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# Novitates neocaledonicae XI: A new endemic species of *Garcinia* L. (Clusiaceae), with an emended description of *G. virgata* Vieill. ex Guillaumin

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**ABSTRACT**
A new species, *Garcinia urceolata* Munzinger, Bruy & M.Pignal, sp. nov. (Clusiaceae), is described from New Caledonia. It is restricted to North Province, from the Tchamba valley in the south to Mandjélia in the north of the main island of Grande-Terre, occurring in dense humid rainforests on non-ultramafic substrate. Material of this small tree species was first collected more than fifty years ago but was confused with *G. virgata* Vieill. ex Guillaumin as both taxa have small leaves. *Garcinia urceolata*, sp. nov. differs from *G. virgata* in a number of features of the leaves, flowers and fruits. *Garcinia urceolata*, sp. nov. also grows at higher elevation and in wetter conditions than *G. virgata*. Both species are purported to have dehiscent fruit, along with other New Caledonian members of the genus, a distinctive character that was used to justify the description of the genus *Septogarcinia* Kosterm., which is no longer regarded as distinct from *Garcinia* L. Line drawings and colour photos are provided for both the new species and for *G. virgata* for comparison, along with a preliminary risk of extinction assessment for each of them, which indicates that *G. urceolata*, sp. nov. is Vulnerable (VU) while *G. virgata* is Near Threatened (NT).

**KEY WORDS**
Clusiaceae,
*Garcinia*,
New Caledonia,
conservation,
lectotypification,
new species.

**RÉSUMÉ**

*Novitates neocaledonicae XI : Une nouvelle espèce endémique de* Garcinia *L. (Clusiaceae), avec la description amendée de* G. virgata *Vieill. ex Guillaumin.*

Une nouvelle espèce, *Garcinia urceolata* Munzinger, Bruy & M.Pignal, sp. nov. (Clusiaceae), est décrite pour la Nouvelle-Calédonie. Elle est restreinte à la Province Nord sur l'île principale de la Nouvelle-Calédonie (Grande-Terre), connue de la vallée de la Tchamba au sud de la province à Mandjélia au nord, en forêt dense humide sur des substrats non ultramafiques. Ce petit arbre avait été récolté il y a plus de cinquante ans, mais il avait été confondu avec *G. virgata* Vieill. ex Guillaumin car les deux espèces ont de petites feuilles. *Garcinia urceolata*, sp. nov. se distingue de *G. virgata* par un certain nombre de caractéristiques des feuilles, des fleurs et des fruits. Il pousse également plus en altitude et dans des conditions plus humides. Les deux espèces sont supposées avoir des fruits déhiscents, comme plusieurs espèces de la Nouvelle-Calédonie, un caractère distinctif qui a été utilisé il y a longtemps pour justifier la description du genre *Septogarcinia* Kosterm., mais que nous n'avons pas retenu pour distinguer ce genre de *Garcinia* L. Des dessins au trait et des photos couleur sont fournis pour la nouvelle espèce et pour *G. virgata* à titre de comparaison, ainsi qu'une évaluation préliminaire du risque d'extinction, qui indique que *Garcinia urceolata*, sp. nov. est Vulnérable (VU), tandis que *G. virgata* a pour statut Near Threatened (NT), « Quasi menacé ».

**MOTS CLÉS**
Clusiaceae,
*Garcinia*,
Nouvelle-Calédonie,
conservation,
lectotypification,
espèce nouvelle.

## INTRODUCTION

*Garcinia* L. contains approximately 260 species, which are mainly confined to the tropics (Jones 1980; Stevens 2007), and is usually regarded as a taxonomically difficult genus (Sosef & Dauby 2012). Since Linneaeus' description, *Garcinia* has been divided into many sections, which were reduced to 14 in an unpublished thesis by Jones (1980), most of which are supported by molecular work (Sweeney 2008). Only two of these sections (*Mungotia* and *Discostigma*) occur in New Caledonia (Jones 1980; Sweeney 2008).

Observations made in 2007 by one of us (JM) at the herbarium of New Caledonia (NOU, acronyms follow Thiers 2020) showed that the material identified as *Garcinia virgata* appeared to be very heterogeneous. Observations of fruiting material in the field confirmed that there appeared to be two taxa, one with a large fleshy fruit with a thick pericarp, and another with smaller fruit with a thin pericarp, but whose leaves were very similar. It was not until an expedition to Mount Katapupaik, organized by the program "Our Planet Reviewed/La Planète Revisitée" (http://www.laplaneterevisitee.org/fr), that we had the chance to see both species in bloom simultaneously, with male and female flowers (Munzinger *et al.* 2018). This allowed us to confirm that they were indeed two species, that looked very similar on sterile herbarium specimens but were quite distinct from one another in the morphology of their reproductive organs.

The fruit of most species of *Garcinia* is an indehiscent drupe or berry (Stevens 2007), and for this reason, Kostermans (1962) described the genus *Septogarcinia* for a species from Sumbawa that has a capsular fruit (*Septogarcinia sumbawaensis* Kosterm.). Corner (1976) disagreed with the generic delimitation of Kostermans, and Jones (1980) in her dissertation thesis, synonymized *Septogarcinia* with *Garcinia* sect. *Brindonia,* indicating that she planned to transfer Kostermans's species to *Garcinia* (using a replacement name as a *nomen novae* because the name *Garcinia sumbawensis* Lauterb. already existed), but she failed to make a valid combination. No material of this species was included by Sweeney (2008) in his molecular phylogenetic study, but its characters were coded for the morphological phylogenetic work of Ruhfel *et al.* (2013). Finally, the combination was later made in *Garcinia* (Medellín-Zabala & Marinho 2015), but these authors created a later homonym. Kostermans was obviously unaware that several species of New Caledonian *Garcinia*, viz. *G. virgata* Vieill. ex Guillaumin, *G. neglecta* Vieill., and *G. comptonii* Baker f. all have capsular fruits, and should therefore also have been placed in *Septogarcinia* as he conceived it. Jones (1980) likewise did not cite any of these species, otherwise she probably would have assigned them to *G.* sect. *Brindonia*. All these species, including the new species described in the present paper, are currently included in a phylogenetic study to test the taxonomic value of fruit dehiscence in relation with sections delimitation.

We have long been certain that there must be two species currently confused under *G. virgata*, mainly because of the fruit. The male and female flowers remained to be observed in the field. Their recent observation now allows us to characterize the two entities morphologically well, to emend the description of *G. virgata*, which is so far known only from the short diagnosis of Guillaumin (1942), and to describe the second species which is new to science, which we call *Garcinia urceolata* Munzinger, Bruy & M.Pignal, sp. nov. Each species is illustrated, along with a plate of photographs in the field and a distribution map is provided. A preliminary conservation status following IUCN (2012) criteria is also given.

## MATERIAL AND METHODS

All material of *Garcinia* collected in New Caledonia from NOU, MPU and P was studied. Scans of specimens at K and Z have been seen through their websites, respectively

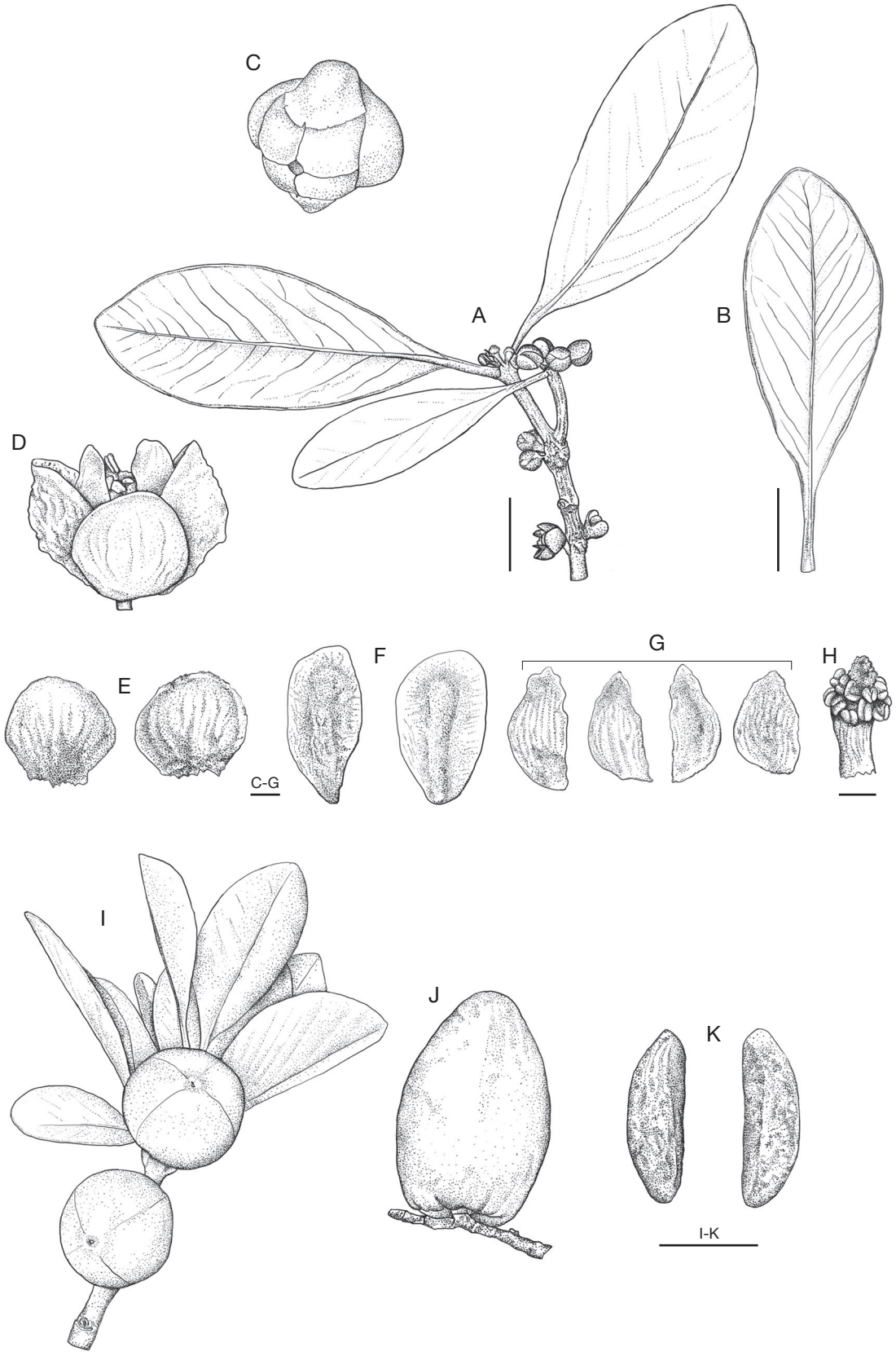


Fig. 1. — *Garcinia urceolata* Munzinger, Bruy & M.Pignal, sp. nov.: **A**, flowering branch; **B**, abaxial surface of leaf; **C**, male flower (fresh); **D**, male flower (in herb.); **E**, adaxial (**left**) and abaxial (**right**) surfaces of external sepals; **F**, adaxial (**left**) and abaxial (**right**) surfaces of internal sepals; **G**, petals; **H**, androecium; **I,** fruiting branch with globose fruits; **J**, pyroid fruit; **K**, seeds. **A**, **B**, **D-H,** *McPherson 4065* (NOU); **B**, from *Munzinger et al. 4708* (NOU); **I**, from photo by P. Lowry, not vouchered; **J**, from photo by D. Létocart, not vouchered; **K**, *Munzinger et al. 3554* (P). Drawings by Laurence Ramon. Scale bars: A, B, I-K, 1 cm; C-H, 1 mm.

https://apps.kew.org/herbcat/navigator.do and https://www.herbarien.uzh.ch/en.html. In addition, we consulted two virtual collections: Global Plant initiative (https://plants.jstor.org/) and RECOLNAT (https://www.recolnat.org/fr/) to locate additional material. When geo-coordinates were not indicated on original labels of herbarium specimens, they were calculated post-facto using MacKee's gazetteer (available at http://phanero.novcal.free.fr/index-georeference-deprospectionbotanique.html, last consulted on 25th March, 2020) and are provided in square brackets. Morphological descriptions were prepared using standard terminology from Harris & Harris (2001). When the herbarium material was adequate, multiple measurements were made on each of the various organs, in which case the values given are the minimum, the first quartile, the third quartile, and the maximum. When two values are given separated by the symbol "×", the first value is always the length, and the second is the width (or diameter). For virtual measurements made on scanned images, we used the "annotate" tool developed by the RECOLNAT infrastructure (https://www.recolnat.org/fr/annotate). We applied the IUCN Red List Categories and Criteria (IUCN 2012; IUCN Standards & Petitions Subcommittee 2019) to assess the risk of extinction of the new species. We calculated Extent Of Occurrence (EOO) and Area Of Occupation (AOO) (using a 2 × 2 km grid) using the online "geocat" software (http://geocat.kew.org; Bachman *et al.* 2011).

## TAXONOMIC TREATMENT

Family Clusiaceae Lindl.
Subfamily Clusioideae Burnett
Tribe Garcinieae Choisy in DC.
Genus *Garcinia* L.

### ***Garcinia urceolata*** Munzinger, Bruy & M.Pignal, sp. nov. (Figs 1; 2; 3)

*G. virgato* Vieill. ex Guillaumin *similis, sed cum obtusiore apice et acutiore base foliis obovatis (vs elliptica), longiore petiolo (6-8 vs 3-4 mm), viridulis urceolatis floribus (vs luteolos cupuliformes), staminibus 20 in columna insertis (vs 30 in columna non inserta), ovario oblato,* c. *1.5 × 3 mm (vs globosum,* c. *2 × 2 mm), stigmate late elliptico (vs quadrangulare cornutum), globoso-pyriforme fructu (23 × 15-21 mm) vs minus obovatumque (11-18 × 8-12 mm), crasso pericarpio (> 3 mm) vs tenue (< 1 mm) praecipue differt.*

Typus. — **New Caledonia**. Roches de la Ouaième, 20°38'17"S, 164°52'1"E, 764 m, 26.XI.2019, fleur verte, fruit vert, *J. Munzinger, G. McPherson & D. Bruy 8115* (holo-, P[P00864939!], iso-, G, MPU[MPU312616!]), NOU[NOU090534!]).

Etymology. — The species is named after the small urn (Latin: *urceus*) shaped fresh flowers, with a small apical opening (Figs 1C; 2E).

Distribution. — *Garcinia urceolata*, sp. nov. ranges from the Tchamba River valley at its southern limit to Mandjélia in the north, and occurs from 520 to 950 m elevation (Fig. 3).

Habitat and ecology. — The species is restricted to dense humid forest on non-ultramafic substrate.

Phenology. — Buds were observed in August, flowers in October-November, green fruit in November and January-February, and mature fruits in March-April.

Conservation status. — *Garcinia urceolata*, sp. nov. is known from eight subpopulations, three of which occupy two adjacent 2 × 2 km grid cell giving an EOO of 1185 km² and an AOO of 48 km². Two of the subpopulations occur in North Province in the "*Réserve de nature sauvage du mont Panié*", the other six subpopulations falling outside protected areas. The species can be locally abundant (Roches Ouaième) but is threatened by bushfires and invasive browsers in at least some localities (respectively Tchamba, Roches Ouaième, Atéou and Panié). These threats are responsible for an estimated decline in habitat quality and the number of mature individuals of this species. In Tchamba and Roches Ouaième, the species was observed both in burnt edge and heartwood forests (unlikely bushfires). Fire being the main threat to this species, the number of locations (*sensu* IUCN 2012) is therefore 10. We consequently assign a preliminary conservation status of Vulnerable (VU B1ab(iii,v)+2ab(iii,v)) to *G. urceolata*, sp. nov. using the IUCN Red List criteria (IUCN 2012).

Vernacular name. — Unknown.

Additional material examined. —New Caledonia: Vallée de la Tchamba, exploitation Létocart, 21°0'20"S, 165°14'2"E, 520 m, 13.I.2009, Lisière de forêt dense humide, fr., *L. Barrabé, D. Létocart, I. Létocart & A. Morignat 835* (NOU[NOU033932], P[P04899833]); Crête entre Haute Tchamba et Haute Amoa (Expl. For. Létocart), 600 m, [21°0'54"S, 165°14'11"E], 14.I.1966, Forêt humide, fr., *H.S. MacKee 14248* (P[P04666014]); Massif Ton-Non: Secteur Sud, 800-900 m, [20°39'1"S, 164°51'45"E], 21.III.1968, Forêt humide, très dense, ripe fr., *H.S. MacKee 18541* (NOU[NOU018078], P[P04667145]); Pouébo : Crête entre Mandjélia et Salandané, 600 m, [21°0'54"S, 165°14'11"E], 26.II.1970, Forêt humide, fr., *H.S. MacKee 21643* (NOU[NOU018077], P[P04898188]); Pouébo : Mt. Mandjélia, 600-750 m, [20°23'45"S, 164°31'25"E], 29.XI.1972, Forêt humide, fl., *H.S. MacKee 25920* (P[P04898186]); Pouébo : Mt. Mandjélia, 750 m, [20°24'2"S, 164°31'41"E], 14.II.1977, Forêt basse humide, jfr., *H.S. MacKee 32775* (NOU[NOU018079], P[P04665835]); Massif Ton-Non, 650 m, [20°38'7"S, 164°52'17"E], 20.X.1977, fl., *H.S. MacKee (leg. Cherrier) 34095* (NOU[NOU018068], P[P04665820]); Pouébo, Mt. Mandjélia, 750 m, [20°24'2"S, 164°31'41"E], 9.I.1981, Forêt humide, green fr., *H.S. MacKee 38538* (NOU[NOU018067], P[P04665819]); Mt. Panié, 950 m [-20.58139, 164.77556], 1.IV.1981, fr., *G. McPherson 3708* (MO, P[P04667141]); Below radio tower at Mandjélia, above Pouébo, 700 m, [20°24'9"S, 164°31'28"E], 18.VIII.1981, Forested slopes, bt., *G. McPherson 4065* (MO, NOU[NOU018085], P[P04667139]); Mt. Panié, above Haut Coulna, on SW forested slopes, 20°36'82"S, 164°44'40"E, 970-1060 m, 29.X.1999, fl., *G. McPherson & H. van der Werff 17799* (MO, NOU[NOU018083]); Mt. Panié, above Haut Coulna, on SW forested slopes, 20°36'82"S, 164°44'40"E, 970-1060 m, 29.X.1999, fl., *G. McPherson & H. van der Werff 17803* (MO, NOU[NOU018084]); Mt Colnett, forested eastern slopes, 20°30'00"S, 164°42'52"E, 1000 m, 29.X.2003, fl., *G. McPherson, U. Swenson & A. Mouly 19032* (MO, NOU[NOU004326]); Mt Colnett, forested eastern slopes, 20°29'13"S, 164°42'39"E, 800-925 m, 02.XI.2003, fl., *G. McPherson, U. Swenson & A. Mouly 19160* (MO, NOU[NOU004343]); Province Nord, Roches de la Ouaième, *c.* 750 m, [20°38'24"S, 164°51'55"E], 28.X.2005, fl., *J. Munzinger, P.P. Lowry, H. Blaffart & E. Brown 3129* (NOU[NOU009686], P[P04899853, P04899854]); Panié, 900 m, [20°34'37"S, 164°46'46"E], 15.II.2006, fr., *J. Munzinger, I. Spir, Y. Pillon, C. Grignon & M. Wanguene 3554* (NOU[NOU014114], P[P04899832]); Mont Panié, versant Sud, cascade de la Guen, 20°37'28"S, 164°46'57"E [585 m], 3.IV.2007, jfr., *J. Munzinger, H. Blaffart, M. Wanguene, O. Chapelle & J. Tiavouane 4300* (NOU[NOU021353], P[P04897539]); Mandjélia, sous l'antenne,


FIG. 2. — *Garcinia urceolata* Munzinger, Bruy & M.Pignal, sp. nov.**: A**, habit; **B**, aspect of bark and sapwood; **C**, leaves; **D**, latex (cross section of a leafy branch); **E**, female flowers and young fruit; **F**, pyroid fruit; **G**, globose fruit; **H**, cross and longitudinal section of globose fruit and seed; **A**, **B**, *Munzinger et al. 8162*; **C**-**E**, **G**, *Munzinger et al. 8115*; **F**, **H**, not voucher. **A**-**E**, **G**, Photos by J. Munzinger; **C**, photo D. Létocart; **H**, photo P. Lowry.

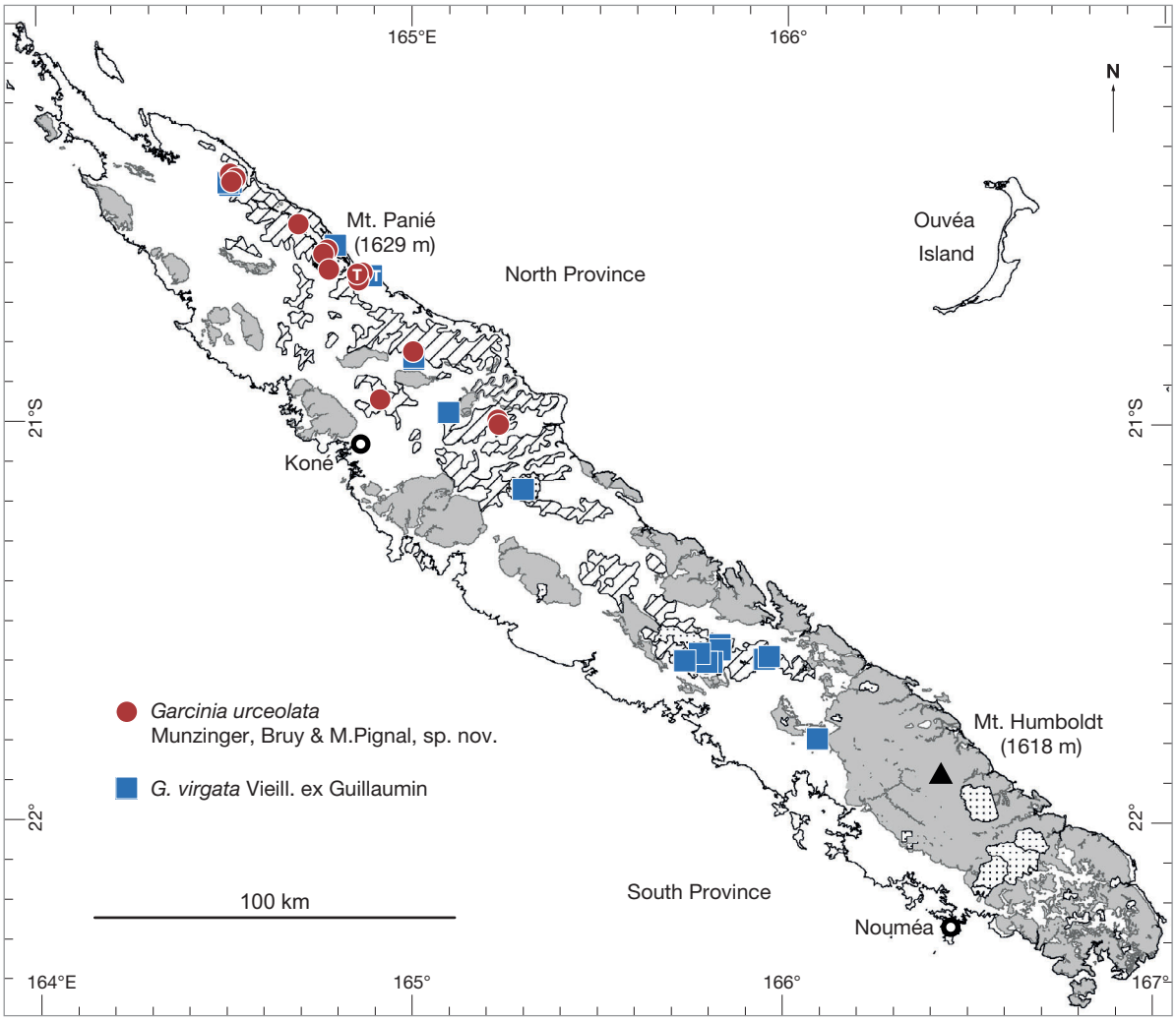


FIG. 3. — Distribution of *Garcinia urceolata* Munzinger, Bruy & M.Pignal, sp. nov. and *G. virgata* in New Caledonia. Areas filled in grey indicate ultramafic substrate; dotted areas indicate protected areas; crosshatching indicates dense humid forests (from Jaffré *et al.* 2012). The collection localities of types specimens are indicated by a white "T".

750 m, [20°23'51"S, 164°31'53"E], 14.XI.2007, fl., *J. Munzinger 4708* (NOU[NOU029109]); Roches de la Ouaième, Panié, Wayem Parcelle 2, 20°38'27"S, 164°52'17"E, 607 m, 3.XI.2010, Forêt sur pente, fl., *J. Munzinger, V. Hequet, H. Vandrot, I. Pounds & J.-P. Butin 6125* (NOU[NOU063303], P[P00903334, P00903335]); Roches de la Ouaième, Panié, Parcelle 4, 20°38'29.8"S, 164°51'40.9"E, 900m, 4.XI.2010, fl., *J. Munzinger, V. Hequet, H. Vandrot, P. Birnbaum & I. Pounds 6146* (NOU[NOU063324]); Roches de la Ouaième, 20°38'20"S, 164°52'6"E, 704 m, 26.XI.2019, fleur verdâtre, *J. Munzinger, G. McPherson & D. Bruy 8112* (G, MPU[MPU312618]), NOU[NOU090660], P[P00864992]); Koné, Atéou, 20°57'7"S, 164°55'8"E, 731 m, 1.XII.2019, fleur verte, *J. Munzinger, G. McPherson, D. Bruy, H. Vandrot, C. Laudereau, H. Cazé & J.-P. Butin 8162* (MPU[MPU312628], NOU[NOU090661], P[P00864986]); Piémont (versant sud) du Ka[n]talupaik, sommet de la chaîne de l'Inédète, 20°49'56"S, 165°0'25"E, 805 m, 31.X.2017, fl., *M. Pignal, J. Munzinger & D. Bruy 5254* (MO, MPU[MPU1180002], NOU[NOU090541], P[P01073104]).

## DESCRIPTION

Dense shrub, 2-3 m tall or tree to 5-8 m, 7-15 cm DBH, bark grey; sapwood cream; young branchlets opposite decussate, quadrangular in section, becoming terete; latex yellow in trunk and twigs; all parts glabrous. Leaf blade obovate to widely obovate, (17-)43-60(-89) × (11-)16-21(-34) mm, chartaceous to slightly coriaceous, longitudinal black lines on both surfaces sometimes present *in sicco*.; base attenuate, forming an acute angle of (19-)33-45(-76) degrees; margin slightly to strongly revolute, sometimes with a thin hyaline fringe; apex rounded, rarely slightly obtuse and forming an angle of (69-)92-113(-124) degrees; midvein slightly prominent adaxially, strongly prominent abaxially; lateral veins more or less visible on both surfaces *in herb.*, 8-12 pairs, the basal veins ascending to *c.* half of the blade length; petiole slightly canaliculate, (4.1-)6.1-8(-9.1) × (0.8-)1.0-1.2(-3.8) mm. Flowers solitary or grouped in axillary fascicles, usually borne just under the leafy part of the twigs, corolla urceolate, pale green in both sexes. Flower bracts ovate-triangular, 2 mm long × 1.7 mm wide, membranous, brownish, quickly caducous. Male flowers 1-4 per inflorescence; pedicel 2-4 × 2-2.5 mm. Sepals 4, glabrous, two external ones obovate, 4 × 4 mm, two internal ones widely-elliptic to oblong, 5-6 × 3-3.5 mm, 2 mm thick, margin not or only slightly membranous. Petals 4,

TABLE 1. — Comparison of morphological characters between *Garcinia urceolata*, sp. nov. and *G. virgata*. Leaf characters indicated by * are based on *c.* 500 measurements and are presented as (min-) **quartile 1-quartile 3** (-max). **, as the fruit is crushed into a herbarium, these values are approximate.

| Characters | *G. urceolata*, sp. nov. | *G. virgata* |
|---|---|---|
| Habit | shrub or tree | tree |
| Sapwood colour | cream (Fig. 2B) | pinkish (Fig. 5D) |
| Leaf blade form | mostly obovate or widely obovate | mostly elliptic |
| Leaf blade size (mm)* | (17-) **43-60** (-89) × (11-) **16-21** (-34) | (33-) **39-62** (-75) × (5-) **13-19** (-34) |
| Leaf apex | rounded, obtuse to sub-obtuse | acute to rounded |
| Leaf angle apex (°)* | (69-) **92-113** (-124) | (49-) **66-79** (-106) |
| Leaf base | attenuate | cuneate to attenuate |
| Leaf angle base (°)* | (19-) **33-45** (-76) | (19-) **39-50** (-71) |
| Leaf angle between primary and secondary veins* | (26-) **33-43** (-54) | (16-) **25-32** (-41) |
| Petiole size (mm)* | (4.1-) **6.1-8** (-9.1) × (0.8-) **1.0-1.2** (-3.8) | (1.9-) **3.1-4.3** (-7.6) × (0.6-) **0.9-1.3** (-1.8) |
| Corolla shape and colour (male & female) | urceolate, pale green | cup-like, yellowish |
| Number and fusion of stamens (male flowers) | 20 stamens with filaments fused into a distinct column | 30 stamens, distinct column absent |
| Ovary shape and size, stigma shape (female flowers) | ovary oblate, *c.* 1.5 × 3 mm, stigmata widely elliptic | ovary globose, *c.* 2 × 2 mm, stigmata 4-angle star-like |
| Fruit width (on dry material) (mm) | 35-123** | 8-12 |
| Fruit height (on dry material) (mm) | 19-53** | 11-18 |
| Pericarp texture | fleshy | coriaceous |
| Pericarp thickness | > 3 mm | ≤1 mm |
| Seed size (mm) | *c.* 18 × 6-7 | 8-11 × 3-5 |

elliptic, 4-5 × 3-3.5 mm, fleshy, apex obtuse and truncate. Stamens 20, filaments fused into a distinct column 1 mm high, anthers *c.* 0.5 mm wide; rudimentary pistil conical, *c.* 1 × 1 mm, truncate at summit. Female flowers solitary, pedicel 1.5-2 mm long, 2-2.5 mm in diameter. Sepals 4, pale green, two external ones widely ovate, *c.* 3 × 3-4 mm, two internal ovate, 3 × 2.5 mm, margin not or only slightly membranous. Petals ovate, 4 × 2.5-3 mm, fleshy, connate in basal quarter. Staminodes 0. Ovary oblate, *c.* 1.5 × 3 mm, glabrous, 4-locular, vertically grooved; stigma widely elliptic, warty, pale yellow. Fruit globose-pyroid, 23 × 15-21 mm in fresh material (crushed *in herb.* 35-123 × 19-53 mm), dehiscence not observed (but expected), the pericarp 3.5-6 mm thick, surface smooth, fleshy, probably green when mature, yellow inside. Calyx persistent. Peduncle *c.* 2 mm × 3 mm. Seeds 1-4, ellipsoid, sometimes slightly compressed laterally, *c.* 18 × 6-7 mm, surface with irregular longitudinal lines, brown-blackish, tegument thin, fleshy and orangish.

### TAXONOMIC NOTE

*Garcinia urceolata*, sp. nov. probably belongs to Sect. *Brindonia* (Thouars) Choisy, but further studies, including phylogenetic ones, are needed.

### SPECIES RECOGNITION

With its small leaves and its general architecture, *Garcinia urceolata*, sp. nov. could only be confused with *G. virgata* Vieill. ex Guillaumin. Table 1 compares the main morphological characteristics of these two species. Herbarium specimens without reproductive organs can be difficult to identify. Leaf shape in *G. urceolata*, sp. nov. is usually obovate or broadly obovate, with an apex rounded, obtuse to sub-obtuse, whereas the leaves of *G. virgata* are elliptic with an acute apex, but intermediates exist; the size of the petiole makes it easier to distinguish the material, even if some values overlap. The colour of the bark and of the sapwood are apparently reliable characters for identifying sterile material, and should be carefully noted in the field. Moreover, *G. urceolata*, sp. nov. has been recorded from 520 to 950 m in elevation while *G. virgata* occurs at lower elevations (50 to *c.* 650 m). Some individuals of *G. urceolata*, sp. nov. have been observed in November bearing both open flowers and almost mature fruits (See *Munzinger et al. 8115*; Fig. 2E; G) while specimens of *G. virgata* have only flowers or fruits, never both. Variation in the shape of the fruit (globose to pyroid) might be related to the maturity of the fruit, but this remains to be verified.

## ***Garcinia virgata*** Vieill. ex Guillaumin
(Figs 3; 4; 5)

*Bulletin du Muséum national d'Histoire naturelle, Série 2*, 14: 149 (1942). — Type: New Caledonia, Wagap, 1861-67, *Vieillard 2362* (lecto-, P[P04667134]!, here designated; possible isolecto-, K[K000677836] photo seen, P[P04667133, P04667135, P04667138]!).

*Garcinia virgata* (Vieill. ex Guillaumin) Govaerts, comb. superfl., *Skvortsovia* 4: 83 (2018).

ETYMOLOGY. — At the time of its description, *Garcinia virgata* was the New Caledonian member of the genus with the smallest leaves and twigs, and it may have been named based on this aspect, one meaning of virgate being "with long, slender twigs'" (Short & George 2013). Alternatively, the author may have noticed the black lines often present on the leaf-blade (especially on the type) and used virgate in its other sense, i.e. "streaked or striped" (Short & George 2013).

DISTRIBUTION. — *Garcinia virgata* is known from Haute-Ouenghi in the south to Forêt Frouin in the north of Grande-Terre (Fig. 3).

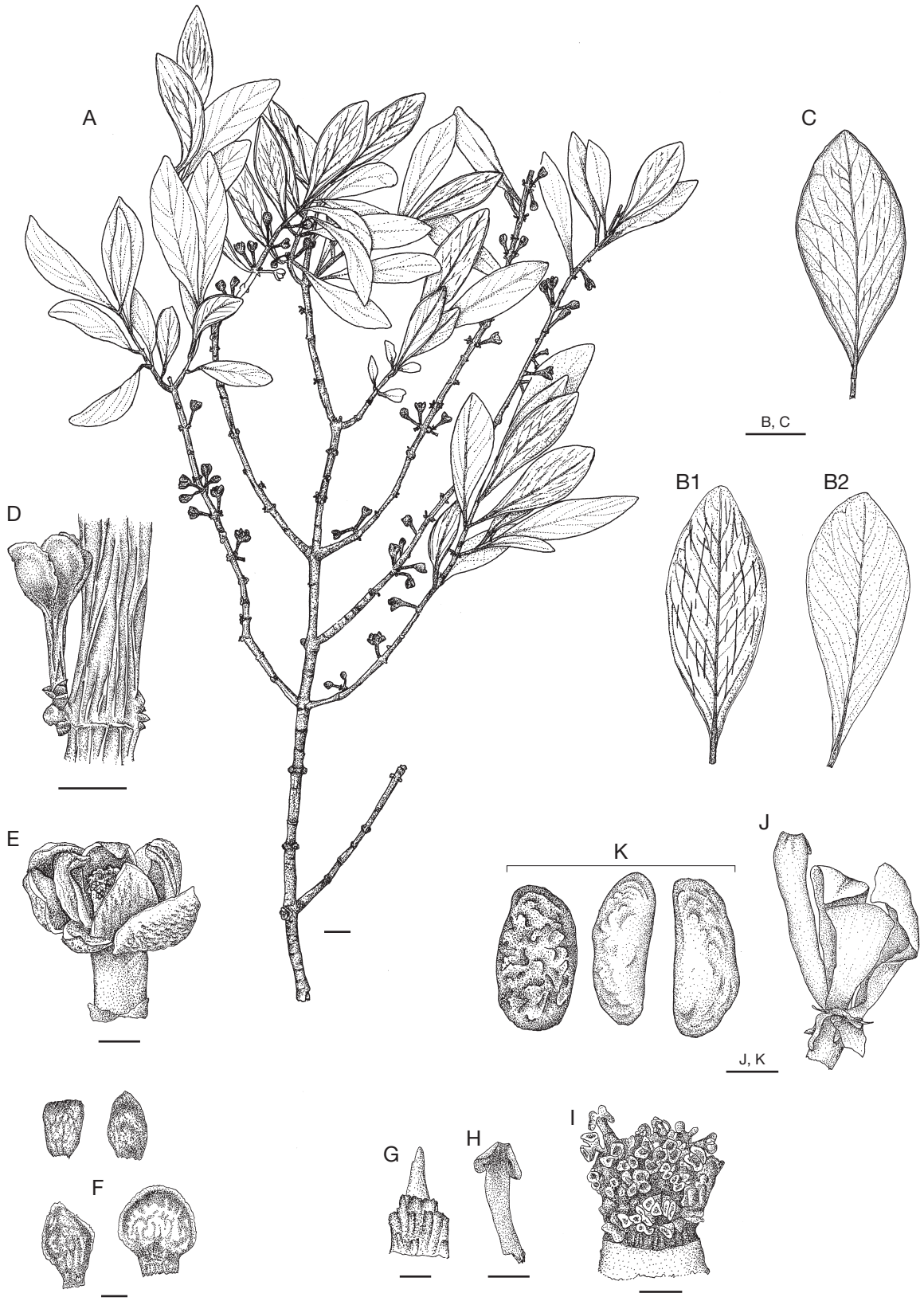


FIG. 4. — *Garcinia virgata* Vieill. ex Guillaumin: **A**, flowering branch; **B1**, **B2**, adaxial surface of leaves; **C**, abaxial surface of leaf; **D**, flower and aspect of twig; **E**, male flower (in herb.); **F**, inner and outer surfaces of sepals; **G**, pistillode; **H**, stamen; **I**, androecium; **J**, fruit opening by four valves; **K**, dorsal and lateral surfaces of the seed; **A**-**I**, *McPherson 6122* (NOU); **K**, *Munzinger et al. 7258* (P, MPU). Drawings by Laurence Ramon. Scale bars: A-C, 1 cm; D, J, K, 2 mm; E, F, I, 1 mm; G, H, 0.5 mm.


FIG. 5. — *Garcinia virgata* Vieill. ex Guillaumin: **A**, habit; **B**, trunk; **C**, pruinose twig with one leaf removed, showing yellow latex; **D**, sapwood; **E**, male flower; **F**, female flower; **G**, fruit; **H**, fruits, seed, adaxial surface of leaf; **A**-**D**, **G**, **H**, *Munzinger et al. 7258*; **E**, *Munzinger et al. 8015*; **F**, *Munzinger et al. 8015bis*. Photos by J. Munzinger.

Habitat and ecology. — This species can be locally quite common in dense humid forest, especially along forest edges, but it also grows in drier conditions, in what some authors call "mesic forest" (Munzinger & Gâteblé 2017), currently included within dense humid forests *sensu* Jaffré *et al.* (2012), which still need to be more clearly characterized (Jaffré *et al.* 2008). *Garcinia virgata* occurs from 50 to *c.* 650 m in elevation, on non-ultramafic substrate, and is probably under-collected.

Phenology. — Buds were collected in October-November, and flowers in (end of October-) November and December, while the end of fruiting was observed in March-April.

Conservation status. —*Garcinia virgata* is known from 12 subpopulations, three of which occupy two adjacent 2 × 2 km grid cell, and one of which occupy three adjacent grids. The calculated EOO is 2604 km² and the AOO is 68 km². In North Province, one subpopulation occurs in the "*Réserve de nature sauvage du massif de l'Aoupinié*" and another one is found in the "*Réserve de nature sauvage du mont Panié*". In South Province, one subpopulation occurs in "*Parc des Grandes Fougères*" reserve. The other 9 sub-populations fall outside protected areas. The plant can be locally very abundant (Mandjélia, Katalupaik, Farino) and, although some sub-populations may be threatened by bushfires and/or introduced browsers, we counted 12 locations (*sensu* IUCN). Since the number of locations is a few more than 10 and the species is threatened in some sites, we assign *Garcinia virgata* a preliminary status of Near Threatened (NT) using the IUCN Red List criteria (IUCN 2012).

Vernacular name. — Unknown.

Additional material examined. —**New Caledonia**. Koindé-Canala, 21°36'S, 165°58'E, 600 m, 24.XI.77, buds, *P. Bamps 5828* (NOU[NOU018088]); Mandjélia, 20°24'16.711"S, 164°31'1.265"E, 545 m, 24.IX.2019, bt., *D. Bruy & A. Pagenaud 1437* (MPU312913, NOU[NOU106906], P); Farino, parc des Grandes Fougères, 21°36'27"S, 165°44'15"E, 561 m, 21.X.2008, buds, *G. Dagostini, C. Grignon, W. Nigote & V. Apiazari 1620* (NOU[NOU050015], P[P04899873]); Aoupinié, route d'exploitation forestière à gauche, au niveau de l'esplanade, [21°9'34"S, 165°20'17"E, 422 m], 10.VI.2002, st., *V. Dumontet, Y. Blanchard & P. Maituku 151* (NOU[NOU090550]); Parc des Grandes Fougères, 21°37'20"S, 165°45'55.81"E, 8.XI.2012, bt., *V. Hequet 4076* (NOU[NOU082835]); Mandjélia, 20°24'15.1"S, 164°31'13.38"E, 15.X.2016, bt., *V. Hequet 4420* (NOU[NOU085463]); Aoupinié, [21°10'40"S, 165°18'12"E], 14.X.1999, bt., *M. Litaudon, M. Adenot & P. Maituku 182* (NOU[NOU090542]); Col Amieu : Route du Col Toma, [21°36'45"S, 165°47'54"E], 400 m, 19.IV.1965, old fr., *H.S. MacKee 12464* (P[P04898220]); Col Toma, 400 m, [21°35'17"S, 165°46'36"E], 6.X.1967, bt., *H.S. MacKee 17613* (NOU[NOU018065], P[P04244754]); Haute Diahot: Tendé (Expl. For. Frouin), 500-600 m, [20°24'37"S, 164°31'18"E], 12.XII.1968, fl., *H.S. MacKee 19986* (NOU[NOU018066], P[P04666034]); Cascade de Ciu to Koindé and La Foa, *c.* 650 m, [21°35'44"S, 165°57'54"E], 10.XII.1983, male fl., *G. McPherson 6122* (MO, NOU[NOU017914], P[P04666749]); Along old lumber road south from road leading from Cascade de Ciu toward Koindé and la Foa, 650-700 m, [21°35'44"S, 165°57'54"E], 13.III.1984, green fr., *G. McPherson 6402* (MO, P[P04666762]); Mandjélia, 20°24'17"S, 164°31'1"E, 558 m, 25.XI.2019, fleur jaune, *J. Munzinger, G. McPherson, D. Bruy & D. Fleurot 8107* (MPU[MPU312620], NOU[NOU090662], P[P00864946]); Mandjélia, 20°24'17"S, 164°31'1"E, 558 m, 25.XI.2019, fleur jaune, *J. Munzinger, G. McPherson, D. Bruy & D. Fleurot 8103* (MPU[MPU312621], NOU[NOU090663], P[P00864963]); Amieu, [21°53'54"S, 165°49'58"E], 16.XI.2007, st. (but fruits collected on the ground 26.III.2007), *J. Munzinger 4818* (NOU[NOU029080], P[P04788067]); Haute Ouenghi, prop. Hugo Gérard, 21°48'4"S, 166°5'46"E, 475 m, 12.IV.2014, fr., *J. Munzinger et al. 7258* (MPU[MPU312294], NOU[NOU052208], P[P01044673]); Flanc sud du Ka[n]talupaik, 20°50'49"S, 165°0'37"E, 390 m, 29.X.2017, Lisière de forêt humide, male fl., *J. Munzinger, D. Bruy & M. Pignal 7982* (MPU[MPU311516], NOU[NOU090343], P[P01073357]); Flanc sud du Ka[n]talupaik, 20°50'49"S, 165°0'37"E, 390 m, 1.XI.2017, Lisière de forêt humide, male fl., *J. Munzinger, D. Bruy & M. Pignal 8015* (MPU[MPU311510), NOU[NOU090342], P[P01073381]); Flanc sud du Ka[n]talupaik, 20°51'7"S, 165°0'34"E, 300 m, 2.XI.2017, male fl., *J. Munzinger, D. Bruy & M. Pignal 8034* (MPU[MPU311515), NOU[NOU090344], P[P01073372]); Piémont (versant sud) du Ka[n]talupaik, sommet de la chaîne de l'Inédète, 20°51'7"S, 165°0'28"E, 320 m, 28.X.2017, fl., *M. Pignal, J. Munzinger & D. Bruy 5177* (MPU[MPU311517); Col d'Amieu, forêt de Pembaï, [21°35'27"S, 165°50'33"E], 14.XI.1980, buds, *B. Suprin 904* (NOU[NOU017917]); Chute de Tao, , [20°34'13"S, 164°48'9"E, 50 m], 14.XII.1965, st., *J.-M. Veillon 561* (NOU[NOU018087]); Plateau de Tango : Haute Tiwaka, [20°57'59"S, 165°1'5"E], 20.X.1981, bt., *J.-M. Veillon 4639* (NOU[NOU018089], P[P04666744]).

## Note

Guillaumin's mention of "*C. virgata* Vieill. ex Guillaumin" (Guillaumin 1942: 149) was interpreted as *Clusia virgata* by Govaerts, who recently published the combination *Garcinia virgata* (Vieill. ex Guillaumin) Govaerts (Govaerts 2018). But Guillaumin clearly used the delimitation of the species and the choice of Vieillard's epithet, as all duplicates of the type material, "Vieillard 2362" (viz. K000677836, P04667133, P04667134, P04667135, and P04667138), are annotated by Vieillard's hand as "*Garcinia virgata,* Vieill.*"*. Moreover, in this paper, Guillaumin (1942) lists many species in different families, spelling out the genus name in full for the first species listed and then abbreviating it with its initial for all subsequent species, including for new species or combinations. Thus, it is clear that the "*C.*" in Guillaumin's protologue is nothing more than a typographical error that is to be correct (as per Article 60.1. of the Shenzhen Code; Turland *et al.* 2018). As a consequence, the new combination published by Govaerts (2018) was superfluous.

As the material is heterogeneous, we have selected a lectotype, choosing P04667134 which includes a hand drawing of a dissected flower.

Prenylated xanthones and tocotrienols were isolated from the stem bark of *Garcinia virgata* (Merza *et al.* 2004). The voucher for this analysis is *Dumontet 151*, wrongly cited as collected in the forest of Frouin in Mandjélia by Merza *et al.* (2004), whereas the specimen label indicates Aoupinié. We were able to verify the specimen and confirm that it was correctly assigned to this species.

## Amplified description

As the species newly described in this paper was previously included in the little-known *G. virgata*, we propose to emend the description of the latter, in order to clearly distinguish between the two species.

Trees up to 8 m tall, bark pale brown to grey, sapwood pinkish, young branchlets flattened to quadrangular, slightly

channeled, pruinose; latex yellow in trunk and twigs; all parts glabrous. Leaf blade obovate, narrowly obovate or elliptic, (33-)39-62(-75) × (5-)13-19(-34) mm, chartaceous to slightly coriaceous, dots or longitudinal black lines (up to 3 mm long) usually present *in sicco*.; base cuneate to attenuate, forming an angle of (19-)39-50(-71) degrees; margin flat to slightly revolute; apex acute to rounded, forming an angle of (49-)66-79(-106) degrees; midvein flat above, prominent below, lateral veins obvious on both surfaces *in sicco*., 8-10 pairs, the basal veins strongly ascending (to half or more of the blade length); petioles flat above, rounded below, (1.9-)3.1-4.3(-7.6) × (0.6-)0.9-1.3(-1.8) mm. Flowers solitary or grouped in axillary fascicles, mostly just under the leafy part of the twigs, corolla cup-like, yellowish on both sexes. Flower bracts round to narrowly elliptic, 1 × 0.5-1 mm. Male flowers 1-7 per inflorescence; pedicel 2-2.5 × 1 mm. Sepals 4, glabrous, two external ones slightly oblate, 2.5-3 × 3-3.5 mm, margin membranous, two internal ones elliptic, *c.* 2.5 × 2 mm. Petals 4, elliptic, 2-2.5 × 1.8-2 mm, fleshy, apex obtuse. Stamens *c.* 30, not forming a distinct column, anthers *c.* 0.5 mm wide; rudimentary pistil conical, *c.* 1 × 0.5 mm. Female flowers 1-3 per inflorescence, sessile or pedicel up to 2 mm long, 1 mm in diameter. Sepals 4, pale green, two external ones orbicular, *c.* 3-3.5 × 3-3.5 mm, two internal ones elliptic, *c.* 3 × 2 mm, margin membranous. Petals 4, 3 × 2 mm, fleshy, connate in basal half. Staminodes 0-2, slender, sagittate, filament to 1.5 mm. Ovary globose, *c.* 2 × 2 mm, glabrous, 4-locular, vertically grooved; stigma 4-angled, lobes warty, pale yellow. Fruit narrowly obovoid, 11-18 × 8-12 mm, smooth, dehiscent apically by four valves, pale brown when opening, the pericarp 0.5-1 mm thick. Calyx persistent. Peduncle *c.* 2-4 × 3 mm. Seeds 1-4, ellipsoid, sometimes slightly compressed laterally, 8-11 × 3-5 mm, surface ruminate, brown-blackish.

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