6500 species among about 225 genera (POWO 2023) and found worldwide. One genus, the tropical to subtropical Asian *Claoxylon* A. Juss., consists of about 80 species (POWO 2023) of shrubs and small trees, including *C. marianum*, which is restricted to the Mariana Islands of Guam, Rota, and Saipan (Fosberg et al. 1979), as well as Anatahan (Ohba 1994). This species is similar in growth form and leaf anatomy to *D. latifolia*. It also presents as a small irregular tree inhabiting limestone forest. The branches are also smooth, grey, terete, and brittle, bearing prominent abscission scars and terminal whorls of large oblong leaves with impressed lateral veins (Fig. 2A). However, the species is most easily distinguished from *D. latifolia* by its serrate leaf margins (Fig. 2B), the youngest leaves pubescent and often purplish, especially when dried, as well as by its bluish-green inflorescences (Fig. 2C) producing purplish fruits (Fig. 2D).

Claoxylon marianum was first collected in 1792 on Guam (BISH 165552) by Tadeáš Haenke, one of two botanists with the Malaspina expedition that stopped on the island for eight days to reprovision and collect natural-history specimens (David et al. 2003). Hence, Haenke or his colleague Luis Née may have recorded the Chamoru name of this species, just as they did for other plants they gathered during the expedition (Madulid 1989). However, the taxonomic accounts of their specimens by Presl (1830, 1835) and Cavanilles (1791–1801), respectively, do not include local names, nor a description of *C. marianum*. In fact, the species would not be described until 1866 by Johannes Müller-Argoviensis (in Candolle 1862–1866: 783) from exemplars obtained on Guam (G 00313924, MNHN P05478664) in 1819 by Gaudichaud (1826).

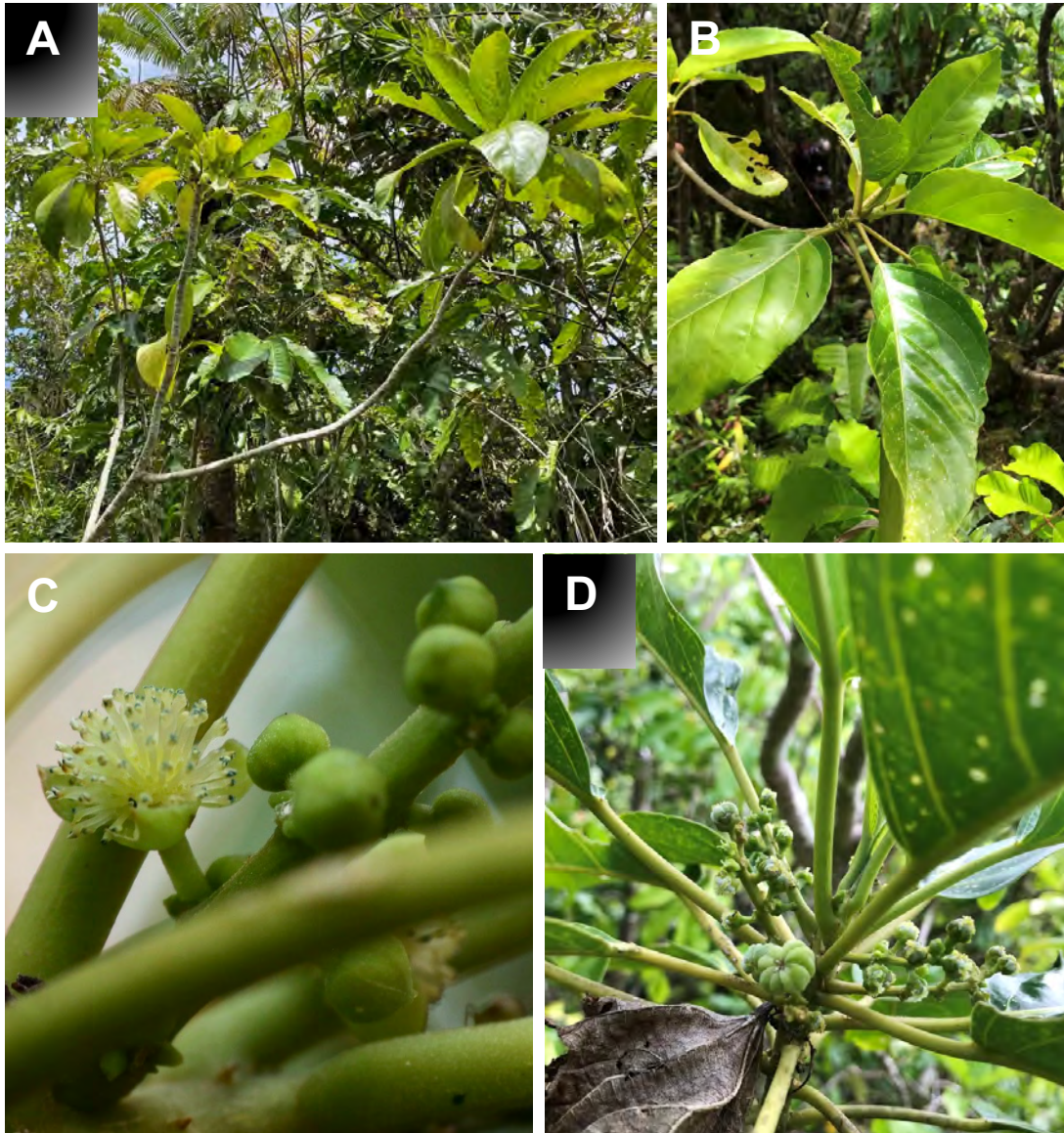


Figure 2. *Claoxylon marianum* Muell.Arg. (Euphorbiaceae), Guam. A) Common habitus as shrubby tree (94524278). B) Toothed leaves crowded at branch terminus (86964495). C) Male flowers and buds (153656635). D) Female flowers and fruit (86964496). Image numbers from iNaturalist (www.inaturalist.org); photographers: N. Sablan (A, C), M. Martinez (B, D); licensing: © the author with permission (A, C), CC BY-NC (B, D).

GUETTARDA SPECIOSA L.

The third and final species to be discussed here is a member of the large and varied dicot family Rubiaceae, the gardenias, maddows, and bedstraws, with over 13,500 species among about 611 genera (POWO 2023) and found worldwide. One genus, the tropical to subtropical Asian *Guettarda* L., consists of about 145 species (POWO 2023) of shrubs to medium-sized trees, including *G. speciosa* L., which is found from eastern Africa throughout Austral and southeastern Asia and the tropical Pacific Ocean, including the Mariana Islands of Aguiguan, Guam, Rota, Saipan, and Tinian (Fosberg et al. 1979), as well as Alamagan (Vogt & Williams 2004). It is typical of Oceanic back-stand environments where it grows tallest, rarely to 15 m, but can be found inland in the Marianas as an uncommon shrubby tree over limestone basement, tolerating open canopy and poor soils, such as cliff edges and karstic terrain (Raulerson & Rinehart 2018). This species can be superficially similar in growth form and leaf anatomy to the two aforementioned species when encountered in marginal habitat (Fig. 3A). That is, it can also present as a small irregular tree with branches that are smooth and bear abscission scars and terminal whorls of large oblong leaves with conspicuous midrib and lateral veins (Fig. 3B). However, the species is most easily distinguished from the others by broader scalloped leaves with pale non-impressed veins and especially the fragrant tubular white flowers arranged in cymes (Fig. 2C) that produce small woody spheroid fruit (Fig. 2D).

Chamoru Plant Names**KATOT**

Many early botanical accounts of the Mariana Islands, most of which include indigenous plant names (Pineda 1792, unpubl. in Mallada and Driver 1990, Gaudichaud 1826, Marche 1891, Safford 1905, Prowazek 1913, Merrill 1914, 1919, Bryan 1934–1941, 1956–1960, Glassman 1948), do not mention the plant *Dendrocnide latifolia* or Chamoru names potentially attributable to this species. Kanehira (1931) writes incorrectly that Merrill (1914) had included the species in his account of Guam plants, which Stone (1970) corrects. The first mention of a Chamoru term associated with *D. latifolia* appears to be in Kanehira (1931), who included the name **kahtat** (Table 1) with the description of his new species *Laportea saipanensis*, now a junior subjective synonym of *D. latifolia* (see Chew 1965).

The next record for *D. latifolia* is from Fosberg (1946), an unpublished paper that I have been unable to access. However, another unpublished report, Falanruw et al. (1990), in a sweeping compilation of Micronesian plant names, included from Fosberg (1946) the Chamoru names **kahtat**, **kahtl**, and **katud**, apparent variants of a single term, perhaps (in part) from secondary sources from multiple Mariana Islands to include Kanehira (1931). Falanruw et al. (1990) indicate that the “[n]ames attributed to Fosberg (1946) are further referenced in that report, to original sources and collection numbers of voucher specimens”. Fosberg (1953–1954: 177) later records in his unpublished field notes **katude palawan**, in modern orthography **katot palao'an** or the “female katot”. Stone (1970), because of his reliance on Safford (1905) and Merrill (1914), did not include an indigenous name in his species account of *D. latifolia*, hence neither did Raulerson & Rinehart (1991). Vogt & Williams (2004) record the term **chew**, a *lapsus*. Its capitalization in their account's species heading directly following the Latin binomial and enparenthetic original authority mirrors the placement *per* ICN rules (Turland et al. 2018) of the surname of the taxonomist who was responsible for the generic recombination of the species, Wee-Lek Chew (1965). Most recently, in the revised version of their first edition, Raulerson & Rinehart (2018) included for *D. latifolia* the names **katot** and **katud** after consultation with J.E. Tuquero (Univ. Guam).

The similarity of the terms as recorded by Kanehira (1931), Fosberg (1946 in Falanruw et al. 1990), and Raulerson & Rinehart (2018) suggest orthographic variants with multiple, overlapping sources that record a single nomen most closely approaching the contemporary Chamoru word **katot**.

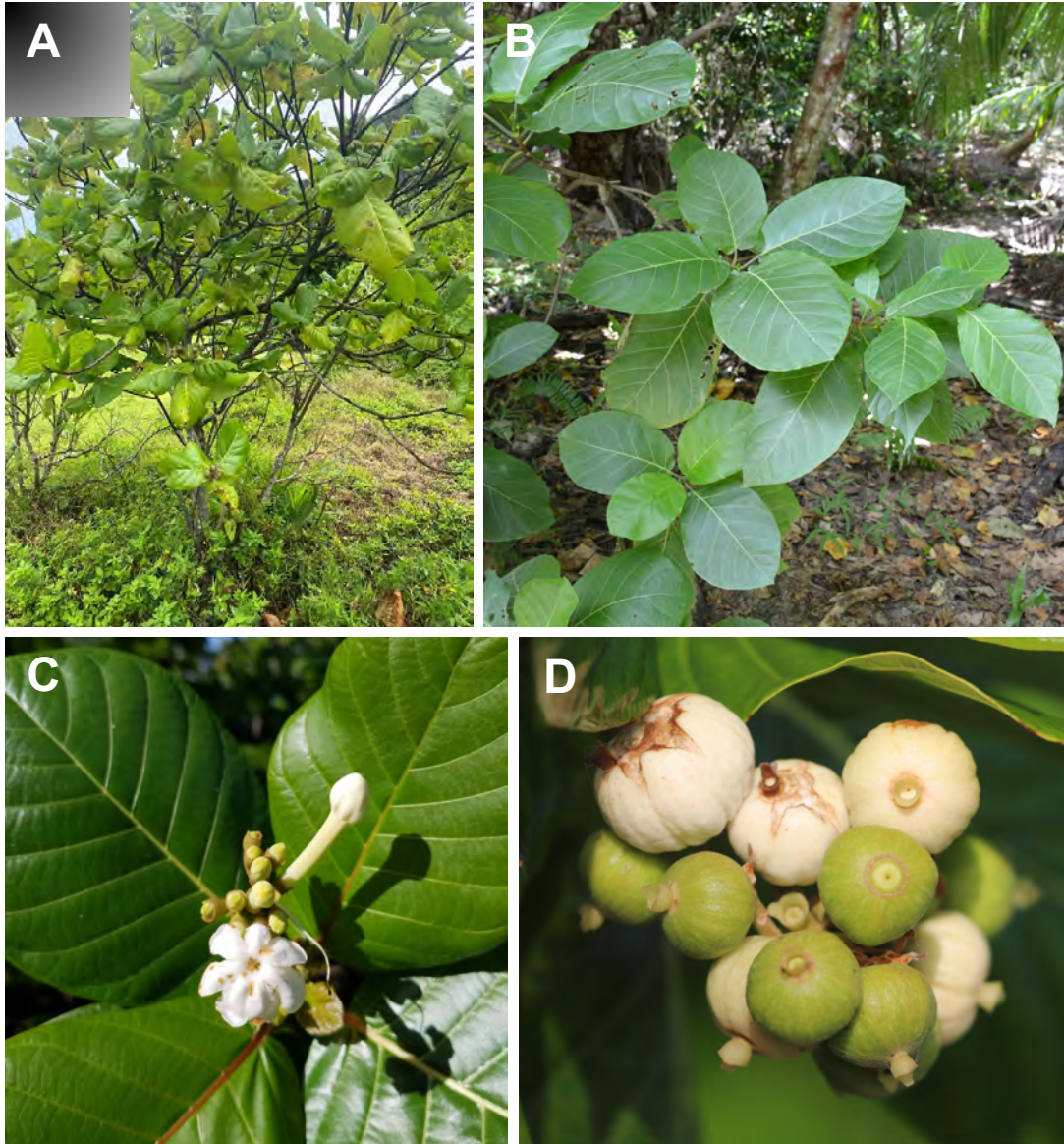


Figure 3. *Guettarda speciosa* L. A) Common habitus as shrubby tree, Guam (130198175). B) Leaves crowded at branch terminus, Guam (12922175). C) Flowers and buds, Saipan (7100716). D) Fruit, Aitutaki, Cook Islands (163554764). Image numbers from iNaturalist (www.inaturalist.org); photographers: C. Certeza (A), M. Freedman (B), M. Kargul (C), A. Chapman (D); licensing: CC BY-NC (A–C), CC BY-NC-SA (D).

Supporting this, native speakers (see Acknowledgements) indicate the word refers to a stinging or irritating sensation, especially in the mouth, or something that produces such a sensation, particularly a plant. Bilingual dictionaries of Chamoru define the term in parallel fashion. Vera (1932) gives among his three definitions of **katot**: *picar con dolor, produciendose a veces bubas en la boca*, that is “to sting painfully, sometimes producing swellings in the mouth”. Topping et al. (1975) likewise define **katot** as a “sensation in [the] mouth caused by eating certain foods”. Rivera et al. (2009) offers “to cause itching; to cause an irritation in the mouth by eating poisonous food, leaves and roots”. Reassuringly, this interpretation of the varied spellings by the non-Chamoru botanists is consistent with the presence in this plant family of characteristic stinging hairs, restricted in *D. latifolia* to the pistillate flowers (Chew 1969) and seedlings (M. Martinez 2023, pers. comm.).

Clouding somewhat this straightforward interpretation of **katot** as a Chamoru term exclusive to *D. latifolia* is that it is currently and has long been applied in the botanic record to at least one other plant, one restricted to the Marianas, *Claoxylon marianum*. Gaudichaud in 1819 first recorded in a fieldnote now attached to the syntype specimens of *C. marianum* (G 00313924) the name **katud-cunau** followed parenthetically by an alternate spelling **katoud counao** (Fig 4A–B), then in the voyage's botanic volume (Gaudichaud 1826: 73) settled on **katoud-kounaou**. This seeming indecision reveals his struggle to capture phonemic units novel to a sensitive ear within the limits of a foreign tongue, a challenge that he and his shipboard zoological colleagues faced throughout the expedition (e.g., St. John 1989, Kerr 2013). His commanding officer L. Freycinet (1829: 267) found time during the expedition's extended stay on Guam to compile his scientific colleagues' vocabularies of Chamoru terms, recording the name of *C. marianum* in his glossary's unusual orthography as **katod kōnao**. Speculatively, these variants appear closest to **katot kuñao**, the “brother-in-law of katot”, perhaps indicating that the plant is similar to **katot**, ostensibly *D. latifolia*. As an aside, this is apparently the earliest record of the word **kuñao** in the Chamoru language, indicating that by the close of the 18th century this Spanish loan concerning family relationship had gained usage along with or in preference to its indigenous equivalent.

The next mention of a Chamoru name for *C. marianum* is **cator**, also on an original label accompanying a specimen, one gathered by Antoine-Alfred Marche on Guam (MNHN P05478663), probably in 1888 when he did most of his collecting there (Marche 1891). Decades later, Merrill (1914: 100) also recorded the term **cator** from Guam for *C. marianum*. Shortly thereafter, a specimen collected by P. Nelson in 1918 on Guam (NY 03950778) includes the name **katutu lahe**, in modern orthography likely **katot lāhi**, the “male katot”, perhaps indicating a male specimen of this dioecious species or to distinguish it from the somewhat similar *D. latifolia*. Fosberg (1946 in Falanruw et al. 1990) spells this as **katud lahi**. Years later he again encounters the term (as **katude lahi**) in northern Guam (Fosberg 1953–1954: 177) for *C. marianum*, this time from the same Chamoru landowners that also provided the analogous term **katot palao'an** (“female katud”) mentioned above for *D. latifolia*. During this period, Bryan includes the name **cator** (Bryan 1941) and **kator** (Bryan 1960a) for *C. marianum*. Later, a specimen collected by M. Evans in 1966 from Guam (NY 03950763) includes a note with the name **cato**. Merrill's (1914) term was copied by Glassman (1948), Souder (1963), and Stone (1970), the lattermost also serving as the source for many other indigenous plant names in Topping et al. (1975), Falanruw (1976), and Mitchell & Rook (1979). Topping et al. (1975) rendered many Chamoru plant names compiled by Stone (1970) into a uniform orthography, including **katot** to be later cited by Falanruw et al. (1990) among others (Table 1). Raulerson & Rinehart (1991, 2018) continued Stone's terms and spellings. Donnegan et al. (2011) recorded **katot**, either from Falanruw et al. (1990) or from among their study islands of Rota, Saipan, and Tinian.



Figure 4. A) Type specimens of *Claoxylon marianum* Muell.-Arg. (G 00313924). B) Gaudichaud's field number : 248; with Chamoru name : Catou Cunau (Catou Cunau); C) Field number : 63; and the Chamoru name : Panao; D) A note indicating : C'est plutôt un Claxylon[sic] ! Juss.; E) Gaudichaud's signature and date. F-G) Page six of Gaudichaud's inventory of Mariana plants in which he originally listed specimen 63 as : Guettardae . Images © Conservatoire et Jardin botaniques de la Ville de Genève with permission (A-E) and public domain, courtesy F. Wamprecht (F-G).

INAFOK AND KALEKŊAO

Two other rarely encountered terms are also applied to *C. marianum*. First, Gaudichaud (1826: 73) records for this species the only mention I believe in the botanic literature of the term **inoufouk** (Table 1). This appears to be in modern orthography **inafok**, hence comprised of the prefix **in-** used to denote something “possessing the quality of...” and the root **áfok**, meaning “slaked lime”, a caustic powder derived from heating coral skeleton and added to a preparation of the intoxicating nut of the betel palm (*Areca catechu* L.) that is widely chewed in Micronesia and elsewhere (Paulino et al. 2011, Hattori 2018). Second, Kanehira (1931) provides from Saipan the challenging **kattleknau**. Falanruw et al. (1990) includes this term, as well as the *lapsus* **kattেকnau**, apparently from Kanehira (1931) but cited Stone (1970) as the source, which does not mention it. Much later Donnegan et al. (2011) includes the misspelling. Speculatively, this term could derive from **kalek** (sometimes as **ka'lek**), which has among its meanings “acrid, burning on the tongue” (Rivera et al. 2009), plus a morpheme approaching **ŋao**, suggesting it derives from **kuŋao**, brother-in-law, via a lexical process involving syncope (S. Chung 2024, pers. comm.), again indicating that this species belongs to a “family” of similar plants.

Supporting the application of the names **katot**, **inafok**, and **kalekŋao** to *C. marianum*, the fresh and dried milky latex of this plant, like the flowers and seedlings of *D. latifolia*, can also elicit contact dermatitis (Mitchell & Rook 1979: 264). As well, Fosberg (1953–1954: 177) after speaking with landowners in Guam about this species recorded in his field notes “dry bark said to make the skin itch”. Likewise, the collector M. Evans included with a specimen (NY 03950763) the note “[b]ark will irritate the skin”. Hence, these terms reflect a widespread feature of indigenous nomenclatures in being founded on a detailed familiarity with the organisms they describe. Parallel trends occur in Chamoru zoological nomenclature (Kerr 1990). The names **katot**, **inafok**, and **kalekŋao** indicate an extensive and close relationship by the Chamoru with these occasional species. Surely all native plants in the Marianas have been handled and tasted or otherwise experienced firsthand and at length. In doing so, indigenous healers and others with knowledge of the forest also regarded **katot**, the trees *D. latifolia* and *C. marianum*, as similar and distinctive amongst native trees in their ability to irritate and cause discomfort when mishandled. That these nomina can be assigned plausible translations appears fortunate; they aid our historical interpretation. By comparison, only about 10% of the approximately 300 names comprising the Chamoru fish nomenclature are translatable (Kerr 1990). The likely 600+ recorded botanical names in Chamoru await a parallel analysis.

PANAO OR PĀNAO

To muddle the Western botanical record further, another Chamoru name, the untranslatable **panao** (to some Guam speakers **pānao**), has been applied sporadically and, as I contend below, mistakenly to *Claoxylon marianum* (Table 1). The confusion starts early; the first published mention of any Chamoru name for this tree is by Gaudichaud (1826: 73) who recorded in 1819 the term **panao** for this, at the time, undescribed genus and species that inhabited [*l*]es *forets vierges encore qui recouvrent les sommets culminans...*, “the still virgin forests covering the highest peaks” of central Guam. In another volume of the expedition's account, L. Freycinet (1829: 268) repeats this definition of the name, but adds that the tree is used in construction for “beams, joists, etc.” Later, the Spanish colonial governor of the Marianas during 1871–1873, Luís de Ibáñez y García (1886: 128) lists the Chamoru names of several otherwise unidentified trees including **panao** as among the *clases de maderas de las que los chamorros apenas hacen uso de ellas*, “types of timber little used by the Chamoru”. Soon thereafter, other governors, Francisco Olive y García (1884–1887, unpubl. in Driver 1984), Joaquín Vara de Rey y Rubio (1890, unpubl. in Driver 2000), Luis Santos Fontordera (1891, unpubl. in Driver 2000) and perhaps others, record **panao** as being used for boards or as timber on Guam.

Table 1. Chronology of Chamoru nomina ascribed to *Claoxylon marianum*, *Dendrocnide latifolia*, and *Guettarda speciosa* as written in the botanical record. References indicated by superscripts are unpublished manuscripts translated in Driver (1984, 2000) or herbaria specimen sheets, giving the collector and year of collection. Asterisks following Chamoru terms indicate discussion in the text of a clear *lapsus* rather than an orthographic variant.

Year	Author(s)	Chamoru term	Current disposition
1819	Gaudichaud ¹	catoud counao catud-cunau panao	<i>C. marianum</i> <i>C. marianum</i> <i>G. speciosa</i>
1826	Gaudichaud	inoufouk katoud-kaunou panao	<i>C. marianum</i> <i>C. marianum</i> <i>C. marianum</i>
1829	Freycinet	katod katod konao panao	Unknown tree <i>C. marianum</i> <i>C. marianum</i>
1886	Ibáñez y García	panao	Unknown tree
1887	Olive y García ²	panao	Unknown tree
1888	Marche ³	cator	<i>C. marianum</i>
1890	Vara de Rey y Rubio ⁴	panao	Unknown tree
1891	Santos Fontordera ⁴	panao	Unknown tree
1905	Safford	cator panao panao panao	<i>C. marianum</i> <i>C. marianum</i> Unknown tree
1913	Prowazek	panao	<i>Dipterocarpus gracilis</i>
1914	Merrill	cator panao	<i>C. marianum</i> <i>G. speciosa</i>
1918	Nelson ⁵	katutu lahe	<i>C. marianum</i>
1931	Kanehira	kahtat kattleknau	<i>D. latifolia</i> <i>C. marianum</i>
1932	Vera	panao	Unknown tree
1941	Bryan	cator panao	<i>C. marianum</i> <i>C. marianum</i>
1946	Fosberg	kahtat kahtl katud katud lahi pano	<i>D. latifolia</i> <i>D. latifolia</i> <i>D. latifolia</i> <i>C. marianum</i> <i>G. speciosa</i>
1948	Glassman	panao	<i>C. marianum</i>
1954	Fosberg	katude palawan katuk lahe panao	<i>D. latifolia</i> <i>C. marianum</i> <i>G. speciosa</i>
1960	Bryan	cator panao	<i>C. marianum</i> <i>C. marianum</i>
1963	Souder	cator panao	<i>C. marianum</i> <i>C. marianum</i>
1966	Evans ⁶	cato	<i>C. marianum</i>
1970	Stone	cator panao panao	<i>C. marianum</i> <i>C. marianum</i> <i>G. speciosa</i>
1975	Topping et al.	panao	Unknown tree
1976	Falanruw	cator panao	<i>C. marianum</i> <i>C. marianum</i>

Year	Author(s)	Chamoru term	Current disposition
1979	Mitchell & Rook	cator	<i>C. marianum</i>
		panao	<i>C. marianum</i>
1989	Falanruw et al.	panao	<i>C. marianum</i>
		panao	<i>G. speciosa</i>
1990	Falanruw et al.	cator	<i>C. marianum</i>
		kahtat	<i>D. latifolia</i>
		kahtl	<i>D. latifolia</i>
		katot	<i>C. marianum</i>
		katteknau*	<i>C. marianum</i>
		kattleknau	<i>C. marianum</i>
		katud	<i>D. latifolia</i>
		katud lahi	<i>C. marianum</i>
		panao	<i>C. marianum</i>
		panao	<i>G. speciosa</i>
		pano	<i>G. speciosa</i>
1991	Raulerson & Rinehart	cator	<i>C. marianum</i>
		panao	<i>C. marianum</i>
		panao	<i>G. speciosa</i>
1992	Driver	panao	<i>C. marianum</i>
1992	Whistler	panao	<i>G. speciosa</i>
1993	Fosberg et al.	panao	<i>G. speciosa</i>
		pano	<i>G. speciosa</i>
2000	Cruz et al.	panao	<i>G. speciosa</i>
2004	Donnegan et al.	katot	<i>C. marianum</i>
		katteknau*	<i>C. marianum</i>
		pano	<i>G. speciosa</i>
2004	Vogt & Williams	chew*	<i>D. latifolia</i>
		panao	<i>G. speciosa</i>
2008	Yoshioka	panao	<i>G. speciosa</i>
2009	Uyehara & Wiles	panao	<i>G. speciosa</i>
2013	Wiecko	panao	<i>C. marianum</i>
		panao	<i>G. speciosa</i>
2015	Falanruw	panao	<i>G. speciosa</i>
2018	Raulerson & Rinehart	cator	<i>C. marianum</i>
		katot	<i>D. latifolia</i>
		katud	<i>D. latifolia</i>
		panao	<i>C. marianum</i>
		panao	<i>G. speciosa</i>
2022	Borja & Roppul	panão	<i>G. speciosa</i>
2022	Gawel	panao	<i>G. speciosa</i>

¹ G 00313924; ² see Driver (1984); ³ MNHN P05478663; ⁴ see Driver (2000); ⁵ NY 03950778; ⁶ NY 03950763.

However, *C. marianum* often presents as a small and crooked tree (Fig. 2A) and so is presumably ill suited as lumber. As well, the wood of this genus is notoriously weak (Floyd 2008); indeed *Claoxylon* is from the Greek *κλάω* + *ξύλον*, meaning “brittle wood”. Perhaps not realizing this, Safford (1905) admits both Gaudichaud's and Olive's interpretations of the term, while indicating that in the Philippines **panao** refers to *Dipterocarpus hispidus* Fern.-Vill. in Blanco, non Thwaites (= *D. gracilis* Blume), a southeast Asian timber species whose range does not extend to the Marianas. Safford's curious aside seems to derive from Blanco's (1880) flora of the Philippines, the

only publication to my knowledge that considered both the short-lived nomen *D. hispidus* and indigenous terms for the species.

In a subsequent account of Marianas natural history, Prowazek (1913: 104), perhaps *via* Blanco (1880) or Safford (1905), concludes the Chamoru term **panao** denotes *D. hispidus*, clearly unaware that the tree does not inhabit the archipelago. Yet in the same volume, Prowazek (*ibid.*, p. 117), like Safford, also applied **panao** to *C. marianum*. However, in an account of Guam's flora, Merrill (1914) *via* Chamoru-speaking collectors at the Guam Experimental Station (e.g., J. Guerrero, see MNHN P05478795) restricts the name to the native tree *Guettarda speciosa* L. In contrast, Vera (1932) seems to split the difference, defining **panao** only as *un arbol*, “a [type of] tree”. Bryan (1941, 1960a–b) offers **panao** for both *C. marianum* (in addition to **cator**) and *G. speciosa*. Fosberg (1946 in Falanruw et al. 1990) records **pano** and later (Fosberg 1953–1954: 177) **panao** for *G. speciosa*. Glassman (1948) and Souder (1963) adhere to Safford's interpretation. Stone (1970), following Gaudichaud through Safford, applies the name to both *C. marianum* and *G. speciosa*. Topping et al. (1975), who usually follow Stone (1970), record only that **panao** is a “[t]ype of tree [with] hard wood, good for lumber” *sensu* Safford (1905) *in partim*. Falanruw (1976) does not discuss *G. speciosa*, but applies the name to *C. marianum* citing Stone (1970). Mitchell & Rook (1979), Falanruw et al. (1989), Wiecko (2013), and Raulerson & Rinehart (1991, 2018) continue Stone's spelling and dual definition. Driver (1992) in her English translation of Ibáñez y García (1886) included an unsourced gloss of **panao** as *C. marianum*, which must ultimately derive from Gaudichaud (1826), perhaps *via* Stone (1970). Most recently, Whistler (1992), Fosberg et al. (1993), Cruz et al. (2000), Vogt & Williams (2004), Yoshioka (2008), Uyehara & Wiles (2009), Donnegan et al. (2011), Falanruw (2015), Borja & Roppul (2022), and Gawel (2022) do not treat *C. marianum* and apply **panao**, **panão**, or **pano** to *G. speciosa* (Table 1).

How then to resolve whether **panao** as recorded in the Marianas referred to *C. marianum*, *G. speciosa*, both, or perhaps another species altogether? Current usage among native speakers appears restricted to *G. speciosa* (Cruz et al. 2000, Mendiola 2009, Borja & Roppul 2022, M. Martinez 2023 pers. comm., J. Tuquero 2023 pers. comm.). Linguistic and ethnographic accounts provide evidence of similar usage historically. Unlike *C. marianum*, the larger *G. speciosa* possesses hard, durable wood used throughout Oceania in constructing houses, furniture, and canoes (Wilder 1931, Whistler 1990, Thaman 1992) and hence is a candidate for the unidentified timber species of L. Freycinet, Ibáñez y García, and Olive y García. Further, possible cognates of the Chamoru word **panao** occur among Austronesian languages throughout the western Pacific. For *G. speciosa* Whistler (1990) records the names **fano** or **whano** (Tuomotus) and **hano** (Cook Islands) among others. Ross et al. (2008) collate some of these with other terms: **pano-pan** (Muyuw, Papua New Guinea), **p^won-p^won** (Mwotlap, Vanuatu), **pano-pano** (Niue), **hano** (Marquesas), **ano** (Rarotonga), **fano** (Society Islands) and more. From this set, Ross et al. (2008) provide reconstructions in several focal Austronesian subgroups, including Proto-Polynesian ***fano** or ***pano** and Proto-Oceanic ***p^wano**. They did not venture a reconstruction to Proto-Malayo-Polynesian, the presumptive and earlier subgroup from which Chamoru arose (Smith 2017, Reid 2002). Hence, it remains unclear whether one is possible or even whether **panao** is an Oceanic loan word in Chamoru (S. Chung 2024, pers. comm.). Still, the cognate sets and reconstructions of Ross et al. (2008) for the closely related albeit descendent subgroups, as well as the species' widespread use as lumber, remain suggestive as to a singular identity of the tree **panao** in the botanical record of the Marianas as *G. speciosa*, just as it does in modern usage.

If so, the residual mystery is why then did Gaudichaud (1826) alone record **panao** for *C. marianum*, while all other contemporaneous (L. Freycinet 1829) and subsequent independent accounts (Table 1) were either unsure of the tree's identity or identified it as *G. speciosa*? The two species are distinct on close inspection, belonging to morphologically divergent families (Euphorbiaceae and Rubiaceae, respectively) that were well characterized by Gaudichaud's day (Jussieu 1789). While it appears unlikely that the botanist would confuse the two, there is evidence

that he, or perhaps one of the midshipmen assigned to assist him in scientific work (Rivière 2003, p. xvii), did just that.

Müller-Argoviensis (in Candolle 1862–1866: 783) described *C. marianum* from an examination of two of Gaudichaud's specimens (Fig. 4A). The first possessed a field number of 248 (Fig. 4B), which Gaudichaud had identified on the field label (Fig. 4A) and in his notes (Wamprechts 2011) as an undescribed euphorbiacean in the genus *Croton*. This was a reasonable field assignment as the genus was then understood for this new tree whose genus, *Claoxylon*, would not be described for several more years (Jussieu 1824) — albeit in time for inclusion in Gaudichaud's (1826) and L. Freycinet's (1829) reports discussing the tree. However, the second specimen bearing field number 63, he or a proxy mistakenly recorded as *Guettarda*, along with the Chamoru name **panao** (Fig. 4C, F–G). Müller-Argoviensis caught the error of the Latin designation and included the specimen in his type series for the new species. A note apparently in Gaudichaud's hand (Fig. 4D) and partially overlapping his original 1819 specimen label (autographed in 1830, Fig. 4E) necessarily postdates the description of *Claoxylon* in 1824 and predates his use of the genus name in his botanic report in 1826. The note corrects his original identification saying, *Ç'est plutôt un Cla[o]xylon ! Juss.*, that is, “This is more of a *Claoxylon* ! Juss.” (Here, the exclamation point was not for emphasis, but merely botanical shorthand for having seen an actual specimen of the genus, while “*Juss.*” is the abbreviated surname of the original describer customarily appended to a taxonomic name.)

Thus, the local name **panao** was correctly associated by Gaudichaud with the Latin name *Guettarda*, but not with the specimen itself. However, following Müller-Argoviensis's reassignment, no corresponding change occurred to the Chamoru name on the label (Fig. 4). Incorrectly recording the meanings of indigenous words was a common mistake among early European visitors to the Pacific islands. Early vocabularies of Austronesian languages, including Chamoru, are understandably rife with these mix-ups by non-speakers. For example, Gaudichaud's shipboard colleague, the zoologist Joseph Paul Gaimard (1819 in Dumont d'Urville 1834, see Kerr 2013), preserves the Chamoru term for *femme* (*vieille*) or “elderly woman” as, curiously, **shashaga** (= **chachaga** or “inner thigh”). Was this a frameshift error during/post transcription or a playful Chamoru interpreter having a go? Two years earlier on Guam, the visiting German naturalist Adelbert Chamisso (1821: 65) erred similarly. He spoke excellent Spanish (Kotzebue 1821: 240) and so could converse directly with many native Chamoru speakers in the old Hispanic colony. Nevertheless, he records *Ein Berg*, “a mountain”, as **alumtano** (= **håloomtåno**, meaning “forest”).

Conclusions

The indigenous Chamoru term still in use for the native tree *Dendrocnide latifolia* (Urticaceae) is **katot**. This name is also used for a similar endemic tree *Claoxylon marianum* (Euphorbiaceae). Some speakers additionally distinguish between the two species via the terms, **katot palao'an** and **katot låhi**, respectively. The term **katot** is translatable and refers to both trees' irritant qualities of, respectively, their urticating hairs and milky sap. This characteristic can also account for additional names recorded for the latter species, interpreted here as **kalekñao** and **inafok**. The tree *C. marianum* has also been mistakenly referred to as **panao** beginning early in the botanical literature, a name restricted in the Marianas to another tree *Guettarda speciosa* (Rubiaceae).

This nomenclatural exploration began as a short note to document an indigenous name of a single species of plant. Instead, a complicated history was uncovered of dubious ascriptions veiled in bespoke orthographies spanning centuries and involving several, sometimes otherwise unidentified trees. Numerous other Chamoru names for species are lacking a written record or display non-standard orthographies in recent botanical accounts of the Marianas. In addition to consultation with Chamoru speakers possessing expertise in agriculture and traditional medicine, some fraction of these terms may also be available and their history probed in the considerable scientific record of botany in the Mariana Islands.

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