



## A revision of *Mezoneuron* (Leguminosae: Caesalpinioideae) in New Caledonia, with perspectives on vegetation, geology, and conservation

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### Abstract

*Mezoneuron* is a genus segregated from *Caesalpinia s.l.* There are five species of *Mezoneuron* in New Caledonia, all of which are endemic to this island group. Full descriptions of the species are provided here, together with an identification key, a composite illustration, and distribution maps. Preliminary conservation assessments have been produced using distribution data from herbarium specimens in combination with knowledge of habitats and threats. These reveal a level of threat to each species ranging from Vulnerable to Critically Endangered. Three new combinations are proposed.

**Key words:** Fabaceae, *Mezoneuron*, *Mezoneurum*, ultramaphic

### Introduction

The genus *Mezoneuron* Desfontaines (1818: 245) (orthographic variants *Mezonevron*, *Mezoneurum*: see note below) comprises c. 25–30 species, and has been considered by various authors either to be a subgenus of *Caesalpinia* Linnaeus (1753: 380) (Hattink 1974, Larsen *et al.* 1980, Hou 1996), or a distinct genus (Prain 1892, Lewis *et al.* 2005).

In its broadest sense, the pantropical genus *Caesalpinia* comprises c. 140 spp., and contains 25 generic names in synonymy (Lewis 2005). However, various studies have provided evidence demonstrating that *Caesalpinia s.l.* as thus circumscribed is polyphyletic (e.g. Lewis & Schrire 1995; Simpson *et al.* 2003; Gagnon *et al.* 2013), and Lewis *et al.* in 2005 reinstated eight genera from within *Caesalpinia s.l.*, one of which was *Mezoneuron*. The monophyly of *Mezoneuron* and five other of these genera has been supported in more recent studies, such as that of Gagnon *et al.* (2013).

*Mezoneuron* is distinguished morphologically from *Caesalpinia s.s.*, and from the other genera recently segregated from *Caesalpinia s.l.*, by its laterally compressed, indehiscent fruits, which have a wing along the upper suture. The fruits of *Caesalpinia s.s.*, and the genera segregated from within *Caesalpinia s.l.*, by comparison, vary from being woody and dehiscent in *Caesalpinia s.s.*, and otherwise inflated or laterally compressed, dehiscent or indehiscent, sometimes spiny, but always lacking the sutural wing.

The centre of diversity of *Mezoneuron* is South East Asia, with approximately 15 species distributed from China to Papua New Guinea and into Australia. In addition, there are two species in continental Africa, one endemic in Madagascar, one endemic in Hawaii, and five species endemic to New Caledonia. Fossils of *Mezoneuron* fruits have been found in North America and Europe, from formations of the middle Eocene, c.45 Mya, demonstrating that *Mezoneuron* was distinct from *Caesalpinia* by this time (Herendeen & Dilcher 1991, Herendeen & Crane 1992). There are no extant species of *Mezoneuron* in either of these regions.

The species of *Mezoneuron* are scrambling shrubs or lianas (or in the case of the Hawaiian endemic, *M. kauaiense* Hillebrand (1888: 110), a small tree), with bipinnate leaves, and usually with recurved prickles on the stems and leaf rachises. The flowers are usually yellow with red markings on the standard petal, or occasionally entirely pink to red (*M. kauaiense*, *M. sumatranum* (Roxburgh) Wight & Arnott ex Miquel (1855: 105) or white (*M. hildebrandtii* Vatke (1882: 338)), varying in size from a few millimetres in length up to c. 3 cm. The fruits range in length from 2 to 20

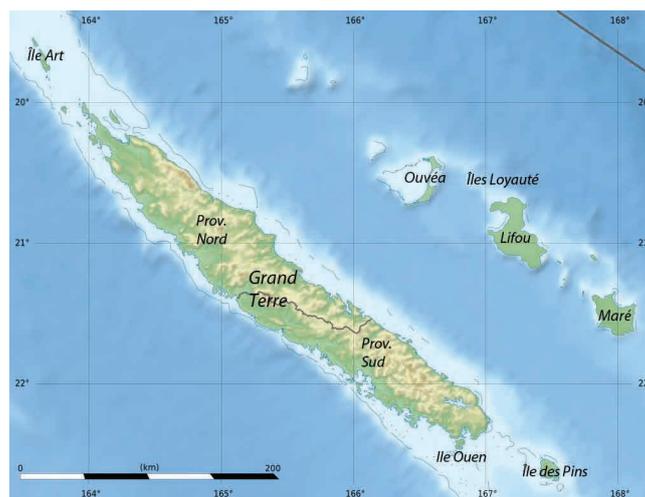
cm (the sutural wing measuring between 1 mm and 20 mm in width) and may be single or multi-seeded. Within New Caledonia the flowers of *Mezoneuron* are relatively small in size, with the exception of *M. ouenensis* (Guillaumin) R. Clark, and the fruits small and single-seeded.

Since the original species descriptions were created (1906–1936), no study has been published of the taxonomy of the New Caledonian species of *Mezoneuron*. This research aims to clarify the taxonomy of these species, with reference to their ecology and geology, and with consideration of their phylogenetic relationships. Three new combinations are created.

**Orthographic note:** The genus was first published under the name *Mezonevron* Desfontaines (1818: 245) with the species *M. glabrum* Desf., and was known by this name according to a number of authors in the years subsequent to publication. However, the orthographic variant *Mezoneuron* was adopted (as well as, occasionally, the incorrect *Mezoneurum*), and used by the majority of authors in the botanical literature since 1822 (Applequist 2013). A proposal was submitted to the Nomenclature Committee in 2012 (Reveal & Ghandi 2012) to conserve the spelling *Mezoneuron* against *Mezonevron*; this proposal was rejected, but on the grounds that the rules in place in the ICN (International Code of Nomenclature for algae, fungi and plants) governing the use of the letter ‘u’ in spelling over the letter ‘v’ meant that the proposal was unnecessary (Applequist 2013). The correct spelling therefore according to these rules is *Mezoneuron*.

### New Caledonia: Geology and Vegetation

New Caledonia is a small group of islands in the South Pacific, with a total land area of 19, 100 sq. km (Morat *et al.* 2001) (Figure 1) and a population of c. 250 000 (Jaffré *et al.* 2012). The island group originally formed part of the Gondwana supercontinent, and has been isolated from other land masses since the Late Cretaceous period (100.5–66 Mya) (Heads 2008).



**FIGURE 1.** Relief map of New Caledonia, showing names of major islands (adapted from Vidiani 2015)

The native terrestrial vegetation of New Caledonia can be divided into four major types: low and middle-elevation maquis (0–900 m), high-elevation maquis (exposed summits above 850–900 m), tropical dry (sclerophyllous) forest, and rain forest (Jaffré *et al.* 1998). The species of *Mezoneuron* in New Caledonia occur in maquis, in wet forest, and sclerophyllous forest habitats, on ultrabasic and non-ultrabasic substrates.

The geology of New Caledonia is comprised of an unusually high proportion of ultramaphic rocks, covering c. 1/3 of the island, or c. 5500 km<sup>2</sup> (Jaffré 1992; Proctor 2003). Ultramaphic rocks, also described as ultrabasic, are igneous or metamorphic rocks with silica content below 45% and have high concentrations of magnesium, iron, chromium, cobalt, and nickel (Proctor 2003). Where the low silica content is accompanied by an abundance of dark-coloured ferromagnesian minerals, the term ultramaphic is preferred (Jaffré 1992). The soils formed from these rocks typically have a deficiency of nutrients needed by plants, such as potassium, phosphorus, and calcium (Brooks 1987).

The Gondwanic origin, subsequent long isolation, and the challenging conditions of growth on ultramaphic soils, have rendered New Caledonia a global biodiversity hotspot, with very high levels of endemism. There are approximately 3260 native plant species on New Caledonia, an estimated 74% of which are endemic (Myers *et al.* 2000; Jaffré *et al.* 2001; IUCN 2014).

**Maquis:**—Of the c. 5500 km<sup>2</sup> of New Caledonia that is comprised of ultramaphic rock, around 4500 km<sup>2</sup> is covered by maquis. Maquis may also occur on siliceous substrates (Morat *et al.* 2012). New Caledonian maquis occurs from sea level up to 1600 m, and experiences an annual rainfall of 900–4000 mm (Proctor 2003). It is generally evergreen, 2–8 m tall, and more or less shrubby with a dense sedge layer, but there are a number of variants. Maquis can be divided into three types according to Jaffré (1980): (a) ‘Maquis arbustif’ (shrubby) (b) ‘Maquis buissonant’ (bushy) (c) ‘Maquis ligno-herbacé’ (woody-herbaceous). These types of maquis may all develop into a tall maquis (‘maquis paraforestier’) that has an open tree canopy. The unifying features of the maquis are that most species are sclerophyllous, and have nanophylls to microphylls. Hairy leaves, narrow leaves, and scented leaves are common (Proctor 2003). Maquis has a high floristic diversity and very high endemism of up to 90% (Perry *et al.* 2002).

**Sclerophyllous forest:**—The dry, or sclerophyllous, forest is a formation found in low rainfall areas, with average annual precipitation of less than (1100–) 1200 mm per year and a marked dry season, on sedimentary and volcanic substrates (Morat *et al.* 2012). It does not occur on ultramaphic substrates. It is found at elevations of 0–300 m, and is dominated by semi-deciduous trees of c. 10–12 m in height (Jaffré *et al.* 1993). Gaïac scrub vegetation, of which the main component is usually *Acacia spirorbis* Labillardière (1825: 69), comprises a large proportion of the dry forest habitat that still remains on the islands.

**Rainforest:**—The rainforests (moist evergreen forests) occur on both ultramaphic (c. 600 km<sup>2</sup>) and non-ultramaphic substrates (c. 2750 km<sup>2</sup>), at between 300 and 1000 m in areas with rainfall ranging from 1500 to 3500 mm per year (Proctor 2003). They have a closed canopy that is generally 15–20 m high, and up to 8 m high at elevations above 1000 m (Proctor 2003).

The remaining vegetation is anthropogenic, and consists of savannas and thickets largely dominated by exotic species (Jaffré *et al.* 1998).

## Threats and Conservation

The native vegetation of New Caledonia is subject to a number of threats, including clearing for cattle ranching, mining for minerals (including nickel, cobalt, chromium, and gold), fire, and competition from invasive species.

As a result of these threats, over 50% of the original vegetation of New Caledonia has disappeared since the arrival of humans on the island 3,500 years ago (Jaffré *et al.* 1998). The threats to the native vegetation types are potential threats also to the species of *Mezoneuron* occurring within them, and within this context they are discussed here.

New Caledonia has a protected area network of 25 reserves, covering c. 2.7% of the total land area, or 52654 ha. However, 83% of the territory’s threatened plant species do not occur in any protected area. The extremely rare sclerophyllous forest and the low to mid-elevation maquis vegetation types are almost totally unprotected (Jaffré *et al.* 1998).

Only 5–6% of the remaining low to mid-elevation maquis is within protected areas, all of which are concentrated into the southern half of the main island. Of the 178 low or mid-altitude maquis plant species classified as threatened to some degree, only four are found in protected areas (Jaffré *et al.* 1998). Maquis is affected by clearing, mining, and fires. According to Jaffré *et al.* (1998), the reduction in area of maquis has not been as dramatic as that of the other vegetation types. However, the threats to this vegetation type are ongoing.

Tropical dry (sclerophyllous) forest is the most endangered vegetation type on New Caledonia, having been reduced to <2% of its original extent in part due to land clearance, cattle ranching, and fire (Bouchet *et al.* 1995). These are continuous threats, particularly as the proportion of the remaining sclerophyllous forest in protected areas is very low, around 0.23% of the remaining area of that vegetation type (Jaffré *et al.* 1998). There are only three designated nature reserves that protect tropical dry forest in New Caledonia: Ouen-Toro, Parc Forestier Michel Corbasson, and Lepredour (Jaffré *et al.* 1998).

Evergreen moist forest (rainforest) is the least threatened of the native vegetation types, as it occupies 21% of the land area, and is reasonably well represented in protected areas (Jaffré *et al.* 1998). However, this forest type has experienced considerable reduction from its original cover of c. 70% of the island. There is significant pressure for logging native trees, and frequent fires have converted some of this vegetation to maquis, posing a threat to some forest species and largely eliminating rainforest from iron crust soils (McCoy *et al.* 1999)

## Aims

The primary aim of this study is to provide a taxonomic revision of the species of *Mezoneuron* in New Caledonia, with full descriptions, a key, illustrations, and nomenclatural updates in the form of three new combinations. Preliminary conservation assessments are also provided, informed by knowledge of the habitat preferences of the species, and of threats to the vegetation types. The study also provides a brief discussion of the putative origins of *Mezoneuron* in New Caledonia in the context of the genus as a whole, and of the relationships of these species to *Caesalpinia s.l.*, and to the putative sister genus *Pterolobium* R. Brown ex Wight & Arnott (1834: 283), based on morphological and phylogenetic data.

**TABLE 1. Comparative characters of New Caledonian *Mezoneuron* species (the most informative characters are highlighted in bold typeface).**

	<i>baudouinii</i>	<i>montrouzieri</i>	<i>ouenensis</i>	<i>rubiginosum</i>	<i>schlechteri</i>
<b>Habit</b>	scrambling shrub, becoming lianescent	scrambling shrub	shrub	liana	liana
<b>Height</b>	to c. 5m	to 6m	1–2m	to c. 5m	to 20m or more
<b>Armature</b>	unarmed, or stems and leaf rhachis with recurved prickles	often unarmed, sometimes recurved prickles on main stem and leaves	unarmed	stems unarmed, leaf rhachis sometimes with recurved prickles	unarmed or with scattered recurved prickles on stems and/ or leaf rhachis
<b>Stem indumentum</b>	sparsely to moderately tomentose	glabrous to sparsely to moderately tomentose	glabrous	sparsely to moderately tomentose	glabrous or sparsely to densely tomentose
<b>Petiole length cm</b>	2–7.5	1.4–10	2.5–3.5	4.3–14	2–5.5 (–8)
<b>Rhachis length cm</b>	(6–) 9–25	(1.5–) 5.4–25 (–28.8)	2.5–7.5	14.5–25.5	(3–) 5–23
<b>Pinnae (pairs)</b>	(4–) 5–11	1–6	2–3	4–6	(2–) 3–7 (–8)
<b>Pinna length cm</b>	(2–) 3–7.5 (–9)	(0.8–) 2.4–7.0	1.2–3.8	4.8–10	2.8–12.7
<b>Leaflet pairs per pinna</b>	(3–) 5–15	1–6	1–2	2–5	(3–) 4–8 (–14)
<b>Leaflet dimensions cm</b>	0.7–2.3 × 0.4–1.7	(1.1–) 1.5–3.6 (–4.3) × 0.8–2.6 (–3.3)	3.3–5 × 2.7–4	3.2–5.1 × 2–3.3	1.8–4.7 × 0.6–3.1
<b>Inflorescence indumentum</b>	glabrous or sparsely, occasionally densely, tomentose	glabrous or sparsely to densely tomentose	glabrous	sparsely to densely tomentose	glabrous or sparsely to moderately tomentose
<b>Pedicel length mm</b>	2–8	2–7	8–10	2–3	3–10
<b>Pedicel articulated</b>	yes	yes	no	no	no
<b>Petal length mm</b>	(3–) 4–6	3–6	11–13 (laterals)	6–7	4–8
<b>Stamen length mm</b>	3–6	(2–) 3–6	12–15	6–8	5–11
<b>Ovary indumentum</b>	densely hairy	glabrous or densely hairy	unknown	densely hairy	glabrous
<b>Pod dimensions cm</b>	3.4–6.4 × 2–3.5	2.4–5.4 × 1.4–2.8	unknown	unknown	4–5.6 × 1.7–2.6

## Materials and Methods

Herbarium specimens from BRI, K, MO, NOU, NY, and P were studied (herbarium acronyms according to Thiers 2014). Measurements and label data were taken from all specimens seen (listed in Appendix 1). Flowers were rehydrated in boiling water prior to measuring. Fieldwork was carried out in New Caledonia in July 2009, during which herbarium specimens were collected, and field observations were made.

Preliminary conservation assessments were based on Extent of Occurrence (EOO) and Area of Occupancy (AOO): EOO being the total extent of the range of the taxon (the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all sites presently occupied by the taxon), whilst AOO is the area within the extent of occurrence which is actually occupied by the taxon. The records were derived from herbarium specimens, and the preliminary assessments carried out using the GEOcat online tool. Analysis of the habitat preferences of the species (information derived from specimen labels), in relation to known threats to these habitats, and knowledge of vegetation cover in New Caledonia (from current vegetation maps), has been carried out to provide better informed preliminary assessments.

It is noted that the herbarium specimens used in these analyses were in some cases collected several decades ago, or as far back as the mid 1800's, and we lack evidence of the continuing existence, or otherwise, of these populations, other than through interpretation of vegetation changes. If more information on current populations were available, the category of threat assigned may be different as a result, probably at a higher level (more threatened).

#### Key to the Species (Table 1)

1. Petals c. 1–1.3 cm long; leaflets 3.3–5 × 2.7–4 cm, orbicular to obovate; known only from Ile Ouen ..... *M. ouenensis*
- Petals 0.3–0.8 cm long; leaflets usually smaller than 3.3–5 × 2.7–4 cm; throughout New Caledonia ..... **2**
2. Leaflet length usually 2× width or more, leaflet blade narrowly elliptic to rhombic; pedicels slender, 3–10 mm long, not articulated; stamen filaments 5–11 mm; ovary glabrous ..... *M. schlechteri*
- Leaflet length usually less than 2× width, leaflet blade elliptic to suborbicular or oblong; pedicels 2–6 (–8) mm long, articulated or not; stamen filaments 3–8 mm; ovary usually hairy, or if glabrous then leaflets broadly elliptic to suborbicular ..... **3**
3. Leaflets per pinna (3–) 5–15 pairs; leaflets narrowly oblong, 0.7–2.3 × 0.4–1.2 (–1.7) cm; pinnae in 4–11 pairs; ovary densely hairy; fruit 3.4–6.4 × 2–3.5 cm ..... *M. baudouinii*
- Leaflets per pinna 1–6 pairs; leaflets elliptic, rhombic, ovate, or broadly oblong, 1.1–3.6 (–5.1) × 0.8–2.5 (–3.3) cm; pinnae in 1–6 pairs; ovary glabrous or hairy; fruit 2.4–4.8 (–5.4) × 1.4–2.8 cm ..... **4**
4. Robust liana, growing in forest; inflorescence a densely congested panicle, flowers spaced c. 2–3 mm apart, pedicels 2–3 mm long, not articulated; stamen filaments 6–8 mm; style 4–10 mm; ovary densely hairy ..... *M. rubiginosum*
- Scrambling shrub, growing in maquis, (rarely sclerophyllous forest); inflorescence a relatively lax panicle, flowers spaced up to 6 mm apart, pedicels 2–7 mm, articulated 1–2 mm below calyx (not always conspicuously); stamen filaments 3–6 mm; style 3–5 mm; ovary glabrous or hairy ..... *M. montrouzieri*

### Species Descriptions

#### *M. baudouinii* Guillaumin

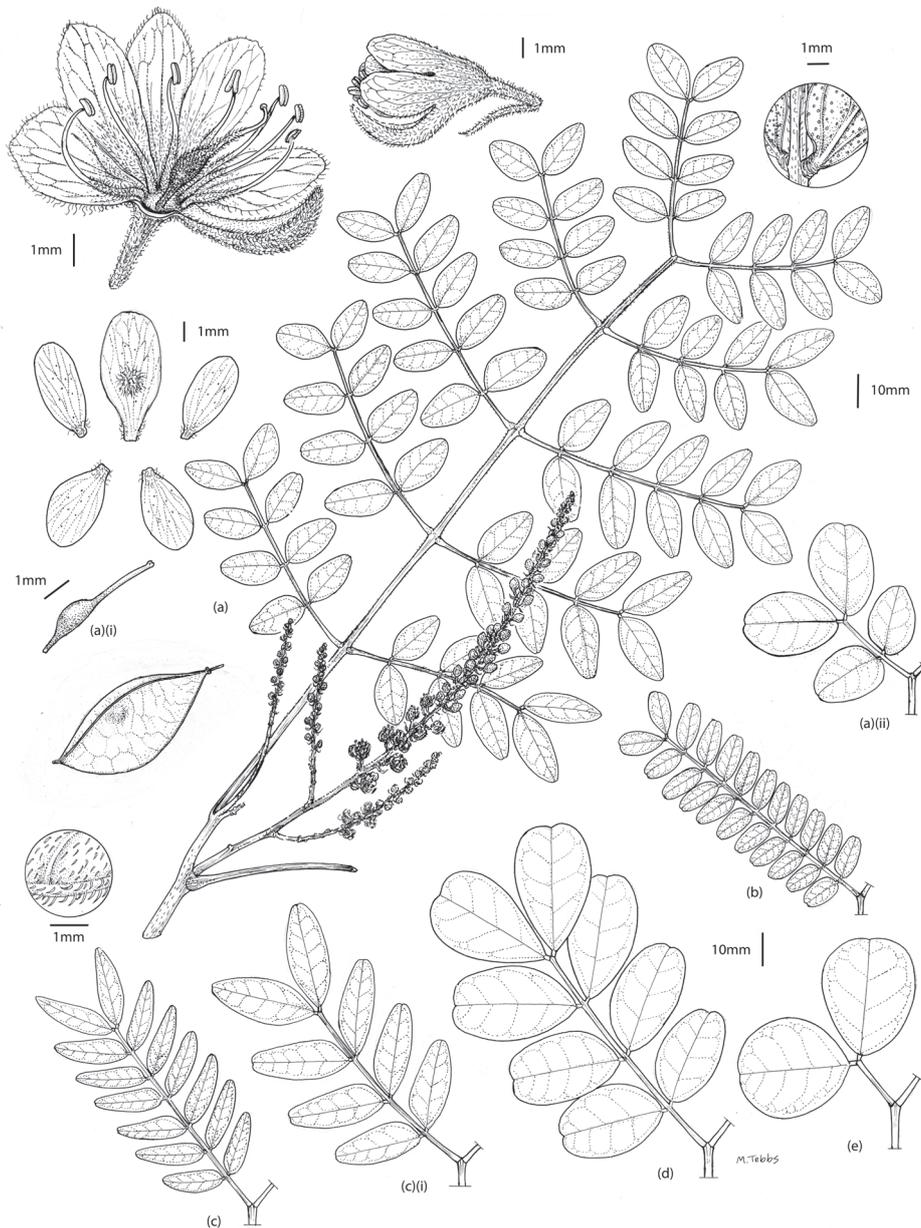
Contribution à la Flore de la Nouvelle-Calédonie. *Bulletin du Muséum National d'Histoire Naturelle* 31: 482. 1925.

Lectotype (here designated):—NEW CALEDONIA: Nouméa, *Pancher 176*, P (P00379673!); isolectotypes:—P (P00379675!, P00379674!)

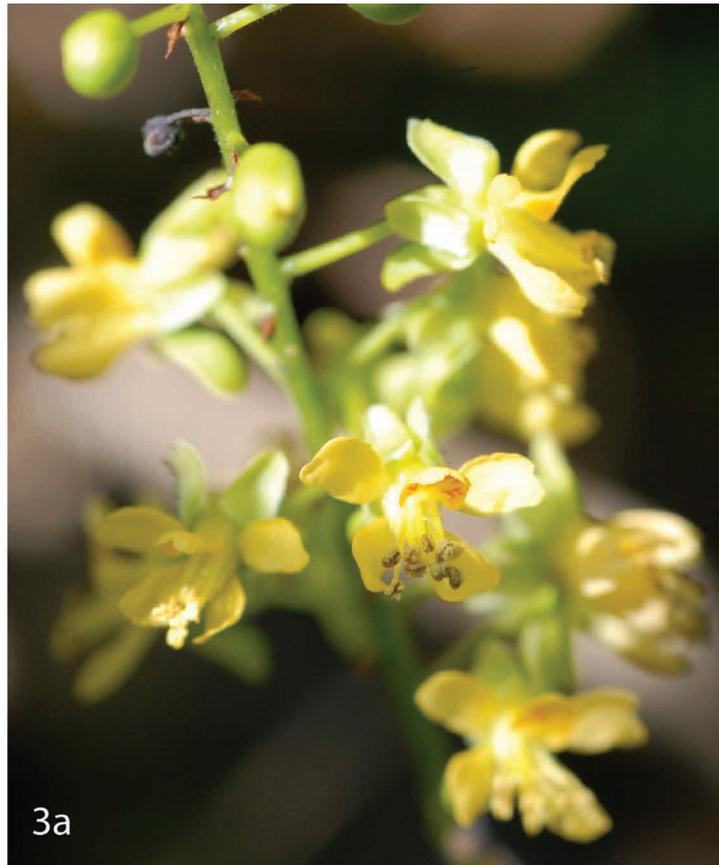
Remaining syntypes:—NEW CALEDONIA: Nouméa, *Baudouin 249*, P (P00751918!)

Scrambling shrub, becoming lianescent, to c. 5 m. *Stems* with scattered small recurved prickles, older stems with corky spine-tipped tubercles, sparsely to moderately whitish to ferruginous tomentose. *Stipules* semi-caducous, triangular, 0.5–2 × 0.5–2 mm, glabrous to densely tomentose. *Leaves* bipinnate, rhachis unarmed (especially older leaves), or with small recurved prickles in pairs at the pinna insertion points, and sometimes scattered on the internodes; pinnae (4–) 5–11 opposite pairs, paripinnate; leaflets opposite, sometimes subopposite on lower parts of pinna, (3–) 5–15 pairs per pinna; petioles 2–7.5 cm; rhachis (6–) 9–25 cm; pinnae (2–) 3–7.5 (–9) cm; leaf rhachis and pinna rhachis glabrous or sparsely to moderately tomentose with whitish to ferruginous hairs. *Leaflets* oblong, strongly oblique at base, apex obtuse to slightly emarginate; terminal leaflets 0.7–2.2 × 0.4–1.2 (–1.7) cm; median laterals 1–2.3 × 0.4–1.5 cm; midvein usually excentric, slightly diagonal, impressed above, slightly raised below, secondary veins reticulate, anastomosing, faintly to clearly visible; glabrous on both surfaces, or sometimes with few ferruginous hairs on lower midvein, on upper or lower surface. *Inflorescence* a panicle, usually few-branched, axillary or terminal, 9–20 cm long, glabrous, or very sparsely, occasionally densely, white to ferruginous tomentose on the axes, hairs sometimes only at pedicel insertion points. *Pedicels* 2–8 mm, articulated 1–2 mm below calyx. *Bracts* sometimes singly at base of racemes, triangular, 1–2 × 0.5 mm, moderately to densely orange tomentose; bracteoles singly at base of pedicels, caducous, 1–1.5 × 0.5–1 mm, lanceolate to elliptic, apex acute, inrolled, sparsely to moderately ferruginous tomentose. *Hypanthium* c. 1mm deep, usually glabrous, occasionally moderately ferruginous tomentose; lower calyx lobe c. 5 ×

3 mm, other lobes c.  $4 \times 2$  mm, all glabrous. *Median petal* (3–)  $4-6 \times 2-2.5$  mm, with a circular patch of dense, dark ferruginous hairs on inner surface where claw and blade meet, and hairs on margins of claw, outer surface glabrous; upper lateral petals  $4-5 \times 2-2.5$  mm; lower laterals  $4-5 \times 2-3$  mm; all laterals with blade glabrous, claw very sparsely ferruginous tomentose on inner surface. *Stamens* 10, filaments 3–6 mm long, densely ferruginous tomentose on lower half. *Ovary* 1–1.5 mm long, densely ferruginous pubescent, style 2–3 mm, glabrous, or ferruginous pubescent on the lower to half of length or less; stigma funnel-shaped, the rim fimbriate. *Fruit* (3.4–)  $4.2-6.4 \times 2-3.5$  cm, wing 3–5 mm, extending along upper  $\frac{2}{3}$  to whole fruit length, fruit surface glabrescent, sometimes with a few hairs at the base and on the margins. *Seeds* 1 per fruit, circular, flattened, 1–1.1 cm diameter, brown, smooth. (Figure 2, Figure 3)



**FIGURE 2.** Illustration of *M. montrouzieri*, with leaf detail of all species. (a) *M. montrouzieri* habit, leaf and inflorescence, with detail showing idioblasts on leaf undersurface; flower, side view; flower opened out; petals, inner surface (median, 2 upper laterals, 2 lower laterals); ovary and style; fruit with detail of hairs—drawn from Clark, R.P. 160; (a)(i) *M. montrouzieri* glabrous ovary; (a)(ii) leaf pinna—drawn from Clark, R.P. 150 (specimen formerly identified as *M. deverdiana*); (b) pinna of *M. baudouinii*—drawn from Clark, R.P. 141; (c), (c)(i) pinnae of *M. schlechteri* (showing variation)—drawn from Clark, R.P., 132, 134; (d) pinna of *M. rubiginosum*—drawn from McPherson, G. 2089; (e) pinna of *M. ouenensis*—drawn from Balansa, B. 312. Illustration by Margaret Tebbs.



**FIGURE 3.** *M. baudouinii*: 3a. flower; 3b. leaf (Clark, R.P. 161)

**Distribution:**—Endemic to New Caledonia. Ile Art; Grand Terre, North and South Provinces, East to West. (Figure 4)

**Habitat:**—Occurs in wet forest, or maquis (Appendix 2), on ultramaphic soil. Elevation 0–400 m.

**Phenology:**—Flowering December to July, fruiting June to August.

**Preliminary Conservation Assessment:**—Extent of Occurrence 11,469.543 km<sup>2</sup> = VU, Area of Occupancy 36.000 km<sup>2</sup> = EN

**Category assigned:**—Endangered

**Rationale:**—This species, which grows in both wet forest and maquis, can be considered to be Endangered due to the small AOO, low number (c. 6) of known populations, and the continuing threats to its habitat of wet forest or maquis. Threats include logging, clearing, mining, and fires.

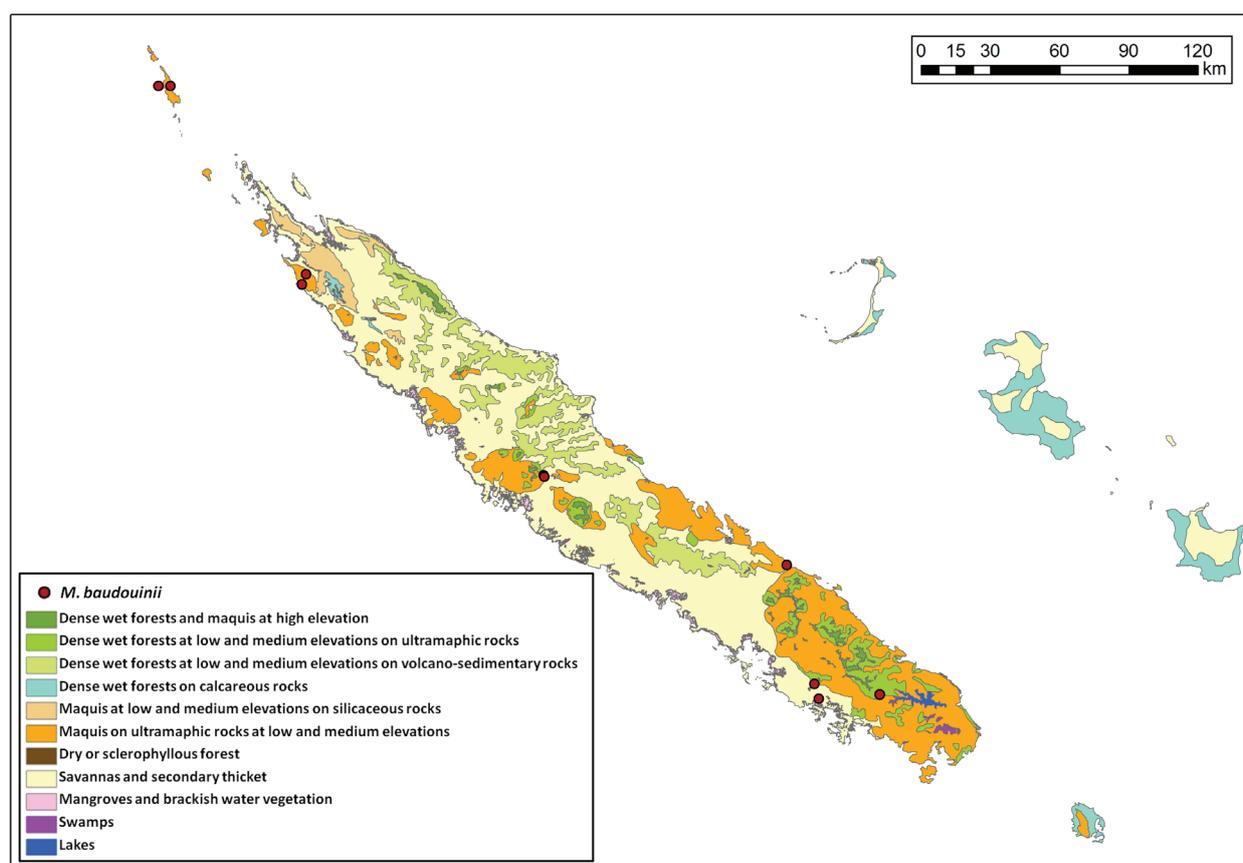


FIGURE 4. Distribution of *M. baudouinii*

**Nomenclatural Notes:**—The lectotype was selected for being the specimen most closely corresponding to the species description, and bearing both flowers and fruit.

### *M. montrouzieri* Guillaumin

in Guillaumin & Beauvisage, *Species Montrouzieranae*. *Annales de la Société Botanique de Lyon* 38: 87–88. 1913.

Lectotype (here designated):—NEW CALEDONIA: Taulé, *Deplanche 338*, P (P00379688!); isolectotypes:—K! L (L0651493!), NY! P (P00625915!)

Remaining syntypes:—NEW CALEDONIA: Taulé, *Deplanche 340* K (K000264184!), L (L0651493!), NY!, P (P00379688!, P00625915!, P02142824!); Taulé, *Vieillard 2521*, P (P00379687!, P02142820!, P02142822! P02142823!); Ile Art (49 in herb. Lugd.) *Mueller: 3, 12; Deplanche 558* P! (barcode unknown)

Synonym.—*M. deverdiana* Guillaumin, *Bulletin de la Société Botanique de France* 83: 310. 1936.

Syntypes:—NEW CALEDONIA: Cap Deverd, *Vieillard 2533* (specimen not seen, the number as written in the protologue is possibly a typographic error, as the specimen *Vieillard 2523!* is determined as *M. deverdiana*); Cap Deverd, *Deplanche 341* K (K000556379!) NY!, P (P00379664!, P00379665!, P00379689!, P00379690!); Cap Deverd, *Pancher 41* (location of specimen unknown).

Synonym. *M. deverdiana* Guillaumin var. *glabrifoliolula* Guillaumin (1936: 310).

Syntypes:—NEW CALEDONIA: Route de Canala, *Balansa, B. 2447* L (L0651586!), P (P00379662!, P00379663!, P00624907!); prés l’embouchure du Douthio, *Balansa, B. 3668* P (P00379661!, P00379686!); Taulé, *Vieillard 2522* P! (barcode unknown).

Scrambling shrub to c. 6m. *Stems* unarmed, or with scattered recurved prickles, glabrous to very sparsely to moderately whitish to ferruginous tomentose. *Stipules* semi-caducous, triangular, c. 1–2 × 0.5 mm, moderately tomentose, or

on margins only. *Leaves* bipinnate, rhachis unarmed or with recurved prickles in pairs at pinna insertion points, and scattered on the internodes (particularly on younger leaves); pinnae 1–6 opposite pairs, paripinnate; leaflets opposite to subopposite, 1–6 pairs per pinna; petioles 1.8–8.5 cm; rhachis (1.5–) 5.4–25 (–28.8) cm; pinnae (0.8–) 2.4–7 cm. *Leaflet* shape variable, with irregular margin, elliptic to orbicular, base oblique, apex obtuse or rounded to slightly emarginate, margin inrolled; terminal leaflets (1.2–) 1.5–3.6 (–4.3) × 0.8–2.5 (–3.3) cm; median laterals (1.1–) 1.6–3.4 × 0.8–2.6 cm; secondary veins reticulate, anastomosing, slightly impressed above and raised below; both surfaces glabrous to sparsely, occasionally moderately, tomentose, with somewhat appressed, whitish to ferruginous hairs. *Inflorescence* a panicle, often few-branched, axillary or terminal, flowers spaced up to 6 mm apart, 8–30 cm long, glabrous or sparsely to densely ferruginous tomentose. *Pedicels* 2–7 mm, articulated c. 1–2 mm below calyx, sparsely to moderately (densely when very young) ferruginous tomentose. *Bracts* sometimes singly at base of racemes, triangular, c. 0.5–1 × 0.5 mm, partially tomentose; bracteoles at base of pedicels, 1.5–4 × 0.5–1 mm, linear or lanceolate, acute, sparsely to densely ferruginous tomentose. *Hypanthium* c. 1 mm deep, glabrous or sparsely to moderately ferruginous tomentose, or hairs on margins only; lower calyx lobe 4–6 × 2–3 mm; other lobes 3–6 × 2–3 mm, glabrous or sparsely to moderately ferruginous tomentose. *Median petal* 3–6 × 1.5–3 mm, with a patch of translucent or ferruginous hair on inner surface where blade and claw meet, and hairs on margins of claw, outer surface glabrous; upper lateral petals 3–6 × 1.5–2 mm; lower laterals 3–6 × 1.5–2 mm; all laterals with blade glabrous, claw very sparsely ferruginous tomentose on inner surface. *Stamens* 10, (2–) 3–6 mm, filaments flattened, sparsely to densely tomentose, with long, translucent or whitish to ferruginous hairs on the lower half of the inner face or both faces. *Ovary* 2–3 mm long, glabrous, or densely pubescent with translucent, whitish, or ferruginous hairs, style 3–5 mm, very sparsely pubescent on lower half; stigma funnel shaped, the rim fimbriate. *Fruit* 2.4–5.4 × 1.4–2.4 cm, wing 2–4 mm, fruit surface glabrous or subglabrous, or sparsely to moderately ferruginous tomentose, glossy. *Seeds* 1 per fruit. (Figure 2, Figure 6)

**Distribution:**—Endemic to New Caledonia. Distributed mostly on the West coast in the northern half of the island, with two localities on the East coast, in the southern part of the island. Ile Art; Grand Terre, North and South Provinces (primarily North), East to West (primarily West). (Figure 5)

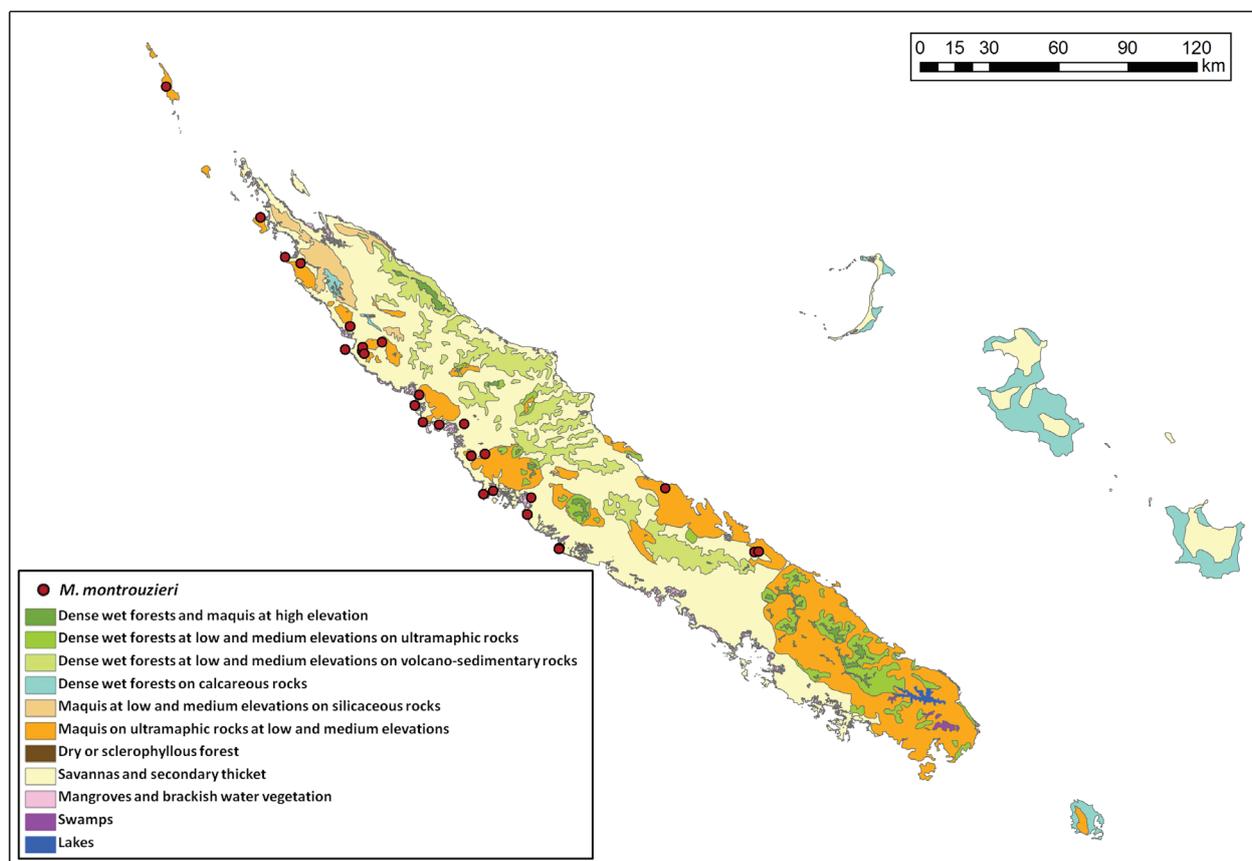


FIGURE 5. Distribution of *M. montrouzieri*



**FIGURE 6.** *M. montrouzieri*: 6a, c. leaves (Clark, R.P. 150, 160); 6b. young inflorescence (Clark, R.P. 160); 6d, e. inflorescences (Clark, R.P. 137, 150); 6f. fruit (Clark, R.P. 150)

**Habitat and Ecology:**—Maquis and sclerophyllous forest (Appendix 2), on ultramaphic or non ultramaphic soil. Elevation 1–900 m.

**Phenology:**—Flowering December to August, fruiting November to July.

**Preliminary Conservation Assessment:**—Extent of Occurrence 15,220.484 km<sup>2</sup> = VU, Area of Occupancy 60.00 km<sup>2</sup> = EN

**Category assigned:**—Endangered

**Rationale:**—*M. montrouzieri* occurs in maquis on ultramaphic or non ultramaphic soil, and in sclerophyllous forest (non ultramaphic soil). (Table 2)

Several of the herbarium specimen records are located in areas that are now savanna or secondary thicket. According to the maps of Jaffré *et al.* (1998), at least some of these are in areas that were formerly vegetated with sclerophyllous forest. Precise information regarding the pattern of forest loss over time is not available, so we are unable to confirm that the specimens were collected in this habitat. However, some of the specimen label data do indicate that the vegetation was indeed sclerophyllous forest at the time of collection (Table 2). For example, specimen *Veillon 7298*, according to the label, was collected in ‘fourre sclerophylle secondaire, substrat calcaire’, Cap Goulvain, Bourail, in 1990. The map of Jaffré *et al.* (1998) indicates that this area was formerly an area of sclerophyllous forest, whereas the map here provided (adapted from Jaffré *et al.* 2012), shows the current vegetation of this area to be savanna or secondary thicket.

**TABLE 2.** Ecology and character states of specimens of *M. montrouzieri* (organised geographically, north to south)

Collector	Coll. No.	Locality	Substrate Ultramaphic/ Non	Vegetation type (Maquis/ Sclerophyllous forest)	Ovary indumentum (hairy/ glabrous)	Pairs pinnae	Pairs lfts.	Leaflet size (median value)
Morat	6186	Ile Art	U	M	H	4	3	2.8 × 1.5
Dagostini	1691	Nehoue	U	M	H	4	3	2.5 × 1.7
McKee	20734, 18349	Nehoue	U	M	H	3 to 5	2 to 3	2.8 × 1.8; 2.7 × 1.7
McKee	16913, 16615	Nehoue	U	M	H	3	3	2.2 × 1.3; 2.2 × 1.2
McPherson	6211	Cap Deverd	N	not stated	G	2 to 3	2	2.5 × 1.1 (but high max)
Clark	150	Cap Deverd	N	scrub/ savanna	G	2 to 3	1 to 2	1.7 × 1.4
Labat	4116	Tinip	U	M	H	5	3 to 4	2.2 × 1.5
Clark	153, 154	Tinip	U	M	G	(1-) 2-3	(1-) 2-3 (-4)	2.6 × 1.9
McKee	16895	Tinip	U	M	G	3	1(-2)	3.3 × 2.3
McKee	20992	Homede boua	U	M	unknown	3	1, 2	2.5 × 1.8
Clark	158	Katepahie	U	M	H	5 to 6	5	2.8 × 1.7
Labat	3500	Gatope, Voh	N	S	unknown	6	4	1.3 × 0.8
McKee	25032	Oundjo	U	M	H	6	4 to 5	1.6 × 0.9
Munzinger	3987	Konaimbo	unknown	S (now scrub/ savanna)	unknown	4	3, 4	2.2 × 1.3
Hequet	3526	Tiaoe	N	S	G	4	2, 3	2.8 × 1.7
McPherson	5682	Tiea, Pouembout	U	‘low forest’ - but maquis from map data	G	5	3, 4	3.1 × 1.9
Jaffré	2898	Pindai	N	S	H	4, 5	3	4 × 2.7
McMillan	5047	Nepoui	N	S	H	3, 4	2	2.6 × 2
Veillon	6588	Nepoui	N	S	H	3	2, 3	2.3 × 1.7
Veillon	8090	Poya	N	S	H	2, 3	2, 3	4.8 × 3.3
Hequet	3636	Mepouiri	N	S (now scrub/ savanna)	G	unknown	2	3.3 × 2.3
Veillon	7298	Bourail, Cap Goulvain	N	S (now scrub/ savanna)	G	6	4	3.8 × 2.3
Barriere	146	Poros	U	M	unknown	4	1, 2	3 × 2.2
Barrabé	944	Canala	U	M	unknown	4	4, 5	1.7 × 1.1
McKee	14203	La Douthio	U	M	H	3, 5	6, 7	1.9 × 1.1

In other cases, such as specimen *Labat 3500*, the label records dry forest, ‘forêt sèche basse’ in 2004, and this is supported by current vegetation data. It can be concluded with reasonable confidence, therefore, that sclerophyllous forest is one of the vegetation types in which *M. montrouzieri* occurs.

*Mezoneuron montrouzieri* can be considered as Endangered under IUCN criteria, as although it is fairly widely distributed over the islands, represented by a moderate number of populations, and found in two vegetation types, maquis and sclerophyllous forest, on both ultramaphic and non ultramaphic soil, these habitat types are the two most threatened in New Caledonia (Jaffré *et al.* 1998). Both habitats are subject to damage through clearing, mining activities, and fires, and sclerophyllous forest in particular is highly threatened. Moreover, both habitat types are poorly represented within protected areas.

**Nomenclatural Notes:**—The sheet containing the lectotype bears two specimens, *Deplanche 338*, and *Deplanche 340*, one in flower and one in fruit. Although no information is given on the sheet as to which specimen relates to which collector number, separate sheets of *Deplanche 340* held at NY and P are fruiting specimens. It is highly probable, therefore, that the fruiting specimen of sheet 338/ 340 is specimen no. 340, and the flowering one no. 338. The flowering specimen is selected as the lectotype on the basis of being housed in the institution at which the author was based, and there being known duplicates at three additional institutions (K, L, NY), and upon it being a flowering specimen, which is more taxonomically informative than the fruiting specimen.

Regarding the species epithet ‘*deverdiana*’, the correct spelling for this name should be ‘*deverdianum*’, as it is an adjectival epithet based on a geographical location, and the ending should therefore agree with the genus ending.

The specimen *Deplanche 558* may be incorrectly numbered, on the basis that the number on the specimen label has been crossed out by an unknown individual.

#### Note on the taxonomy of *M. montrouzieri* and *M.everdiana*

As circumscribed here, *M. montrouzieri* includes the specimens previously designated as a distinct species, *M.everdianum*. There is a range of morphological variation represented within *M. montrouzieri* as it is defined here, in leaf morphology (pinnae number and leaflet number), and in the ovary indumentum, which is either densely hairy or glabrous. This variation renders definition of two distinct entities problematic. It is worth noting that variation in both of these character states within a single taxon is not uncommon in the Caesalpinioideae: Lewis (1994) noted with regard to *Caesalpinia s.l.* (as then circumscribed), that “leaflet size and shape vary greatly both between and within species...sometimes leaflet size varies greatly on a single terminal branchlet of one plant...”. Furthermore, evidence to suggest the conspecific nature of these specimens is that individuals with either a glabrous or hairy ovary, but which are otherwise morphologically indistinguishable, have been found occurring together in the same locality, Tinip, between 1969 and 2009.

It is also notable that this species, as here delimited, occurs on both ultramaphic and non-ultramaphic soil, being therefore facultative with relation to ultramaphic substrate, as opposed to obligate, meaning that the plant will grow well on ultramaphic soil, without having a specific requirement for any of the edaphic or physical qualities of the substrate (Brooks 1987). According to Pillon *et al.* 2009, species occurring on both ultramaphic and non-ultramaphic soil are not uncommon. For example two of the 13 species of the genus *Geissois* Labillardière (1825: 50) (Cunoniaceae) occur on both ultramaphic and non-ultramaphic soils (Pillon *et al.* 2014). Pillon *et al.* (2009) also noted that some species having a broad soil tolerance within the Cunoniaceae were complex and taxonomically challenging; this situation reflects the one discussed here. However, it is also noted by Pillon *et al.* (2009) that increasing molecular evidence suggests that there may be a greater number of cryptic taxa (defined as two or more distinct species that are erroneously classified under one species name [Bickford *et al.* 2007]), in New Caledonia than previously thought, and that these taxa may display greater fidelity to substrates than previously thought. The number of species understood to be broadly soil tolerant may decline as further data comes to light.

No correlation was found between the different character states described within this species, and geological and ecological variations. The reticulate nature of these parameters is outlined in Table 2.

#### *Mezoneuron ouenensis* (Guillaumin) R. Clark *comb. nov.*

Basionym. *Caesalpinia ouenensis* Guillaumin, *Bulletin de la Société Botanique de France* 83: 308–309. 1936.

Holotype:—NEW CALEDONIA: *Balansa, B. 312, 27 ‘7bre’ 1868* (fl.) P (P00379653!)

Shrub, 1–2 m. *Stems* without recurved prickles, glabrous. *Stipules* unknown. *Leaves* bipinnate, unarmed, all parts glabrous; pinnae 2–3 opposite pairs, paripinnate; leaflets opposite, 1–2 pairs per pinna; petioles 2.5–3.5 cm; rachis 6.5–7.5 cm; pinnae 1.5–3.8 cm. *Leaflets* orbicular to obovate, base oblique, apex rounded; 3.3–5 × 2.7–4 cm; secondary veins anastomosing, visible on both surfaces. *Inflorescence* an axillary raceme, c. 7 cm long, all parts glabrous. *Pedicels*

8–10 mm, not articulated. *Bract* at base of pedicel 2–3 mm long, lanceolate. *Hypanthium* c. 3 mm deep, glabrous, lower calyx lobe c.  $9 \times 3$  mm, other lobes c.  $6\text{--}7 \times 3$  mm, glabrous. *Median petal* size unknown, lateral petals c. 11–13 mm long. *Stamens* 10, c. 12–15 mm long, glabrous; ovary not seen. *Fruit* unknown. (Figure 2)

**Distribution:**—Endemic to New Caledonia. Known only from the type specimen, collected on Ile Ouen (South Province). (Figure 7)

**Habitat and Ecology:**—The edge of a stream. Vegetation not stated on specimen label, inferred to be maquis on ultramaphic substrate, as this is the only native vegetation type on Ile Ouen.

**Phenology:**—Unknown.

**Preliminary Conservation Assessment:**—

**Category assigned:**—Critically Endangered

**Rationale:**—*M. ouenensis* is determined here as Critically Endangered, as it is known only from a single specimen, collected in 1868. Ile Ouen, the type locality, is a small island (c.  $8.7 \times 7.2$  km), which is inhabited and has been subject to anthropogenic disturbance that may have destroyed the population from which the type specimen was derived. There are very few herbarium collections from this island, particularly from recent years. This could indicate either that there is little of interest to collect on the island, which could be a result of destruction of the vegetation, or simply that the island is seldom visited by collectors. A survey of the island is required to verify this assessment.

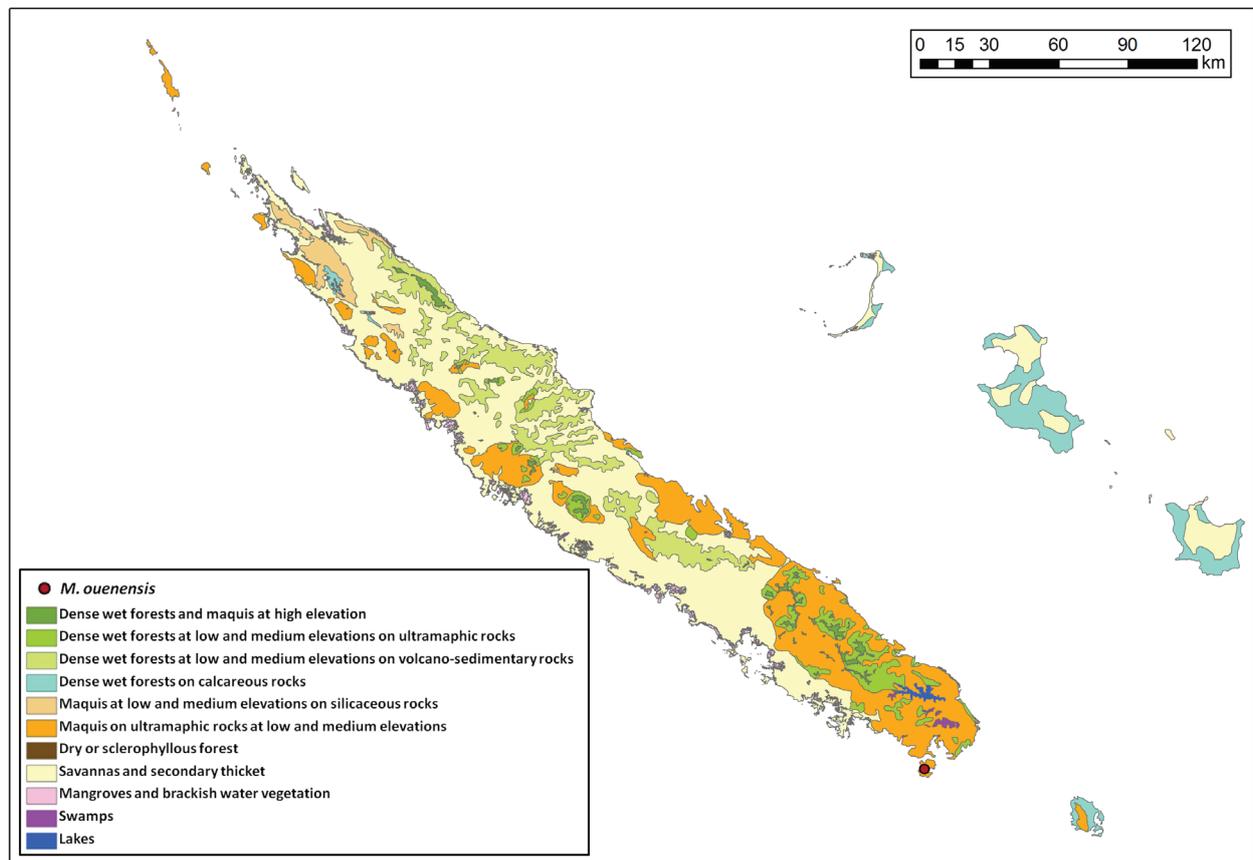


FIGURE 7. Distribution of *M. ouenensis*

*Mezoneuron rubiginosum* (Guillaumin) R. Clark *comb. nov.*

Basionym. *Caesalpinia rubiginosa* Guillaumin, *Bulletin de la Société Botanique de France* 83: 309–310. 1936.

Lectotype (here designated):—NEW CALEDONIA: Boghen, *Cribs* 982, P (P02969638!); isolectotype: P (P02969637!)

Remaining syntypes:—NEW CALEDONIA: Mount Boakim, *Lecard s.n.*, P (P02969633!, P02969644!)

Liana to 5m. *Stems* apparently unarmed; sparsely to moderately whitish to ferruginous tomentose. *Stipules* semi-caducous, triangular,  $1\text{--}1.5 \times 0.5$  mm, sparsely tomentose. *Leaves* bipinnate, rachis unarmed or with recurved prickles in pairs at pinna insertion points, and sometimes scattered on the internodes, sparsely to densely whitish or ferruginous tomentose;

pinnae 4–6 opposite pairs, paripinnate; leaflets opposite, 2–5 pairs per pinna; petiole 4.3–14 cm; rhachis 14.5–25.5 cm; pinnae 4.8–10 cm. *Leaflets* elliptic to obovate, oblique at base, obtuse to slightly emarginate at apex; terminal leaflets 3.2–5.1 × 2–3.3 cm; median laterals 2.8–5.1 × 1.8–3 cm; secondary veins reticulate, anastomosing, clearly visible on both surfaces; glabrous above, or with few whitish to ferruginous hairs on lower midvein, below glabrous or glabrate, with sparse hairs on petiole and midvein, or sparsely appressed hairy, denser on midvein. *Inflorescence* an axillary, supra-axillary, or terminal, raceme or few to many-branched panicle, congested, the flowers spaced c. 2–3 mm apart, 12–18.5 cm long, sparsely to densely ferruginous tomentose on peduncle and pedicels. *Pedicels* 2–3 mm, not articulated. *Bracts* sometimes singly at base of racemes, triangular, c. 1 × 0.5 mm, moderately to densely tomentose; bracteoles at base of pedicels, 3 × 0.5–1 mm, linear, inrolled, moderately to densely ferruginous tomentose. *Hypanthium* c. 2 mm deep, sparsely to moderately ferruginous tomentose; lower calyx lobe c. 5 × 2 mm, sparsely ferruginous tomentose, other lobes c. 4 × 2 mm, glabrous or with very few hairs, slightly ciliate on the margins. *Median petal* 6 × 2.5–3 mm, with a patch or band of ferruginous hairs on inner surface of claw, outer surface glabrous; upper lateral petals 6–7 × 2.5 mm, lower laterals 6–7 × 2.5 mm; all laterals with blade glabrous, claw very sparsely ferruginous tomentose on inner surface or both surfaces very sparsely puberulous. *Stamens* 10, filaments 6–8 mm, ferruginous tomentose on lower 1/3. *Ovary* 3–4 mm, densely ferruginous tomentose, style 4–10 mm, moderately ferruginous pubescent along most or all of its length; stigma funnel-shaped, the rim fimbriate. *Fruit* unknown. (Figure 2)

**Distribution:**—Endemic to New Caledonia. Lifou (Îles Loyauté); Grand Terre, North and South Province, Western side. (Figure 8)

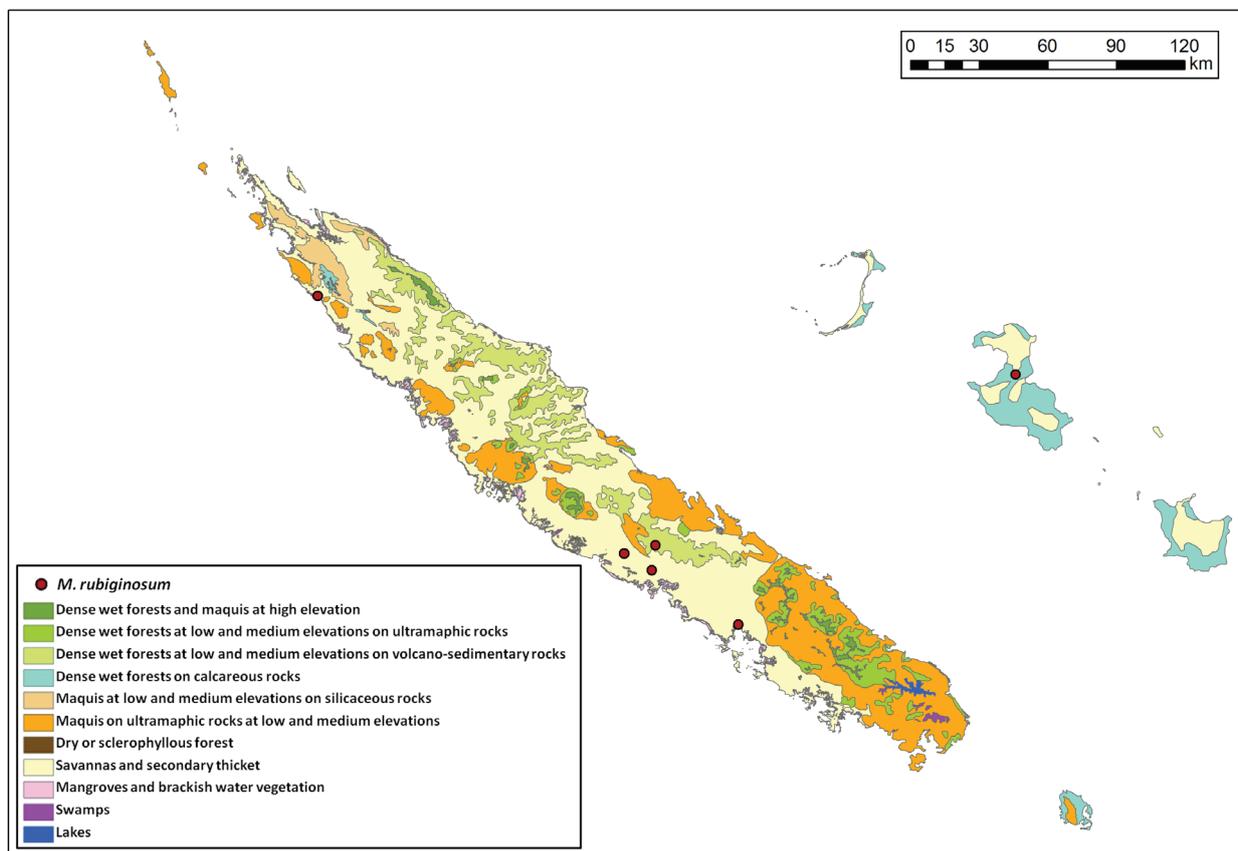


FIGURE 8. Distribution of *M. rubiginosum*

**Habitat and Ecology:**—Wet forest (Appendix 2), on non-ultramaphic soil (collections *McPherson 2089*, *Daniker 2390*, *Hartley 14975*). The species may also occur in sclerophyllous forest, according to the localities of some specimens collected in areas that appear to have been formerly vegetated with sclerophyllous forest (*Jaffré et al. 1998*). Due to the imprecise nature of the locality information available, however, it is not possible to confidently establish the vegetation type from which some of the specimens were collected (*McKee 26003*, *Cribs 982*, *Gervais s.n.*). Elevation 100–800 m.

**Phenology:**—Flowering October to November, fruiting time unknown.

**Preliminary Conservation Assessment:**—Extent of Occurrence 16,020.691 km<sup>2</sup> = VU, Area of Occupancy 16.00 km<sup>2</sup> = EN

**Category assigned:**—Critically Endangered

**Rationale:**—*M. rubiginosum* occurs in wet forest on non-ultramaphic soil. It may also occur in sclerophyllous forest, but this cannot be determined with certainty on the basis of the data available.

The specimens available at the time of study were collected between 1886 and 1972 (and date unknown). There has been an ongoing decline in the area of cover of both wet and sclerophyllous forest between the early records, and the present day, and at some of the collection localities the forest appears to have been replaced by savannas and secondary thicket. The assessment generated for this species by GeoCAT based on AOO is EN (Endangered), and based on EOO alone the rating is VU. However, the EOO measurement is somewhat biased by the single specimen collected from the Îles Loyauté, without which it would be EN. On further analysis, taking into account the age of the known specimens, and the depleted forest cover in some of the specimen localities, it appears highly probable that the total number of individuals still in existence is lower than inferred from the AOO and EOO, and that some of the populations have been negatively impacted, or destroyed. On this basis, we conclude that this species is in danger of extinction, and may be appropriately assigned the category CR (Critically Endangered).

**Nomenclatural Notes:**—The lectotype was selected for being the syntype that most closely corresponds to the species description.

*M. schlechteri* (Harms) R. Clark *comb. nov.*

Basionym. *Caesalpinia schlechteri* Harms

Harms, H.A.T. (1906) Beiträge zur Kenntnis der Flora von Neu-Kaledonien. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie*: 1–274

Type:—NEW CALEDONIA: Auf den Bergen bei Oubatche, 800m, 26 Dec. 1902, *Schlechter*; F.R.R. 15572 (fl.)

Lectotype:—(here designated) M (M0217766, image!); isolectotypes:—BR, (000005110605, image!), K (K000556378!), L (L0018794!)



**FIGURE 9.** *M. schlechteri*: 9a. flower; 9b. inflorescence (Clark, R.P. 132)

Liana to 20 m or more. *Stems* unarmed, or with scattered recurved prickles, glabrous or sparsely to densely ferruginous tomentose. *Stipules* semi-caducous, triangular, 0.5–1 × 0.5–1 mm, subglabrous to sparsely tomentose. *Leaves* bipinnate, rhachis unarmed, or with recurved prickles up to 5 mm in length, in pairs at pinna insertion points and scattered on the internodes, sparsely to moderately ferruginous tomentose; pinnae (2–) 3–7 (–8) opposite pairs; paripinnate; leaflets opposite, (3–) 4–8 (–14) pairs per pinna; petiole 2–5.5 (–8) cm; rhachis (3–) 5–23 cm; pinnae 2.8–12.7 cm, sparsely to moderately ferruginous tomentose, occasionally with scattered recurved prickles on the rhachis. *Leaflets* elliptic to rhomboid, strongly oblique at base, apex obtuse to slightly emarginate; terminal leaflets 2–4.7 × 0.6–3.1 cm; median laterals 1.8–4.4 × 0.6–2.3 cm; secondary veins reticulate, anastomosing, clearly visible on both surfaces, or indistinct on upper surface; upper surface usually glossy, glabrous, or sometimes with a few hairs at the base or along the basal part of the margins; lower surface glabrous, with sometimes a few hairs at the base or along the basal part of the margins. *Inflorescence* a raceme or panicle, axillary, supra-axillary or terminal, 13–31 cm long, glabrous, or sparsely to moderately ferruginous tomentose on all parts, occasionally a few recurved prickles on the lower axis. *Pedicels* 3–10 mm, not articulated, glabrous to densely ferruginous tomentose. *Bracts* sometimes singly at base of racemes, triangular, 0.5–2 × 0.5–1 mm, subglabrous to sparsely tomentose; bracteoles at base of pedicel, usually caducous, 1–1.5 × 0.5–1 mm, lanceolate, inrolled, sparsely to moderately orange pubescent, or ciliate only along margin, sometimes glabrescent. *Hypanthium* 1–2 mm deep, glabrous, lower calyx lobe c. 8 × 3–4 mm, other lobes c. 6 × 3–4 mm, all lobes glabrous or with ciliate margins. *Median petal* 4–6 × 1.5–3 mm, with a circular patch of dense, dark ferruginous hairs on inner surface where claw and blade meet, and on margins of claw, outer surface glabrous; upper lateral petals (4–) 5–8 × 1.5–3 mm; lower laterals (4–) 5–8 × 1.5–4 mm; all laterals with blade glabrous, claw very sparsely ferruginous tomentose on inner surface. *Stamens* 10, filaments 5–11 mm long, lower 1/3 to 1/2 with long translucent or ferruginous tomentose hairs. *Ovary* 3–4 mm long, glabrous, style 5–7 mm, sparsely to moderately pale translucent or ferruginous tomentose on lower half, sometimes thickened towards apex; stigma funnel-shaped, the rim fimbriate. *Fruit* glabrous, 4–5.6 × 1.7–2.6 cm, wing 4–6 mm wide. *Seeds* 1 per fruit. (Figure 2, Figure 9)

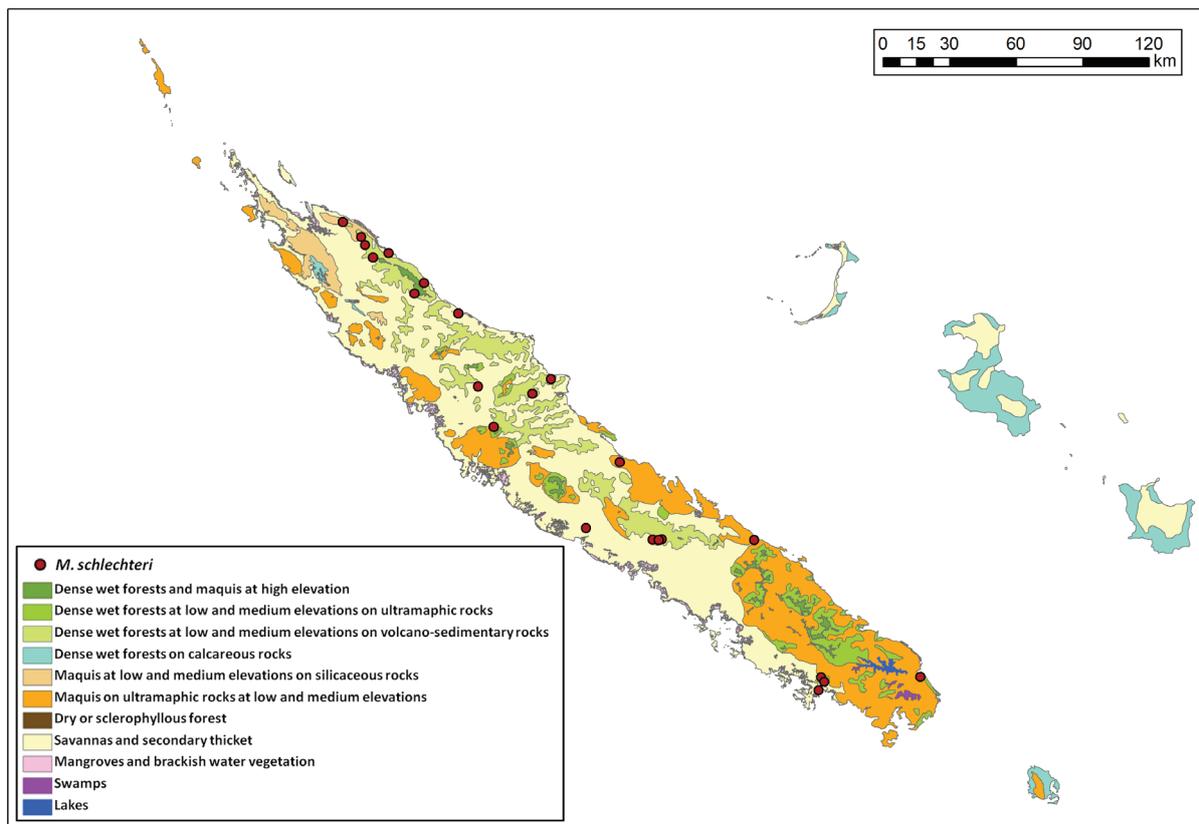


FIGURE 10. Distribution of *M. schlechteri*

**Distribution:**—Endemic to New Caledonia. Grande Terre, North and South Province, East to West (primarily East). (Figure 10)

**Habitat and Ecology:**—Dense wet forest (Appendix 2), on ultramaphic and non-ultramaphic (volcano-sedimentary) soil. Elevation 100–800 m.

**Phenology:**—Flowering July to January, fruiting December to February

**Preliminary Conservation Assessment:**—Extent of Occurrence 10,382.55 km<sup>2</sup> = VU, Area of Occupancy 84.00 km<sup>2</sup> = EN

**Category assigned:**—Vulnerable

**Rationale:**—*M. schlechteri* occurs in wet forest. It can be considered as Vulnerable as it is found in a number of localities throughout the island, and its habitat, although subject to the threats discussed in the introductory text (primarily logging), is not thought to be in immediate danger of widespread destruction throughout the island.

**Nomenclatural Notes:**—The author of the name, H. Harms, was based in Berlin herbarium (B), and no duplicate of the type is available from this institution (if one existed, it is likely that it was destroyed). The specimen at M is designated here as the lectotype, as this herbarium is in the country in which the author was based, and it is therefore more likely to have been seen by him. It is also taxonomically informative, bearing flowers and leaves.

### Note on Anatomy of *Mezoneuron*

A widespread morphological feature within *Mezoneuron*, including the species from New Caledonia, is the presence of subepidermal idioblasts in a range of morphological structures. Idioblasts are defined as cells that differ from the surrounding cells in shape, size or function (Beentje 2010), and they have a range of potential functions. Enlarged isolated subepidermal secretory cells (a type of idioblast) embedded in tissue of the petals and/ or sepals occur in a number of species of *Caesalpinia s.l.* (Rudall *et al.* 1994). These occur in the leaves (Fig. 2 (a), detail), flowers, and/or fruits of the species of *Mezoneuron* in New Caledonia, and are often very densely arranged. They merit further study in this group, and may prove to be a significant taxonomic character.

## Discussion

### Taxonomy and Conservation Status of *Mezoneuron* in New Caledonia

Up to six species of *Mezoneuron* have been recorded in New Caledonia, three of which were originally described within the genus *Mezoneuron*, and the remaining three in *Caesalpinia*. The species of *Mezoneuron* in New Caledonia are notably morphologically homogeneous, particularly in their flowers and fruit, although the little-known *M. ouenensis* differs by having markedly larger flowers than the other species. Of the three species lacking combinations in *Mezoneuron*, one, *M. schlechteri*, bears fruit with the characteristic wing, and can be placed with confidence in this genus. Although the fruit of the other two species, *M. rubiginosum* and *M. ouenensis* are not known, it is probable that these belong to the genus *Mezoneuron* because the vegetative and floral morphology is congruent. It is noted, however, that the floral morphology of *M. ouenensis* also allows for the possibility that this species may be better placed within one of the other generic segregates of *Caesalpinia s.l.*. A few widespread species of *Caesalpinia s.l.* are known to occur in New Caledonia (*Caesalpinia crista* Linnaeus (1753: 380), *Caesalpinia decapetala* (Roth) Alston), *Guilandina bonduc* Linnaeus (syn. *Caesalpinia bonduc* (L.) Roxburgh), but no endemics are known. We cannot in the absence of available fruit, or molecular sampling, definitively place *M. ouenensis* in any one of the segregate genera of *Caesalpinia s.l.*, but here place it within *Mezoneuron* on the basis of biogeographical and morphological features.

The close morphological similarity between the species of *Mezoneuron* in New Caledonia described here may be indicative of incipient sympatric speciation, particularly in the case of the *M. montrouzieri* complex, which may contain cryptic species. It has been suggested that other groups of New Caledonian plants may harbour cryptic species due to adaptive radiation to different soil types, such as ultramaphic vs. non-ultramaphic soils (Pillon *et al.* 2009; Pillon *et al.* 2014). This contrasts with other known examples of cryptic species in the *Caesalpinia* group, such as in the *Caesalpinia hintonii* Sandwith (1937: 303) complex (Sotuyo *et al.* 2007) and *Arquita grandiflora* Gagnon *et al.* (Gagnon *et al.* 2015, in press), which are thought to have arisen through vicariance due to mountain uplift, followed by low selective divergence of lineages.

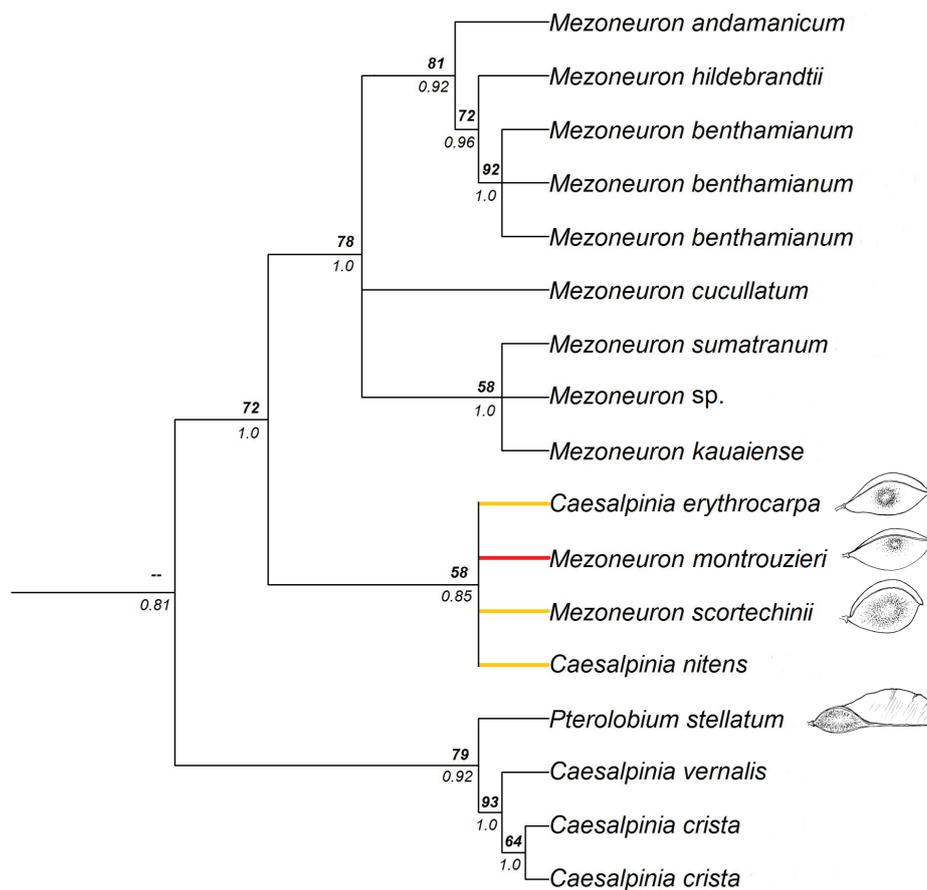
Another possible explanation for the morphological complexity within *M. montrouzieri* is that there are two distinct species which are undergoing hybridisation. The specimens found in the locality of Tinip in particular, which exhibit characters of both the traditionally recognised species *M. montrouzieri* and *M. deverdiana* (ovary hairy or

glabrous, intermediate number of pinnae and leaflets), may be evidence of hybridisation. The floral homogeneity within the species of *Mezoneuron* in New Caledonia is suggestive of shared pollinators, which, as well as probably indicating close evolutionary relationships, could facilitate hybridisation between taxa. This species complex represents an ideal candidate for a population level genetic study as the apparently plastic morphology of the group is difficult to analyse.

It is possible that further studies may demonstrate that the *M. montrouzieri* complex in fact contains two species, with the specimens formerly identified as *M. deverdiana* forming a distinct taxon. In this scenario, this taxon would be classified as highly threatened, probably Critically Endangered, due to the small number of populations and their size. In addition to a molecular study, further investigation of all of the New Caledonian species of *Mezoneuron in situ* could help to elucidate the species relationships, and provide sufficient data with which to produce full conservation assessments.

### Taxonomy of New Caledonian *Mezoneuron* in an evolutionary context

The species of *Mezoneuron* endemic to New Caledonia share the synapomorphy of a relatively small (2.5–6.5 × 1.5–3.5 cm), single-seeded fruit with a narrow wing (2–5 mm) (Figure 2, 6, 11), compared with the fruits of the remainder of the genus, which are significantly larger (to c. 20 × 6 cm), usually multi-seeded, and with a broader wing (to c. 18 mm).



**FIGURE 11.** Phylogeny of the *Mezoneuron* containing clade of the informal *Caesalpinia* Group. Strict consensus of 100,000 equally parsimonious trees based on rps16 plastid sequences. Bootstrap support is shown in bold above branches, and posterior probability values are shown italicised, below the branch (Gagnon *et al.* 2013). The branches of the tree shown in yellow indicate species found in Australia, and the branch in red is a New Caledonian endemic species. Fruits of species within the New Caledonian species containing clade are shown (except *C. nitens*, the fruit of which are unknown), and contrasted with that of the winged fruit of *Pterolobium* within the sister clade. Fruit illustrations by R. Clark

The fruit type of the New Caledonian species is shared with the Australian endemic species *M. brachycarpum* Benth (1864: 278) and *C. traceyi* Pedley (1997: 99) and subendemic (Australia and New Guinea) *Caesalpinia erythrocarpa* Pedley (1997: 98) (Figure 11). Although lacking combinations in *Mezoneuron*, these latter two species can be assigned with confidence to *Mezoneuron* according to their fruit, vegetative, and floral morphology. A fourth Australian endemic, *Caesalpinia nitens* (F. Mueller ex Benth) Pedley (1997: 99) is here considered part of this group on the basis of the vegetative and floral morphology, although the fruit is unknown. A more widespread species, *Mezoneuron scortechinii* F. Mueller (1882: 73), occurring in Australia, has a similar fruit type to the Australian (sub)endemics, albeit more ligneous.

The similarity between the fruit of the New Caledonian and Australian species of *Mezoneuron* appears to be indicative of a common ancestor. This hypothesis is supported by the findings of Gagnon *et al.* (2013), which show, although with weak support, one of the species of *Mezoneuron* from New Caledonia (*M. montrouzieri*) forming a clade with three of the (sub)endemic Australian species, including *C. nitens* (Figure 11).

The study of Gagnon *et al.* (2013) shows *Pterolobium stellatum* (Forsskål) Brenan (1954: 425), in a clade sister to the clade containing *Mezoneuron* (Figure 11). This seems to indicate that the winged fruit may have originated in a common ancestor to *Pterolobium* and *Mezoneuron*, and have subsequently diverged into the two forms, samaroid and non-samaroid.

A probable hypothesis is that *Mezoneuron* arrived in New Caledonia relatively recently in its evolutionary history. The fossil record shows that *Mezoneuron* was extant in North America and Europe in the middle Eocene, c.45 Mya (Herendeen & Dilcher 1991, Herendeen & Crane 1992). Like other legumes, it may have dispersed eastwards from North America along the Tethys Seaway, a seasonally dry to arid tropical belt that became Tethyan-wide during the Tertiary period, 65-2 Mya (Schrire *et al.* 2005). As it dispersed eastwards from North America, *Mezoneuron* is likely to have established first in Africa and then South East Asia. A putative relatively recent establishment of *Mezoneuron* in New Caledonia could go some way to explaining the morphological similarity between the species. This hypothesis merits further investigation.

To further elucidate the species limits and relationships within *Mezoneuron*, and its relationship to other genera, a wider molecular analysis of the taxa is necessary. Understanding of the *M. montrouzieri* complex, in particular, could benefit from a molecular study.

### Conservation of *Mezoneuron* in New Caledonia

As described in the preliminary conservation assessments carried out here, all species of *Mezoneuron* in New Caledonia are threatened to some degree: *M. schlechteri* is considered Vulnerable, *M. baudouinii* and *M. montrouzieri* as Endangered, and *M. ouenensis* and *M. rubiginosum* as Critically Endangered. Few of the localities of *Mezoneuron* species are in protected areas: according to the locality data, *M. baudouinii* may occur in the protected areas of Thy, Mt. Mou, and Yaté, and *M. schlechteri* in the protected areas of Rivière Bleu, Thy, Mt. Panié, and Yaté (Jaffré *et al.* 1998). The known localities of *M. montrouzieri*, *M. ouenensis*, or *M. rubiginosum* do not correspond to any protected areas. To safeguard the future of all species of *Mezoneuron* in New Caledonia, efforts should be made to create new protected areas, or extend existing ones, to encompass the species. This is particularly true in the cases of *M. montrouzieri*, and *M. ouenensis*, which are found in maquis or sclerophyllous forest, the two most threatened vegetation types in New Caledonia (Jaffré *et al.* 1998). *M. baudouinii* and *M. rubiginosum*, although occurring in the less threatened rainforest vegetation, are represented by few known populations, and therefore also merit greater protection than they currently receive.

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**Appendix 1. Specimens seen (listed in order by species, then by geography, north to south). All collected in New Caledonia.**

***M. baudouinii***

- Barrabé, L., Swenson, U., Munzinger, J. 952*, Ile Art, Belep, Plateau Nord, Te Waala, 19 42 2 S, 163 36 50 E, 255m, 24 Aug. 2009 (st.) (K, NOU)  
*Barrabé, L., Swenson, U., Munzinger, J. 965*, Ile Art, Belep, Plateau Nord, Te Waala, 19 42 9 S, 163 39 52 E, 248m, 26 Aug. 2009 (fr.) (K, NOU, P)  
*McKee, H.S. 30507*, Ile Art, Plateau Nord, 200m, 10 Dec. 1975 (fl.) (K, NOU)  
*Clark, R.P. 141*, Prov. Nord, base of Tiebaghi, 20 29 25 S, 164 11 53 E, 15m, 25 Jul. 2009 (fr.) (BRI, CHIC, K, NOU, P)  
*Clark, R.P. 142*, Prov. Nord, base of Tiebaghi, 20 29 24 S, 164 11 52 E, 15m, 25 Jul. 2009 (fr.) (K, NOU, P)  
*Clark, R.P. 143*, Prov. Nord, base of Tiebaghi, 20 29 24 S, 164 11 54 E, 15m, 25 Jul. 2009 (fr.) (K, NOU, P)  
*McKee, H.S. 31140*, Dome de Tiebaghi, 400m, 25 Apr. 1976 (st.) (K)  
*McKee, H.S. 31191*, Dome de Tiebaghi, 400m, 25 Apr. 1976 (fl.) (K, P)  
*Sevenet, T. 677*, Tiebaghi, 13 Jun. 1974 (fr.) (NOU)  
*Veillon, J.M. 3068*, Dome de la Tiebaghi, 400m, 11 Jun. 1974 (fr.) (K, NOU, P)  
*Barrabé, L., Mouly, A. 513*, Nétéa, Poirin Néa, 21 15 3 S, 165 11 56 E, 10 Jul. 2007 (fl.) (NOU)  
*Clark, R.P. 162*, Prov. Nord, Poya, Tribu de Nétéa, 21 14 59 S, 165 11 46 E, 130m, 1 Aug. 2009 (fr.) (K, NOU, P)  
*Clark, R.P. 161*, Prov. Nord, Poya, Tribu de Nétéa, 21 15 06 S, 165 11 21 E, 130m, 1 Aug. 2009 (fr.) (K, NOU)  
*Clark, R.P. 164*, Prov. Nord, Poya, Tribu de Nétéa, 21 15 26 S, 165 12 05 E, 90–100m, 1 Aug. 2009 (fr.) (K, NOU)  
*Brinon, H. 392*, Thy, 200m, 27 Aug. 1978 (fr.) (NOU)  
*Clark, R.P. 165*, Prov. Sud, Mont Mou, 22 04 29 S, 166 19 54 E, 130–170m, 2 Aug. 2009 (st.) (K, NOU)  
*McKee, H.S. 16043*, Route de Yaté, Dalmates, 150m, 08 Dec. 1966 (fl.) (K, NOU)

Locality uncertain:

- Baudouin 249*, Nouméa (fl.) (P)  
*Pancher 176*, Nouméa (fl., fr.) (P)  
*White, C.T. 2173*, Paita, 21 Oct. 1923 (st.) (BRI)

***M. montrouzieri***

- Morat, P. 6186*, Ile Art, 25 Aug. 1978 (fl.) (NOU)  
*Veillon, J.M. 3713*, Ile Art, 25 Aug. 1978 (fl.) (NOU)  
*Dagostini, G., Rigault, F. 1691*, Massif de Poum, versant Nord, captage Tich, 150–200m, 8 Mar. 2008 (st.) (NOU)  
*McKee, H.S. 16913*, Nehoue, Mine Fantouche, 100m, 18 Jun. 1967 (fr.) (K, NOU)  
*McKee, H.S. 16615*, Nehoue, Mine Fantouche, 50–100m, 20 Apr. 1967 (fl.) (NOU)  
*McKee, H.S. 18349*, Nehoue, Cap Tonerre, 0–30m, 4 Feb. 1968 (fl.) (K)  
*McKee, H.S. 20734*, Nehoue, Cap Tonnerre, 9 Sep. 1969 (st.) (K, NOU)  
*Clark, R.P. 150*, Prov. Nord, Cap Deverd, 38–50m, 20 45 36 S, 164 22 44 E, 30 Jul. 2009 (fl., fr.) (K, NOU)  
*Clark, R.P. 151*, Prov. Nord, Cap Deverd, 38–50m, 20 45 36 S, 164 22 44 E, 30 Jul. 2009 (fl., fr.) (K, NOU)  
*Deplanche 341*, Cap Deverd, 1861 – 67 (fl.) (K, NY, P)  
*McKee, H.S. 30023*, Cap Deverd, Gomen, 10 Apr. 1975 (st.) (K, NOU)  
*McPherson, G. 6211*, Cap Deverd, south of Kaala-Gomen, 30m, 22 Dec. 1983 (fl.) (K, MO)  
*Vieillard 2523 [or 2533]*, Cap Deverd, 1861 – 67 (fl.) (P)  
*Clark, R.P. 152*, Tinip, 20 45 10 S, 164 27 10 E, 84m, 30 Jul. 2009 (fl., fr.) (K, NOU, P)  
*Clark, R.P. 153*, Tinip, 20 45 10 S, 164 27 10 E, 84m, 30 Jul. 2009 (fl., fr.) (BRI, K, NOU, P)  
*Clark, R.P. 154*, Tinip, 20 45 10 S, 164 27 10 E, 84m, 30 Jul. 2009 (fl., fr.) (K, NOU)  
*Clark, R.P. 156*, Tinip, 20 45 10 S, 164 27 6 E, 70m (fl., fr.) (K, NOU)  
*Labat, J.-N. et al. 4116*, Prov. Nord, Kaala-Gomen, Tinip, 26m, 20 46 45 S, 164 27 26 E, 27 Nov. 2009 (fl., fr.) (K, P)  
*McKee, H.S. 16895*, Tinip, entre Gomen et Ouaco, vers 20m, 17 Jun. 1967 (st.) (K, NOU)  
*McKee, H.S. 35126*, Tinip, 12 May 1978 (fr.) (NOU)  
*McKee, H.S. 39353*, Tinip, 150m, 29 Jul. 1981 (fl.) (K)  
*McKee, H.S. 20992*, Taom, Mt. Homedeboua, 800–900m, 16 Oct. 1969 (fl.) (NOU)  
*Clark, R.P. 137*, Prov. Nord, base of Katepahie, near Voh, 20 56 31 S, 164 41 8 E, 13–100m, 24 Jul. 2009 (fl.) (BRI, CHIC, K, NOU, P)  
*Clark, R.P. 157*, Prov. Nord, base of Katepahie, near Voh, 20 56 25 S, 164 41 11 E, 25–30m, 30 Jul. 2009 (fr.) (K, NOU)

- Clark, R.P. 158*, Prov. Nord, base of Katepahie, near Voh, 25–35m, 20 56 25 S, 164 41 10 E, 31 Jul. 2009 (fl.) (K, NOU)
- Clark, R.P. 159*, Prov. Nord, base of Katepahie, near Voh, 20 56 31 S, 164 41 9 E, 25–30m, 31 Jul. 2009 (fl., fr.) (K, NOU, P)
- Clark, R.P. 160*, Prov. Nord, base of Katepahie, near Voh, 20 56 23 S, 164 41 11 E, 40m, 31 Jul. 2009 (fl.) (K, NOU)
- Jaffré, T. 1255*, Base du Katepahie, 15 Dec. 1973 (fl.) (K, NOU)
- Labat, J.-N. et al. 3500*, Voh, Tribu de Gatope, Presqu'île de Gatope, 20 59 3 S, 164 40 4 E, 141m, 16 Nov. 2004 (fl.) (NOU)
- McKee, H.S. 30567*, Voh, Katepahie, 1 Jan. 1976 (st.) (K, NOU, P)
- Webster, G.L., Jaffré, T. 19282*, Mt Katepahie, 2km NW of Voh, 20–100m, 20 55 S, 164 40 E, 13 Dec. 1973 (fl.) (P)
- McKee, H.S. 25032*, Oundjo, 0–50m, 17 Feb. 1972 (fl.) (K, NOU)
- McKee, H.S. 22424*, Kone, Pinjen, 16 Aug. 1970 (fl.) (NOU)
- Munzinger, J. 3987*, Rivière Coco, base du Koniambo, Dec. 2006 (fl.) (NOU)
- Hequet, V., Butin, J.-P., Henocque, S. 3526*, Base du Pic Tiaoué, 21 10 40 S, 164 57 30 E, 130m, 12 Dec. 2006 (fl.) (NOU)
- McPherson, G. 5682*, Plateau de Tiea, 5km S of Pouembout, 300m, 4 May 1983 (fl.) (MO)
- McMillan, C. 5047*, Presqu'île de Nepoui, 100 ft., 10 Jul. 1952 (fl.) (P)
- Veillon, J.M. 6588*, presqu'île de Nepoui, 18 Nov. 1987 (fl.) (NOU)
- Veillon, J.M. 8090*, Poya, Station de Mueo, 6 May 1998 (fl.) (NOU)
- Hequet, V., Papineau, C., Paulaud, D. 3636*, Mépouiri, 15 Mar. 2007 (fl.) (NOU)
- Barrière, R. 146*, Cote Est, Vallée de la Poro, 21 18 58 S, 165 42 40 E, 100m, 8 Oct. 2007 (fr.) (NOU)
- Barrabé, L., Nigote, W. 944*, Canala, Route a Horaire, 21 34 5 S, 166 5 4 E, 294m, 19 Aug. 2009 (fl.) (K, NOU)
- Balansa, B. 2447*, Route de Canala, Nov. 1869 (fl.) (L, P)
- Balansa, B. 3668*, près l'embouchure du Dothio (fr.) (P)
- McKee, M. 14203*, Ouroue (embouchure de la Dothio), 10–100 m, 8 Jan. 1966 (fr.) (K)
- Balansa, B. 1384*, N.E. de St. Louis (fl.) (NY, P)
- Deplanche 338*, Taulé, 1861 – 67 (fl.) (K, L, NY, P)
- Deplanche 340*, Taulé, 1861 – 67 (fr.) (K, L, NY, P)
- Taulé, *Vieillard 2521* (fl.) (P)
- Taulé, *Vieillard 2522* (fl.) (P)
- Locality uncertain:
- Deplanche 558* (fl.) (P)
- Vieillard 20525*, 1861 – 1867 (fr.) (P)
- M. ouenensis***
- Balansa, B. 312*, 27 '7bre' 1868 (fl.) (P)
- M. rubiginosum***
- McKee, H.S. 26003*, Koumac, 250m, 1 Dec. 1972, (fl.) (K, P)
- Daniker, A.U. 2390*, Lifou, 27 Oct. 1925, (fl.) (P)
- McPherson, G. 2089*, Boguen River Valley, above Katrikoin, c. 20 km E of Bourail, c. 160m, 20 Nov. 1979 (fl.) (MO, NOU)
- Hartley, T.G. 14975*, Boguen River, c. 25km NW of La Foa., 160m, 20 Nov. 1979 (fl.) (NOU)
- Cribs 982*, Boghen, 100m, Oct. 1900, (fl.) (P)
- Gervais s.n.*, Ouaiia, 6 Oct. 1886, (fl.) (P)
- Lecard, M.T. s.n.*, Mount Boakim, 800m (fl.) (P)
- M. schlechteri***
- McKee, H.S. 21910*, Haut Diahot, Tende – Exp. Frouin, 12 May 1970 (fr.) (K, NOU)
- McKee, H.S. 36669*, Haut Diahot, Tende, 650m, Mar. 1979 (fl.) (NOU)
- McKee, H.S. 41454*, Haute Diahot, 600m, 12 May 1983, *McKee* (fr.) (K, MO, NOU)
- Bamps, P. 6149*, Mandjelia, 20 24 S, 164 32 E, 715m, 4 Jan. 1978 (fl.) (NOU, P)
- McKee, H.S. 21648*, Pouebo, Mandjelia, Salandané, 26 Feb. 1970(fr.) (K, NOU)
- McKee, H.S. 37777*, Pouebo, Mt. Mandjelia, 750m, Feb. 1980 (fl.) (NOU)
- McKee, H.S. 37992*, Pouebo, Mandjelia, 28 Mar. 1980 (st.) (NOU)
- McPherson, G. 4080*, Mandjelia, above Pouebo, 700m, 18 Aug. 1981 (fr.) (MO, NOU, P)
- McPherson, G. 4375*, Mandjelia, above Pouebo, c. 700m, 13 Nov. 1981 (fl.) (MO, NOU, NSW, P)

*Munzinger, J. 1920*, Mandjelia, 12 Jan. 2004 (fl.) (NOU)  
*Veillon, J.M. 5419*, Mandjelia, 650m, 15 Mar. 1983 (fr.) (NOU, P)  
*Schlechter, F.R.R. 15572*, Auf den Bergen bei Oubatche, 800m, 26 Dec. 1902 (fl.) (BR, K, L, M)  
*McKee, H.S. 35937*, Pouebo, Ouangati, 700m, Oct. 1978 (fl.) (NOU)  
*Clark, R.P. 146*, Prov. Nord, Mont Panié, 20 53 25 S, 164 47 46 E, 173m, 27 Jul. 2009 (st.) (K, NOU, P)  
*Clark, R.P. 147*, Prov. Nord, Mont Panié, 20 33 27 S, 164 47 10 E, 497m, 28 Jul. 2009 (st.) (K, NOU)  
*McPherson, G., van der Werff, H. 17724*, Province du Nord, Mt. Panié, above Haut Coulna, 20 36 82 S, 164 44 40 E, 500–550m, 24 Oct. 1999 (fl.) (CANB, K, MO, NOU)  
*McKee, H.S. 35882*, Tanghene – Ouaieme, Oct. 1978 (fl.) (NOU)  
*Vieillard, E. 2520*, Poindimie, 1861 – 67 (fl.) (NY, P)  
*Veillon, J.M. 4683*, Plateau de Tango, 400m, 22 Oct. 1981 (fl.) (K, NOU, P)  
*McKee, H.S. 19943*, Crête entre haute Tchamba et haute Amoa, 600m, 14 Nov. 1968 (fl.) (NOU)  
*Munzinger, J. et al. 1454*, Haute Tchamba, 21 0 55 S, 165 15 6 E, 10 Nov. 2002 (fl.) (MO)  
*Bernardi, L. 10107*, Forêt Plate, 21 8 – 21 10 S, 165 3 – 165 7 E, 500–550m, 12 Aug. 1965 (fl.) (K)  
*Odricourt 842*, Region de Houailou, Aug. 1966 (st.) (NOU)  
*McKee, H.S. 34758*, Bourail, 500m, 27 Feb. 1978 (fl.) (NOU)  
*McKee, H.S. 5109*, Vallee de Thy, 25 Aug. 1956 (st.) (K)  
*Clark, R.P. 132*, Prov. Sud, near to Farino, 573m, 21 36 51 S, 165 46 27 E, 22 Jul. 2009 (fl.) (CHIC, K, NOU, P)  
*McKee, H.S. 20567*, Farino, foret Mépéou, Expl. Germain, 15 Apr. 1969 (fl.) (NOU)  
*Clark, R.P. 133*, Prov. Sud, near Sarramea, 21 36 49 S, 165 48 49 E, 435m, 23 Jul. 2009 (fl.) (K, NOU)  
*Clark, R.P. 134*, Prov. Sud, near Sarramea, 21 36 49 S, 165 48 49 E, 435m, 23 Jul. 2009 (st.) (K, NOU)  
*McKee, H.S. 8148*, 1km S. of Col d'Amieu, 500m, 16 Jan. 1961 (fl.) (L, P)  
*McKee, H.S. 42358*, Yaté, Les Dalmates, 3 Nov. 1984 (fl.) (NOU)  
*Clark, R.P. 131*, Prov. Sud, Mont Koghis, 22 10 46 S, 166 30 36 E, 431m, 21 Jul. 2009 (fl.) (BRI, CHIC, K, NOU, P)  
*Brinon, H. 750*, Thy, 130m, 8 Jun. 1980 (fl.) (NOU)  
*McPherson, G. 2764*, Thy River Valley, c. 12 km NE of Nouméa, 8 Jun. 1980 (fl.) (MO, NOU, NSW)  
*Balansa, B., M. 3338*, nord de la Conception, Dec. 1870 (fl.) (P)  
*Schmid, M. 5017*, Rivière Bleue (gros Kaoris), 1974 (fl.) (NOU)  
 Locality uncertain:  
*Brinon, H. 750*, 130m, 08 Jun. 1980 (fl.) (K, NOU)  
*Franc, I. 3056* (fl.) (NY)  
*McKee, H.S. 44930*, Mont Pembai, 700m, 31 May 1990 (fl.) (NOU)  
*Pancher s.n.*, 1861 (fl.) (P)  
 Material inadequate for identification (sterile):  
*McKee, H.S. 5194*, Rivière Encaissée, near Pouembout, 20m, 31 Aug. 1956 (fl.) (K, P, L)

## Appendix 2. Vegetation type from specimen labels

Species	Vegetation type (from label)	Collector	Collector number
<i>baudouinii</i>	maquis	Clark, R.P.	143
<i>baudouinii</i>	maquis and dense forest	Brinon, H.	392
<i>baudouinii</i>	forest	McKee, H.S.	16043
<i>baudouinii</i>	forest	White, C.T.	2173
<i>baudouinii</i>	low forest	Barrabé <i>et al.</i>	965
<i>baudouinii</i>	low forest	Barrabé <i>et al.</i>	952
<i>baudouinii</i>	low dense forest	McKee, H.S.	31140
<i>baudouinii</i>	low dense forest	McKee, H.S.	31191
<i>baudouinii</i>	good quality secondary wet forest	Clark, R.P.	161–165
<i>montrouzieri</i>	maquis	Barrabé <i>et al.</i>	944
<i>montrouzieri</i>	maquis	Clark, R.P.	152–156
<i>montrouzieri</i>	maquis	Clark, R.P.	157–160

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Appendix 2. (Continued)

Species	Vegetation type (from label)	Collector	Collector number
<i>montrouzieri</i>	maquis	Clark, R.P.	150, 151, 153
<i>montrouzieri</i>	maquis	Jaffré, T.	1255
<i>montrouzieri</i>	maquis	Labat, J.-N.	4116
<i>montrouzieri</i>	maquis	McKee, H.S.	16615
<i>montrouzieri</i>	maquis	McKee, H.S.	16895
<i>montrouzieri</i>	maquis	McKee, H.S.	16913
<i>montrouzieri</i>	maquis	McKee, H.S.	18349
<i>montrouzieri</i>	maquis	McKee, H.S.	20734
<i>montrouzieri</i>	maquis	McKee, H.S.	20992
<i>montrouzieri</i>	maquis	McKee, H.S.	25032
<i>montrouzieri</i>	maquis	McKee, H.S.	30023
<i>montrouzieri</i>	maquis	McKee, H.S.	30567
<i>montrouzieri</i>	maquis	McKee, H.S.	39353
<i>montrouzieri</i>	maquis	Webster, G.L. <i>et al.</i>	19282
<i>montrouzieri</i>	maquis paraforestier	Barrière, R.	146
<i>montrouzieri</i>	thicket	Veillon, J.M.	6588
<i>montrouzieri</i>	scrub	McPherson, G.	6211
<i>montrouzieri</i>	forest	Morat, P.	6186
<i>montrouzieri</i>	forest	Hequet, V.	3636
<i>montrouzieri</i>	dry forest	Hequet, V.	3526
<i>montrouzieri</i>	low sclerophyllous forest	Labat, J.-N.	3500
<i>montrouzieri</i>	sclerophyllous littoral forest	Jaffré, T.	2898
<i>montrouzieri</i>	secondary sclerophyllous thicket	Veillon, J.M.	7298
<i>montrouzieri</i>	degraded sclerophyllous formation	Veillon, J.M.	8090
<i>rubiginosum</i>	wooded slope	Hartley, T.G.	14975
<i>rubiginosum</i>	tall forest, partially degraded	McKee, H.S.	26003
<i>schlechteri</i>	forest	Balansa, B.	3338
<i>schlechteri</i>	forest	Bamps, P.	6149
<i>schlechteri</i>	forest	McPherson, G.	4080
<i>schlechteri</i>	forest	McPherson, G.	4375
<i>schlechteri</i>	forest	McPherson, G. & van der Werff, H.	17724
<i>schlechteri</i>	forest	Schmid, M.	5017
<i>schlechteri</i>	wet forest	McKee, H.S.	21910
<i>schlechteri</i>	littoral forest	Odricourt	842
<i>schlechteri</i>	secondary forest	Clark, R.P.	131
<i>schlechteri</i>	low degraded forest	Clark, R.P.	132
<i>schlechteri</i>	good quality secondary forest	Clark, R.P.	146, 147
<i>schlechteri</i>	degraded dense wet forest	Clark, R.P.	134