adansonia

2023 • 45 • 10

The French Polynesian *Atractocarpus* Schltr. & K.Krause (Rubiaceae): circumscription of *A. tahitensis* and description of *A. teamotuaitaui* sp. nov., both microendemic and critically endangered species in the Society Islands

Arnaud MOULY & Jean-François BUTAUD

art. 45 (10) — Published on 9 May 2023
www.adansonia.com

PUBLICATIONS SCIENTIFIQUES

MUSÉUM NAL HIST NATURELLE

Adansonia est indexé dans / Adansonia *is indexed in:*
– Science Citation Index Expanded (SciSearch®)
– ISI Alerting Services®
– Current Contents® / Agriculture, Biology, and Environmental Sciences®
– Scopus®

Adansonia est distribué en version électronique par / Adansonia *is distributed electronically by:*
– BioOne® (http://www.bioone.org)

Adansonia est une revue en flux continu publiée par les Publications scientifiques du Muséum, Paris
Adansonia *is a fast track journal published by the Museum Science Press, Paris*

Les Publications scientifiques du Muséum publient aussi / *The Museum Science Press also publish:* ***Geodiversitas***, ***Zoosystema***, ***Anthropozoologica***, ***European Journal of Taxonomy***, ***Naturae***, ***Cryptogamie*** **sous-sections** ***Algologie***, ***Bryologie***, ***Mycologie, Comptes Rendus Palevol***

Diffusion – Publications scientifiques Muséum national d'Histoire naturelle
CP 41 – 57 rue Cuvier F-75231 Paris cedex 05 (France)
Tél.: 33 (0)1 40 79 48 05 / Fax: 33 (0)1 40 79 38 40
diff.pub@mnhn.fr / http://sciencepress.mnhn.fr

ISSN (imprimé / *print*): 1280-8571/ ISSN (électronique / *electronic*): 1639-4798

The French Polynesian *Atractocarpus* Schltr. & K.Krause (Rubiaceae): circumscription of *A. tahitensis* and description of *A. teamotuaitaui* sp. nov., both microendemic and critically endangered species in the Society Islands

Arnaud MOULY
Université de Franche-Comté,
UMR 6249 Chrono-Environnement & Jardin botanique de Besançon,
16 route de Gray, F-25030 Besançon cedex (France)
arnaud.mouly@univ-fcomte.fr

Jean-François BUTAUD
Consultant en foresterie et botanique polynésienne,
boîte postale 52832, F-98716 Pirae, Tahiti (Polynésie française)
jfbutaud@hotmail.com

Submitted on 22 September 2021 | accepted on 26 September 2022 | published on 9 May 2023

Mouly A. & Butaud J.-F. 2023. — The French Polynesian *Atractocarpus* Schltr. & K.Krause (Rubiaceae): circumscription of *A. tahitensis* and description of *A. teamotuaitaui* sp. nov., both microendemic and critically endangered species in the Society Islands. *Adansonia*, sér. 3, 45 (10): 151-159. https://doi.org/10.5252/adansonia2023v45a10. http://adansonia.com/45/10

ABSTRACT
French Polynesia possesses the most eastward species of the genus *Atractocarpus* Schltr. & K.Krause in the Pacific Ocean. The genus was known from a single species in the Society Islands, *Atractocarpus tahitensis* (Nadeaud) Puttock, restricted to Tahiti and Raiatea. The species remained unseen there for more than a century. Field prospections from poorly explored altitudinal areas of Tahiti Nui allowed to find new populations of the species. Moreover, another taxon bearing very atypical features, including shortly petiolate and basally cordate leaves (vs long petiolate and basally attenuate leaves), is here recognized and described as a species new to science, *Atractocarpus teamotuaitaui* sp. nov., restricted to Tahiti's peninsula (Tahiti Iti). An identification key to species is provided, as well as a list of specimens, a morphological description, information on their phenology, distribution and ecology. Photos are presented for each species.

KEY WORDS
French Polynesia,
Society Islands,
Rubiaceae,
Gardenieae,
threats,
identification key,
new species.

RÉSUMÉ
Le genre Atractocarpus *(Rubiaceae) de Polynésie française : circonscription d'*A. tahitensis *et description d'*A. teamotuaitaui *sp. nov., deux espèces microendémiques et en danger critique d'extinction dans les Îles de la Société.*
La Polynésie française possède l'espèce la plus à l'Est du genre *Atractocarpus* Schltr. & K.Krause pour l'Océanie. Le genre n'était connu que d'une seule espèce dans les îles de la Société, *Atractocarpus tahitensis* (Nadeaud) Puttock, limitée à Tahiti et Raiatea. L'espèce y est restée non vue pendant plus d'un siècle. Des prospections de terrain dans des zones d'altitude et peu explorées de Tahiti Nui ont permis de trouver de nouvelles populations pour l'espèce. Par ailleurs, un autre taxon aux caractéristiques très atypiques, comme des feuilles brièvement pétiolées et cordées à leur base (vs feuilles longuement pétiolées et atténuées), est reconnu et décrit ici comme une espèce nouvelle pour la science, *Atractocarpus teamotuaitaui* sp. nov., restreinte à la presqu'île de Tahiti (Tahiti Iti). Une clé de détermination des espèces est fournie, ainsi qu'une liste du matériel, une description morphologique, la phénologie, la distribution et l'écologie. Une planche photographique est présentée pour chaque espèce.

MOTS CLÉS
Polynésie française,
Îles de la Société,
Rubiaceae,
Gardenieae,
menaces,
clé d'identification,
espèce nouvelle.

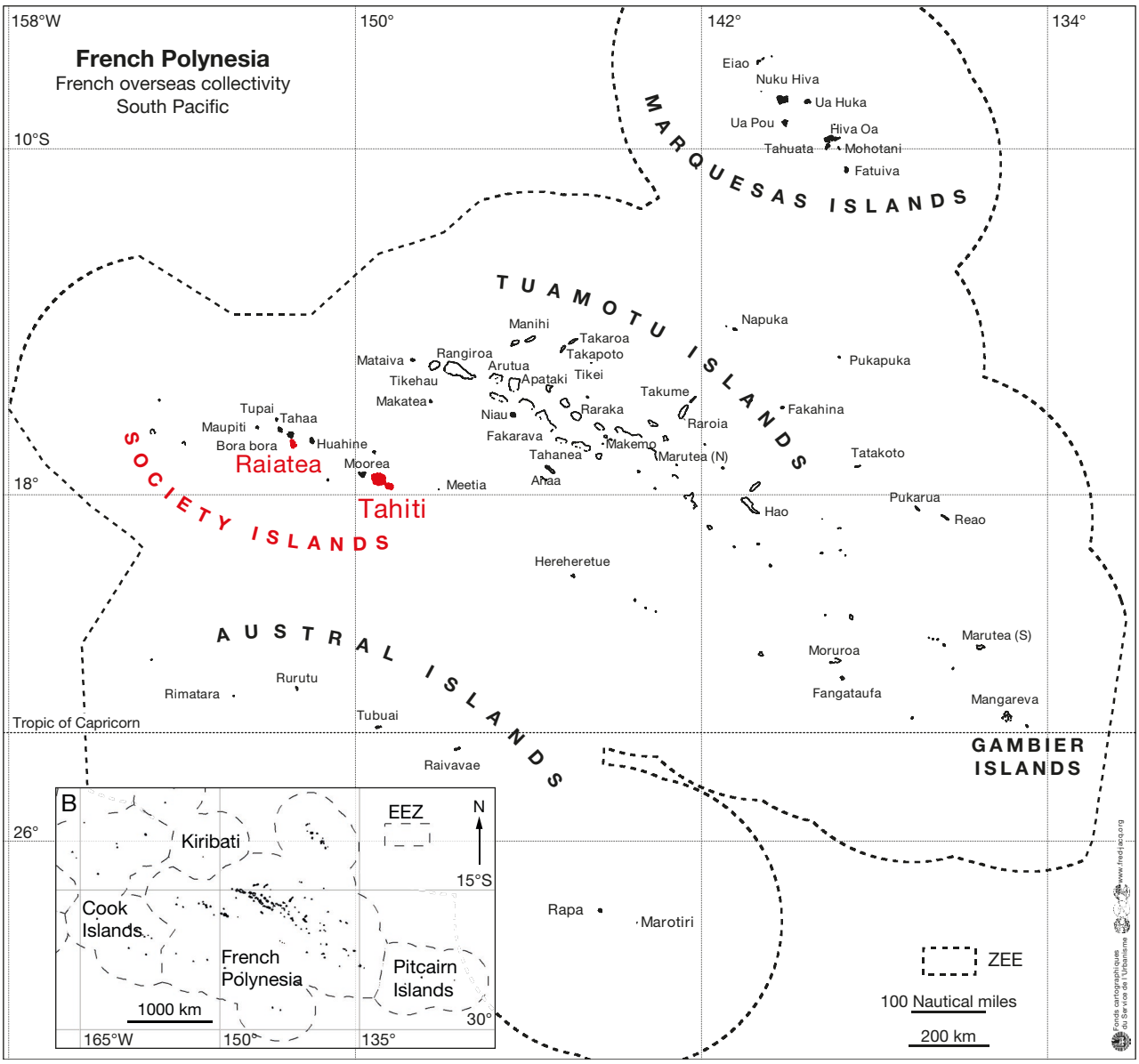

Fig. 1. — Map of French Polynesia archipelagos and main islands showing Tahiti and Raiatea (in red) among the Society Islands.

INTRODUCTION

The flora of the islands of French Polynesia forms a unique biodiversity within the global biodiversity hotspots due to their remoteness from continental areas. Indeed, given the long distances separating the Polynesian volcanic islands from Asia, Australia and America (about 6000 km), the taxonomic composition of the French Polynesian flora is not proportional to the world flora. According to Florence (1997), a significant taxonomic disequilibrium is notable with, for example, fewer Asteraceae than expected, representing *c.* 4.2% of the species (vs *c.* 8.4% in the World flora) and more Rubiaceae, the first plant-family in French Polynesia in number of species, with *c.* 9% of the species against (vs *c.* 4.2% in the World flora).

In French Polynesia, the Rubiaceae family includes around a hundred native species and a few species introduced long ago or recently for food, health care or ornament (Govaerts 2011). The most diverse genera of Rubiaceae in French Polynesia are *Psychotria* L. (tribe Psychotrieae), with 29 endemic species (Lorence *et al.* 2017; Butaud & Florence 2020), followed by the genus *Ixora* L. (tribe Ixoreae) with 19 endemic species. On the other hand, certain tribes, quite diverse elsewhere in the West Pacific Islands, are poorly represented in the South-Central Pacific Ocean. Indeed, the tribe Gardenieae consists of twelve species: *Gardenia carinata* Wall. ex Roxb., *Gardenia jasminoides* J.Ellis, *Gardenia mutabilis* Reinw. ex Blume, *Gardenia oudiepe* Vieill., *Gardenia taitensis* DC., *Gardenia tannaensis* Guillaumin, *Gardenia ternifolia* Schumach. & Thonn., *Gardenia thunbergia* Thunb., *Rosenbergiodendron formosum* (Jacq.) Fagerl., *Euclinia longiflora* Salisb., *Rothmannia longiflora* Salisb. and *Atractocarpus tahitensis* (Nadeaud) Puttock. Of these,

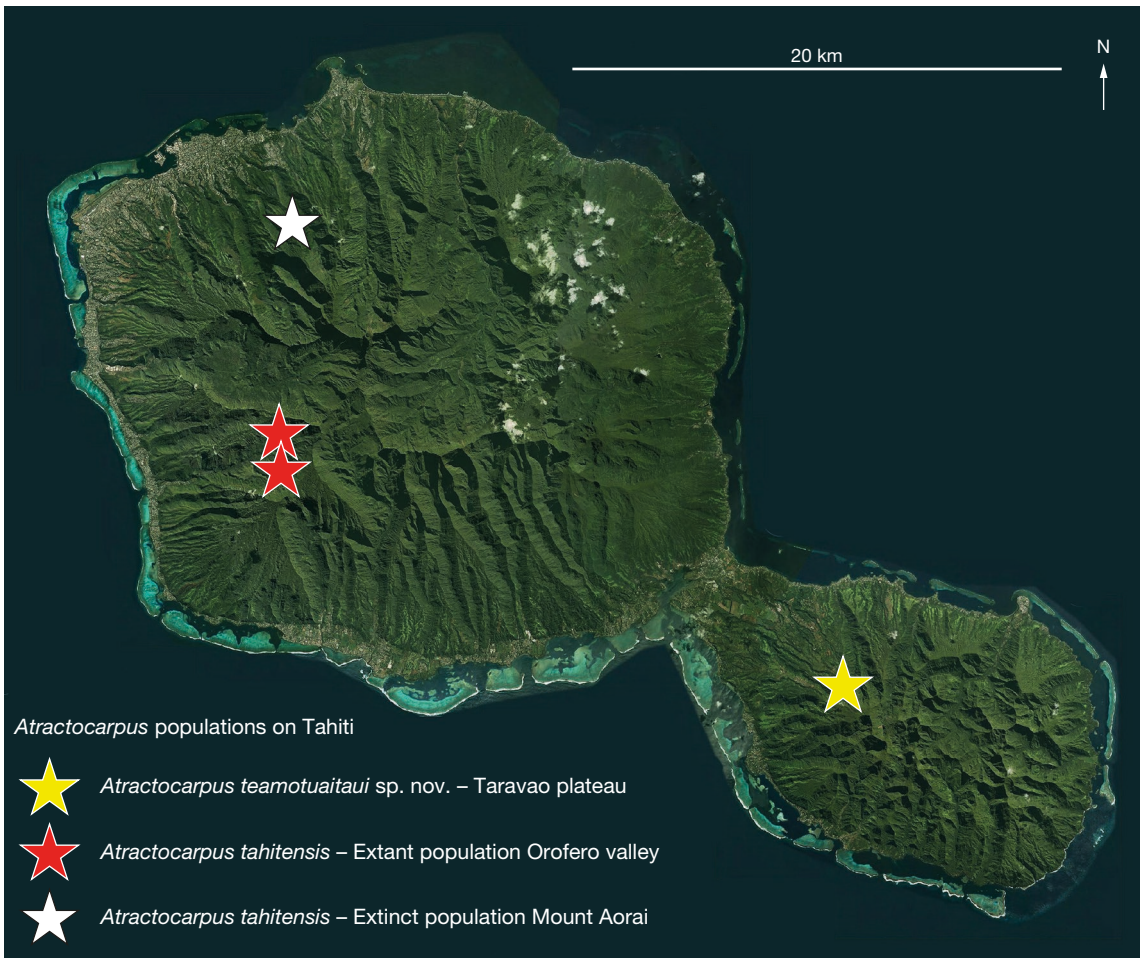

Fig. 2. — Satellite picture of Tahiti and location of extant and extinct populations of both *Atractocarpus* Schltr. & K.Krause species.

Atractocarpus tahitensis is the only native species, the other Gardenieae species resulting from introductions. The very popular *Gardenia taitensis* is used as an ornamental and medicinal species and is a component of monoi oil.

Atractocarpus tahitensis was initially described by Nadeaud (1873) as *Randia tahitensis* Nadeaud. Later on, Fosberg (1987) transferred the name under *Trukia* Kanehira. Few years later, according to morphological phylogenetic results by Puttock & Quinn (1999), Puttock (1999) reduced the genus *Trukia* as a synonym of *Atractocarpus* Schltr. & K.Krause, and published the new combination *Atractocarpus tahitensis* (Nadeaud) Puttock. When describing the taxon, Nadeaud (1873) noticed its rarity in the field, as the species was known from a single population on Tahiti's mount Aorai on mid-elevation slopes. Fosberg attributed to the species two early 20th century collections from Raiatea by J.W. Moore, extending the distribution of the species to the Leeward Islands, but also stressed that it appeared to be quite rare.

During fieldwork in Tahiti looking for this species now classified as a protected species in French Polynesia, local botanist Walter Teamotuaitau found in 2008 living specimens of a species that resembles *Atractocarpus tahitensis* in many aspects (flower and fruit morphology) but differs in various vegetative and reproductive structures (e.g. leaf size and shape, flower size). These specimens seem to represent a morphologically distinct population from the already known taxa described in Pacific Islands. Recently, Mouly *et al.* (2021) included a representative of this population, as "*Atractocarpus* sp. 1" in a molecular phylogenetic study of *Atractocarpus*. In their phylogenetic tree, this representative was placed as sister to *A. carolinensis* (Valeton) Puttock, endemic to the Caroline Islands.

Within the genus *Atractocarpus*, several taxa including the novel population from Tahiti, *A. tahitensis*, *A. carolinensis, A. crosbyi* (Burkill) Puttock, an endemic species from Tonga, and *A. sezitat* (Guillaumin) Mouly from New Caledonia and Vanuatu, share the following characteristics: short condensed perennial reproductive branching, flowers with short urceolate corolla-tube and small rounded-ovate fruits carried by a long pedicel and thin fruit-walls. If they are not close relatives in view of the phylogenetic tree topology (Mouly *et al.* 2021; *A. tahitensis* not tested), they seem to form a recurrent morphotype of *Atractocarpus* in the different lineages that may indicate an ancestral type for the genus.

The present paper intends to revise the genus *Atractocarpus* in French Polynesia and to evaluate whether the new

TABLE 1. — Distinctive features for the *Atractocarpus* Schltr. & K.Krause species resembling the new Tahitian population.

	***Atractocarpus teamotuaitaui* sp. nov.**	***Atractocarpus tahitensis* (Nadeaud) Puttock**	***Atractocarpus carolinensis* (Valeton) Puttock**	***Atractocarpus crosbyi* (Burkill) Puttock**	***Atractocarpus sezitat* (Guillaumin) Mouly**
Breeding system	Plants with hermaphroditic flowers	Plants with hermaphroditic flowers	Dioecious species	?Dioecious species	Plants with hermaphroditic flowers
Habit	Weakly branched treelet *c.* 4 m	Slender treelet 6-10 m	Slender treelet 4-10 m	Slender treelet *c.* 6 m	Weakly branched treelet *c.* 4 m
Leaf base	Limb base rounded to slightly cordate	Limb base attenuated	Limb base attenuated	Limb base cuneate	Limb base attenuated
Leaf petiole	Short *c.* 2-3 mm	10-15 mm	5-27 mm	7-15 mm	5-10 mm
Ratio corolla lobes/corolla tube	2-2.5	1.3-1.5	1-1.5	1-1.2	1.1-1.3
Geographic locality	Society Islands: Tahiti Iti	Society Islands: Tahiti Nui, Raiatea	New Guinea, New Ireland, New Britain, Solomon Islands & Truk archipelago (Caroline Islands)	Tonga	New Caledonia & Vanuatu

population may be regarded as a new species to science, or is conspecific to another taxon already described. It provides a determination key for French Polynesian *Atractocarpus* species, morphological descriptions, lists of studied material, distributions, ecological and conservation considerations for species.

KEY TO SPECIES OF *ATRACTOCARPUS* IN FRENCH POLYNESIA (SOCIETY ISLANDS: TAHITI-RAIATEA):

1. Leaves generally elliptic with an attenuate base and a petiole longer than 10 mm long, corolla lobes/corolla tube length ratio between 1.3 to 1.5 ..... *Atractocarpus tahitensis* (Nadeaud) Puttock
— Leaves generally elliptic-ovate with a rounded-cordate base and a petiole less than 4 mm long, corolla lobes/corolla tube length ratio equal or above 2 ..... *Atractocarpus teamotuaitaui* Mouly & Butaud, sp. nov.

MATERIAL AND METHODS

We examined all collections of the genus *Atractocarpus* from French Polynesia and related Oceanian species in the herbaria of Papeete (PAP) and Paris (P), as well as those digitized from BISH, L, U and US. The measurements given in the descriptions were taken in the field and from herbarium specimens. The distribution maps were produced from herbarium data (mainly PAP, P and US), and made it possible to assess the appropriate threat categories. Various comments from field naturalists in French Polynesia and information present on herbarium labels have made it possible to establish the ecological characteristics of the taxa.

RESULTS

A careful examination of the new Tahitian population compared to the Pacific Islands morphologically relative species (Table 1) shows that the taxon presents unambiguous and distinctive morphological features. Indeed, the individuals differ from the related species *Atractocarpus tahitensis* by leaf shortly petiolate (2-3 mm vs 10-15 mm), lamina with rounded to cordate base (vs attenuate-cuneate), and long corolla lobes (corolla lobe/corolla tube length ratio: 2-2.5 vs 1.3-1.5). Consequently, the distinctiveness of the new population appears sufficient to describe it as a species new to science. The tribe Gardenieae is here considered to be represented by two native representatives in French Polynesia, both restricted to Society Islands and more precisely, to Tahiti and Raiatea (Figs 1; 2).

SYSTEMATIC TREATMENT

Family RUBIACEAE Juss.
Subfamily CINCHONOIDEAE Raf. (incl. IXOROIDEAE Raf.)
Tribe GARDENIEAE A.Rich. ex DC.
Genus *Atractocarpus* Schltr. & K.Krause

Atractocarpus tahitensis (Nadeaud) Puttock
(Fig. 3)

Australian Systematic Botany 12: 316 (Puttock 1999), as 'tahitiensis'. — *Trukia tahitensis* (Nadeaud) Fosberg, *Phytologia* 62: 174 (Fosberg 1987). — Basionym: *Randia tahitensis* Nadeaud, *Énumération des plantes indigènes de l'île de Tahiti*: 54 (Nadeaud 1873).

TYPUS. — **Society Islands**, **Tahiti**. Tahiti Nui, Tepuna, above Pirae, ridge to Aorai, vers 900-1000 m, fl. & fr., 19.XI.1857, *Nadeaud 359*

Fig. 3. — *Atractocarpus tahitensis* (Nadeaud) Puttock: **A**, leafy branch of the species, under the typical vegetation cover; **B**, unripe fruit; **C**, flower in lateral view; **D**, floriferous brachyblast of a perennial inflorescence; **E**, mature flowers and flower buds. Photos by J.-F. Butaud.

(lecto-, P[P00703710], designated by Fosberg 1987; isolecto-, BISH, P[P00703706, P00703707, P00703708, P00703709, P00703711, P04022077, P04022078, P04022079, P04022080, P04022081], US[US00036659]).

Other herbarium specimens examined. — **Society Islands, Raiatea**. On ridge of mountain N of Faaroa Bay, fl. fr., 400 m, 20.I.1927, *Moore 554* (BISH, L[L2897608], U[U1575688], US[US01939487, US02496748]); on ridge N end of highest mountain, fl., 800 m, 4.IV.1927, *Moore 714* (BISH, L[L2897607], U[U1575687], US[US02496749]). — **Tahiti**. Tahiti Nui, Versant Nord-Est du plateau d'Orofero, 653 m, st., 22.IX.2015, *Butaud 3447* (PAP[PAP015919]); *ibid.*, 621 m, fr., 22.IX.2015, *Butaud & Lenoble 3448* (PAP[PAP015920]); *ibid.*, 653 m, fl., 6.XI.2015, *Butaud, Lenoble & Teamotuaitau 3489* (PAP[PAP015942]); *ibid.*, 653 m, fl. fr., 6.XI.2015, *Butaud, Lenoble & Teamotuaitau 3490* (PAP[PAP015943]); *ibid.*, 653 m, fr., 6.XI.2015, *Butaud, Lenoble & Teamotuaitau 3491* (PAP[PAP015944]); Tahiti Nui, Vallée d'Orofero, flanc Sud, partie Ouest du Plateau Tahiti, 916 m, fl., 30.I.2021, *Butaud, Luta, Lenoble & Teamotuaitau 4001* (PAP).

Phenology. — The species seems to bloom from October to February and to rise fruits over the year, ripe fruits being observed mostly from August to November.

Description

Slender treelet 2.5-8(-10) m high, up to 10-15 cm in diameter (at breast height); the young branchlets glabrescent. Stipules connate at the base, 5-7 mm long, hispid to glabrescent. Colleters cylindrical, 0.6-1.1 mm long, *c.* 2 mm wide. Leaves opposite, elliptical to narrowly obovate, glabrous; petioles 10-15 mm long, hispid or glabrescent; lamina 70-165 mm long, 30-50 mm wide with acuminate apex and attenuate base, glossy dark green, dull grey green below, chartaceous; secondary veins in 6-8 pairs at 45-50° to the midvein, arched to straight (*Moore 554*), raised below; tertiary venation reticulate and opaque; domatia absent. Inflorescences axillary, unilateral, a single flower or 2-10-flowered, flowers hermaphroditic; perennial on contracted 1-5-branched brachyblasts; bracts narrowly triangular, 1-2 mm long. Pedicels 18-28 mm long, filiform, 0.6-0.9 mm in width. Hypanthium 2-3 mm long, hispid or glabrescent. Calyx tube obconical, 2-3 mm long; lobes truncate, *c.* 0.5 mm long. Corolla tube 6-9 mm long, urceolate, *c.* 4 mm diameter at the widest point, constricted at mouth, at the lobe's sinuses, externally hispid. Corolla lobes lanceolate, 8-14 mm long, 3-4 mm wide, glabrous. Stamens inserted at the base of the urceolate part of the corolla tube, filament 0.4-0.5 mm, anther basi-dorsifixed,3-3.5 mm long, sagittate at base, acuminate by a sterile appendage, 0.2-0.3 mm long. Style included 3-3.5 mm long, 0.4-0.5 mm wide, glabrous; stigmatic head oblong, deeply bifid, branches 3-3.5 mm long, 1 mm wide. Ovary bilocular, placentas 2, axile, 10-15 ovules per locule. Fruit solitary, on a thin pedicel 20-30 mm long, subspherical to ellipsoid, 22-45 mm long, 20-34 mm diameter, smooth to slightly pointed, calyx persistent and nectary disc forming a short umbo, 1-2 mm long; exocarp yellow green when mature; placental pulp dark brown. Seeds laterally compressed; 2-4(-6) mm in depth, 6-12 mm in length.

Distribution, ecology and threats

Atractocarpus tahitensis occurs in the understory of forest vegetation dominated by: *Syzygium cumini* (L.) Skeels, *Neonauclea forsteri* (Seem. ex Havil.) Merr., *Serianthes myriadenia* Planch. ex Benth., *Alphitonia zizyphoides* (Sol. ex Spreng.) A.Gray, *Metrosideros collina* (J.R.Forst. & G.Forst.) A.Gray, *Spathodea campanulata* P.Beauv., *Coffea arabica* L, *Macaranga taitensis* (Müll.Arg.) Müll.Arg., *Aleurites moluccanus* (L.) Willd., *Miconia calvescens* DC., *Psidium cattleyanum* Sabine, *Ceodes taitensis* (Heimerl) E.F.S.Rossetto & Caraballo, *Cyclophyllum barbatum* (G.Forst.) N.Hallé & J.Florence, *Eugenia reinwardtiana* (Blume) DC., *Glochidion* spp., *Meryta drakeana* Nadeaud, *Myrsine* spp., *Psychotria* spp., *Ixora* spp., *Celtis pacifica* Planch., *Claoxylon taitense* Müll. Arg., *Tarenna sambucina* (G.Forst.) T.Durand ex Drake. This vegetation contains numerous indigenous species associated with naturalized species that threaten the survival of the native ones, the former belonging to the genera *Coffea* L., *Miconia* Ruiz & Pav., *Psidium* L., *Spathodea* P.Beauv., and *Syzygium* Gaertn. The understory is degraded by wild boar grubbing.

On Tahiti, the elevation of occurrence of *Atractocarpus tahitensis* ranges are 620-680 m on the Tahua Iti plateau and 870-920 m on the Tahiti plateau in Orofero valley. Nadeaud's location on the slopes of Aorai was around 1000-1100 m. On Raiatea, the two known populations were located between 400 and 800 m in elevation.

Endemic to the Society Islands, *Atractocarpus tahitensis* has not been reported elsewhere than on Tahiti and Raiatea. Moreover, it is only known from the ridges of the Mount Aorai on Tahiti since Nadeaud's collection in 1857 (another collection by Nadeaud's son is reported in Nadeaud's journal for the same population in 1896 but was not located) and from Raiatea since Moore's two collections in 1927. It has not been collected there since Nadeaud and Moore's prospections. On the other hand, two new locations were discovered on Tahiti in 2015 and 2019, one on the Tahua Iti plateau (often erroneously named Orofero plateau) and one on the Tahiti plateau (also called Taha Iti) in Orofero Valley. These extant populations both hardly exceed 100 mature individuals. The species is protected by the French Polynesian laws and was evaluated as "Critically Endangered" under the IUCN criteria (UICN France *et al.* 2015) based on the Tahua Iti plateau's population. The discovery of a second population may not change the CR evaluation under criteria B as both populations belong to the same locality, due to a short separative distance (Fig. 2), identical environments and threats (wild boars, invasive plant species, rat predation…), an area of occupancy less than 10 km^2, and an observed decline of habitat quality.

Notes

Fosberg (1987) mentioned two collections that possibly could be assigned to this species. According to Nadeaud's field book, these collections were made by Nadeaud's son Temarii in Puairi on elevated crests of Pirae, but have not been located so far. Fosberg also made a handwritten note on a collection at P made by Nadeaud in 1896 in Pirae on Tahiti; this collection belongs to *Gardenia taitensis* DC. and not to *Atractocarpus tahitensis*. The sterile collection *Fosberg 63730* (BISH, US) belongs in fact to *Tarenna sambucina* (G.Forst.) T.Durand ex Drake. Puttock

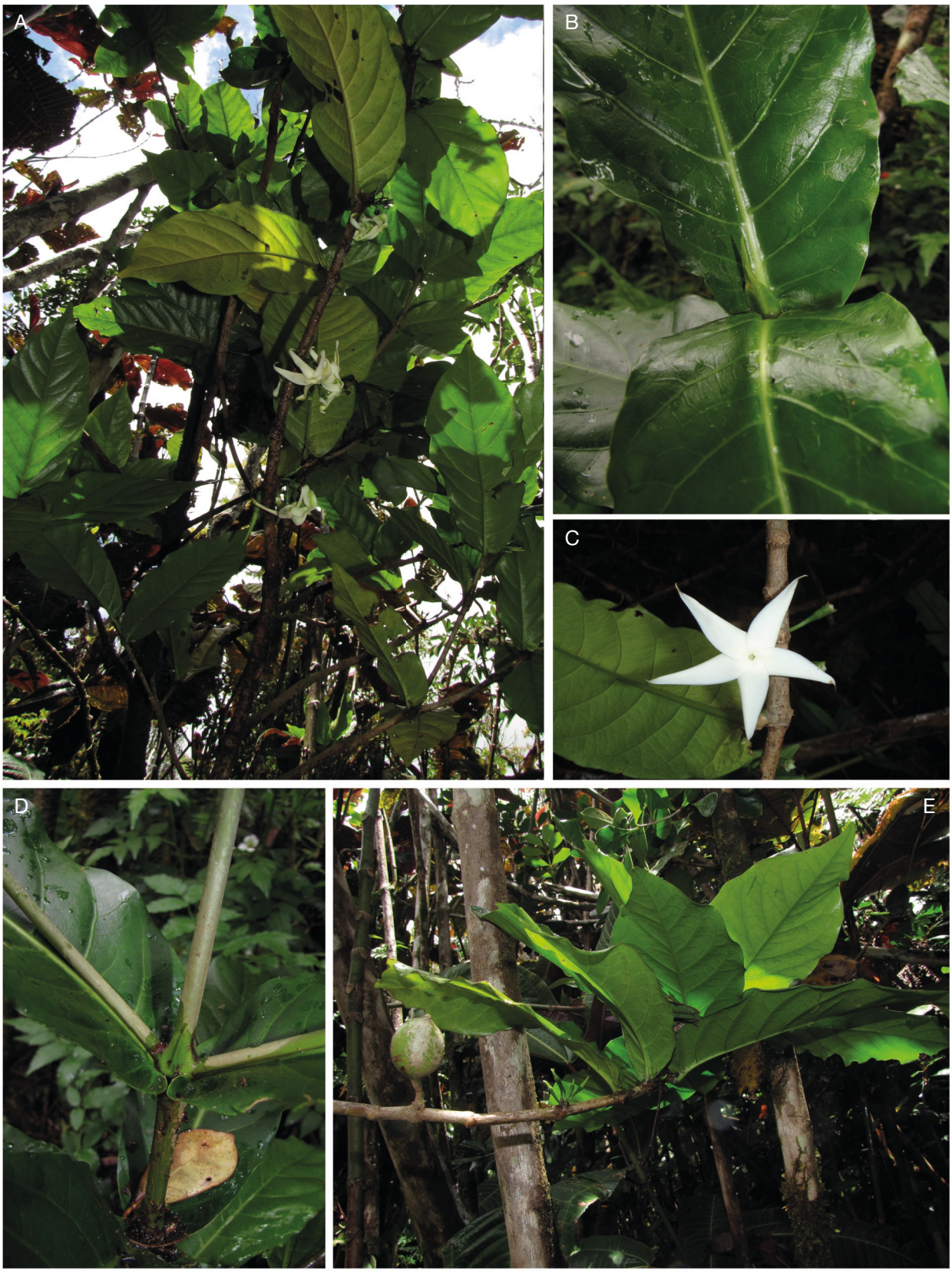

Fig. 4. — *Atractocarpus teamotuaitaui* Mouly & Butaud, sp. nov.: **A**, leafy and flowering branch of the species, under the secondary vegetation cover; **B**, apical stipules; **C**, flower at anthesis; **D**, stipules and detail of the leaf-base at a ramification; **E**, unripe fruit on a branch with the congested leaf cluster. Photos by J.-F. Butaud.

(1999) assumed that *Atractocarpus tahitensis* is a dioecious species, based on very few observed herbarium specimens. According to our field observations, individuals produce hermaphroditic flowers. A similar breeding system has been observed for the other Polynesian *Atractocarpus* species. Finally, a gathering attributed to *Atractocarpus tahitensis* (as *Randia tahitensis*) and collected by M.Hoff on Wallis (*Hoff 4281*, MNHN-P-P05377792) belongs to *Tarenna sambucina*.

Atractocarpus teamotuaitaui Mouly & Butaud, sp. nov.
(Fig. 4)

Atractocarpus teamotuaitaui *sp. nov. differs from the other Polynesian species* A. tahitensis *(Nadeaud) Puttock by its leaves shortly petiolate (2-3 mm vs 10-15 mm), with rounded to cordate lamina base (vs attenuate-cuneate), and long corolla lobes (ratio of the corolla lobe/corolla tube length: 2-2.5 vs 1.3-1.5).*

TYPUS. — **Society Islands, Tahiti**. Tahiti Iti, Plateau de Taravao, Vallon Aoma, versant, 790 m, fl., 2.XII.2014, *Butaud 3410* (holo-, PAP[PAP015896]).

PARATYPI. — **Society Islands, Tahiti**. Tahiti Iti, Taiarapu, Plateau de Taravao, fl. & fr., 25.X.2011, *Florence, Butaud, Meyer, Jacq & Teamotuaitau s.n.* (P, PAP); Plateau de Taravao, sur un replat sous une petite crête, 750 m, fl., 31.I.2008, *Teamotuaitau 182* (PAP[PAP003752]); *ibid.*, *Teamotuaitau 183* (PAP[PAP003841]); Plateau de Taravao, replat sous une crête, 750 m, fr., 28.II.2008, *Teamotuaitau 185* (BESA, PAP[PAP003842]); *ibid.*, *Teamotuaitau 186* (PAP[PAP003759]); Plateau de Taravao, petit replat sous une crête, 750 m, st., 28.II.2008, *Teamotuaitau 187* (PAP[PAP003760]).

PHENOLOGY. — The species seems to bloom from October to February and to produce mature fruits around October and November.

ETYMOLOGY. — The species is dedicated to the French Polynesian naturalist Walter Teamotuaitau who first observed the species in the field in 2008 and regularly monitors the population.

DESCRIPTION

Slender treelet 2-4 m high, up to 4 cm in diameter (at breast height); weakly branched, leaves concentrated toward the branch tips; the young branchlets glabrescent. Seedlings with reniform cotyledons, first leaves elliptic, markedly hairy on the margin. Stipules connate at the base, triangular, with a deep central costa, 7-10 mm long. Colleters cylindrical, 0.6-1.1 mm long, *c.* 2 mm wide. Leaves opposite, elliptical-ovate to narrowly obovate, glabrous; petioles 2-3 mm long; lamina (70-)130-310 mm long, (30-)50-90 mm wide with acuminate apex and rounded to cordate base, glossy light green above, dull pale green below, chartaceous; secondary veins in 7-11 pairs at 50-60° to the midvein, raised below; tertiary venation reticulate and opaque; domatia absent. Inflorescences axillary, a solitary flower, or a perennial cyme contracted in a dwarf branchlet, *c.* 2-9-flowered. Flowers hermaphroditic, drooping; peduncles very short, *c.* 1-2 mm long per axis; bracts narrowly triangular, 1-2 mm long; pedicels 5-10 mm long, slightly puberulent. Hypanthium 3-4 mm long, cup-shaped, slightly puberulent. Calyx tube obconical, 2-3 mm long; lobes truncate, *c.* 0.5 mm long. Corolla tube 5-6 mm long, urceolate, *c.* 5 mm diameter at the widest point, slightly constricted distally, light green after anthesis. Corolla lobes lanceolate, 12-13 mm long, 3-4 mm wide, glabrous, pure white above, greenish below. Stamens inserted at the base of the urceolate part of the corolla tube, filament 0.4-0.5 mm, anther basi-dorsifixed, 4-4.5 mm long, sagittate at base, acuminate by a sterile appendage, 0.2-0.3 mm long. Style included, 2-2.5 mm long, 0.4-0.5 mm wide, glabrous; stigmatic head oblong, deeply bifid, arms 2-2.5 mm long, 0.6-0.8 mm wide. Ovary bilocular, placentas 2, axile, multiovulate. Fruit erect, pale green when immature, turning yellowish-green, on a thickened pedicel 15-20 mm long, subspherical to ellipsoid, 18-33 mm long, 11-29 mm diameter, smooth, calyx persistent, nectary disc forming an umbo, 2-2.5 mm long, yellowish. Seeds laterally compressed; 3-4.5 mm in diameter.

DISTRIBUTION, ECOLOGY AND THREATS

The only known population is located on the sides of a ravine intruding the dissected Taravao plateau between 750 to 805 m, in a degraded hygrophilous/rain-forest vegetation on basaltic substrate, dominated by the invasive species *Miconia calvescens* DC., *Rubus rosifolius* Sm., *Cecropia peltata* L., *Psidium cattleyanum* Sabine, *Spathodea campanulata* P.Beauv., *Cestrum nocturnum* L., *Mikania micrantha* Kunth, *Cinchona pubescens* Vahl, and the native *Weinmannia parviflora* G.Forst., *Crossostylis biflora* J.R.Forst. & G.Forst., *Astronidium glabrum* (G.Forst.) Markgr., *Cyathea* spp., *Alstonia costata* (G.Forst.) R.Br., *Fagraea berteroana* A.Gray & Benth., *Metrosideros collina* (J.R.Forst. & G.Forst.) A.Gray, *Myrsine longifolia* Nadeaud, *Ficus prolixa* G.Forst., *Glochidion* spp., *Melicope* spp., *Freycinetia* sp., *Davallia* spp., *Lepisorus spicatus* (L.f.) Li Lang, *Dicranopteris linearis* (Burm.f.) Underw., and *Dryopteris* sp. A few seedlings were observed from 2011 to 2013 but none since. Indeed, rats eat unripe fruits and seedlings, and can even gnaw through a mature individual (field observations by the second author).

Atractocarpus teamotuaitaui sp. nov. is endemic to the Society Islands and specifically to Tahiti Iti, on the Taravao Plateau. The species is known from a single population with *c.* 40 mature individuals in 2011 and only four remaining in 2022. It grows in forests highly infested by *Miconia calvescens* DC., that exerts a high competitive pressure on native species, as documented in this locality for *Psychotria* species (Meyer *et al.* 2003). Therefore, the species should be quickly assessed for the level of threat it faces, which corresponds to "Critically Endangered – CR", based on the presence of a single population within a 50 × 50 m area, less than 50 individuals with a high mortality rate, with a permanent threat for the environment caused by the *Miconia calvescens* invasion in addition to other invasive plant species, rat predation, and possibly a fungal disease on the leaf buds.

Acknowledgements

The authors wish to thank the Herbaria L, PAP, P, U, US for granting access to their collections during visits or through digitized material available online. They also would like to thank Walter Teamotuaitau and Jacques Florence for sharing their knowledge on the Tahitian *Atractocarpus* and flora in general. The authors wish to thank David H. Lorence and Thierry Deroin for their comments on the manuscript and the improvement of the text.

REFERENCES

BUTAUD J.-F. & FLORENCE J. 2020. — *Psychotria niauensis* sp. nov. (Rubiaceae), espèce calcicole endémique de la Polynésie française, décrite de l'atoll soulevé de Niau (Tuamotu). *Adansonia*, sér. 3, 42 (6):119-130. http://adansonia.com/42/6. https://doi.org/10.5252/adansonia2020v42a6

FLORENCE J. 1997. — *Flore de la Polynésie française.* Vol. 1. Éditions de L'ORSTOM, Paris, 393 p.

FOSBERG F. R. 1987. — The genus *Trukia* Kanehira (Rubiaceae). *Phytologia* 62 (3): 171-176. https://www.biodiversitylibrary.org/page/13152318

GOVAERTS R. H. A. 2011. — *World Checklist of Selected Plant Families Published Update*. Facilitated by the Trustees of the Royal Botanic Gardens, Kew.

LORENCE D. H., FLORENCE J. & MEYER J.-Y. 2017. — Reassessment of the *Psychotria speciosa* G. Forst. (Rubiaceae) complex in Tahiti, Society Islands, with a new combination and description of new species, *Psychotria paulae* J.-Y. Meyer, Lorence & J. Florence, sp. nov. *Adansonia*, sér. 3, 39 (1): 41-53. https://doi.org/10.5252/a2017n1a4

MEYER J.-Y., FLORENCE J. & TCHUNG V. 2003. — Les *Psychotria* (Rubiacées) endémiques de Tahiti (Polynésie Française) menacés par l'invasion de *Miconia calvescens* (Mélastomatacées): Statut, répartition, écologie, phénologie et protection. *Revue d'Écologie (Terre Vie)* 58: 161-185.

MOULY A., BARRABÉ L. & BRUY D. 2021. — Molecular phylogeny of *Atractocarpus* (Rubiaceae): taxonomic implications for several New Caledonian Gardenieae species. *Plant Ecology and Evolution* 154: 111-120. https://doi.org/10.5091/plecevo.2021.1744

NADEAUD J. 1873. — *Énumération des plantes indigènes de l'île de Tahiti*. Ed. F. Savy, librairie de la Société botanique de France, Paris, 86 p. https://doi.org/10.5962/bhl.title.53493

PUTTOCK C. F. 1999. — Revision of *Atractocarpus* (Rubiaceae: Gardenieae) in Australia and new combinations for some extra-Australian taxa. A*ustralian Systematic Botany* 12: 271-309. http://dx.doi.org/10.1071/SB97030

PUTTOCK C. F. & QUINN C. J. 1999. — Generic concepts in Australian Gardenieae (Rubiaceae): a cladistic approach. *Australian Systematic Botany* 12: 181-199. https://doi.org/10.1071/SB98001

UICN FRANCE, MNHN & DIREN POLYNÉSIE FRANÇAISE 2015. — *La Liste rouge des espèces menacées en France* – Chapitre *Flore vasculaire endémique de Polynésie française*. Paris, France.

Submitted on 22 September 2021;
accepted on 26 September 2022;
published on 9 May 2023.