CSIRO PUBLISHING
www.publish.csiro.au/journals/asb *Australian Systematic Botany*, **23**, 333–370

Taxonomic revision of *Pycnandra* subgenus *Trouettia* (Sapotaceae), with six new species from New Caledonia

Ulf Swenson[A,C] *and Jérôme Munzinger*[B]

[A]Department of Phanerogamic Botany, Swedish Museum of Natural History, PO Box 50007, 10405 Stockholm, Sweden.
[B]IRD, UMR AMAP, Laboratoire de Botanique et d'Écologie Végétale Appliquées, Herbarium NOU, F-98848 Nouvelle-Calédonie, *and* IRD, UMR AMAP, Montpellier F-34000, France.
[C]Corresponding author. Email: Ulf.Swenson@nrm.se

Abstract. *Pycnandra* (Sapotaceae, Chrysophylloideae) is endemic to New Caledonia, with ~60 species, and is subdivided into five (or six) subgenera. Here, we revise *P.* subg. *Trouettia* and recognise 17 species of which six (*P. bourailensis*, *P. caeruleilatex*, *P. confusa*, *P. elliptica*, *P. pubiflora* and *P. sessiliflora*) are described as new and provide 10 new combinations. The subgenus is found only in Grande Terre, the main island of New Caledonia. The members occur in a wide range of habitats, from dry maquis vegetation to moist humid forest, from sea level to the higher massif, and all species except *P. bourailensis* and *P. sarlinii* are restricted to ultramafic soils. *Pycnandra* is characterised by the absence of staminodes, a single-seeded fruit, plano-convex cotyledons and the absence of endosperm. *Pycnandra* subg. *Trouettia* is distinguished on a character combination of several homoplastic features such as alternate and tomentulose leaves, pubescent ovary and a broad seed scar. The corolla is tomentulose on the outer surface of six species, a character shared with one species in *P.* subg. *Achradotypus*. Because of past and present mining activities in New Caledonia and because these species are restricted to habitats on ultramafic soils, conservation assessments are urgently needed. Preliminary IUCN Red List assessments are provided for all members of subg. *Trouettia*. Six taxa (*P. deplanchei* subsp. *deplanchei*, *P. deplanchei* subsp. *floribunda*, *P. intermedia*, *P. obscurinerva*, *P. sarlinii*, *P. sessiliflora*) are proposed the IUCN status of *Vulnerable*; *P. caeruleilatex*, *P. elliptica* and *P. schmidii* are considered to be *Endangered*, and the two species *P. bourailensis* and *P. confusa* are proposed to be listed as *Critically Endangered*.

Introduction

Classification of Sapotaceae in Australia and New Caledonia has undergone major rearrangement during the past few years. It has been demonstrated that *Pouteria sensu* Pennington (1991) is polyphyletic and absent from the region and we have therefore resurrected the staminode-bearing genera *Beccariella*, *Planchonella*, *Sersalisia* and *Van-royena* (Swenson and Anderberg 2005; Swenson *et al*. 2007*a*; Triono *et al*. 2007). In Pennington's (1991) classification of Sapotaceae the non-staminode genera *Leptostylis*, *Niemeyera* and *Pycnandra* were accepted, whereas *Ochrothallus*, *Sebertia* and *Trouettia* were not, being the three genera accepted by his predecessor (Aubréville 1967). Recent phylogenetic analyses have demonstrated that all these taxa form a monophyletic complex distinguished by the absence of staminodes, one-seeded fruits, plano-convex cotyledons and an included radicle (Bartish *et al*. 2005; Swenson *et al*. 2007*a*, 2008*b*). Support for clades that correspond to previously accepted genera varies within this complex (Swenson *et al*. 2008*a*). In fact, a notion of a narrow generic concept is inappropriate because the traditionally used diagnostic characters show much homoplasy and convey little phylogenetic signal. A classification that preserves nomenclatural stability with two recognised genera, namely *Niemeyera sensu stricto*, with five (one still undescribed) species in Australia, and *Pycnandra*, comprising 60–65 species in New Caledonia, is therefore preferred (Swenson and Munzinger 2009). More inclusive clades are accepted at the subgeneric level that will provide some phylogenetic information. Hence, a series of revisions have been undertaken, viz. *P.* subg. *Pycnandra*, *P.* subg. *Achradotypus* and *P.* subg. *Sebertia* (Swenson and Munzinger 2009, 2010*a*, 2010*b*). Here, we revise *P.* subg. *Trouettia*, with a diagnostic key and IUCN Red List conservation assessments for all members of the subgenus.

Historical review

The genus *Trouettia* was described by Baillon (1891*b*) on the basis of one collection by Benedict Balansa (1825–1891) from New Caledonia and an unpublished manuscript by Jean Baptiste Louis Pierre (1833–1905). Baillon failed to notice that 5 months earlier he had, on the basis of a specimen of Emile Deplanche (1824–1874), described the shrub *Chrysophyllum deplanchei*, characterised by similar features (Baillon 1891*a*). In fact, juxtaposition of the two collections reveals two identical plants. In his *Histoire des Plantes*,

 10.1071/SB10025 1030-1887/10/050333

Baillon (1891*c*) described *Ochrothallus*, a genus similar to *Trouettia*, but with flowers having up to 11 corolla lobes, not five as in the latter. However, the two genera were soon united with *Chrysophyllum* by Engler (1897), a view followed by Baehni (1938) and Vink (1958). Vink (1958) pointed to a general agreement among botanists that a five-merous flower and absence of staminodes characterise *Chrysophyllum*. He further stated that the number of corolla lobes is too variable to be informative for generic delimitation. We agree with this opinion, although floral morphology is even more divergent than he thought and, in fact, the non-staminode lineage of Chrysophylloideae in Australasia is only distantly related to *Chrysophyllum*, a genus restricted to South America (Swenson *et al*. 2008*a*, 2008*b*). Pennington (1991) placed *Ochrothallus* and *Trouettia* in synonymy under *Niemeyera*, again addressing problems as to the number of floral parts, but left the majority of species unassigned to genus (Govaerts *et al*. 2001).

Some authors have had obvious problems in agreeing on whether *Trouettia* and *Ochrothallus* were to be accepted at generic level or united with other taxa. Guillaumin (1911) accounted only for *Chrysophyllum*; however, in his synoptic flora of New Caledonia (Guillaumin 1948), *Ochrothallus* was accepted with five species, based on a flower with twice as many corolla lobes as sepals (anisomerous flower), regardless of the absence or presence of staminodes. In retrospect, phylogenetic studies using morphology and molecules have demonstrated that these five species belong to the genera *Beccariella*, *Pichonia* and *Pycnandra* (Swenson *et al*. 2007*a*). Aubréville (1964, 1967) placed *Ochrothallus* and *Trouettia* in his Malacanthées and recognised nine and two species, respectively, in these genera. Again, an anisomerous flower distinguished *Ochrothallus*, as opposed to a five-merous flower of *Trouettia*. Recent phylogenetic analyses have clearly shown polyphyly of *Ochrothallus sensu* Aubréville (1967) and that the traditionally used floral characters have evolved multiple times, although there is molecular support for a subclade that includes the type species of *Ochrothallus* and *Trouettia*. This group corresponds to Clades B–D *sensu* Swenson *et al*. (2008*a*), but it would be morphologically difficult to characterise on the generic level, and would entail high risk of nomenclatural instability. We proposed, therefore, that subclades supported by the molecular analyses are better considered on a subgeneric level to preserve nomenclatural stability (Swenson and Munzinger 2009).

Morphology

Morphology of *Pycnandra* has been intensively studied over the past several years and cladistic analyses have been conducted using the resulting data (Swenson and Anderberg 2005; Swenson *et al*. 2007*a*, 2008*a*). In the present paper, we have utilised this information to produce the diagnostic key, diagnoses and descriptions for the 17 (including tentatively) recognised species in *P.* subg. *Trouettia*. Morphological data have been gathered from herbarium specimens and fresh material collected since 2002. New material has primarily been deposited at MO, NOU, P and S (abbreviations follow Holmgren *et al*. 1990). Stem diameter, when available, is measured at breast height (dbh). Flowers and fruits from herbarium specimens were boiled in Copenhagen mixture (70 mL ethanol, 29 mL distilled water, 1 mL glycerol) in a microwave oven until the parts were soft, and then examined under a stereo-microscope. Flower and seed characters were also studied in the field, and when appropriate, fruits were dissected and seeds cleared from pulp. The terminology used follows Harris and Harris (1997). Illustrations were prepared using both herbarium specimens and photos taken in the field. Lists of examined specimens are organised alphabetically by locality and then in a chronological order.

Habit

Pycnandra subg. *Trouettia* is a group of shrubs, treelets and tall canopy trees, all endemic to New Caledonia (Fig. 1). Among the small shrubby species, often up to 3 m tall, are *P. deplanchei* subsp. *deplanchei*, *P. intermedia*, *P. lissophylla* and *P. obscurinerva*. *Pycnandra fastuosa*, *P. pubiflora*, *P. sessiliflora* and *P. sessilifolia* are the largest members, being constituents of the humid forest canopy, and can attain a height of 20 m. *Pycnandra fastuosa* has two types of foliage, one with a closed and another with an open secondary venation (Fig. 1*D*, *E*). It seems that mainly tall adult trees of this taxon set flowers, resulting in flowering material being seldom collected. The shrubby species *P. obscurinerva* was originally described as a form of *P. lissophylla* (Vink 1958), although not recognised by Aubréville (1967). Our unpublished molecular data of multiple accessions clearly demonstrate that these forms are genetically distinct and rather fit the concept of cryptic species (cf. Pillon *et al*. 2009). A similar case is true for *P. heteromera* and the herein described *P. elliptica*, two species quite distantly related although morphologically similar.

Phyllotaxis and venation

All members of *Pycnandra* subg. *Trouettia* have alternate, entire and pubescent leaves clustered at the tips of branches. The upper leaf surface is pubescent but glabrescent in about half of the species. Mature leaves are often coriaceous and dark green above, in contrast to an indument of brown, copper or grey of the lower surface (Fig. 1). The leaf venation is brochidodromous in most species, often with distinct secondaries and well developed loops, although eucamptodromous venation occurs in *P. fastuosa*, *P. pubiflora*, *P. sarlinii*, *P. schmidii* and *P. sessilifolia*. The tertiary venation is frequently reticulate, sometimes with one or two veins extending towards the midvein as in *P. carinocostata*, *P. elliptica*, *P. heteromera*, *P. lissophylla* and *P. obscurinerva*, or somewhat oblique as in *P. confusa*, *P. fastuosa*, *P. pubiflora* and *P. sarlinii*, but generally faint due to the indument. We often refer to faint and weak venation, by which we mean hardly visible and just visible, respectively, especially observed on fresh material in the field (Fig. 1).

Indument

Presence of malpighiaceous hairs or trichomes (the term used here) is diagnostic for Sapotaceae. The nominal malpighiaceous trichome is an epidermal structure with a short stalk and two branches, which in *Pycnandra* subg. *Trouettia* forms a tomentulose indument on the outer surface of leaves, petioles, pedicels and sepals (glabrous species are absent from this

Fig. 1. Field images of *Pycnandra* subg. *Trouettia* (Sapotaceae), a genus endemic to New Caledonia. (*A*) *P. bourailensis*, a new species confined to gallery forest on non-ultramafic soils; (*B*, *C*) *P. deplanchei* subsp. *floribunda*, a subspecies of the humid forest on ultramafic soils in the south of the main island Grande Terre; (*D*, *E*) *P. fastuosa*, a large tree on ultramafic soils, growing in humid forest with two types of secondary venation, i.e., the closed type (*D*) and the open type (*E*); (*F*) *P. lissophylla*, a cryptic species confined to ultramafic soils and readily confused with *P. obscurinerva*; (*G*, *H*) *P. pubiflora*, a new species characterised by pubescent flowers, known from pockets of humid forest in the south, not far from Noumea. Photos: Jérôme Munzinger (*A–C*, *F–H*) and Ulf Swenson (*D*, *E*).

subgenus). The length and curvature of the branches can vary in some species such that some trichomes are T-shaped, Y-shaped or simple, giving a more or less tomentose to villous indument, best expressed in *P. caeruleilatex*, *P. francii* and *P. sessilifolia*. The colour of the indument is generally brown or ferruginous on all parts, and with age it often turns grey, especially on the lower surface of leaves (Fig. 1*A*, *B*). Leaves of *P. fastuosa* have a peculiar copper shade below (Fig. 1*E*). About half of the species have a well developed indument on the external surface of the corolla, not only some scattered trichomes as often is the case in subg. *Achradotypus* (Swenson and Munzinger 2010*a*). The ovaries are usually covered with long, simple trichomes, except for *P. caeruleilatex*, *P. carinocostata*, *P. confusa*, *P. heteromera* and *P. obscurinerva* where the indument is limited to a ring at the base of the ovary. This ring of trichomes is particularly conspicuous in *P. confusa*, being wine-red and sharply contrasting with the white corolla.

Flowers

The flowers of *Pycnandra* subg. *Trouettia* are borne in fascicles that generally do not develop into burls except in *P. fastuosa*, *P. heteromera*, and to some degree in *P. sarlinii*. Fascicles are axillary or more frequently positioned along branches below the apical clusters of leaves, making several species ramiflorous. Each fascicle can have a single flower or up to 40 flowers. Throughout the subgenus the corolla is cyathiform or cup-shaped and white (Fig. 1*C*, *F*, *H*), except for *P. intermedia*, which usually has greenish flowers. A distinct character for some members of this subgenus is possession of imbricate, tomentulose, and successively larger bracts that subtend each flower, present in *P. caeruleilatex*, *P. elliptica*, *P. heteromera*, *P. sarlinii* and *P. sessiliflora*. An unusual feature for the genus is a dense indument on the external surface of the corolla lobes, present in *P. caeruleilatex*, *P. deplanchei*, *P. francii*, *P. pubiflora*, *P. schmidii* and *P. sessilifolia*, as well as in one member of subg. *Achradotypus* (*P. ouaiemensis*). This indument shall not be confused with the usually scattered, easily overlooked trichomes found in several members of the latter subgenus (Swenson and Munzinger 2010*a*). A handful of species of subg. *Trouettia* have anisomerous flowers in which the number of corolla lobes, each with a single stamen, outnumbers the sepals. Flowers of *P. confusa*, *P. fastuosa*, *P. pubiflora* and *P. schmidii* are all five-merous and have two stamens inserted opposite each corolla lobe. Stamens are further inserted in or just below the corolla-tube orifice, with the exception of *P. intermedia* in which the stamens are inserted just above the tube orifice (Fig. 14*F*). *Pycnandra carinocostata* is also odd, because it can have one or two stamens opposite each corolla lobe, and sometimes the pairs of stamens are partly fused (Fig. 5*G*). As far as known, the colour of the anthers is cream in all taxa.

Fruits

In contrast to other subgenera of *Pycnandra*, fruits of subg. *Trouettia* are fairly well known except for *P. bourailensis* and *P. elliptica*. The form is often ellipsoid to obovoid, whereas it is fusiform in *P. deplanchei* and *P. obscurinerva*. Fruits are generally glabrous, with some scattered trichomes around the short remnant style and/or behind the persistent sepals. Inside, the fruits have little pulp, a single seed, no endosperm, and red to pink, plano-convex cotyledons. The seed has more or less the same shape as the fruit whereas the size of the seed scar varies among species. *P. deplanchei* and *P. intermedia* have the smallest seed scar, covering ~15–20% of the seed surface, whereas it is the testa that covers 15–20% of the surface in *P. pubiflora* and *P. sarlinii*.

Conservation assessment

Information on the conservation status of species can be of significant value for environmental protection and sound natural-resource management, especially in the light of former, present and future mining operations in New Caledonia (Jaffré *et al*. 1998; Pascal *et al*. 2008). In fact, IUCN Red List assessments are increasingly regarded as critical components of any taxonomic revision (Callmander *et al*. 2005; Munzinger *et al*. 2008) and have prompted many workers to assess conservation status for various taxa (Morat and Chalopin 2007; Mouly and Hoang 2007; Swenson *et al*. 2007*b*; Venter and Munzinger 2007; Pillon *et al*. 2008; Hopkins *et al*. 2009; Munzinger and Swenson 2009; Pillon and Nooteboom 2009; Snow 2009).

We applied the IUCN Red List guidelines (IUCN 2001, 2008) to evaluate the threat to each species in the present revision. IUCN bases threat analysis on a variety of criteria and subcriteria involving reduction in population size (Criterion A), population geographic range (Criterion B), declining and/or fragmentation of small to very small populations (Criteria C, D) and quantitative analyses (E). Geographic range is measured as *extent of occurrence* (EOO) and *area of occupancy* (AOO) where EOO is the minimum convex polygon containing all points of occurrence, whereas AOO is the area estimated by superimposing a grid (3×3 km) onto occurrence points and calculating the cumulative area of cells occupied by the species. The number of subpopulations was calculated by using a 2×2 km grid where subpopulations were considered coherent if not separated by more than one cell. We used a smaller grid size, following Swenson and Munzinger (2009), because Grande Terre, the main island of New Caledonia, is ~16 595 km^2 and forms a mosaic of soil types, mountain ranges and valleys. Previous studies have suggested that a smaller grid size provides a better estimate for taxa that do not (and presumably never did) occur throughout their range because of naturally disjunct distribution and/or heterogeneous abiotic factors (Good *et al*. 2006; Callmander *et al*. 2007; Munzinger *et al*. 2008).

Taxonomic treatment

Below we outline descriptions and a diagnostic key to species of *Pycnandra* subg. *Trouettia* (Sapotaceae). Common characters for the subgenus are given in the subgeneric description and *not reiterated* under each species. When the word ‘or’ has been used in the subgeneric description, the appropriate character state is always given in the subsequent description for each species. If the words ‘sometimes’ or ‘rarely’ are used, only the less frequent character state is repeated for the species in which it occurs. Types are cited for each basionym and *not repeated* among the examined specimens. Homotypic synonyms are indicated with triple lines ‘≡’ and heterotypic with double lines ‘=’.

Pycnandra subg. ***Trouettia*** (Pierre ex Baill.) Swenson & Munzinger, comb. et stat. nov.

≡ *Trouettia* Pierre ex Baill., *Bull. Mens. Soc. Linn. Paris* 2: 945 [3 June] (1891*b*). *Type*: *Trouettia leptoclada* Pierre ex Baill. (= *Pycnandra deplanchei* (Baill.) Swenson & Munzinger)

= *Ochrothallus* Pierre ex Baill., *Hist. Pl.* 11: 298 [Sep.–Oct.] (1891*c*). *Type*: *Ochrothallus sessilifolius* (Pancher & Sebert) Pierre ex Baill. (*Chrysophyllum sessilifolium* Pancher & Sebert)

= *Corbassona* Aubrév., *Fl. Nouv.-Caléd.* 1: 72 (1967). *Type*: *Corbassona deplanchei* (Baill.) Aubrév. (*Chrysophyllum deplanchei* Baill.)

Nomenclatural note

Trouettia has priority over *Ochrothallus* by being published about 3 months before the latter. However, the name *Ochrothallus* is mentioned in a book on products and classification of Sapotaceae (Planchon 1888). This classification was preliminary and partly erected by Jean Baptiste Louis Pierre, who in a letter accredited Planchon to publish the name. Baillon (1891*c*) cited this work when he validly described the genus.

Description of subg. Trouettia

Trees or shrubs with white latex, rarely bluish. *Leaves* simple, entire, alternate, clustered at branch tips; upper surface glabrous or tomentulose on young leaves but glabrescent, lower surface tomentulose or tomentose, sometimes glabrescent; leaf base cuneate or rarely cordate to truncate; leaf apex round, subacute or retuse; leaf trichomes ferruginous or rarely golden or copper, often turning grey with age, malpighiaceous, sometimes also T-shaped, Y-shaped and/or simple, forming a villous indument; stipules absent; secondary venation brochidodromous or eucamptodromous; intersecondaries absent; tertiary veins oblique, reticulate or reticulate with some parallel veins near the midvein, never areolate. *Flowers* borne in fascicles below the leaves, being ramiflorous and/or axillary, burls absent or present, bisexual, pedicellate or sessile; pedicel tomentulose, tomentose to villous, with bracts at the base, along the pedicel or imbricate, sometimes similar to the sepals. *Sepals* 5 (rarely 4 or 6) in a single whorl, free, quincuncial, ovate, tomentulose or rarely tomentose to villous outside, always glabrous inside, persistent in fruit. *Corolla* cup-shaped, white, pubescent on the outside or glabrous; tube and lobes of equal length or rarely tube shorter than lobes; lobes variable in number, recurved or spreading. *Stamens* 1 or 2 opposite each corolla lobe, inserted in, below, or rarely above the tube orifice, shorter, as long as or longer than the corolla, glabrous or a few trichomes on the anther; anthers ± ovate, basifixed, versatile, 10–30% calcarate (spurred) of its length; anther appendage minute to absent. *Staminodes* absent. *Ovary* with 5 locules (rarely less or more), conical with the style or the style slender and almost as long as the corolla, indument variable; apex simple, without visible stigmatic areas. *Fruit* a berry, ellipsoid, obovoid, ovoid or fusiform, glabrous, pubescent at the base (behind the sepals) or sometimes at base and apex, pulp poorly developed, 1-seeded; seeds not laterally compressed, of the same form as the fruit; seed scar variable; testa shiny or dull, brown or grey; cotyledons plano-convex, smooth or ±ruminate, red; radicle included in cotyledons; endosperm absent.

Key to the species of subgenus *Trouettia*

1. One stamen inserted opposite each corolla lobe (corolla unknown in *P. bourailensis*, cf. Figs 1*A*, 2) 2
   Two stamens inserted opposite each corolla lobe 13
2. Corolla evenly pubescent on the outside 3
   Corolla glabrous (or nearly so) 6
3. Flowers sessile; sepals and bracts below flower similar, imbricate; latex bluish ..... *P. caeruleilatex*
   Flowers pedicellate; bracts absent or distributed along pedicel; latex white 4
4. Leaf base cuneate; sepals tomentulose; corolla lobes 5 ..... *P. deplanchei*
   Leaf base cordate to truncate; sepals tomentose; corolla lobes ≥7 5
5. Leaves obovate, 3–8 cm long; sepals 2.5–3.5 mm long ..... *P. francii*
   Leaves elliptic to oblanceolate, 18–40 cm long; sepals 4–5 mm long ..... *P. sessilifolia*
6. Flower or fruit sessile to subsessile, subtended by imbricate bracts 7
   Flower or fruit pedicellate, ~3–5 mm long; bracts 0–3, alternate, not imbricate 10
7. Secondary veins straight; tertiaries with some parallel veins to the secondaries 8
   Secondary veins arcuate; tertiaries reticulate or oblique 9
8. Leaves elliptic, 5–8 cm long; secondaries of 12–20 pairs; flowers not on burls ..... *P. elliptica*
   Leaves oblong, 10–20 cm long; secondaries of 20–30 pairs; flowers often on burls ..... *P. heteromera*
9. Tertiary venation oblique; sepal indument golden in colour; 9 or 10 corolla lobes ..... *P. sarlinii*
   Tertiary venation reticulate; sepal indument copper in colour; 7 or 8 corolla lobes ..... *P. sessiliflora*
10. Midvein impressed above; flowers greenish, ≤2 mm long ..... *P. intermedia*
    Midvein crested above; flowers white, 3–5 mm long 11
11. Flowers axillary; one or two stamens opposite each corolla lobe; sepals 4.0–4.5 mm long ..... *P. carinocostata*
    Ramiflorous; never two stamens opposite each corolla lobe; sepals 1.5–2.0 mm long 12
12. Leaves linear, 7–15 cm long; fruit obovoid, 10–15 mm long ..... *P. lissophylla*
    Leaves oblong, 4–7 cm long; fruit fusiform, 15–20 mm long ..... *P. obscurinerva*
13. Corolla pubescent; anthers with scattered trichomes 14
    Corolla glabrous; anthers glabrous 15
14. Petiole 35–90 mm long; indument on lower leaf surface partly persistent ..... *P. pubiflora*
    Petiole 5–10 mm long; leaves below glabrescent ..... *P. schmidii*
15. Leaves often oblong; midvein crested above (Fig. 5*D*); pedicel 5–7 mm long ..... *P. carinocostata*
    Leaves not oblong; midvein flat above; flowers sessile or subsessile 16
16. Leaves oval to elliptic, 12–15 cm long; pedicel ~1 mm long (subsessile), flowers not borne on burls ..... *P. confusa*
    Leaves ovate to elliptic, generally larger, 15–25 cm long; flowers sessile, borne on burls ..... *P. fastuosa*

Pycnandra bourailensis Swenson & Munzinger, sp. nov.

Species haec in habitu *Pichoniae balansae* similis sed foliis alternis et tomentosis, et nervis tertiis reticulatis differt.

Holotype: Nouvelle Calédonie, Province Sud, Bourail, Haute Kouri, 400 m alt., 23 Sep. 1976, *H.S. MacKee 32009* (S 09-24755), *isotypes* (MO, NOU 010152, P).

Tree up to 15 m tall. *Leaves* elliptic to broadly elliptic, 7–10 × 4–6 cm, young leaves tomentulose on both surfaces,

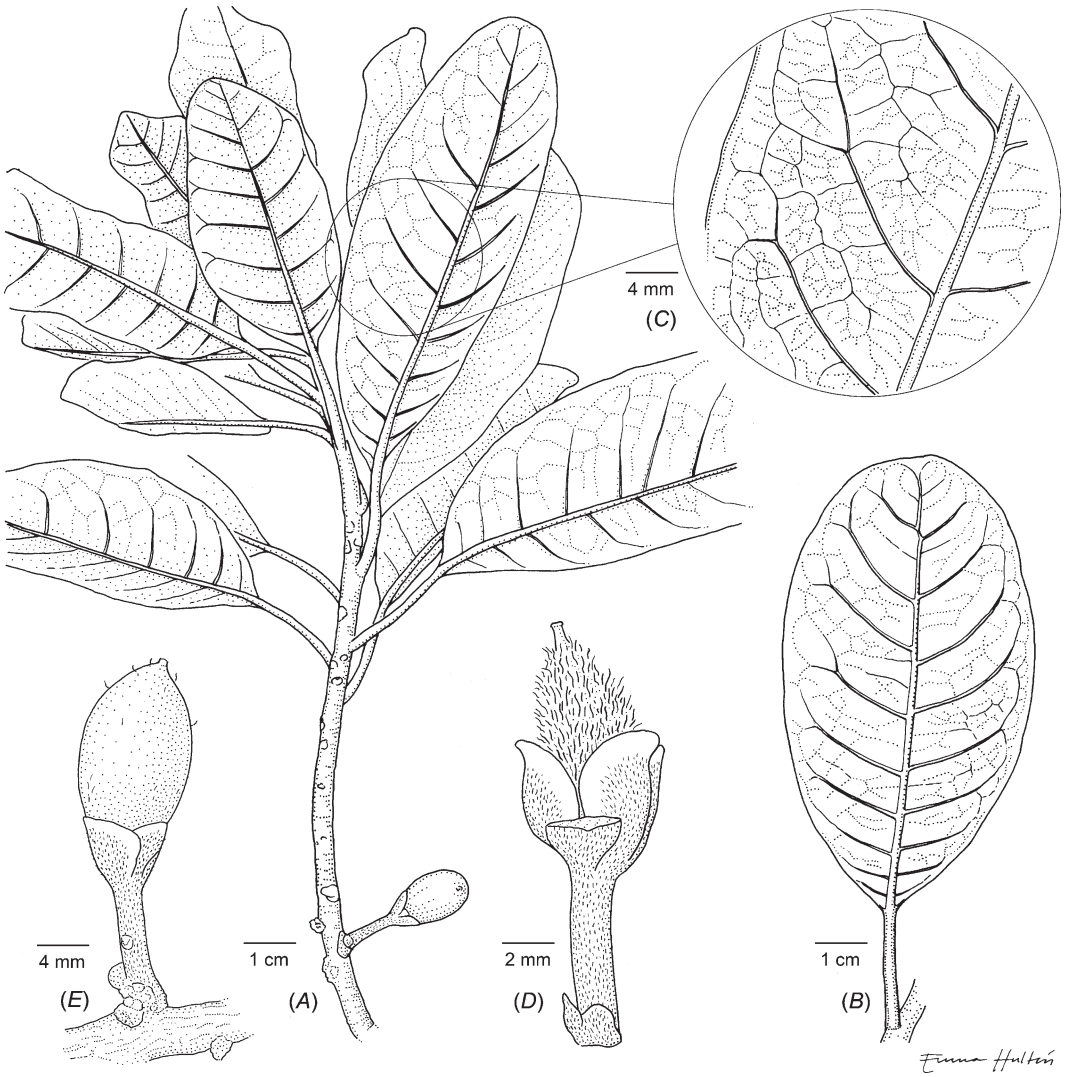

Fig. 2. *Pycnandra bourailensis*. (*A*) Habit, (*B*) leaf, (*C*) leaf venation (lower surface), (*D*) pedicel, sepals and pubescent ovary, and (*E*) immature fruit. Drawn from *Munzinger et al. 2963* (*A–C*, *E*), *Veillon 7720* (*D*).

glabrescent; apex round; venation brochidodromous with weak loops; secondaries of 8–10 pairs, distinct below, weakly visible above; tertiaries reticulate; petiole 15–25 mm long, tomentulose, glabrescent, black with age. *Flowers* borne along branches below the leaves, not on burls; pedicel 10–15 mm long, tomentulose, with a few minute bracts at the base. *Sepals* 4.0–5.0 mm long. *Corolla* unknown. *Ovary* and style hirsute throughout except for the top of style, ~7–9 mm long. *Fruit* poorly known, obovoid, 28–32 × 13–15 mm, crowned with a minute remnant style (Figs 1*A*, 2).

Recognition

The corolla of *P. bourailensis* is still unknown, which excludes it from the diagnostic key above. Floral characters are homoplasious in *Pycnandra* (Swenson *et al*. 2008*a*); however, on the basis of a close relationship with *P. deplanchei*, we predict that the flowers are small, have one stamen inserted opposite each corolla lobe and the corolla lobes are probably pubescent on the outer surface. The leaves are characteristically elliptic, with a reticulate venation that superficially resembles the habit of *Pichonia balansae*, a genus with opposite leaves, fine areolate higher venation, and flowers with staminodes. Petioles become black with age; however, it is uncertain whether this is a diagnostic character for *P. bourailensis* or caused by some fungal diseases. Flowers and field study of the species will answer these questions in the future.

Phenology

Flowering season is unknown; fruits are observed in August and September.

Distribution

Pycnandra bourailensis is confined to an area near Bourail on the western coast of Grande Terre (Fig. 3*A*). It occurs in gallery forest on schist and/or greywacke at an elevation of ~400 m altitude.

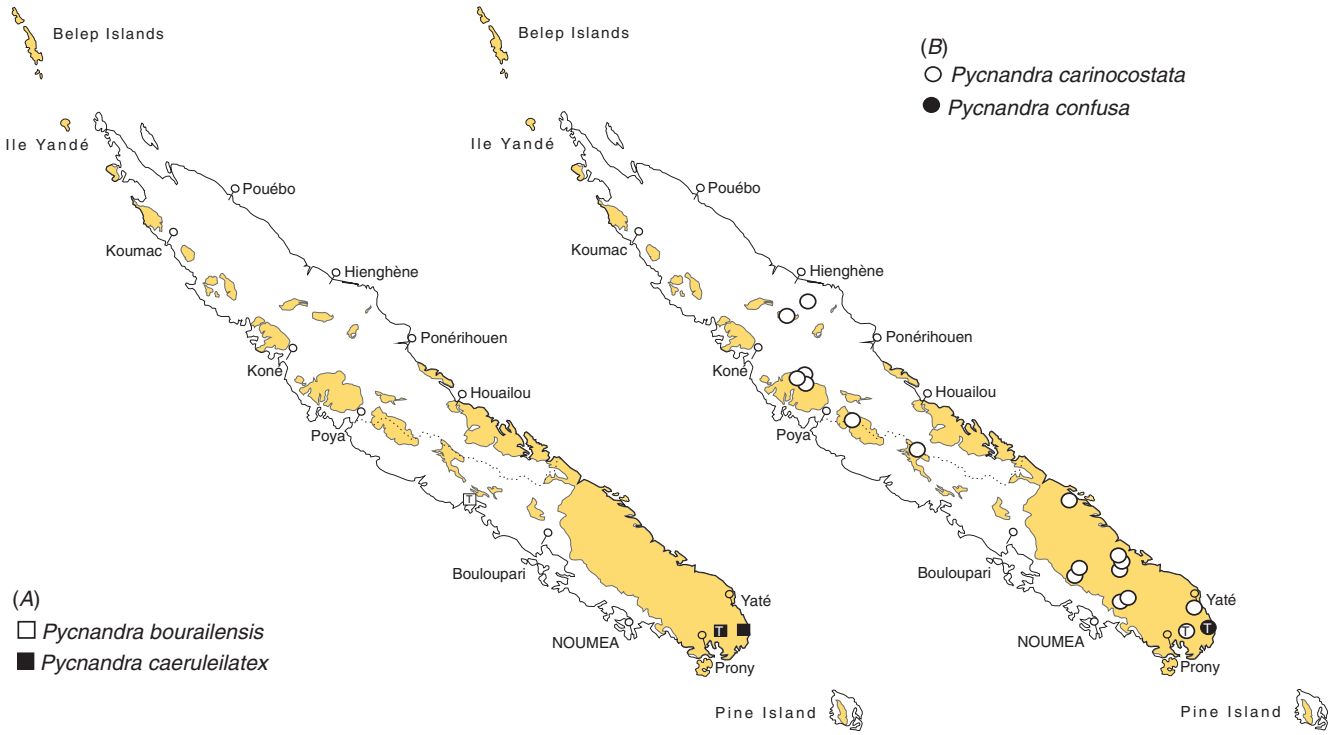

Fig. 3. Map of New Caledonia with distributions of (*A*) *Pycnandra bourailensis* (□) and *P. caeruleilatex* (■), and (*B*) *P. carinocostata* (○) and *P. confusa* (●). Type localities are indicated with 'T'. Shaded areas are land/mountain ranges dominated by ultramafic soil.

Etymology

The specific name is adopted after Bourail, the small town not too far from the only known locality.

Conservation status

The only known population of *P. bourailensis* occurs outside protected areas. The forest can readily be considered as a forest remnant, and such habitats are severely damaged on Grande Terre's western coast by the introduced rusa deer (*Cervus timorensis*) (Jaffré *et al*. 2008). *P. bourailensis* is assigned the preliminary status of *Critically Endangered* CR: D1+2.

Specimens examined

PROVINCE SUD: Bourail, haute vallée de la Kouri, 7.vii.1993, *Veillon 7720* (NOU, P, S); Bourail, 400 m alt., 5.viii.2005, *Munzinger*, *Veillon*, *D.*, *I.*, *B.*, & *S. Létocart 2963* (K, MO, NOU, NSW, P, S).

Pycnandra caeruleilatex Swenson & Munzinger, sp. nov.

Species haec *Pycnandrae pubiflorae* similis sed floribus sessilis et corollis 5–7-lobatis et staminibus tot quot lobis (corollae) differt.

Holotype: Nouvelle Calédonie, Province Sud, Forêt Nord, 4 Jan. 2005, *J. Munzinger*, *G. Dagostini*, *F. Rigault* & *D. Kurpisz 2622* (P 00630503), *isotypes* (MO, NOU 007232, S 09-1101).

Shrub or tree up to 15 m tall and a stem dbh of 15 cm, latex bluish. *Leaves* elliptic, 5–12 × 2–4 cm, young leaves tomentose on both surfaces, T-shaped trichomes with long branches present, glabrescent, somewhat persistent along mid- and secondary veins, ultimately glabrous; apex round; venation brochidodromous with weak loops; secondaries of 7–11 pairs, distinct below; tertiaries reticulate; petiole 10–15 mm long, tomentulose, glabrescent. *Flowers* 1–5 in each fascicle, sessile, borne along branches below the leaves, seldom axillary, not on burls, subtended by 3 or 4 imbricate bracts. *Sepals* 2.0–3.0 mm long, similar to the bracts, both with a glabrous margin. *Corolla* 5–6 mm long, with 5–7 spreading lobes, evenly pubescent on the outside. *Stamens* 1 opposite each corolla lobe, inserted in the tube orifice, as long as the corolla; anthers 1.5 mm long, often with a few scattered trichomes. *Ovary* with 5 locules, conical with style, sparsely pubescent at base, 2.5–3.0 mm long. *Fruit* globose or ovoid, 20–26 × 14–19 mm, glabrous, crowned with a 1–2-mm-long remnant style; seed scar almost hart-shaped, 30–40% of seed circumference and 60–70% of the seed length; testa shiny, brown (Fig. 4).

Recognition

This is mainly a ramiflorous species with sessile, anisomerous flowers, imbricate sepals and bracts, and bluish latex, a combination of features that readily distinguish it from all other members of *Pycnandra*. Bluish latex occurs only in one other congener, *P. acuminata* (subg. *Sebertia*), a species that differs in leaf indument, isomerous flowers and absence of imbricate bracts. The indument on leaves and flowers is similar to that of its sister species *P. pubiflora* (Swenson *et al*. 2008*a*) that differs in having larger leaves, pedicellate flowers, and two stamens (not one) opposite each corolla lobe.

Phenology

Pycnandra caeruleilatex blooms in December and January, with ripe fruits in November.

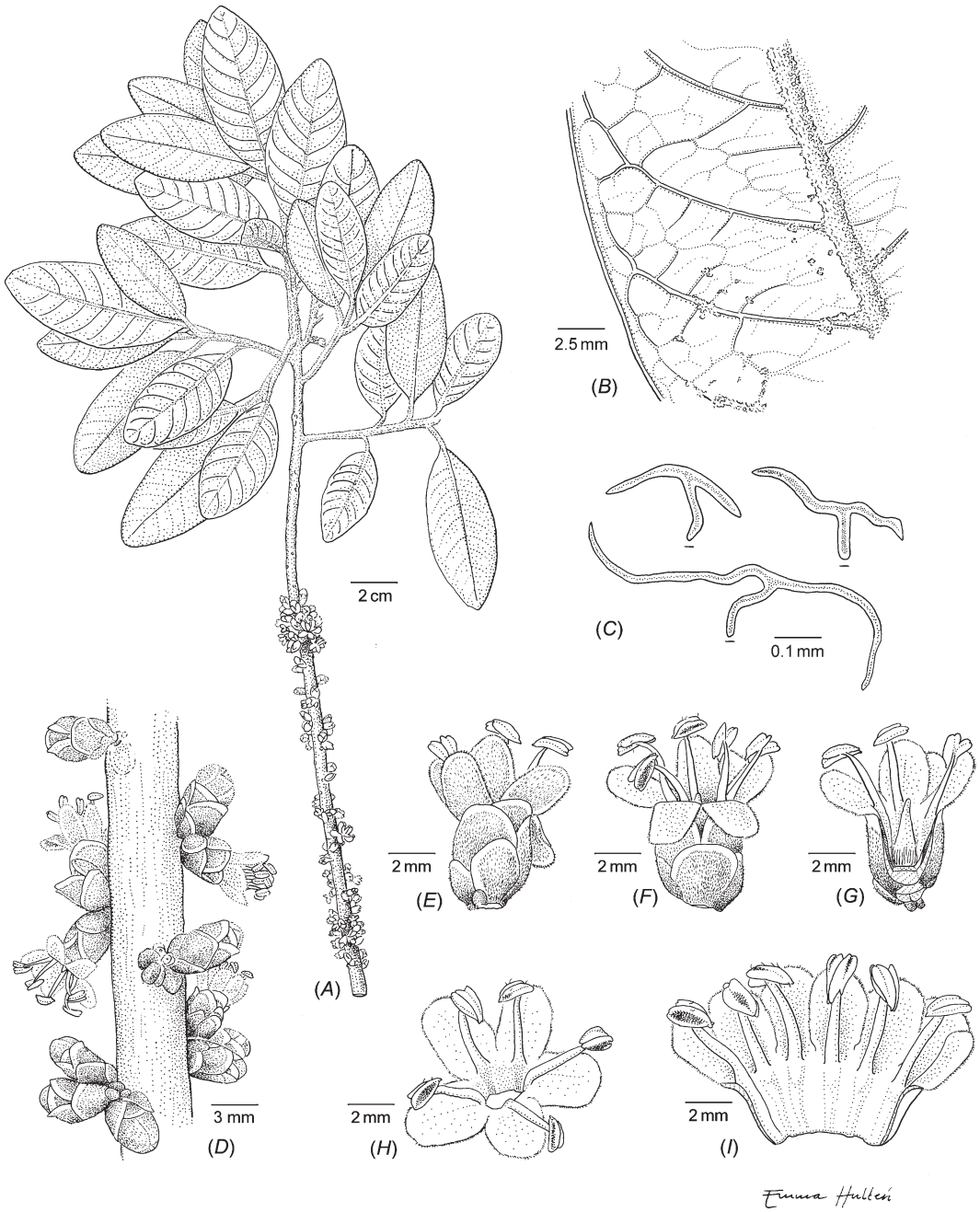

Fig. 4. *Pycnandra caeruleilatex*. (*A*) Habit, (*B*) leaf venation (lower surface), (*C*) types of trichomes, (*D*) inflorescence, (*E*) flower from the outside, showing pubescent corolla lobes, (*F*) flower, (*G*) transection of flower, (*H*) top view of corolla, and (*I*) open 7-lobed corolla. Drawn from *Munzinger et al. 2622* (*A–I*).

Distribution

This new species is only known from two localities, Forêt Nord and Kuebuni, at the southern end of Grande Terre, where it grows in dense humid forest of low and medium elevation on ultramafic soil (Fig. 3*A*).

Etymology

The epithet refers to the bluish (*caeruleus*) latex.

Conservation status

The first discovered population of *P. caeruleilatex* occurs within the semi-protected forest Forêt Nord botanical reserve. It is a naturally uncommon species and only two trees were found in a survey of 6000 trees with a dbh $\geq$5 cm at this site. There are two impending threats of Forêt Nord, including (1) the construction of a coal-burning power station merely 300 m from the border of the reserve and (2) the nearby mining industry using a sulfuric-acid process. The second location is outside the New Caledonian

reserve system where fires and illegal logging repeatedly damage the forest. An appropriate EOO cannot be calculated with only two points, whereas the AOO is 18 km^2. *P. caeruleilatex* is here assigned a preliminary status of *Endangered* EN: B1ab (iii)+B2ab(iii).

Specimens examined

PROVINCE SUD: Forêt Nord, 22.xii.2004, *Munzinger* (*leg. Kurpisz*) *2611* (NOU, P, S); 20.i.2009, Kuebuni, embouchure près du radier, 22°15′27″S, 167°00′16″E, *Munzinger 5630* (NOU), and 18.xi.2009, *Munzinger* & *Beauvallet 6001* (MO, NOU, P, S).

Pycnandra carinocostata Vink, *Nova Guinea, n.s.*, 8: 106, 122 (1957)

Holotype: Nouvelle Calédonie, Kanala, 1861–67, *Vieillard 2887* (P 00291305), *isotypes* (G 00191253, P 00290227, P 00290228).

Note

One isotype in Paris (P 00290228) is a mixture of two species, where the small branch to the lower right belongs to *Endiandra sebertii* (Lauraceae).

Shrub or tree up to 10 m tall and a stem dbh of 15 cm. *Leaves* oblong to elliptic, 6–15 × 2–5 cm, tomentulose on both surfaces, glabrescent above; indument below turning grey with age; apex round; venation brochidodromous; midvein crested above; secondaries of (15–)20–30 pairs, weakly visible; tertiaries reticulate, with some parallel veins near midvein; petiole 8–15 (–20) mm long, tomentulose, glabrescent. *Flowers* 2–4 in each fascicle, axillary, not on burls; pedicel 5–7 mm long, tomentulose, with 1–3 minute bracts at the base. *Sepals* 5 (rarely 6), 3.5–4.5 mm long. *Corolla* 4–5 mm long with 5 (rarely 6) spreading lobes, glabrous; tube shorter than lobes. *Stamens* 1 or 2 opposite each corolla lobe, inserted below the tube orifice, slightly longer than the corolla, glabrous; anthers 1.2 mm long. *Ovary* with 5 locules, conical to slender with style, sparsely pubescent at the base, 4.0–6.0 mm long. *Fruit* ovoid, 10–20 × 7–10 mm, sparsely pubescent at the base, crowned with a 2–4 mm long remnant style; testa shiny, brown, thin (0.1 mm); cotyledons ruminate (Fig. 5).

Recognition

Sterile specimens of *P. carinocostata* can be confused with *P. heteromera*, a species tentatively placed in subg. *Trouettia*. The foliage, leaf venation and indument of the two are similar; however, *P. carinocostata* is primarily recognised on having smaller leaves, axillary and few flowers per fascicle, minute bracts below the flower, and two (rarely one) stamens opposite each corolla lobe. *Pycnandra heteromera* is mainly ramiflorous and the flowers have consistently one stamen opposite each corolla lobe. A useful field character is the crested midvein in *P. carinocostata* (Fig. 5*C*, *D*), slightly channelled in *P. heteromera*.

Phenology

Blooms between January and April, followed by fruits that apparently can persist to the next flowering season. However, neither flowers nor fruits have been collected many times.

Distribution

Pycnandra carinocostata is confined to areas with ultramafic soil from Yaté in the south to the Tchingou massif in the north (Fig. 3*B*). This species occurs primarily in humid forest at high altitudes, from 900 m and upwards, and it has occasionally been collected on lower mountains.

Etymology

Vink (1957) named this species after the crested (*carino*-) midvein (*costa*).

Conservation status

Pycnandra carinocostata is a typical high-altitudinal species known from four botanical reserves: Mount Humboldt, Mount Kouakoué, Mount Mou and Montagne des Sources (all in the south). All other localities (except the Tonine collection) are within mining concessions, with potential risk of future exploitation. The total EOO is 6968 km^2 of which 3800 km^2 are above 300-m altitude, and the AOO of 11 subpopulations is only 99 km^2. However, on the basis of its presence in several protected areas, *P. carinocostata* is assigned a preliminary status of *Least Concern*, with the recommendation that it is carefully monitored in the future.

Specimens examined

PROVINCE NORD: massif de Tchingou, 20°53′36″S, 165°00′42″E, 1160–1175 m alt., 1.iv.2001, *McPherson* & *Munzinger 18091* (MO, NOU, P, S); Mt Paéoua, 15.ii.1968, *MacKee 18408* (P); Mt Paéoua, plateau sommital, 900–1100 m alt., 4.vii.1967, *MacKee 17033* (NOU, P); Mt Paéoua, 21°10′08″S, 165°05′46″E, 1105 m alt., 10.ix.2008, *Munzinger*, *D.* & *I. Létocart*, *Chapelle*, & *Amice 5127* (NOU, S); Tonine, 1000 m alt., 23.v.2006, *Pillon 425* (NOU, P, S). PROVINCE SUD: col west Roussettes, vallée/crête haute vallée/Baraoua Houaïlou, 21°25′45″S, 165°24′43″E, 950–1000 m alt., 14.i.1969, *MacKee 21447* (NOU, P, S); crête entre haute vallée de Houaïlou et vallée de Baraoua, 900–950 m alt., 7.i.1966, *MacKee 14177* (P); Mé Maoya (mine Emma), 21°21′S, 166°19′E, 1100–1200 m alt., 11.vii.1965, *Bernardi 9646* (G); Montagne des Sources, 660 m alt., 25.ii.1964, *Blanchon 635* (NOU, P); Montagne des Sources, 5.iii.1964, *Blanchon 686* (NOU, P); Montagne des Sources, 20 km NE of Noumea, 850 m alt., 28.vi.1979, *McPherson 1709* (NOU, P); Mt Kouakoué, 21°57′30″S, 166°32′22″E, 1248 m alt., 27.xi.2002, *Tronchet*, *Munzinger*, *Le Borgne* & *Oddi 553* (MO, NOU, P, S); Mt Kouakoué, 1100 m alt., 9.xi.2004, *Munzinger*, *Labat* & *McPherson 2553* (MO, NOU, P); Mt Kouakoué, 12.v.2006, *Munzinger*, *McPherson*, *Lowry*, *Brown* & *Gaudeul 3427* (NOU, P, S); Mt Mou, 1200 m alt., 13.iii.1951, *Guillaumin* & *Baumann 11273* (A, G, L, P, Z); Mt Mou, 1200 m alt., 28.i.1969, *Schmid 2654* (NOU, P); Mt Mou, 22°04′33″S, 166°20′09″E, 1000 m alt., 18.iv.2004, *Munzinger* & *Pignal 1978* (MO, NOU, P, S); Port Bouquet, Mé Ouébo, 4.xi.1981, *MacKee* & *Cherrier 39852* (P); Yaté, Gouemba, 400 m alt., 22.iii.1981, *MacKee 38857* (NOU, P); Yaté, Gouemba, 500 m alt., 5.vi.1981, *MacKee 39139* (NOU, P).

Pycnandra confusa Swenson & Munzinger, sp. nov.

Species haec *Pycnandrae sessiliflorae* similis sed floribus subsessilis, pedicellis 2–3 bracteatis, corollis 5-lobatis et staminibus 10 differt.

Holotype: Nouvelle Calédonie, Province Sud, Kuébini embouchure, près du radier, 22°15′42″S, 167°38′00″E, 20 Jan. 2009, *J. Munzinger* & *M. Beauvallet 5629* (P), *isotypes* (K, MO, NOU 050886, S 10-18484).

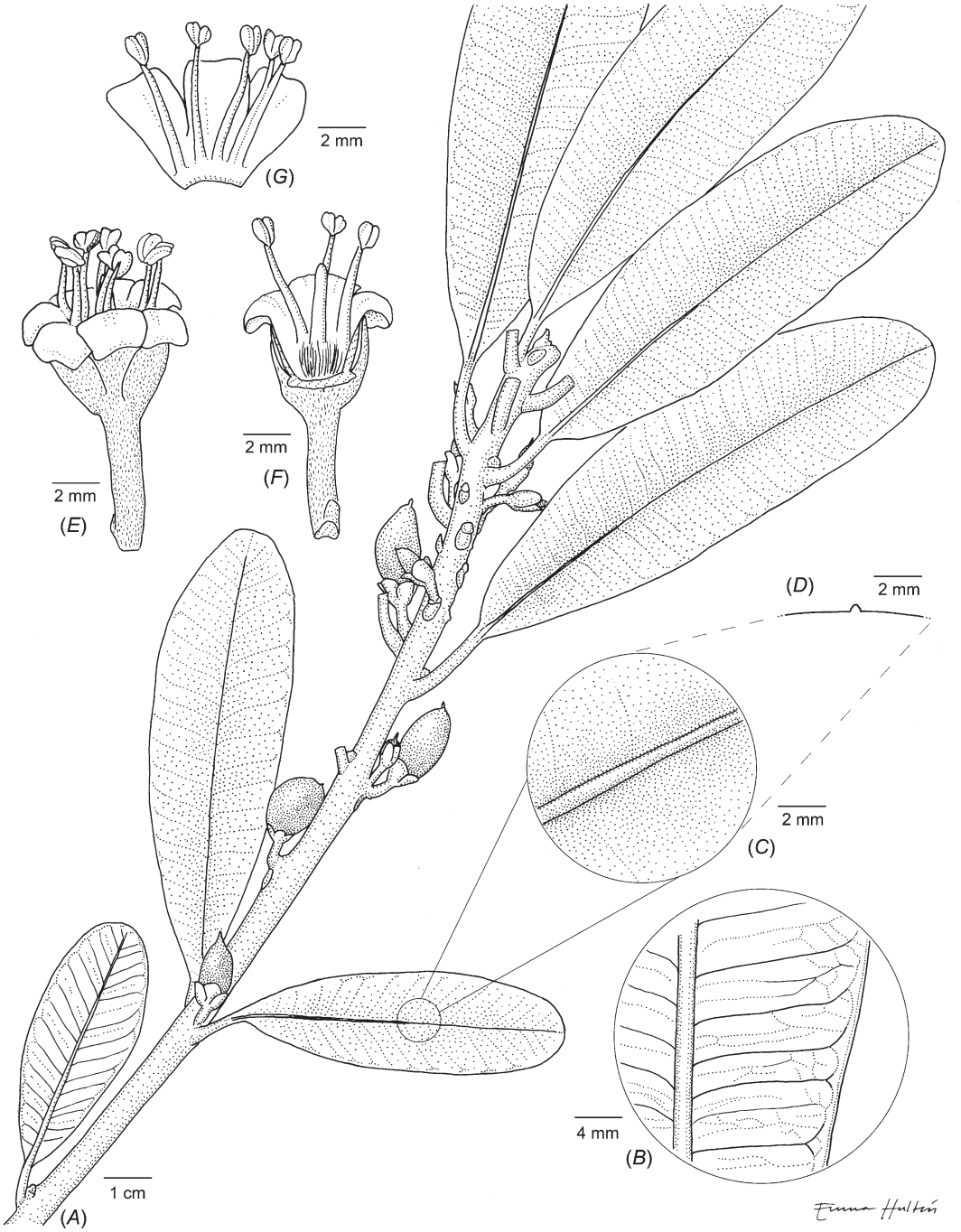

Fig. 5. *Pycnandra carinocostata*. (*A*) Habit, (*B*) leaf venation (lower surface), (*C*) prominent midvein, (*D*) close-up of blade, showing the crested midvein, (*E*) flower, (*F*) transection of flower, with a single stamen opposite each corolla lobe, and (*G*) part of a corolla, with one or two stamens opposite each corolla lobe. Drawn from *MacKee 21447* (*A–D*), *Munzinger and Pignal 1978* (*E–G*).

Tree up to 8 m tall. *Leaves* oval or elliptic, 12–15 × 6–7 cm, sparsely tomentulose on upper surface, glabrescent, greyish tomentulose of short trichomes below; apex round to acuminate; venation brochidodromous with weak loops; secondaries of 15–20 pairs; tertiaries reticulate or partly oblique; petiole 20–30 mm long, tomentulose, glabrescent. *Flowers* 1–3 in each fascicle, subsessile, axillary and below the leaves along the branches, not on burls; pedicel ~1 mm long, tomentulose, with 2 or 3 alternate bracts. *Sepals* 3.0–4.0 mm long. *Corolla* 4.0–6.0 mm long (~8–10 mm wide) with 5 recurved lobes, glabrous. *Stamens* 2 opposite each corolla lobe, inserted just below tube orifice, slightly longer than the

corolla; anthers 1.0–1.2 mm long, glabrous. *Ovary* with 5 locules, slender with style, densely hirsute in a wine-red colour at the base, ~4.5 mm long. *Fruit* ellipsoid, 38–54 × 22–31 mm, glabrous, crowned with a minute remnant style; seed scar 50% of seed circumference and 100% of the seed length; testa shiny, brown; cotyledons slightly ruminate (Fig. 6).

Recognition

Pycnandra confusa is easily distinguished from all other congeners by a lax inflorescences of white, subsessile flowers dispersed along the branches and in the axils of leaves. The foliage resembles that of *P. comptonii* (subg. *Achradotypus*) but is only half of the size and with a brochidodromous venation (not

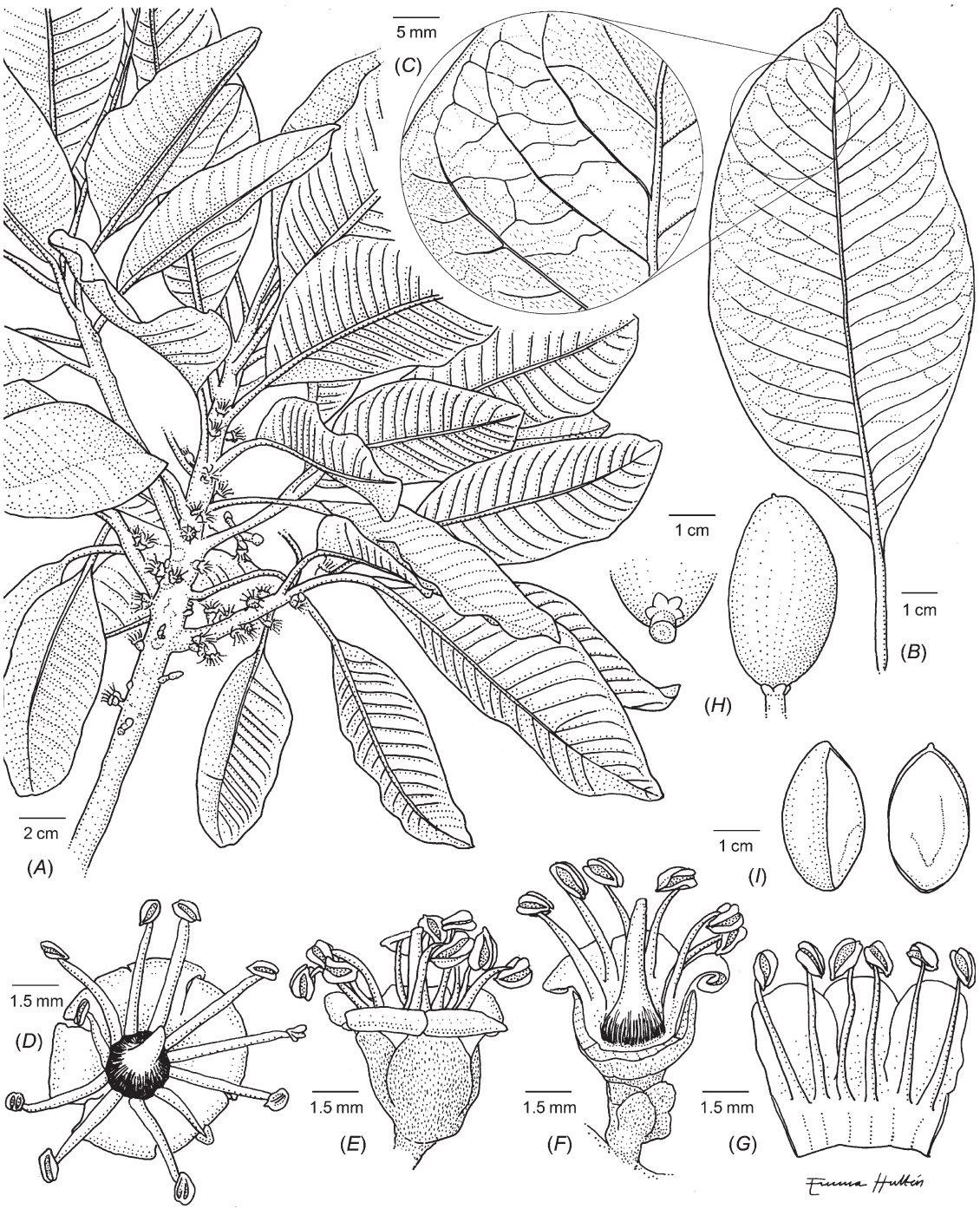

Fig. 6. *Pycnandra confusa.* (*A*) Habit, (*B*) leaf, (*C*) leaf venation, with part of the indument removed (lower surface), (*D*) top view of flowers, (*E*) side view of a flower, (*F*) transection of flower, (*G*) part of an open corolla, (*H*) fruit, and (*I*) seed, side view (left) and view of seed scar (right). Drawn from *Munzinger and Beauvallet 5629* (*A–I*).

eucamptodromous). The flowers are superficially similar to those of *P. sessiliflora*, but are subsessile, have two or three small bracts, and two stamens (instead of one) inserted opposite each corolla lobe.

Phenology

Blooms in January to February and fruiting starts at the end of October until early January (recorded in 2010).

Distribution

This species is known only from the type locality at the south-eastern tip of Grande Terre where it grows in low humid forest on ultramafic soil (Fig. 3*B*).

Etymology

Pycnandra confusa was discovered by chance in 2009. Some colleagues were collecting mycorrhizae from roots of *Planchonella endlicheri*, another member of Sapotaceae in New Caledonia. When Jérôme Munzinger wanted to confirm the identification of the tree, the roots of which were collected, it was obviously not *P. endlicheri*. In habit, it reminded him of *Pichonia dubia* (Pierre ex Guillaumin) Swenson & Munzinger (ined.) before a branch was cut and fell into his hand. It was immediately revealed as a new species to science. Thus, earlier it had been confused (*confusa*) with *P. endlicheri*.

Conservation status

This species is known from a single population and that is outside of the reserve system. The forest has been strongly damaged by fires in the past and is still under threat from repeated fires. Illegal logging is also a threat since we observed several logged individuals of the protected species *Tristaniopsis reticulata* (VU). *Pycnandra confusa* is assigned the preliminary status of *Critically Endangered* CR: D1+2.

Pycnandra deplanchei (Baill.) Swenson & Munzinger, comb. nov.

≡ *Chrysophyllum deplanchei* Baill., *Bull. Mens. Soc. Linn. Paris* 2: 899 (1891*a*). ≡ *Trouettia deplanchei* (Baill.) Aubrév., *Adansonia, n.s.*, 2: 177 (1962). ≡ *Corbassona deplanchei* (Baill.) Aubrév., *Fl. Nouv.-Caléd.* 1: 72 (1967). ≡ *Niemeyera deplanchei* (Baill.) T.D. Penn., *Gen. Sapotac.*: 235 (1991). *Holotype*: Nouvelle Calédonie (without locality), 1861–67, *Deplanche 436* (P 00290186).

= *Trouettia leptoclada* Pierre ex Baill., *Bull. Mens. Soc. Linn. Paris* 2: 945 (1891*b*). ≡ *Chrysophyllum leptocladum* (Pierre ex Baill.) Baill. ex Guillaumin, *Notul. Syst.* (*Paris*) 2: 103 (1911). ≡ *Planchonella leptoclada* (Pierre ex Baill.) Däniker, *Vierteljahrsschr. Naturf. Ges. Zürich* 78 (19): 354 (1933). *Lectotype* designated here: Nouvelle Calédonie, embouchure du Dotio, December 1871, *Balansa 3459* (P 00290263), *isolectotypes* (P 00290260, P 00290261, P 00290262, P 00374411).

Shrub up to 5 m tall. *Leaves* obovate to spathulate or obovate to oblanceolate, glabrous above, tomentulose below; apex retuse or round; venation brochidodromous; midvein prominent below; secondaries of 7–14 pairs; tertiaries reticulate with some parallel veins near midvein, weakly visible; petiole tomentulose. *Flowers* 7–15 in each fascicle, axillary and below the leaves along the branches, not on burls; pedicel 1–3 mm long, tomentulose, with 2 or 3 small bracts at the base. *Sepals* 1.5–3.0 mm long. *Corolla* 2.5–5.0 mm long with 5 (rarely 6) spreading lobes, evenly pubescent on the outside. *Stamens* 1 opposite each corolla lobe, inserted in the tube orifice, slightly longer than the corolla; anthers 0.8 mm long, with some trichomes between thecae. *Ovary* with 5 locules, conical with style, densely hirsute, ~2.0 mm long. *Fruit* obovoid or fusiform, sparsely pubescent at the base and apex, crowned with a minute remnant style; seed scar 20% of seed circumference and 70–80% of the seed length; testa dull, greyish, thin (0.2 mm); cotyledons smooth (Figs 1*B*, *C*, 7).

Key to the subspecies of *Pycnandra deplanchei*

1. Leaves obovate to spathulate, 2–5 cm long; petiole 3–5 mm long ..... subsp. *deplanchei*
   Leaves obovate to oblanceolate, 8–13 cm long; petiole 7–15 mm long ..... subsp. *floribunda*

Pycnandra deplanchei subsp. ***deplanchei***

Shrub up to 3 m tall. *Leaves* obovate to spathulate, 2–5(–6) × 1–3 cm; apex often retuse; petiole 3–5 mm long; secondaries of 7–14 pairs, 2–3 mm apart, inner angle to the midvein less than 45°. *Fruit* 14 × 8–10 mm (Fig. 7).

Recognition

The best field characters of *P. deplanchei* subsp. *deplanchei* are small, tomentulose leaves with a characteristic venation, a pubescent corolla, and an ovary covered with indument. Apart from *P. deplanchei* subsp. *floribunda*, subsp. *deplanchei* could be confused with *P. francii*, a taxon it is distinguished from by having a cuneate leaf base (not cordate to truncate), tomentulose sepals and pedicels (not tomentose), and 5-merous flowers (not anisomerous).

Phenology

Flowers appear from July to December, probably depending on weather over the previous year, and fruits seem to persist on the shrub almost all year round.

Distribution

The range of *P. deplanchei* subsp. *deplanchei* begins at Tamoa valley, via Tontouta River valley to the eastern coast, and north to the area around Kouaoua (Fig. 8*A*). It forms scattered populations in maquis vegetation on ultramafic soil, often among serpentine rocks.

Etymology

This species is named in honour of Emile Deplanche (1824–1874), a French naval surgeon and botanist, who collected plants in New Caledonia (1861–1867).

Conservation status

Pycnandra deplanchei subsp. *deplanchei* does not, as far as known, occur in any protected area. In fact, all known populations are inside or nearby mining concessions, with several of these being active mines. The six known subpopulations form an EOO of 1144 km^2 and an AOO of

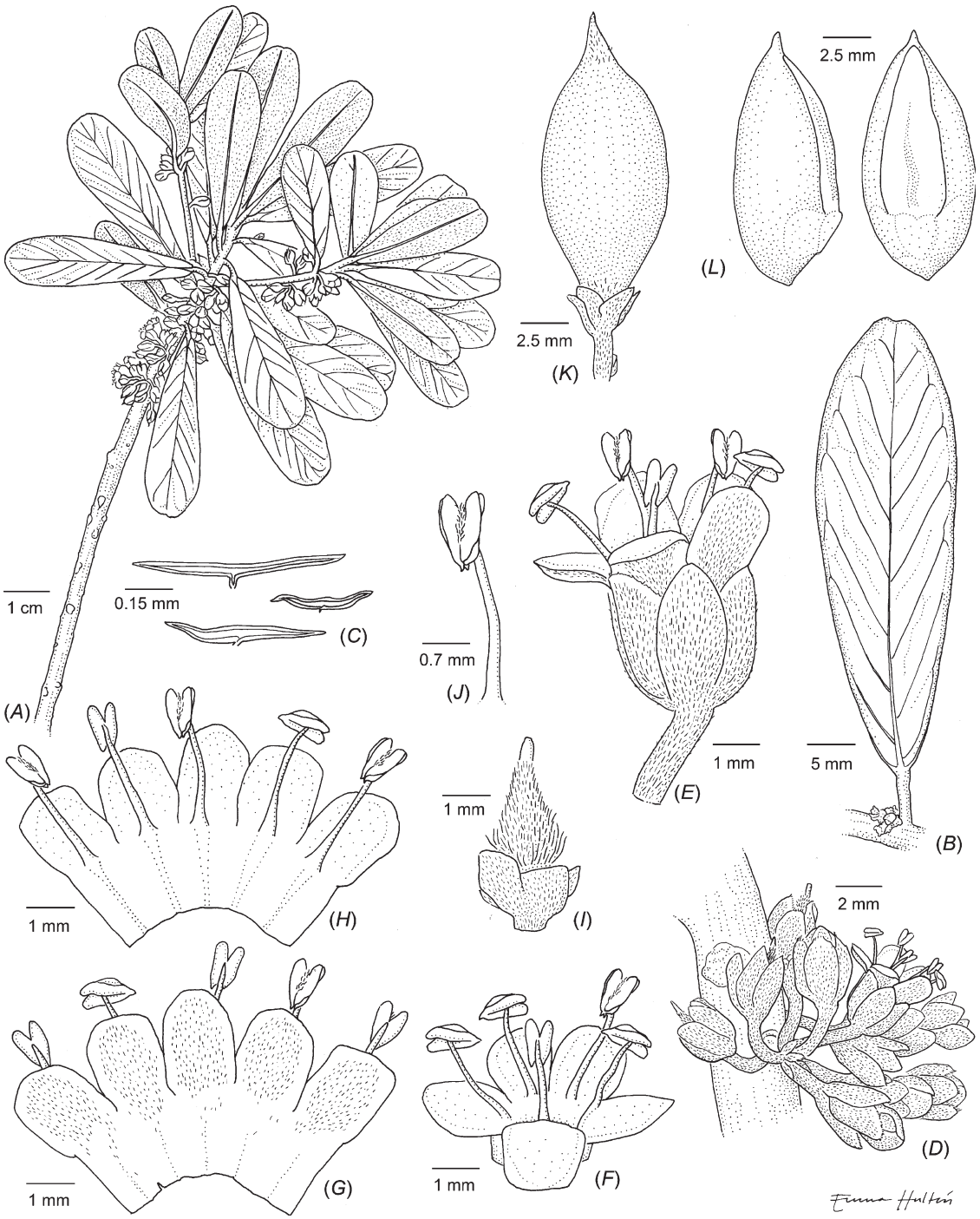

Fig. 7. *Pycnandra deplanchei* subsp. *deplanchei*. (*A*) Habit, (*B*) leaf, (*C*) types of trichomes, (*D*) fascicle of flowers, (*E*) flower, (*F*) corolla, (*G*) open corolla from the outside, showing pubescence, (*H*) glabrous corolla from the inside, (*I*) ovary, (*J*) stamen, (*K*) fruit, and (*L*) seed, side view (left) and seed scar view (right). Drawn from *McPherson 4714* (*A–J*), *Munzinger et al. 3359* (*K*, *L*).

102 km^2. *Pycnandra deplanchei* subsp. *deplanchei* is assigned a preliminary status of *Vulnerable* VU: A2acd+A3cd.

Specimens examined

PROVINCE NORD: Mt Kokoréta, summit, 20.vi.1994, *Cochereau s.n.* (NOU); presqu'ile de Bogota, 13.ix.1989, *MacKee 44606* (NOU, P); route Kouaoua–Bouakaine, 5.x.1992, *Jaffré & Rigault 3171* (NOU, P). PROVINCE SUD: haute Tontouta, branche nord, 100 m alt., 7.viii.1979, *MacKee 37247* (NOU, P, S); Port Bouquet, bout de piste longeant la Rivière Koum, rive gauche, 100 m alt., 23.xi.2001, *Munzinger 978* (MO, NOU, P, S); Tontouta River valley, 30 m alt., 22.vii.1982, *McPherson 4714* (G, L, MO, NOU, P, S); Tontouta River valley, 50 m alt., 18.xii.1982, *McPherson 5277* (G, MO, NOU, P, S); vallée de la Tontouta, près de la mine Liliane, 100 m alt.,

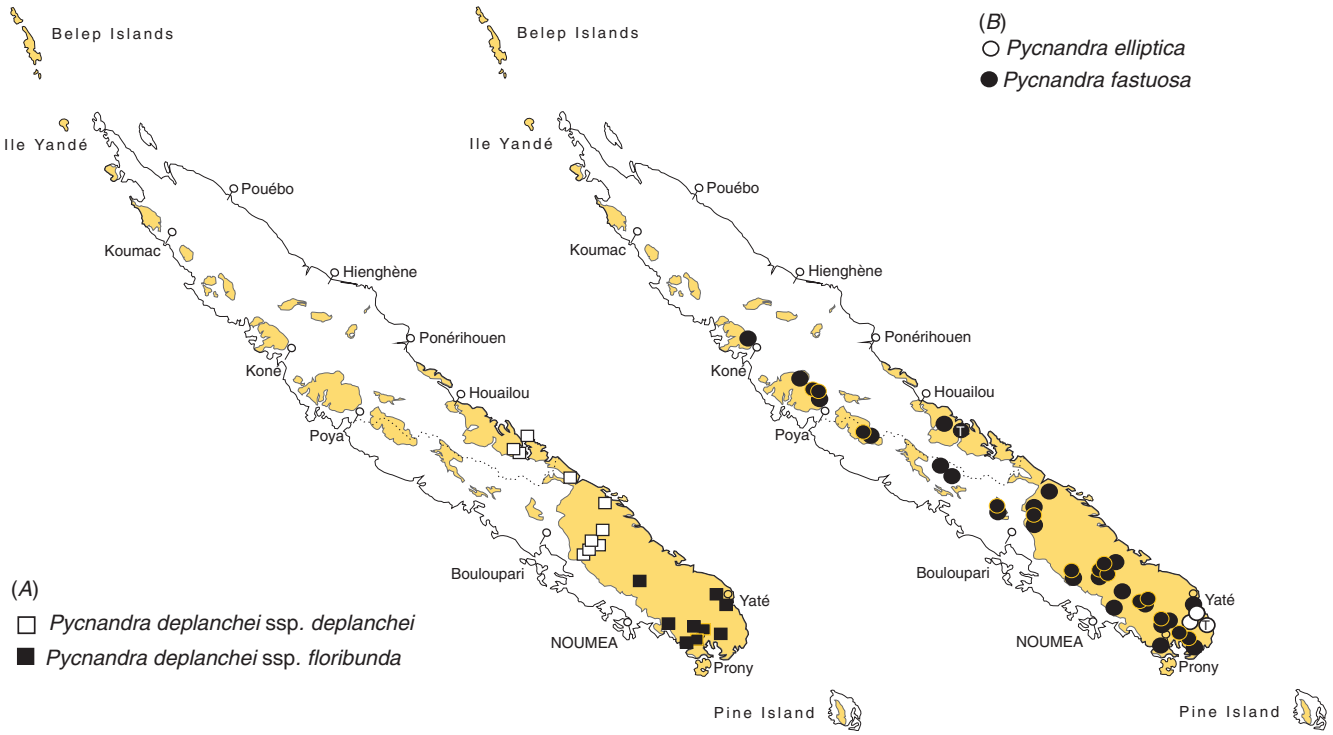

Fig. 8. Map of New Caledonia, with distributions of (*A*) *Pycnandra deplanchei* subsp. *deplanchei* (□), *P. deplanchei* subsp. *floribunda* (■), (*B*) *P. elliptica* (○) and *P. fastuosa* (●). Type localities are indicated with 'T'. Shaded areas are land/mountain ranges dominated by ultramafic soil.

2.i.1972, *MacKee 24812* (P, S); vallée de la Tontouta, 21.iii.1996, *Jaffré, Dagostini & Rigault 3298* (NOU, P); vallée de la Tontouta, 21°58′20″S, 166°14′56″E, 26.ii.2006, *Munzinger et al. 3359* (NOU, P, S).

Pycnandra deplanchei subsp. ***floribunda*** (S.Moore) Swenson & Munzinger, comb. et stat. nov.

≡ *Chrysophyllum floribundum* S.Moore, *J. Linn. Soc., Bot.* 45: 351 (1921). *Holotype*: New Caledonia (without locality), 1914, *R.H. Compton s.n.* (BM), *isotype* (P 00290187).

Note

Vink (1958) united Moore's (1921) species *Chrysophyllum floribundum* with *C. deplanchei* (here transferred to *Pycnandra*), a synonym that escaped Aubréville (1967). Both taxa were included in a phylogenetic study using nrDNA (ITS) and morphology (Swenson *et al.* 2007*a*), where the accession matching the former was used as a possible new species (*Corbassona* 'Munzinger2199'). These two accessions are strongly grouped together and the ITS sequences are identical. Despite molecular similarity, morphological differences and no distributional overlap supports recognition of two subspecies of a single taxon.

Shrub up to 5 m tall. *Leaves* obovate to oblanceolate, (6–)8–13 × (2–)3–5 cm; apex often round; petiole 7–15(–20) mm long; secondaries of 12–14 pairs, (3–)5–7 mm apart, inner angle to midvein more than 45°. *Fruit* 17–28 × 10–13 mm (Fig. 1*B*, *C*).

Recognition

Typical specimens of *P. deplanchei* subsp. *floribunda* have medium-sized obovate leaves and are distinct, and not readily confused with any other congener. Some populations having smaller leaves may overlap in morphology with *P. deplanchei* subsp. *deplanchei*; however, the distance between secondary leaf veins is still larger (~5–7 mm) and the inner angle between the secondaries and the midvein is more than 45° (not less as in *P. deplanchei* subsp. *deplanchei*).

Phenology

Flowers often proliferate along the branches and are recorded between August and November, followed by fruits until January.

Distribution

The distributional range of *P. deplanchei* subsp. *floribunda* is from Mount Dzumac to the south around Prony (Fig. 8*A*). In habit, it grows into a taller shrub than subsp. *deplanchei*, often in more closed humid forest from low altitudes up to ~700 m, always on ultramafic soil.

Etymology

Although Moore (1921) did not explicitly state his intention when he named this taxon *floribundum* (profusely flowering), it most likely refers to an inflorescence with numerous flowers, although not so on the type specimen, but certainly so on other material.

Conservation status

Pycnandra deplanchei subsp. *floribunda* is known from the Yaté Barrage reserve and around (not inside) Grand Kaori reserve. The EOO is calculated to be 770 km^2 and the five known subpopulations add up to an AOO of 72 km^2. All populations

occurring outside reserves are within mining concessions, several of which are currently being exploited. This threat merits *P. deplanchei* subsp. *floribunda* the preliminary status of *Vulnerable* VU: A2acd+A3cd.

Specimens examined

PROVINCE SUD: Baie Ué, 22°20′S, 166°45′E, 15.viii.2004, *Munzinger* (*leg. Dumontet*) *2317* (NOU, P, S); Forêt Anais 1, 22°18′S, 166°43′E, 9.xi.2004, *Munzinger*, *Dagostini* & *Oddi 2199* (NOU, P, S); Mt Dzumac, 700 m alt., 12.vii.1966, *Veillon 794* (NOU, P); pic du Grand Kaori, xi.2007, *Munzinger 4948* (NOU, P, S); plum en face du col, 16.vii.2006, *Munzinger* & *Chapelle 3511* (NOU, S); Yaté, 100 m alt., 13.viii.1978, *MacKee 35625* (NOU, P, S); Yaté, 100 m alt., 14.vii.1984, *MacKee 42035* (NOU, P, S); Yaté, 100 m alt., 2.xi.1985, *MacKee 42895* (NOU, P, S); Yaté, 100 m, 24.viii.1986, *MacKee 43236* (NOU, P, S); Yaté, 100 m alt., 14.xii.1986, *MacKee 43383* (NOU, P, S); Yaté, ancienne route à horaire, 8.viii.2004, *Munzinger 2299* (NOU, P, S); Yaté, entre le barrage et le village, 100 m alt., 4.i.1967, *MacKee 16226* (P, S).

Pycnandra elliptica Swenson & Munzinger, sp. nov.

Species haec *Pycnandrae heteromerae* similis sed foliis ellipticis et minoribus, venis secundariis paribus 12–20 et corollis 5-lobatis differt.

Holotype: Nouvelle Calédonie, Province Sud, Kuébini embouchure, près du radier, 22°15′27″S, 167°00′16″E, 20 Jan. 2009, *J. Munzinger 5631* (S 10-18572), *isotype* (NOU 050322).

Shrub or tree up to 6 m tall. *Leaves* elliptic, 5–8 × 2–3 cm, glabrous above except for the midvein, tomentulose below; indument more or less grey; apex round; venation brochidodromous with distinct loops; secondaries of 12–20 pairs, joining the midvein at 75–90° angle; tertiaries reticulate with parallel veins near the midvein; petiole 8–13 mm long, tomentulose. *Flowers* up to 12 in each fascicle, subsessile, axillary and below the leaves along the branches, not on burls, subtended by 8–14, small, partly sepal-like and imbricate bracts. *Sepals* 5, ~3.0 mm long. *Corolla* 3.0–4.0 mm long with 5 recurved lobes, glabrous or with a few trichomes on the outer surface. *Stamens* 1 opposite each corolla lobe, inserted below the tube orifice, longer than the corolla, glabrous; anthers 1.0 mm long. *Ovary* with 5 locules, slender with style, densely hirsute at the base, 2.0–3.0 mm long. *Fruit* obovoid, 16–18 × 9–11 mm, glabrous, with a persistent style ~1 mm long (Fig. 9).

Recognition

Pycnandra elliptica could be termed a cryptic species, because it is difficult to distinguish from *P. heteromera*; however, our preliminary nuclear sequence data indicate that the two are distantly related. The new species is closely allied to *P. sarlinii* and *P. sessiliflora* with which it cannot be confused. Comparing *P. elliptica* (Fig. 9) with *P. heteromera* (Fig. 13) reveals many similar floral details, among them is a flower subtended by imbricate bracts. The former has smaller and more consistent elliptic leaves, 12–20 secondary veins (between 20 and 30 in *P. heteromera*), and with a reservation that flowering specimens are scarce, the corolla is 5-lobed in the former and 5–8-lobed in the latter. Also, flowers seem not to be borne on burls, which often are developed on *P. heteromera*.

Phenology

Flowers in March and April; fruiting in November.

Distribution

This species is known only from a handful of specimens from the south-eastern corner of Grande Terre (Fig. 8*B*). It grows in maquis vegetation restricted to ultramafic soils, possibly from sea level up to ~500-m altitude.

Etymology

The epithet refers to, as far as known, the consistently elliptic leaves.

Conservation status

No population of *P. elliptica* occurs in a protected area, even if the old collection *MacKee 39004* would be close to Fausse Yaté Reserve. The Gouemba area is located just above (west of) Yaté, an area often subjected to fires. The total EOO is 7 km^2, whereas the AOO adds up to 9 km^2 of the two known subpopulations. All known collection sites are within (or at the margin of) mining concessions. *P. elliptica* is therefore assigned a preliminary status of *Endangered* EN: B1ab(iii)+B2ab(iii).

Specimens examined

PROVINCE SUD: sources de la petite Yaté, rive droite, 500 m alt., 29.iv.1981, *MacKee* (*leg. Cherrier*) *39004* (P, S); Yaté, Gouemba, 300 m alt., 22.iii.1981, *MacKee 38849* (NOU, P, S).

Pycnandra fastuosa (Baill.) Vink, *Nova Guinea, n.s.* 8: 100 (1957)

≡ *Sideroxylon fastuosum* Baill., *Mens. Soc. Linn. Paris* 2: 884 (1890). ≡ *Achradotypus fastuosum* (Baill.) Baill. ex Guillaumin, *Ann. Mus. Colon. Marseille* 2: 188 (1891). *Lectotype* designated by Vink (1957): Nouvelle Calédonia, Mount Mi, 1868–1870, *Balansa 1323* (P 00292407), *isolectotypes* (P 00292405, P 00292406, P 00374316 [drawings]).

= *Chrysophyllum multipetalum* Vink, *Blumea* 9: 43, 68 (1958). ≡ *Ochrothallus multipetalus* (Vink) Aubrév., *Adansonia*, *n.s.*, 2: 181 (1962). *Holotype*: Nouvelle Calédonie (without locality), *Sebert et Fournier 77* (P 00290920), *isotype* (P 00282211).

Nomenclatural note

Baillon (1890) described *Sideroxylon fastuosum* as having a corolla with a short tube, five staminodes, and five stamens, by using the following two collections, *Balansa 1323* from Mount Mi and *Balansa 2800* from Mount Mou. In fact, this description is incorrect because the drawing attached to the sheet of *Balansa 1323* (P 00292406) clearly shows two stamens inserted opposite each corolla lobe and the absence of staminodes. Although the type specimen is in a poor condition, the morphology of the drawing is possible to verify.

Later, Vink (1958) described *Chrysophyllum multipetalum* on the basis of one specimen in bud (*Sebert et Fournier 77*), a sheet that also has an attached illustration of which Vink published one corolla and a flower diagram. The protologue concurs with the illustration that the flower has five sepals, 9 or 10 corolla lobes, and one stamen opposite each corolla

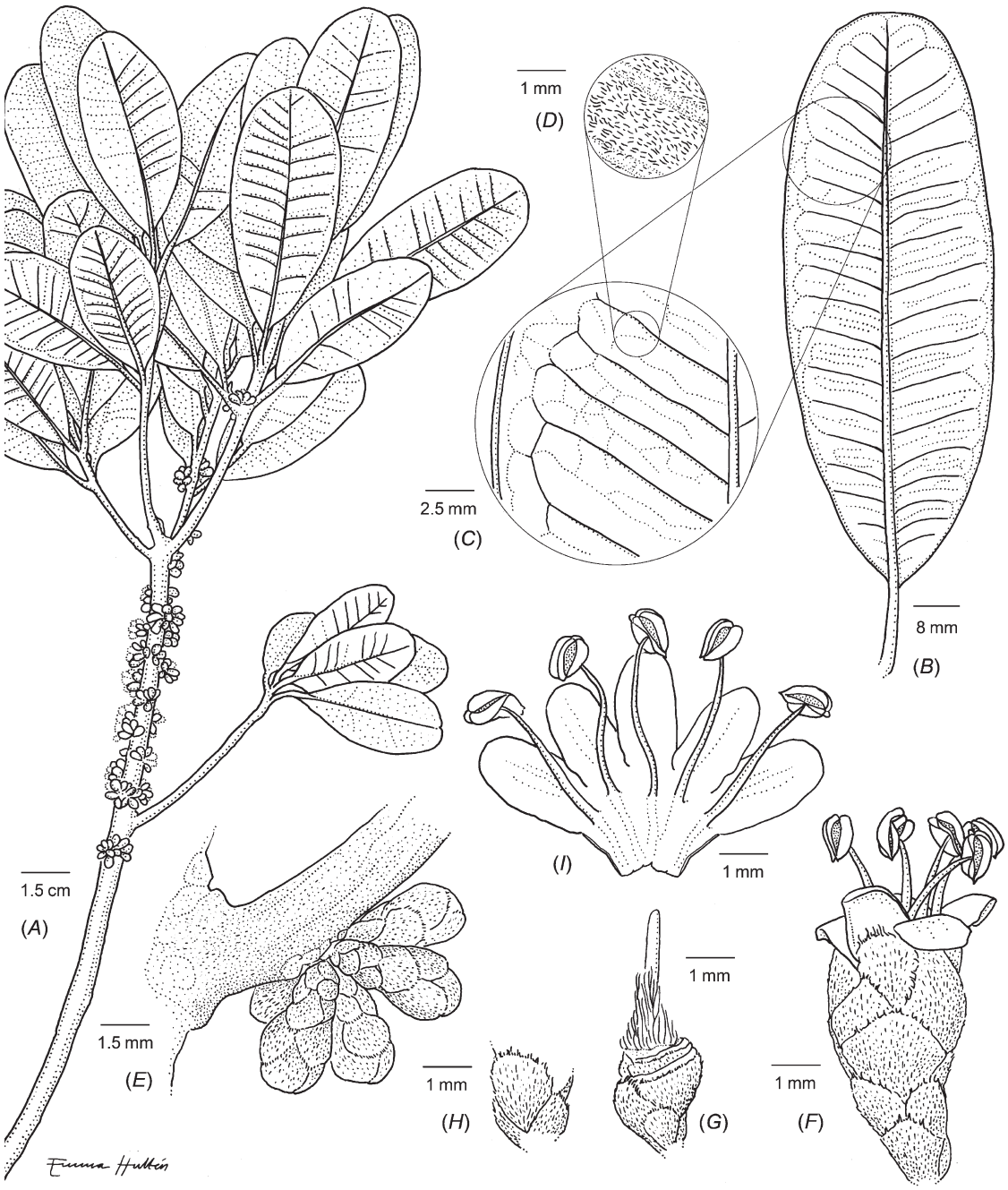

Fig. 9. *Pycnandra elliptica*. (*A*) Habit, (*B*) leaf, (*C*) leaf venation (lower surface), (*D*) indument on lower blade, (*E*) fascicle of flowers in bud, (*F*) flower, (*G*) ovary, (*H*) sepal, and (*I*) open corolla. Drawn from *Munzinger 5631* (*A–E*), *MacKee 38849* (*F–I*).

lobe. It is unclear whether Vink based his description solely on the illustration or whether the characters were cross-checked against the material. Aubréville (1962) transferred this species to *Ochrothallus* and later (Aubréville 1967) he pointed to its close resemblance to *P. fastuosa*, especially the leaf morphology. We have studied the type material of the two species and conclude that they are identical and impossible to separate. The leaf shape, leaf venation and leaf indument are exactly the same. The buds are badly damaged by insects, so neither corolla nor stamens remain on the holotype of *C. multipetalum* (P 00290920). However, in the Paris collection, an isotype (P 00282211) is present with the same illustration and two dissected flowers. The flowers are not intact, but it is clear that there are five corolla lobes and two stamens inserted opposite each corolla lobe. In other words, the flower morphology corresponds to that of the drawing of *P. fastuosa* (P 00292406), but not to Vink's protologue, and we consider the two nomenclatural types as conspecific. But what does the illustration Vink (1958) published resemble? To this, we have no

clear answer; however, *P. sarlinii* (see below) has a flower with five sepals, 9 or 10 corolla lobes and one stamen opposite each corolla lobe. Although this species was described much later (Aubréville 1967), it is possible that a flower or a fragment of this species was studied and illustrated, although the original material was lost or, for some reason, mixed with the collection by *Sebert et Fournier 77*. Suffice to say, we have been unable to identify any collection that matches Vink's protologue and the alleged floral morphology of *C. multipetalum*.

Tree up to 20 m tall and with a stem dbh of 70 cm. *Leaves* ovate to elliptic, (10–)15–25(–35) × 5–12 cm, coriaceous, tomentulose on both surfaces, glabrescent above; indument below often in shade of copper, turning grey with age; apex round; venation eucamptodromous; midvein prominent; secondaries of 10–15 pairs, impressed above, prominent below; tertiaries ± oblique, weakly visible; petiole 20–65 mm long, tomentulose, indument turning greyish. *Flowers* (1–)4–12 in each fascicle, sessile, borne on burls below the leaves along the branches and/or axillary, subtended by 2 or 3 small bracts. *Sepals* 4.0–5.0 mm long. *Corolla* 6–7 mm long with spreading lobes, glabrous. *Stamens* 2 opposite each corolla lobe, inserted just below the tube orifice, slightly longer than the corolla, glabrous; anthers 1.2–1.5 mm long. *Ovary* with 5 locules, conical to slender with style, pubescent at the base, ~4.0–5.0 mm long. *Fruit* ovoid, 35–67 × 20–40 mm, sparsely pubescent at the base, crowned with a 4–5 mm long remnant style; seed scar 90% of seed circumference and 90% of the seed length; testa thin (0.1–0.2 mm); cotyledons ± ruminate (Figs 1*D*, *E*, 10).

Recognition

Pycnandra fastuosa is characterised by large, green, coriaceous leaves, and cannot be easily confused with any other congener. The flowers are sessile in dense fascicles, borne on burls, subtended by small bracts, and only one flower in each fascicle usually develops into a fruit. Despite this homogeneity, molecular studies have indicated that it might be possible to divide populations into two taxa of suitable rank (Swenson *et al*. 2008*a*). The only known morphological character that supports this notion, although poorly understood, is the arrangement of secondary leaf veins, being either more closed (Fig. 1*D*) or open (Fig. 1*E*). The type material is closed-veined with a brown indument on the lower blade, in contrast to forms with a more open venation, arching secondaries, and an indument in a shade of copper. However, there is a continuum between these two types and flowers in good condition of the former are unavailable. We are therefore reluctant to erect a name for the latter.

Phenology

Open flowers are infrequently seen, probably because this is a large tree that sets flowers high up in the canopy and that the corolla quickly fades and drops to the ground. Nevertheless, flowers are recorded between February and March, whereas fruits are set all around the year.

Distribution

Pycnandra fastuosa is one of the most widespread members of subg. *Trouettia*, restricted to ultramafic substrates and humid forests (Fig. 8*B*). It has even been able to colonise small pockets of ultramafic soil north of Farino. The distribution ranges from low hills in the south of Grande Terre to the high mountains such as Mount Kouakoué, Mount Mou, and the Boulinda massif in the north, i.e. from 200 to 1500 m in altitude.

Etymology

The epithet *fastuosa* means proud or haughty, which refers to the fact that the species was originally described as the largest member of *Sideroxylon* (to which it does not belong) in New Caledonia. Nevertheless, it is still one of a handful of members that can attain a height of 20 m or more.

Conservation status

Pycnandra fastuosa is known from the following 11 protected areas: Fausse Yaté, Forêt Nord, Forêt Saille, Grand Kaori, Mount Do, Mount Kouakoué, Mount Mou, Pic du Pin, Pic Ningua, Rivière Bleue and Yaté Barrage. The EOO is calculated to be 5900 km^2 and the 21 known subpopulations add to an AOO of 234 km^2. As here circumscribed, *P. fastuosa* is the most common species of that subgenus and is assigned a preliminary status of *Least Concern*.

Specimens examined

PROVINCE NORD: haute Népoui, Oué Péoué, 9.vii.1970, *MacKee 22225* (NOU); haute vallée de Houaïlou, crête à l'ouest du col des Roussettes, 7.i.1965, *MacKee 14198* (P); Kouaoua, décharge Montmartre, 14.ii.1978, *Veillon 3495* (NOU); massif de Boulinda, 1100 m alt., 30.viii.1981, *McPherson 4143* (G, MO, NOU, P, S); Mé Maoya, Barendeu, 1100 m alt., 22.iii.1983, *MacKee 41345* (NOU, P); Mt Boulinda, 1150–1300 m alt., 28.viii.1967, *MacKee 17365* (P); Mt Boulinda, 9.vii.1975, *Schmid 5329* (NOU); Mt Koniambo, S of Voh, 700 m alt, 12.x.1982, *McPherson 4997* (MO, P); Mt Koniambo, 19.ix.2006, *Barrière 35* (NOU). PROVINCE SUD: Dumbea valley road to Mt Dzumac, 500 m alt., 2.xi.1981, *Pennington & McPherson 10275* (NOU, MO); forested slopes above a tributary of the Rivière Ni, 22°00′37″S, 166°28′08″E, 1050 m alt., 8.xi.2003, *McPherson & Mouly 19177* (MO, NOU, P, S); Forêt Cachée, haute vallée Creek Pernod, 9.iii.1967, *MacKee 16527* (P) and *Veillon 1088* (NOU, P); Forêt de Saille, près du sommet du Pwénari, 21°39′58″S, 166°14′49″E, 1100 m alt., 7.xii.2001, *Munzinger*, *Suprin & Carriconde 1281* (CANB, MO, NOU, P); Forêt de Thy, v.1950, *Sarlin 231* (P); Forêt Nord, 29.ix.2005, *Munzinger & Swenson 2993* (NOU, S) and *2995* (K, NOU, P, S); haute Ni, 1020 m alt., 13.iii.1991, *MacKee 45403* (NOU, P); haute Ni, camp de base, 21°59′12″S, 166°30′38″E, 750 m alt., 6.v.2004, *Munzinger*, *Pignal & Lowry 2027* (NOU, P, S); mois de Mai, 22.vi.1951, *Baumann 13941* (A, NY, P, Z); Mt Do, 4.xi.2008, *Grignon 19* (NOU); Mt Kouakoué, 21°57′28″S, 166°32′19″E, 1250 m alt., 28.xi.2002, *Munzinger et al. 1694* (MO, NOU, P, S); Mt Koungouhaou north, 1100 m alt., 23.iv.1991, *MacKee 45448* (NOU, P); Mt Mou, 13.iii.1870, *Balansa 2800* (P); Mt Mou, 750 m alt., 27.vii.1951, *Baumann 14860* (A, G, L, P, Z); Mt Mou, 1150 m alt., 18.x.1951, *Baumann 15638* (A, L, NY, P, Z); parc de la Rivière Bleue, 22°06′07″S, 166°39′52″E, 10.iv.2008, *Munzinger 5039* (NOU, P, S); pic Ningua, 1115 m alt., 5.iii.2009, *Grignon 227* (NOU); Prony, iii.1914, *Franc 1800* (A, G, P), Prony, col de l'antenne d'Oungoné, 31.viii.2004, *Dagostini 863* (NOU, S); Rivière Bleue reserve, 150 m alt., 17.xi.1981, *Pennington & McPherson 10323* (K, MO, NOU); Rivière le Pirogue, 350–400 m alt., 6.ix.1981, *Gentry & McPherson 34510* (MO); Thy River valley, ~12 km NE of Noumea, 450–550 m alt., 10.v.1979, *McPherson 1622* (K, MO, NOU, P); Upper Ni River valley, along road from Mt Dzumac, ~1 km E of pass from upper Kalouehola River valley, SE of Mt Ouin, 22°00′29″S, 166°28′17″E, 1050 m alt., 4.xii.2002, *Lowry*, *Munzinger*, *Tronchet*, *Hopkins*, *D. & I. Létocart 5932* (MO, NOU, P, S); Yaté, Gouemba, 400 m alt.,

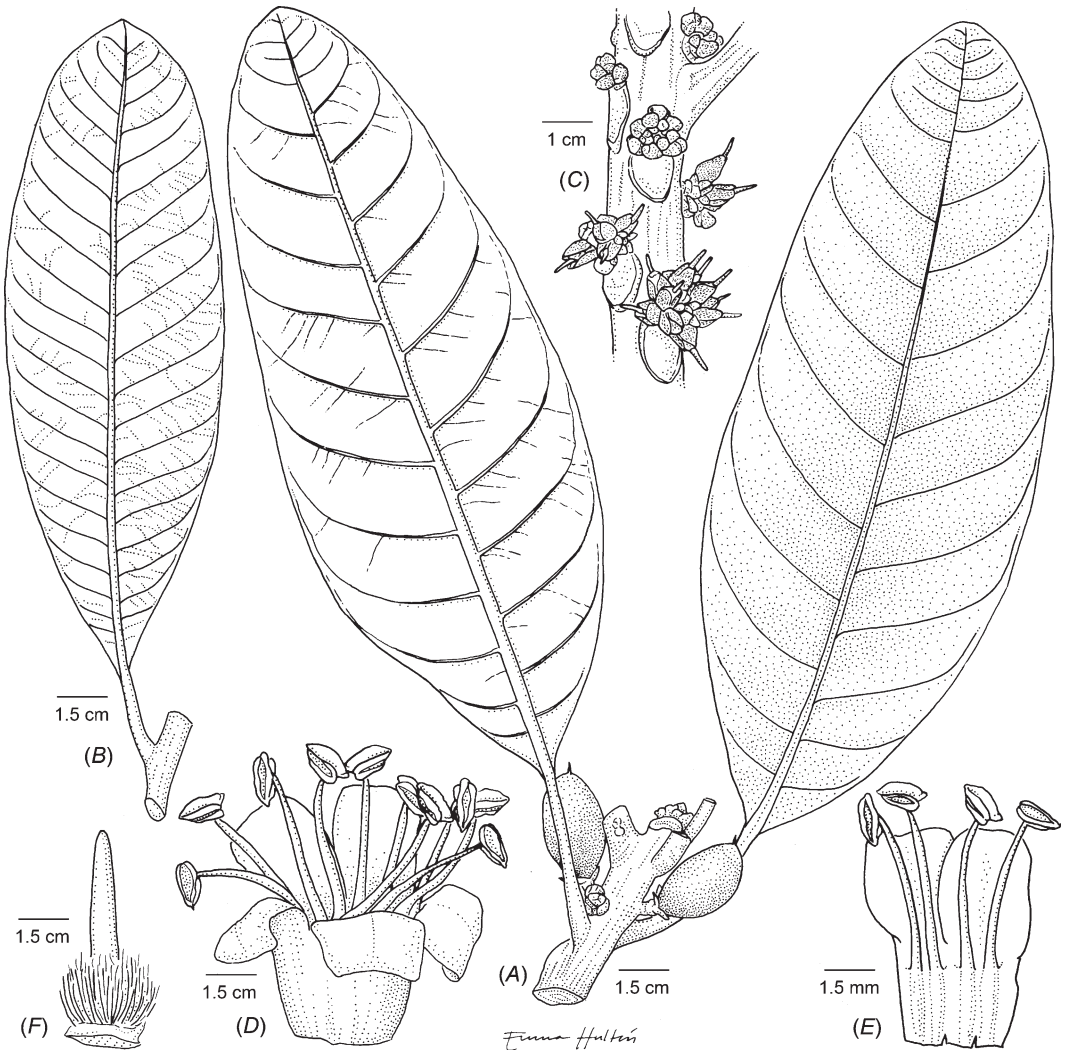

Fig. 10. *Pycnandra fastuosa*. (*A*) Leaves with open type of venation, (*B*) leaf with the closed type of venation, (*C*) fascicles of flowers (dropped corolla) on well developed burls, (*D*) corolla, (*E*) part of an open corolla, and (*F*) ovary. Drawn from *Munzinger and Swenson 2995* (*A*), *Munzinger and Swenson 2993* (*B*), *Munzinger*, *Pignal and Lowry 2027* (*C–F*).

21.ix.1984, *MacKee 42256* (NOU, P); Yaté, 12.vi.1985, *MacKee 42626* (NOU, P).

Pycnandra francii (Guillaumin & Dubard) Swenson & Munzinger, comb. nov.

≡ *Chrysophyllum francii* Guillaumin & Dubard, *Bull. Mus. Natl. Hist. Nat.* (*Paris*) 25: 290 (1919). ≡ *Ochrothallus francii* (Guillaumin & Dubard) Guillaumin, *Bull. Soc. Bot. France* 89: 223 (1942). ≡ *Niemeyera francii* (Guillaumin & Dubard) T.D.Penn., *Gen. Sapotac.*: 235 (1991). *Holotype*: Nouvelle Calédonie, Plaine des Lacs, 200 m alt., Feb. 1907, *Franc 689* (P 00290824), *isotypes* (BM, P 00290821, P 00290825, G 00191251, S 09-1302).

Nomenclatural note

Vink (1958) referred to the type material of this taxon as ‘Type specimen: *Franc 689* in P’. In Paris (P), however, three sheets of this gathering are present, of which Guillaumin annotated only one specimen. This specimen is accepted as the holotype.

Shrub or treelet up to 4 m tall, sometimes forming a tree up to 7 m tall. *Leaves* obovate, 3–8(–10) × 1–3 cm, tomentulose on both surfaces, glabrescent, persistent along midvein; base truncate to cordate; apex round to retuse; venation brochidodromous, transparent on fresh material; secondaries of 6–10 pairs; tertiaries reticulate; petiole 5 mm long, tomentose of ferruginous indument, turning grey with age, partly glabrescent. *Flowers* 2–6 in each fascicle, axillary but also below the leaves along the branches, not on burls; pedicel 1–2 mm long, tomentose, with 0 or 1 bract at the base. *Sepals* 2.5–3.5 mm long, tomentose, partly glabrescent in fruit. *Corolla* 3.0–4.0 mm long with 7–8(–10) spreading or recurved lobes, pubescent along the corolla lobe margin, often also on the middle of the external surface as well as inside the corolla tube. *Stamens* 1 opposite each corolla lobe, inserted in the tube orifice, slightly longer than the corolla, glabrous; anthers 1.0 mm long. *Ovary* with 5 locules, slender with style, densely hirsute, ~4.0 mm long. *Fruit* obovoid, sparsely pubescent at the base and apex (glabrescent), crowned

with a minute remnant style; seed scar 30% of seed circumference and 70–80% of the seed length; testa dull, brown, thin (0.2 mm); cotyledons ± ruminate (Fig. 11).

Recognition

Pycnandra francii is the sister to *P. sessilifolia* (Bartish *et al*. 2005; Swenson *et al*. 2008*a*), and both species are readily distinguished from all other congeners by their truncate to cordate leaf bases, tomentose or villous petioles and sepals, anisomerous flowers, and trichomes along the corolla lobe margin. The two cannot be confused with each other, because the former is a shrub or treelet with small, obovate leaves and the latter can grow into a big tree with large, oblanceolate leaves. *Pycnandra francii* can be confused with the congener *P. deplanchei* subsp. *deplanchei*, which has a cuneate leaf base, tomentulose sepals and 5-merous flowers.

Phenology

Flowers appear in autumn, from February to mid-April, but populations at higher elevations may bloom later. Ripe fruits have been collected between July and November.

Distribution

Pycnandra francii is restricted to areas with ultramafic soils in the southern part of Grande Terre where it often occurs in maquis vegetation, and also in closed humid and gallery forests, from sea level up to ~800 m altitude (Fig. 12*A*).

Etymology

Named in honour of I. Franc (1879–1969), a teacher who made plant collections during his stay in New Caledonia (1904–1931) (Morat 2010).

Conservation status

Pycnandra francii is known from the following six protected areas: Fausse Yaté, Forêt Cachée, Montagne des Sources, Mount Kouakoué, Pic du Pin and Yaté Barrage. All other collections except from Dzumac and Plum, are inside mining concessions. There are at least 19 subpopulations and the calculated EOO and AOO, respectively, are 2759 km^2 and 225 km^2. Jaffré *et al*. (1998) assigned a conservation status of *Vulnerable*, a status still accepted by the IUCN Red List (www.iucnredlist.org, accessed 5 May 2010). However, *P. francii* is more naturally common than earlier believed and it is proposed that the status is changed to *Least Concern*.

Specimens examined

PROVINCE NORD: creek side on the NW coast of Canala, 4.ii.1983, *McPherson 5500* (MO). PROVINCE SUD: Bois du Sud, 29.iii.1951, *Guillaumin* & *Baumann-Bodenheim 11654* (L, P); col de Petchicara, 17.viii. 1966, *Veillon 855*, *856* (NOU); col de Petchicara, 5.xi.1967, *Veillon 1872* (NOU); col de Plum, ascension du sommet du Wé Xi, 29.vii.2007, *Barrabé* & *Rigault 535* (NOU); col de Vulcain, 12.xi.1950, *Baumann-Bodenheim 8286* (L, P); colline à l'ouest du fond de la vallée au sud du Marais Kiki, 250 m alt., 29.vii.1958, *Hürlimann 3217* (G, P, Z); Creek Pernod, 1.ii.1965, *Schmid 62* (NOU); Creek Pernod, 10.i.1969, *Jaffré 139* (NOU); entre le pic du Casse–Cou et la Dumbéa, 9.iii.1951, *Hürlimann 1018* (L, P); Forêt Cachée, Creek Pernod, 9.iii.1967, *Veillon 1111* (NOU); haute Ouenghi, vallée de la Tontouta, 6.vi.1967, *MacKee 17888* (P); haute Tontouta, branche nord, 250 m alt., 19.xi.1975, *MacKee 30256* (P, S); haute vallée des Pins, 1.iv.1951, *Guillaumin* & *Baumann-Bodenheim 11957* (G, L, P, Z); Marais Kiki SE ancienne mine Pernod Creek, 9.iii. 1967, *MacKee 16534* (P); Monts Couvelée, pente E, 30.iii.1951, *Hürlimann 1130* (L, P); Montagne des Sources reserve, ~20 air km NE of Nouméa, 650 m alt., 21.vii.1979, *McPherson 1788* (MO, NOU, P); Mt Dzumac, 800 m alt., 25.vii.1978, *Veillon 3630* (NOU, P, S); Mt Dzumac, 26.x.1984, *Schmid 5415* (NOU, P); Mt Dzumac, 9.viii.2005, *Dumontet 545* (NOU); Mt Koghi, western slope, N of l'Hermitage, 11.iv.1955, *MacKee 2416* (L, P); Mt Mou, versant nord-ouest, proche réserve, 670 m alt., 2.iv.2009, *Grignon* & *Munzinger 251* (NOU); Nouméa, Montravel (parc forestier), 23.iii.1966, *MacKee 14614* (P); Ouroué (embouchure de la Dothio), 24.ii.1966, *MacKee 14467* (L, NOU, P); partie moyenne du plateau de la Montagne des Sources (versant est), 20.x.1946, *Virot 1601* (P); pic de Téréka, iv.1882, *Brousmiche 892* (P); Pic du Pin, 9.i.2007, *Munzinger* & *Pillon 4073* (NOU); Plaine des Lacs, route du Carénage près du Creek Pernod, 10.iii.1966, *MacKee 14518* (L, P); Port Bouquet, Rivière Koum, bout de piste longeant la Rivière Koum, rive gauche, 20 m alt., 23.xi.2001, *Munzinger 965* (MO, NOU, P); Port Bouquet, Rivière Koum, 155 m alt., 24.xi.2001, *Munzinger 1038* (MO, NOU, P); Rivière Bleue de Prony, 14.xi.1974, *MacKee 29452* (P); road towards Mt Dzumac, 8.vi.1966, *Veillon 757* (NOU), road towards Mt Dzumac, 750 m alt., 7.ii.1982, *McPherson 4563* (MO, NOU, P, S); Tontouta valley, near mine Gallién, 28.vii.1956, *MacKee 4980* (P); Tontouta valley, 21°54′15′S, 166°21′11′E, 500 m alt., 11.iii.2007, *Munzinger*, *McPherson*, *D.* & *I. Létocart*, *Amice* & *Chapelle 4211* (NOU, P, S); vallée de la Yaté en aval de la cascade, 135 m alt., 2.vii.1958, *Hürlimann 3091* (G, P, Z); Yaté, mine du Marais Kiki, 300 m alt., 28.vii.1984, *MacKee 42071* (NOU, P, S), Yaté, 22.ix.1985, *MacKee 42850* (NOU, P, S).

Pycnandra heteromera (Vink) Swenson & Munzinger, comb. nov.

≡ *Chrysophyllum heteromerum* Vink, *Blumea* 9: 47, 68 (1958). ≡ *Trouettia heteromera* (Vink) Aubrév., *Fl. Nouv.-Caléd.* 1: 83 (1967). *Holotype*: Nouvelle Calédonie, Mont Dzumac, Apr. 1908, *M.* & *Mme Le Rat 2952* (P 00292235).

Shrub or tree up to 5 m tall. *Leaves* oblong, 10–20 × (2.5–) 3–5 cm, coriaceous, glabrous above, tomentulose below, partly glabrescent; indument turning grey with age; apex round, sometimes retuse; venation brochidodromous; secondaries of 20–30 pairs, weakly visible above; tertiaries reticulate with parallel veins near the midvein; petiole 10–30 mm long, tomentulose of ferruginous indument, turning grey with age, ultimately glabrous. *Flowers* up to 20 in each fascicle, sessile, often borne on burls along branches below the leaves or sometimes axillary, subtended by 5–8 small, imbricate bracts. *Sepals* 5 (rarely 6), 3.0–4.0 mm long. *Corolla* 3.0–5.0 mm long with 5–8 recurved lobes, glabrous. *Stamens* 1 opposite each corolla lobe, inserted below the tube orifice, slightly longer than the corolla, glabrous; anthers 1.0 mm long. *Ovary* with 5 locules, conical with style, sparsely pubescent at the base, 3.0–4.0 mm long. *Fruit* obovoid, 10–20 × 5–8 mm, sparsely pubescent at the base, crowned with a 1-mm-long remnant style; seed scar 30% of seed circumference and 90% of the seed length; testa shiny, brown, thin; cotyledons ± ruminate (Fig. 13).

Recognition

Field characters of *P. heteromera* include the ramiflorous inflorescences, leaves in dense clusters at the tips of branches, anisomerous flowers, and one stamen opposite each corolla lobe.

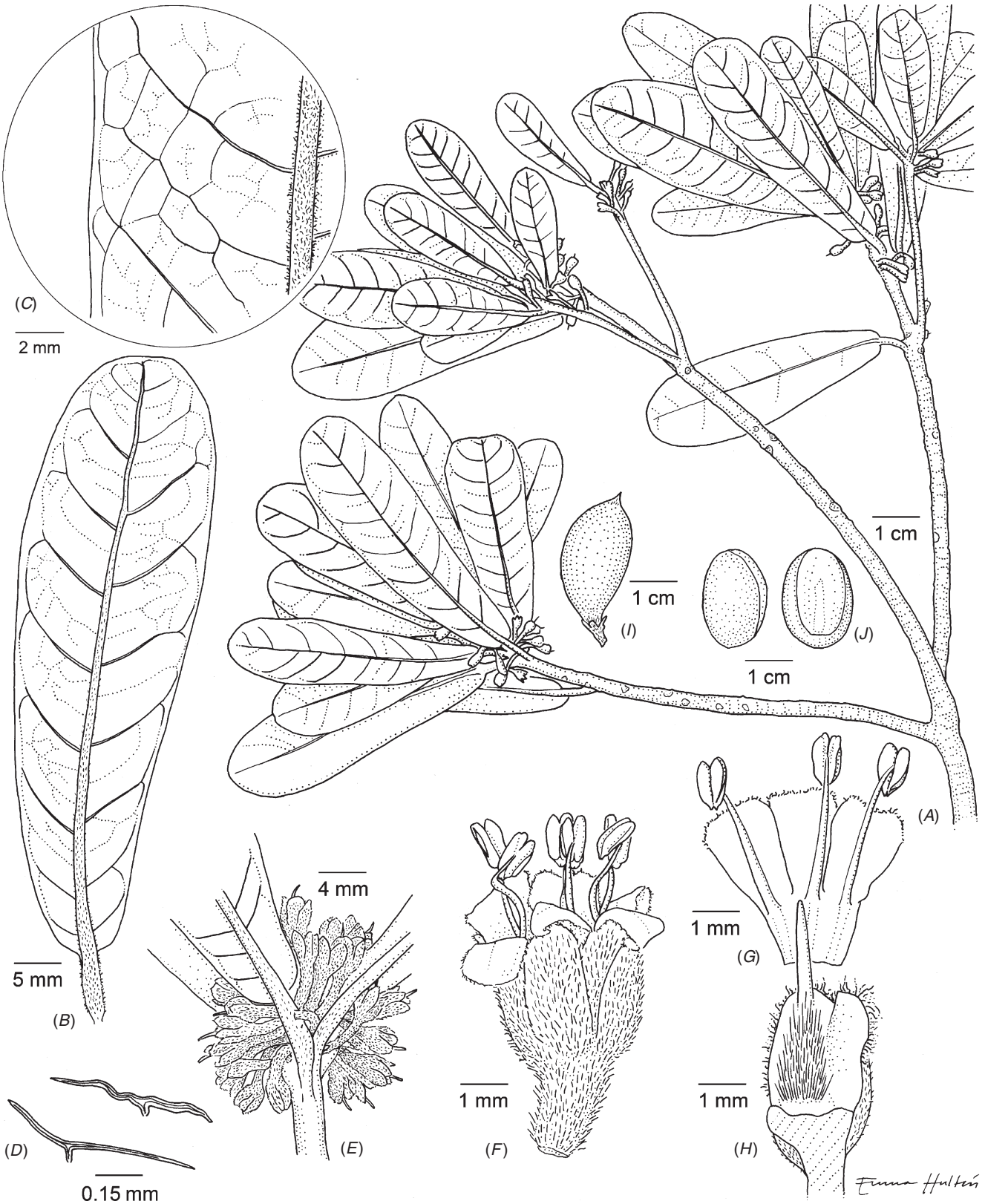

Fig. 11. *Pycnandra francii*. (*A*) Habit, (*B*) leaf, (*C*) leaf venation and pubescence along the midvein (lower surface), (*D*) types of trichomes, (*E*) fascicles of flowers, (*F*) flower, (*G*) part of an open corolla, (*H*) ovary, (*I*) fruit, and (*J*) seed, side view (left) and view of seed scar (right). Drawn from *Franc 689* and *Munzinger et al. 4211* (*A–H*), *MacKee 42850* (*I*, *J*).

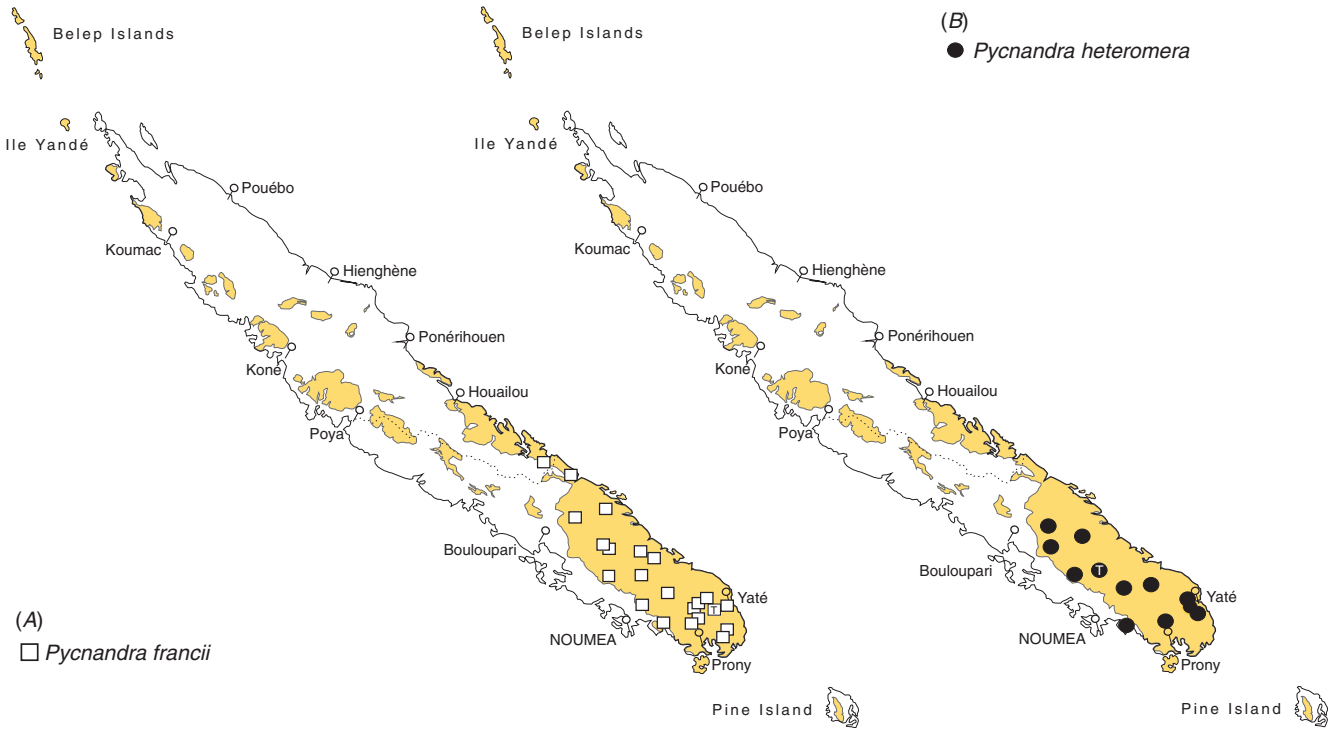

Fig. 12. Map of New Caledonia with distributions of (*A*) *Pycnandra francii* (□) and (*B*) *P. heteromera* (●). Type localities are indicated with 'T'. Shaded areas are land/mountain ranges dominated by ultramafic soil.

Fertile specimens are not readily confused with any congener (except for *P. elliptica*), whereas sterile or fruiting specimens could be mistaken for *P. carinocostata* or possibly *P. lissophylla*. The stiff, coriaceous leaves, secondaries that adjoin to the midvein in an almost 90° angle and flowers on burls subtended by imbricate bracteoles should distinguish it from both. As pointed out above, *P. heteromera* and *P. elliptica* share many floral details; however, 5–8 corolla lobes and oblong, rather large leaves with 20–30 secondary veins in *P. heteromera* distinguish it from the 5-merous flower and quite small, elliptic leaves with 12–20 secondary veins in *P. elliptica*. On the basis of overall morphology, *P. heteromera* is tentatively placed in subg. *Trouettia.*

Phenology

The flowers are mainly borne along branches and open between April and May, with fruits becoming mature in November to December.

Distribution

Pycnandra heteromera is a species of the maquis vegetation of the higher mountain slopes, often between 800 and 1000 m altitude in the south of Grande Terre (Fig. 12*B*). It is restricted to ultramafic soils and frequently found among serpentine rocks.

Etymology

Vink (1958) named this species from the fact that the number of sepals and corolla lobes differ (*hetero-*) in number (*mera*), in other words, the anisomerous flower that is so frequently common in *Pycnandra*.

Conservation status

Pycnandra heteromera is known from the following seven protected areas: Fausse Yaté, Mount Humboldt, Mount Mou, Montagne des Sources, Rivière Bleue, Pic du Pin, and Yaté Barrage. The EOO and AOO are of, respectively, 1454 km^2 and 108 km^2. The 10 known subpopulations have each only few individuals and the species appears to be naturally uncommon. Two populations in Dzumacs and Tonta occur aside from mining concessions, whereas the subpopulation in Mount Dore is suspected of having been destroyed by fire. Yet, this merits *P. heteromera* with fair protection and it is assigned a preliminary status of *Least Concern*.

Specimens examined

PROVINCE SUD: col Vulcain, 900 m alt., 11.xi.1950, *Baumann-Bodenheim 8071* (L, P); crête au nord du Mt Tonta, 950–1150 m alt., 10.viii.1967, *MacKee 17261* (P, S); crête entre haute Tontouta et haute Ouenghi, 1000 m alt., 23.xii.1970, *MacKee 23104* (NOU, P, S); haut bassin de la Rivière Bleue de Prony, 2.x.1969, *Schmid 2996* (NOU); haute Creek Pernod, 2.ii.1992, *MacKee 45731* (NOU); Humboldt, refuge du Vulcain, 950 m alt., 7.v.2005, *Munzinger*, *McCoy*, *Le Borgne* & *Pillon 2798* (NOU, P, S); Mt Dore, 29.xii.1982, *MacKee 41104* (NOU, P); Mt Dzumac, 22°06′S, 166°27′E, 400 m alt., 8.vii.1965, *Bernardi 9489* (G, Z); Mt Dzumac, 8.vi.1966, *Veillon 748* (NOU); Mt Dzumac, xi.1974, *Schmid* (*leg. Favier*) *5191* (NOU, P); piste du Humboldt, au dessus de la mine Gallieni, 21°54′29″S, 166°22′24″E, 800 m alt., 25.vii.2004, *Munzinger 2275bis* (S); réserve botanique de la Fausse Yaté, 300 m alt., 8.x.2007, *Dagostini*, *Rigault*,

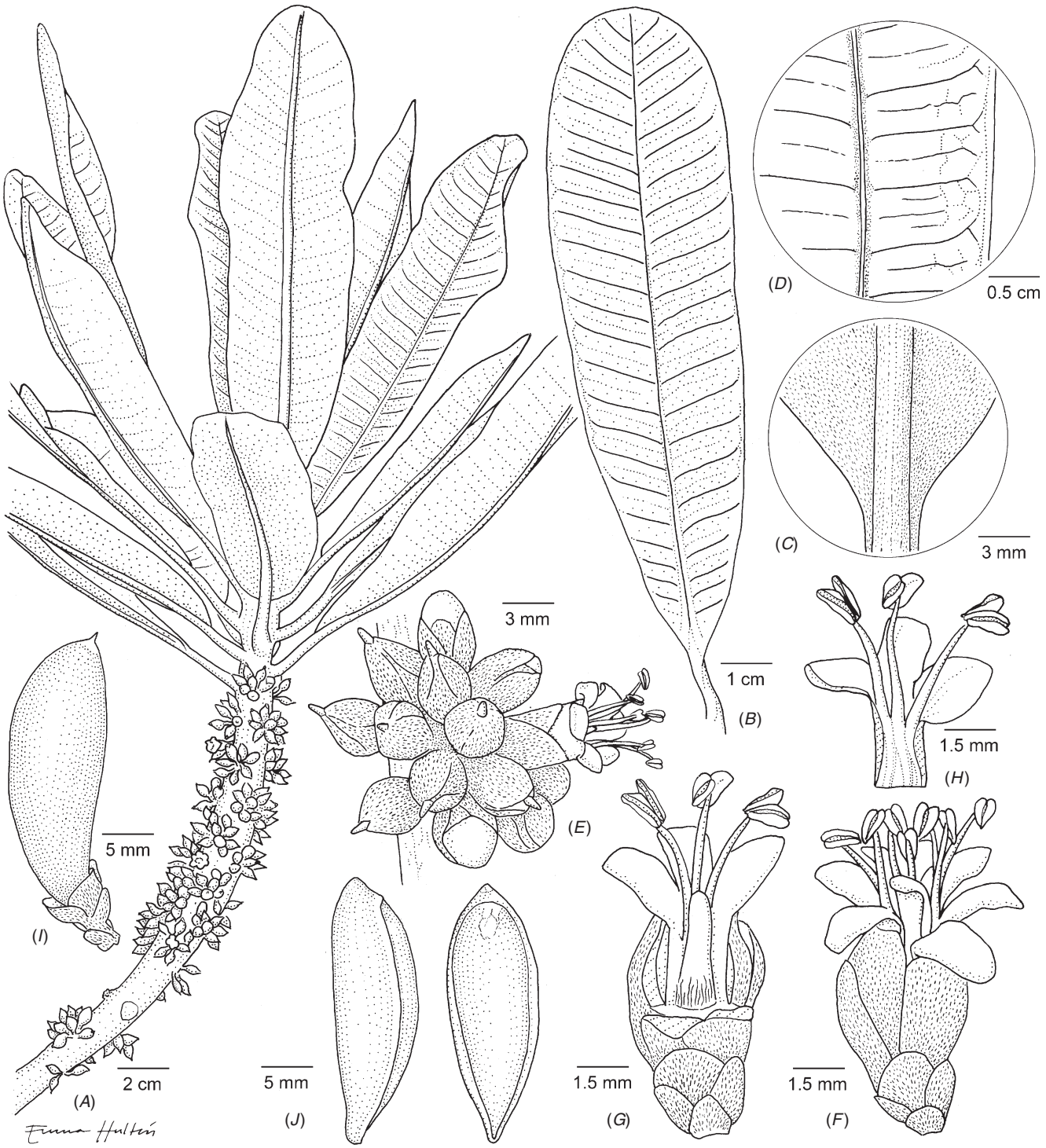

Fig. 13. *Pycnandra heteromera*. (*A*) Habit, (*B*) leaf, (*C*) base of leaf with indument (lower surface), (*D*) leaf venation (upper surface), (*E*) fascicle of flowers, (*F*) flower, (*G*) transection of flower, (*H*) part of an open corolla, (*I*) fruit, and (*J*) seed, side view (left) and view of seed scar (right). Drawn from *Munzinger et al. 2798* (*A–H*), *MacKee 23104* (*I*, *J*).

Barrabé & *Barriera 1435* (NOU, S); road from Dumbea valley to Mt Dzumac, 500 m alt., 2.xi.1981, *Pennington* & *McPherson 10272* (K, NOU); Yaté Barrage, 9.xi.1970, *MacKee 22859* (NOU), Yaté Barrage, 22.ix.1985, *MacKee 42849* (NOU); Yaté Barrage, 9.iv.2009, *Grignon 272* (NOU).

Pycnandra intermedia (Baill.) Swenson & Munzinger, comb. nov.

≡ *Chrysophyllum intermedium* Baill., *Bull. Mens. Soc. Linn. Paris* 2: 898 (1891*a*). ≡ *Trouettia intermedia* (Baill.) Pierre ex Guillaumin,

Ann. Mus. Colon. Marseille, *Ser.* 2, 9: 185 (1911). ≡ *Planchonella intermedia* (Baill.) Däniker, *Vierteljahrsschr. Naturf. Ges. Zürich* 78 (19): 353 (1933). ≡ *Pouteria intermedia* (Baill.) Baehni, *Candollea* 9: 409 (1942). ≡ *Corbassona intermedia* (Baill.) Aubrév., *Fl. Nouv.-Caléd.* 1: 74 (1967). *Lectotype* designated here: Nouvelle Calédonie, Collines ferrugineuses près de l'embouchure du Dotio, Sep. 1870, *Balansa 3045* (P 00290218), *isolectotypes* (P 00290215, P 00290216, P 00290217).

= *Chrysophyllum cochleare* Vink, *Blumea* 9: 60, 69 (1958). ≡ *Trouettia cochlearis* (Vink) Aubrév., *Adansonia*, *n.s.*, 2: 199 (1962). *Holotype*: Nouvelle Calédonie, col de Vulcain, 900 m s.m., 11 Nov. 1950, *M. Baumann 8130* (Z 000028087), *isotypes* (G 00191252, L, P 00290237).

Nomenclatural note

In the Paris herbarium, four specimens are present of the type collection *Balansa 3045*, on which the information on the labels differs slightly. It is unclear how many of these sheets were used by Baillon when he described *Chrysophyllum intermedium*, but one specimen was once in Pierre's herbarium. Another specimen is more complete, indicating more exact the locality, i.e. 'Collines ferrugineuses près de l'embouchure du Dotio'. This specimen was cited as type by Aubréville (1967) and it is here designated as the lectotype.

Shrub up to 2 m tall. *Leaves* elliptic to obovate, 3–5 × 1.5–2.5 cm, glabrous above, tomentulose below, glabrescent; apex round to retuse; venation brochidodromous, weakly visible on fresh material; secondaries of 6–8 pairs; tertiaries reticulate with some parallel veins near midvein; petiole sparsely tomentulose. *Flowers* 4–10 in each fascicle, axillary or below the leaves along the branches, not on burls; pedicel 1–3 mm long, tomentulose, with 0–2 small bracts at the base. *Sepals* 0.8–1.0 mm long. *Corolla* 1.5–2.0 mm long with 5 spreading lobes, glabrous outside, often with some scattered trichomes on the lobes or in the corolla tube; tube shorter than the lobes. *Stamens* 1 opposite each corolla lobe, inserted just above the tube orifice, as long as the corolla, glabrous; anthers 0.8 mm long. *Ovary* with 5 locules, conical with style, hirsute at the base, ~1.0 mm long. *Fruit* obovoid, 20–25 × 8–10 mm, glabrous; seed scar 20% of seed circumference and 70–80% of the seed length; testa dull, brown, thin (0.1–0.2 mm); cotyledons smooth (Fig. 14).

Recognition

This small shrub is recognised by its small leaves with inconspicuous venation, minute and greenish flowers with a short tube, and a dark ferruginous indument on pedicels and sepals. The flowers wither quickly and become brown. It is readily confused with *P. obscurinerva*, which also is a shrub with similar leaves. Sterile specimens can be distinguished in that the midvein is flat in *P. intermedia*, but crested in *P. obscurinerva*. If the specimen is flowering, the corolla in *P. intermedia* is smaller (1.5–2.0 mm long) than the slightly longer corolla (3.0–4.0 mm) in *P. obscurinerva*, and the tube is shorter than the lobes, whereas in *P. obscurinerva* lobes and the tube are of equal length. *Pycnandra intermedia*, on the basis of morphological similarities with other members, is tentatively placed in subg. *Trouettia.*

Phenology

Flowers are collected between November and March, although they are infrequently recorded.

Distribution

Pycnandra intermedia, like *P. heteromera*, is a species of the maquis vegetation from the higher slopes of the central-southern mountains of Grande Terre (Fig. 15*A*).

Etymology

The specific epithet *intermedia* refers to Baillon's (1891*a*) notion that the genera *Chrysophyllum* and *Sideroxylon* are separated by small but distinct differences, and this species is intermediate between them.

Conservation status

Pycnandra intermedia is know from eight subpopulations where one occurs in a protected area (Ningua) and five are within mining concessions (two of which are currently active exploitations). The EOO and AOO, respectively, are calculated to be 575 km^2 and 81 km^2. *Pycnandra intermedia* is assigned a preliminary status of *Vulnerable* VU: B1ab(ii,iii,iv,v)+B2ab(ii,iii,iv,v).

Specimens examined

PROVINCE SUD: basse vallée de Thio, montagne au sud, route de la mine Bornet, 7.viii.1966, *MacKee 15467* (P); col de Vulcain, 900 m alt., 11.xi.1950, *Baumann 8061* (L, P); contrefort nord du Koungoualou Nord, sous la concession Byzance Red, 12.i.2005, *Munzinger* & *Dagostini 2631* (NOU, P, S); haute Ouenghi, 400–800 m alt., *MacKee 13900* (P); Le Plateau, crête sommitale, 19.iii.1968, *Veillon 1659* (NOU, P); Mt Dzumac–Ouin/Crête, 27.vii.1977, *MacKee 37224* (NOU); piste de Mt Ningua, 8.xi.1983, *Veillon 5616* (NOU, P); sentier du Dzumac, 20.viii.1939, *Virot 205* (P); sentier du Dzumac, 30.xi.1975, *MacKee 30363* (NOU, P); Upper Tontouta, valley hillside, 20.xi.1955, *MacKee 3488* (P); vallée de la Tontouta, 21°54′15′S, 166°21′11′E, 500 m alt., 11.iii.2007, *Munzinger*, *McPherson*, *D.* & *I. Létocart*, *Amice* & *Chapelle 4217* (NOU, P, S).

Pycnandra lissophylla (Pierre ex Baill.) Swenson & Munzinger, comb. nov.

≡ *Chrysophyllum lissophyllum* Pierre ex Baill., *Bull. Mens. Soc. Linn. Paris* 2: 903 (1891*a*). ≡ *Planchonella lissophylla* (Pierre ex Baill.) Däniker, *Vierteljahrsschr. Naturf. Ges. Zürich* 78 (19): 354 (1933). ≡ *Trouettia lissophylla* (Pierre ex Baill.) Aubrév., *Adansonia*, *n.s.*, 2: 177 (1962). ≡ *Niemeyera lissophylla* (Pierre ex Baill.) T.D.Penn., *Gen. Sapotac.*: 236 (1991). *Lectotype* designated by Vink (1958): Nouvelle Calédonie, Mont Humbold, vers 500 m alt., 25 Sep. 1869, *Balansa 1823* (P 00292246), *isolectotype* (P 00292247).

= *Chrysophyllum parvifolium* Schltr., *Bot. Jahrb. Syst.* 39: 225 (1906). *Lectotype* designated here: Iter Neo-Caledonicum, Auf den Bergen am Ngoye, 1000 m alt., 1 Nov. 1902, *R. Schlechter 15189* (P 00290240), *isolectotypes* (BM, E, G 00191250, L 006129, Z 0028088).

= *Chrysophyllum peninsulare* S.Moore, *J. Linn. Soc*, *Bot.* 45: 352 (1921). *Holotype*: New Caledonia, Presque île Bogota, 28 Jun. 1914, *R.H. Compton 1340* (BM).

= *Chrysophyllum lissophyllum* f. *longifolium* Vink, *Blumea* 9: 52 (1958). *Holotype*: Nouvelle Calédonia, Prony, 20 Mar. 1911,

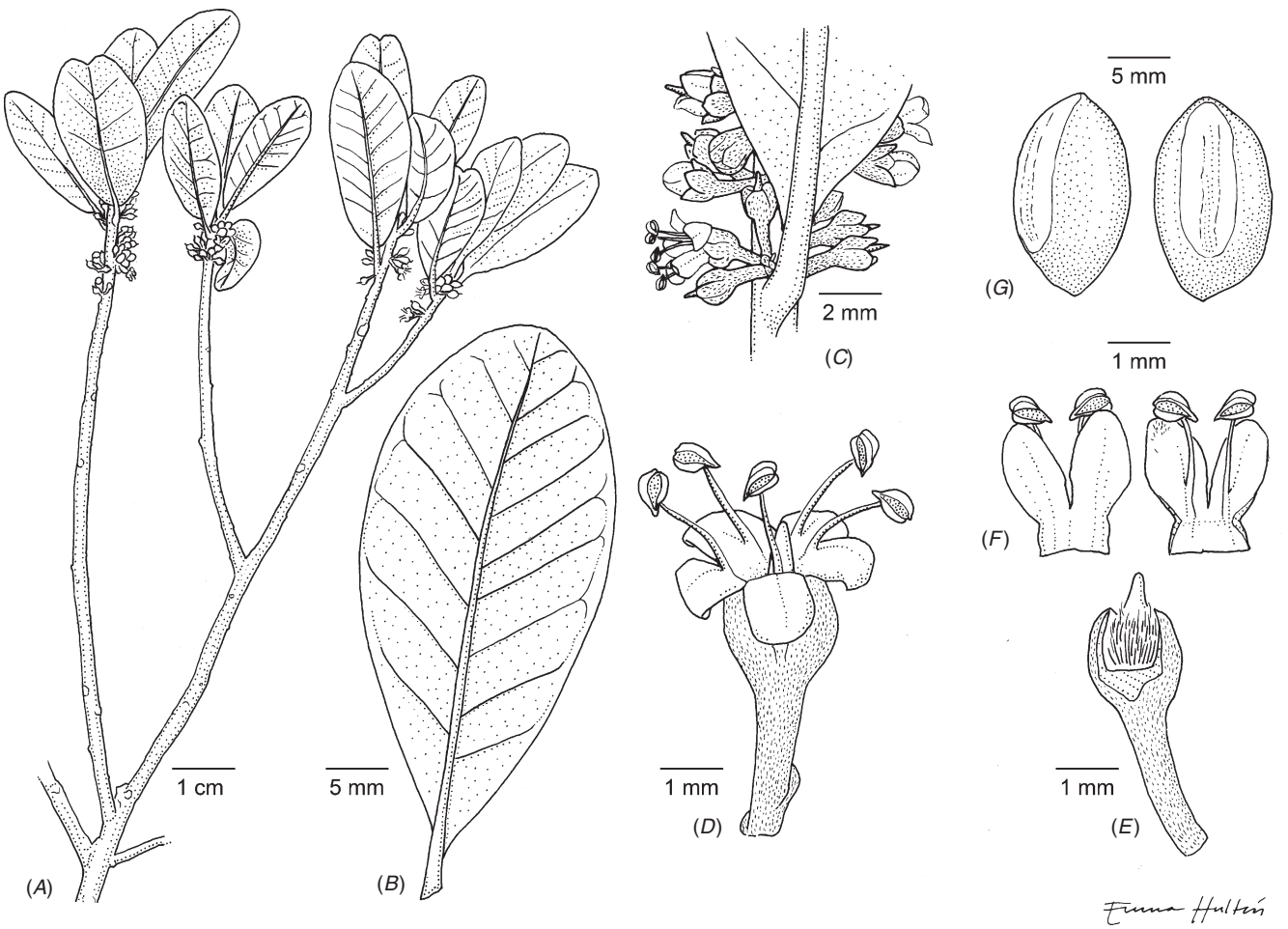

Fig. 14. *Pycnandra intermedia*. (*A*) Habit, (*B*) leaf, (*C*) fascicles of flowers, (*D*) flower, (*E*) transection of flower showing ovary, (*F*) part of an open corolla from the outside (left) and inside, with a few scattered trichomes on top of the lobe (right), and (*G*) seed, side view (left) and view of seed scar (right). Drawn from *Munzinger and Dagostini 2631* (*A–F*), *Pillon* 216 (*G*).

I. Franc 1938 (P 00292256), *isotypes* (E, G 00160434, Z 000031309).

= *Trouettia lissophylla* var. *pedicellata* Aubrév., *Fl. Nouv.-Caléd.*1: 82 (1967). *Holotype*: Nouvelle Calédonie [Haute Ouenghi], *MacKee 13899* (P 00292270), *isotype* (P 00292271).

Nomenclatural note

Baillon (1891*a*) described *Chrysophyllum lissophyllum* and cited two collections, *Balansa 1823* from Mont Humbold and *Balansa 3149* from Mont Poume. These are syntypes; however, in a revision of *Chrysophyllum*, Vink (1958) described two additional forms and used *Balansa 1823* as the type specimen for the nominal form and *Balansa 3149* for the nomenclatural type for *C. lissophyllum* f. *obscurinerve*. Hence, Vink implicitly assigned *Balansa 1823* as the lectotype of *C. lissophyllum*. In contrast, Aubréville (1967) cited both *Balansa 1823* and *Balansa 3149* as holotypes, which violates Art. 8 of the ICBN (McNeill *et al*. 2006) in that a holotype (or lectotype) consists of a single specimen gathered at one time. In addition, Schlechter (1906) described *C. parvifolium* on the basis of the gathering *Schlechter 15189* from the Ngoye Mountains in New Caledonia. Schlechter worked in Berlin (B); however, this specimen is not present there and was probably destroyed during the Second World War (R. Vogt, pers. comm.). Hence, the specimen in Paris is here designated as lectotype.

Shrub up to 3 m tall, sometimes develops into a small tree up to 5 m tall. *Leaves* linear or narrowly elliptic, 7–15 × 1.0–2.5 (–3.0) cm; tomentulose on both surfaces, glabrescent above, partly so below; apex round to subacute; venation brochidodromous, weakly visible on fresh material; midvein flat or weakly crested above; secondaries of 15–25 pairs; tertiaries reticulate with parallel veins near the midvein; petiole 5–10 mm long, tomentulose of ferruginous indument, turning grey with age. *Flowers* up to 40 in each fascicle, mainly below the leaves along the branches and/or axillary; pedicel 1–3 mm long, tomentulose, with 1 or 2 small, alternate bracts. *Sepals* 5 (rarely 4), 1.5–2.0 mm long, inner often with a glabrous margin. *Corolla* 3.0–4.0 mm long with 5 (rarely 4) recurved lobes, glabrous or with some scattered trichomes on the outside. *Stamens* 1 opposite each corolla lobe, inserted in the tube orifice, slightly longer than the corolla, glabrous; anthers 0.7 mm long. *Ovary* with 5 (rarely 4)

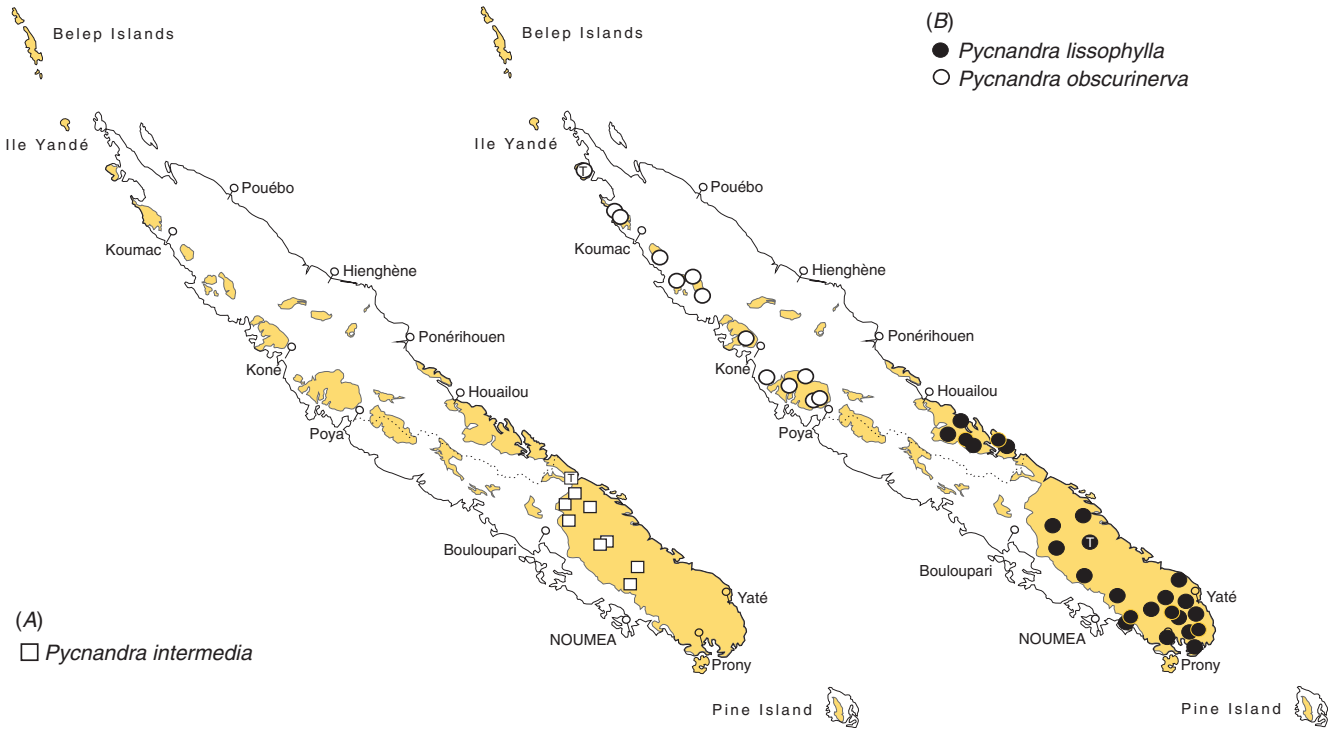

Fig. 15. Map of New Caledonia, with distributions of (*A*) *Pycnandra intermedia* (□), (*B*) *P. lissophylla* (●) and *P. obscurinerva* (○). Type localities are indicated with 'T'. Shaded areas are land/mountain ranges dominated by ultramafic soil.

locules, conical with style, sparsely pubescent at the base, 1.0–2.0 mm long. *Fruit* obovoid, 10–15 × 6–10 mm, glabrous, crowned with a minute remnant style; seed scar 30% of seed circumference and 80–90% of the seed length; testa shiny, light brown, thin (0.1–0.4 mm); cotyledons smooth (Figs 1*F*, 16*A*).

Recognition

Pycnandra lissophylla and *P. obscurinerva* were previously united (Aubréville 1967), being two very similar taxa in many aspects. Flowering and fruiting characters illustrated in Fig. 16 are applicable for both, although it is the latter the drawing is made from. However, our unpublished molecular data indicate a distant relationship and it is untenable to treat them as a unified taxon. The two could be termed cryptic species, an issue that will be addressed elsewhere. *Pycnandra lissophylla* is tentatively placed in subg. *Trouettia*.

Pycnandra lissophylla and *P. obscurinerva* are two species difficult to distinguish from each other. The foliage differs slightly in size and shape, being longer (7–15 cm) and linear to narrowly elliptic in *P. lissophylla*, compared with shorter (4–9 cm) and obovate to oblong in *P. obscurinerva*. Both species have leaves with a crested midvein, a character that is more pronounced in *P. obscurinerva*. Also, the fruit seems to differ slightly, being 10–15 mm long and obovoid in *P. lissophylla*, but 15–20 mm long and fusiform in *P. obscurinerva*. Apart from this cryptic species pair, *P. lissophylla* could possibly be confused with sterile specimens of the sympatric congener *P. heteromera* (cf., Figs 12*B*, 15*B*). In general, *P. lissophylla* is a small, more pliant shrub, with shorter and narrower leaves, than *P. heteromera*, which is a stout shrub or tree.

Phenology

Because of the wide altitudinal range, the flowering season is long, from January to July, or even November, followed by fruits until the set of the next batch of flowers.

Distribution

Pycnandra lissophylla is a shrub restricted to the ultramafic areas of Grande Terre, from Prony in the south to Houaïlou in the north (Fig. 15*B*). It grows primarily in maquis vegetation on serpentine or soils rich in iron, from sea level up to 1000-m altitude.

Etymology

The specific epithet *lissophylla* is of Greek origin and means smooth or even, and refers to the leaf margin (Baillon 1891*a*), which is applicable to all species, with few exceptions of Sapotaceae (Pennington 1991; Swenson and Anderberg 2005).

Conservation status

Pycnandra lissophylla is known from the following two protected areas: Fausse Yaté and Yaté Barrage. The 22 known subpopulations occupy an EOO of 4200 km^2 and an AOO of 297 km^2. Most of the populations are within mining concessions; however, the species is naturally common in maquis vegetation where it grows. *Pycnandra lissophylla* is assigned a preliminary status of *Least Concern*.

Specimens examined

PROVINCE NORD: Canala, Prokoméo radio tower, 700 m alt., 2.ii.1983, *McPherson 5458* (MO, NOU), Canala, Mé Aiu, 23.xi.1990, *MacKee 45183*

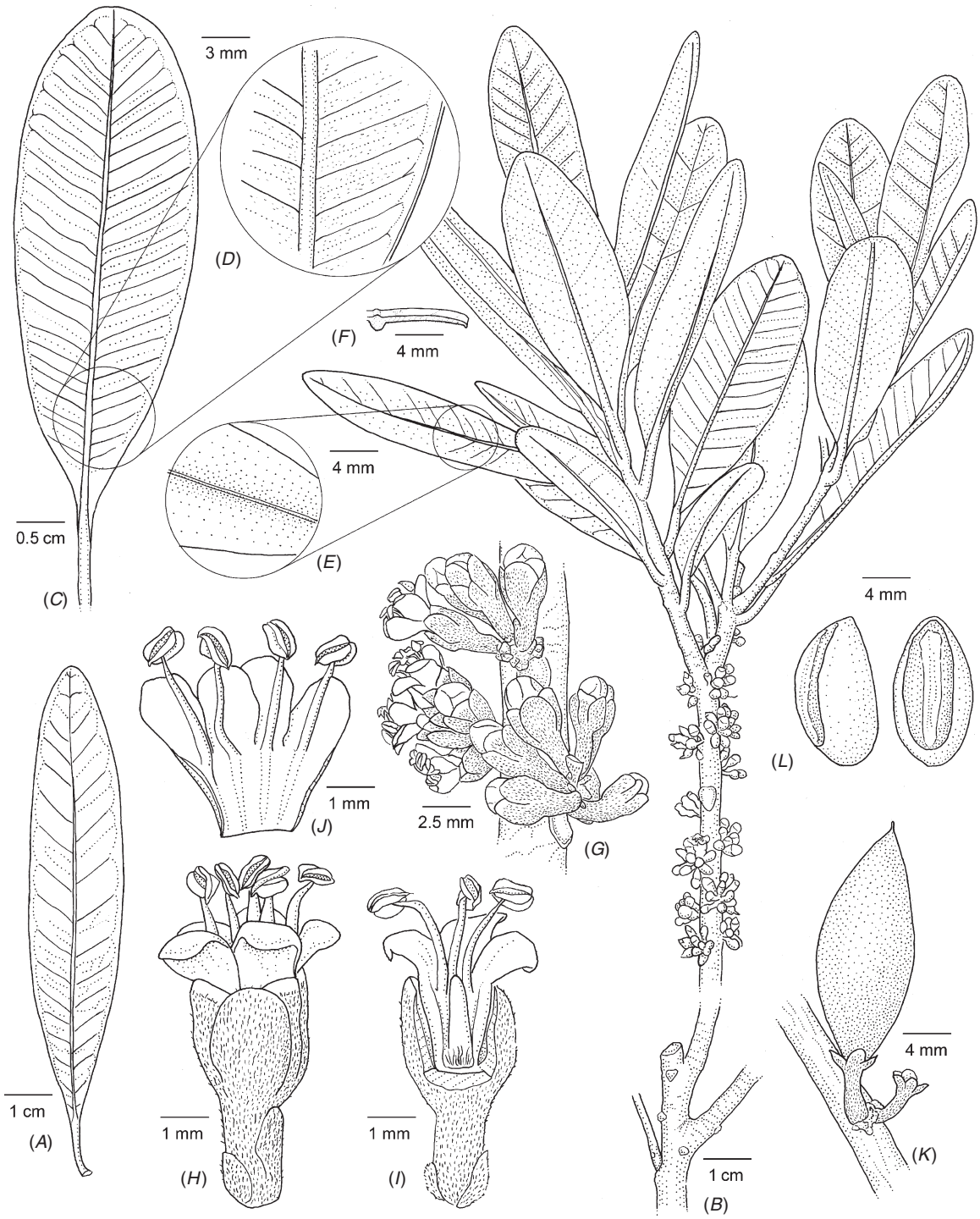

Fig. 16. (*A*) *Pycnandra lissophylla* and (*B–L*) *P. obscurinerva*. (*B*) Habit, (*C*) leaf, (*D*) leaf venation (lower surface), (*E*) crested midvein on the upper surface, (*F*) transection of blade, (*G*) fascicles of flowers, (*H*) a 5-lobed flower, (*I*) transection of flower, (*J*) open 4-lobed corolla, (*K*) fruit, and (*L*) seed, side view (left) and view of seed scar (right). Drawn from *Munzinger et al. 2103* (*A*), *Swenson et al. 701* (*B–F*, *K*, *L*), *Munzinger et al. 2654* (*G–J*). Note that the floral characters (*G–J*) are equally well applicable to *P. lissophylla*.

(P); Gatope, 1861–1867, *Vieillard 2893* (BM, GH, P); hauteurs au nord de Négropo, 25.vi.1977, *MacKee 33377* (NOU, P); Kouaoua, Aréha, 31.iii.1970, *MacKee 21726* (NOU, P), Kouaoua, décharge Montmartre, 14.ii.1978, *Veillon 3472* (NOU), Kouaoua, Ménazi, 6.vii.1989, *MacKee 44458* (NOU, P), Kouaoua, 900 m alt., 30.v.2000, *Jaffré 3418* (NOU, P, S); Poro, 5 km au sud, 1.v.1966, *MacKee 14855* (NOU, P); presqu'île de Bogota, 29.viii.1989, *MacKee* (*leg. Cherrier*) *44568* (NOU); presqu'île de Bogota, vers 500 m alt., 3.vii.1997, *Dagostini 130* (NOU); road north of Canala to Prokoméo and

Kouaoua, 650 m alt., 20.iv.1983, *McPherson 5626* (MO, NOU, P, S). PROVINCE SUD: chute de la Madeleine, 28.vii.1966, *Schmid s.n.*, (NOU); col de Mouirange, Forêt Desmazure, 10.iii.2005, *Dagostini 1051* (NOU); col de Yaté, 18.xi.2009, *Munzinger 6003* (NOU); Combwi, concession sln 'croix du sud', 18.xii.2002, *Dagostini 579* (NOU); Creek Pernod, bord de la route du Carénage, 13.iii.1964, *Blanchon 751* (NOU); Goro, 3 km SW, 22.iii.1981, *McPherson 3626* (G, MO, NOU, P, S); Goro, 22°16′29″S, 166°52′45″E, 26.v.2004, *Munzinger*, *Dagostini* & *McCoy 2103* (MO, NOU, P, S); hauteurs de Yaté, 250 m alt., 31.i.1983, *MacKee 41220* (NOU, P, S); in vicinioribus rivi Madeleine, 22°14–16′S, 166°50–57′E, 200–250 m alt., 3.vii.1965, *Bernardi 9386* (G, P, Z); Kuaua, derrière les décharges de la mine S.L.N. d'Areha, 31.iii.1982, *Suprin 1765* (NOU); Les Dalmates, 18.xi.986, *Jaffré 2817* (NOU); mines Goro, au tombant du plateau, 23.x.1980, *Suprin 801* (NOU); Mt Coumboui (dent de St Vincent), iv.1870, *Balansa 2802* (P); Mt Dore, 6.v.1966, *Nothis 123*, *124* (NOU); Mt Dore, 600 m alt., 13.iii.2002, *Jaffré 3504* (NOU, P, S); Mt Tonta, 10.viii.1967, *Veillon 1316* (P); Mt Tonta, 10.viii.1967, *Veillon 1317* (NOU) and *MacKee 17266* (NOU); nord de Yaté, Mamié, 400 m alt., 8.ii.2005, *Munzinger*, *Rigault* & *Dagostini 2654* (NOU, P, S); Plaine des Lacs, ii.1907, *Franc 785* (G, P), Plaine des Lacs, au NE Grand Lac, 9.ii.1971, *MacKee* (*leg. Corbasson*) *23298* (NOU); Plaine des Lacs, Creek Pernod, 3.iv.1983, *MacKee 41379* (NOU, P); plateau above Goro, 20.xi.1981, *McPherson 4410*, *4415* (MO); Port Boisé, 19.xi.1981, *Pennington* & *McPherson 10337* (MO, NOU); Prony, 150 m alt., 27.iii.1979, *MacKee 36724* (NOU, P, S); road from Dumbea valley to Mt Dzumac, 500 m alt., 2.xi.1981, *Pennington* & *McPherson 10273* (MO, NOU); route de Yaté vers embranch carènage, 20.viii.1974, *Schmid 5027* (NOU, S); route de Yaté, Creek Pernod, 200 m alt., 1.v.1985, *MacKee 42579* (NOU, P); S of Plum, overlooking valley of Pirogues, 6.xi.1981, *Pennington* & *McPherson 10288* (MO, NOU); Yaté, along Fausse Yaté River, 20 m alt., 8.xii.1982, *McPherson 5274* (MO, NOU, P, S); Yaté, hauteurs à l'E Barrage, 9.xi.1970, *MacKee 22855* (NOU); Yaté, 19.ii.1986, *MacKee 43016* (NOU); Yaté, 5 km aval de la chute rivière des Lacs, 1.v.1986, *MacKee 43105* (NOU); Yaté, 29.vi.1986, *MacKee 43164* (NOU), Yaté, 30.xi.1986, *MacKee 43370* (NOU); zone vallonée au sud du Lac en Y, 6.viii.1970, *Veillon 2173* (NOU).

Pycnandra obscurinerva (Vink) Swenson & Munzinger, comb. et stat. nov.

≡ *Chrysophyllum lissophyllum* f. *obscurinerve* Vink, *Blumea* 9: 52 (1958). *Holotype*: Nouvelle Calédonia, Mont Poum[e], *Balansa 3149* (P 00292321), *isotypes* (P 00292320, P 00292322, P 00639323).

Shrub up to 3 m tall. *Leaves* obovate to oblong, 4–7(–9) × 1.5–2.5 cm; tomentulose on both surfaces, glabrescent above, partly so below; indument turning grey with age; apex round; venation brochidodromous, weakly visible on fresh material; midvein crested above; secondaries of 15–25 pairs; tertiaries reticulate with parallel veins near the midvein; petiole 5–10 mm long, tomentulose of ferruginous indument, turning grey with age. *Flowers* up to 15 in each fascicle, mainly below the leaves along the branches and/or axillary; pedicel 2–3 mm long, tomentulose, with 1 or 2 small, alternate bracts. *Sepals* 5 (or 4), 1.5–2.0 mm long, inner often with a glabrous margin. *Corolla* 3.0–4.0 mm long with 5 (or 4) recurved lobes, glabrous or with some scattered trichomes on the outside. *Stamens* 1 opposite each corolla lobe, inserted in the tube orifice, slightly longer than the corolla, glabrous; anthers 0.7 mm long. *Ovary* with 5 locules, conical with style, sparsely pubescent at the base, 1.0–2.0 mm long. *Fruit* fusiform, 15–20 × 5–10 mm, glabrous, crowned with a minute remnant style; seed scar 30% of seed circumference and 80–90% of the seed length; testa shiny, light brown, thin (0.1–0.4 mm); cotyledons smooth (Fig. 16*B–L*).

Recognition

Pycnandra obscurinerva is difficult to distinguish from, and was originally described as an infraspecific taxon of *P. lissophylla* (Vink 1958). An oblong versus a linear leaf shape was used as a diagnostic character. This character, combined with smaller leaves and a fusiform fruit, 15–20 mm long, compared with obovoid, 10–15 mm long fruit in *P. lissophylla*, should separate the two. *P. obscurinerva* is also readily confused with *P. intermedia*, especially if only sterile material is available. Useful field characters for *P. obscurinerva* include that the secondary leaf venation has at least twice as many pairs, more than 15 (not ≤8), and slightly larger corolla (3.0–4.0 mm) than the one in *P. intermedia* (1.5–2.0 mm). As far as known, the three species differ in distribution, *P. obscurinerva* being scattered in the ultramafic mountains of Grande Terre's north-western coast, whereas *P. intermedia* and *P. lissophylla* range in the coherent ultramafic area of the south (Fig. 15).

Phenology

Flowers from February to July, followed by fruits between August and February, when a new flowering season begins.

Distribution

Pycnandra obscurinerva grows in maquis vegetation on ultramafic mountains of north-western New Caledonia (Fig. 15*B*). It is mainly recorded between 400 and 800 m altitude.

Etymology

Apart from the midvein, the venation of *P. obscurinerva* is indistinct, which is reflected in the specific epithet *obscurinerva*.

Conservation status

Pycnandra obscurinerva is restricted to the northern province, where still no reserve exists protecting landscape and vegetation on ultramafic rocks from exploitation (Jaffré *et al*. 1998). There are 11 known subpopulations and only three of those are outside mining concessions. Many concessions are active sites and new mining projects are planned in mountains where this taxon occurs (Koniambo, Poum, Tiébaghi). The total calculated EOO is 1551 km^2, of which merely 437 km^2 are on ultramafic rocks, and the AOO is 144 km^2. *Pycnandra obscurinerva* is not satisfactorily protected and is assigned a preliminary status of *Vulnerable* VU: A2acd+A3cd.

Specimens examined

PROVINCE NORD: Boulinda, 28.iv.1965, *Schmid 144* (NOU), Boulinda, 1000 m alt., 22.ii.1978, *Jaffré 2350* (NOU, S), Boulinda, 23.ii.1978, *Jaffré 2369* (NOU) and *Morat 5951* (NOU, P), Boulinda, 14.ii.2006, *Dagostini 1168* (NOU); crête sommitale de Montagne de Poum, 1.ii.1966, *MacKee 14333* (P); dôme de Tiébaghi, 15.xi.1976, *Jaffré 1817* (NOU); dôme de Tiébaghi, plateau central, 17.vii.1977, *MacKee 33517* (NOU), dôme de Tiébaghi, 5.v.1978, *Jaffré 2457* (NOU); dôme de Tiébaghi, plateau north, 8.vii.1978, *MacKee 35437* (NOU), dôme de Tiébaghi, 450 m alt., 15.vii.1979, *MacKee 37193* (NOU, P, S); dôme de Tiébaghi, 11.i.2004, *Munzinger 1913*, *1915* (NOU); haute Népoui, contrefort S Kopéto, Oua Péoué, 25.iii.1969, *MacKee 20404* (NOU); massif du Koniambo, pente sud–est, 25.viii.1966, *MacKee 15535* (P); massif du Koniambo, 18.xi.1971, *Jaffré 517* (NOU); massif du Koniambo, 700 m alt., 22.ii.1972, *Jaffré 699* (NOU) and *713* (NOU, P); massif du

Koniambo, 21.ix.2006, *Barrière 39* (NOU); Montagne de Ouatendé, 1868, *Vieillard 2894* (P); Montagne de Poum, 300–400 m alt., 5.ii.1966, *MacKee 14992* (G, P, S); Montagne de Poum, 16.viii.1976, *Nothis 481* (NOU), Montagne de Poum, 13.iv.2006, *Munzinger* (*leg. Rigault*) *3395* (NOU); Montagne de Poum, thalweg nord, 8.v.2008, *Dagostini 1596* (NOU); Mt Homédéboa, 800–900 m alt., 16.v.1968, *MacKee 18821* (G, NOU, P, S); Mt Kaala, southern slope, 10.x.1965, *MacKee 13571* (NOU); Mt Kaala, southern slope, 20.x.1956, *MacKee 5519* (P); Mt Kaala, au dessus de Gomen, 18.iii.1966, *MacKee 14590* (NOU); Mt Kaala, pente sud-ouest, 10.ix.1967, *MacKee 17493* (NOU); Mt Kaala, north summit, 1050 m alt., 17.v.1981, *MacKee 39085* (NOU, P); Mt Kaala, 7.xii.2005, *Pillon 216* (NOU); Mt Kopéto, 21°11′23″S, 165°01′23″E, 443 m alt., 3.ix.2009, *Swenson* & *Munzinger 931* (MO, NOU, P, S); Mt Paéoua, 4.vii.1967, *MacKee 17007* (NOU, P); Mt Taom, 8.i.1981, *MacKee 38520* (NOU); Mt Taom, 20°46′52″S, 164°34′15″E, 12.ix.2006, *Munzinger* (*leg. Rigault*) *3548* (NOU); Ouazangou, bord de piste, 4.vii.2007, *Barrière 12* (NOU); Pouembout, on top of Plateau de Tia, 21°10′36″S, 164°53′77″E, 400 m alt., 2.x.2005, *Swenson*, *Munzinger* & *Butin 701* (BRI, MO, NOU, P, S); Poum, bas de creek ouest du massif, a gauche entrée mine, 20 m alt., 11.iv.2006, *Barrière*, *Rigault* & *Barrabé 5* (NOU, S).

Pycnandra pubiflora Swenson & Munzinger, sp. nov.

Species haec *Pycnandrae caeruleilatici* similis sed corollis 5-lobatis, staminibus 10 et pedicellis 2–3 bracteatis differt.

Holotype: Nouvelle Calédonie, Province Sud, col de Mouirange, 6 Jan. 2005, *J. Munzinger*, *G. Dagostini*, *F. Rigault* & *D. Kurpisz 2624* (P 00612452), *isotypes* (NOU 007230, S 09–3174).

Tree up to 12 m tall, with a stem dbh of 25 cm. *Leaves* elliptic, 15–25 × 6–10 cm, coriaceous, tomentulose on upper surface, glabrescent, tomentose below; apex round; venation eucamptodromous, conspicuous below; secondaries of 13–17 pairs; tertiaries oblique or reticulate; petiole 35–90 mm long, tomentose of ferruginous indument, turning grey with age. *Flowers* 5–10 in each fascicle, below the leaves along the branches, not on burls; pedicel 5–7 mm long, tomentulose, with 2–4 alternate bracts, the upper similar to the sepals. *Sepals* 6.0–7.0 mm long. *Corolla* 8.0–11.0 mm long with 5 recurved lobes, evenly pubescent on the outside. *Stamens* 2 opposite each corolla lobe, inserted in the tube orifice, slightly longer than the corolla; anthers 2.5–3.0 mm long, pubescent between thecae. *Ovary* with 5 locules, slender with style, densely hirsute at the base, ~5.0 mm long. *Fruit* obovoid, 25–35 × 20–25 mm, sparsely pubescent at the base, crowned with a 1–2 mm long remnant style; seed scar 70% of seed circumference and 100% of the seed length; testa dull, grey, hard (1.5–2.5 mm); cotyledons ± ruminate (Figs 1*G*, *H*, 17).

Recognition

The foliage of *P. pubiflora* resembles that of *P. comptonii* (subg. *Achradotypus*) and *P. benthamii* (subg. *Pycnandra*), the former two having two whereas the third one having three or four stamens inserted opposite each corolla lobe, and they differ in other floral features too. Flowers are white in *P. pubiflora* and *P. comptonii*, red in *P. benthamii*; the two latter have anisomerous rather wide (~15–20 mm) flowers, whereas *P. pubiflora* has 5-merous, rather small (7–10 mm wide) flowers with recurved lobes (Fig. 1*H*). The best field characters that distinguish the new species are a long petiole and an evenly pubescent corolla and anthers, not glabrous or a few scattered trichomes, respectively, as is found in *P. benthamii* and *P. comptonii*.

Phenology

Flowers are borne mainly along the branches and open in January to March, followed by mature fruits in October and November.

Distribution

Pycnandra pubiflora grows in humid forest on ultramafic rocks, often in pockets of primary vegetation, at fairly low altitudes in the central part of southern Grande Terre (Fig. 18*A*). This new species forms conspicuous small to medium-sized trees and it can easily be observed along the Yaté road, not far from Noumea. The first collection was made in 1969 by Hugh MacKee along the road to Montagnes des Sources, and then in the Rivière Bleue reserve by Gordon McPherson and Terry Pennington in 1981.

Etymology

The species epithet refers to the pubescent corolla.

Conservation status

Pycnandra pubiflora occurs in the following nine protected areas: Fausse Yaté, Forêt Cachée, Forêt de Sailles, Montagne des Sources, Mount Kouakoué, Pic du Grand Kaori, Pic du Pin, Rivière Bleue and Yaté Barrage. *Pycnandra pubiflora* has an EOO of 1352 km^2 and 12 subpopulations add up to an AOO of 144 km^2. Hence, *P. pubiflora* is assigned a preliminary status of *Least Concern*.

Specimens examined

PROVINCE SUD: col de Mouirange, 29.ix.2005, *Munzinger* & *Swenson 3000* (NOU, P, S); Forêt Cachée, 5.vii.2005, *Pillon*, *Kurpisz*, *Rigault* & *Nigote 106* (NOU, P, S); Forêt de Sailles, 890 m alt., 21°39′57″S, 166°14′33″E, 16.xi.2009, *Grignon et al. 549* (NOU); Forêt du Grand Kaori, 21.iii.2005, *Munzinger*, *Rigault* & *Barrabé 2782* (NOU, P, S); Forêt du Pic du Pin, 18.xi.2004, *Dagostini* (*leg. Rigault*) *894* (NOU); Mt Dzumac, 1.vi.2005, *Pillon et al. 61* (NOU); piste des Dzumac, la patte d'Oie, 19.i.2005, *Munzinger* & *Tobe 2646* (NOU, P, S); Rivière Bleue, vers le Grand Kaori, 3.v.2005, *Munzinger 3565* (NOU, P, S); Rivière Bleue reserve, 150 m alt., 17.xi.1981, *McPherson 4394* (MO, S) and *Pennington* & *McPherson 10327* (MO, NOU); Rivière Bleue reserve, vi.1986, *Veillon 6537* (NOU); route Montagnes des Sources, 500 m alt., 11.i.1969, *MacKee 21407* (NOU, P, S).

Pycnandra sarlinii (Aubrév.) Swenson & Munzinger, comb. nov.

≡ *Ochrothallus sarlinii* Aubrév., *Fl. Nouv.-Caléd.* 1: 61 (1967). *Holotype*: Nouvelle Calédonie, col d'Amieu, 12–14 Jul. 1965, *Aubréville* & *Heine 265* (P 00290923), *isotypes* (P 00290921, P 00290922, P 00290924).

Tree up to 15 m tall. *Leaves* elliptic, 12–20 × 4–7 cm, coriaceous, glabrous above, tomentulose below of golden brown trichomes, turning grey with age; apex subacute; venation eucamptodromous, distinct below; secondaries of 16–20 pairs; tertiaries oblique or reticulate; petiole 13–20 mm long, tomentulose of ferruginous indument, turning grey with age. *Flowers* 2–8 in each fascicle, sessile, borne on small burls below the leaves along the branches, subtended by 5–12 imbricate bracts. *Sepals* 2.5 mm long, tomentulose of golden brown trichomes. *Corolla* 3.0–5.0 mm long with 9 or 10 recurved, glabrous (?) lobes. *Stamens* 1 opposite each corolla lobe,

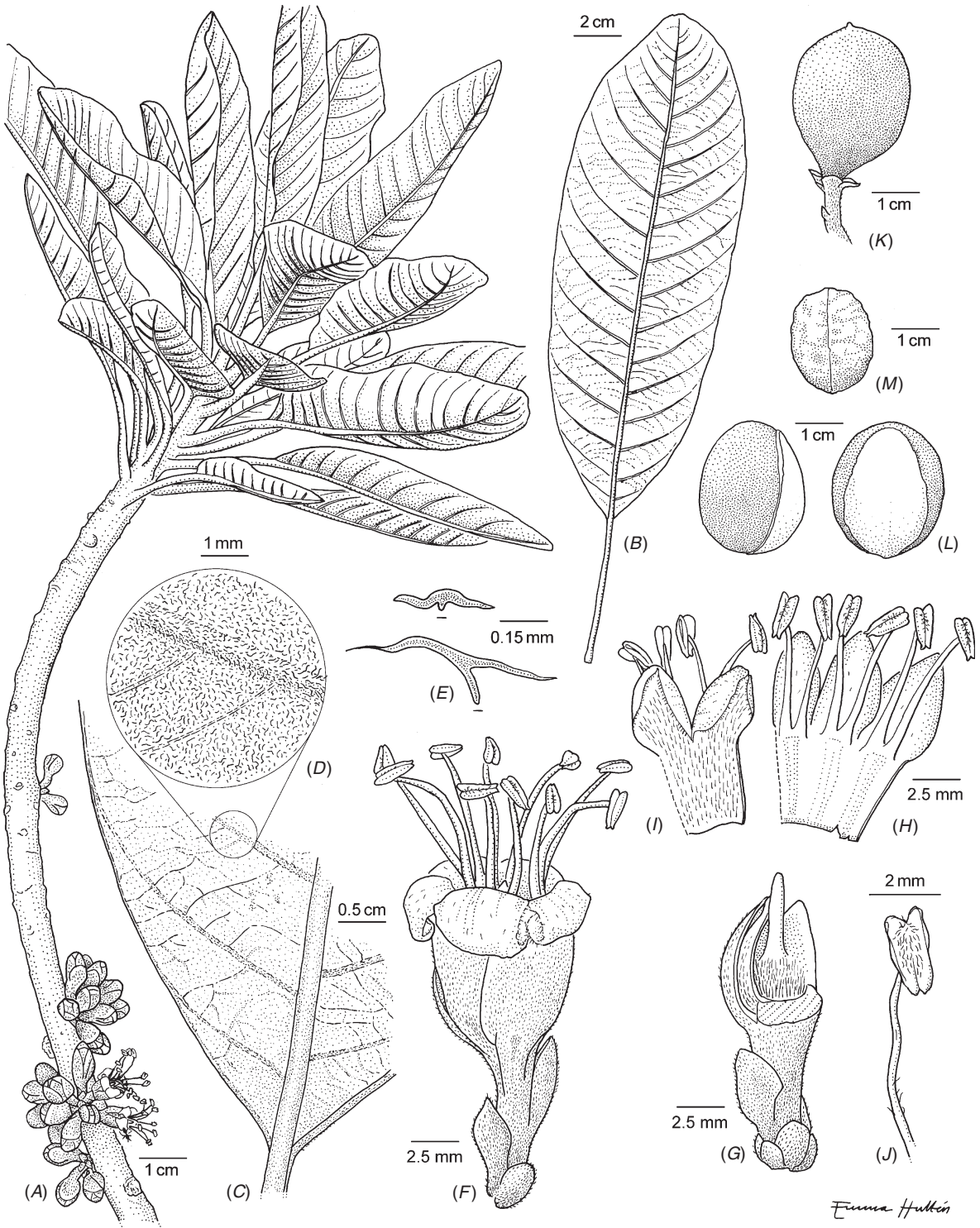

Fig. 17. *Pycnandra pubiflora*. (*A*) Habit, (*B*) leaf, (*C*) leaf venation (lower surface), (*D*) indument, (*E*) types of trichomes, (*F*) flower, (*G*) transection of flower, showing ovary, (*H*) part of an open corolla from the inside and (*I*) the other part from the outside exposing indument, (*J*) stamen, (*K*) fruit, (*L*) seed, side view (left) and view of testa (right), (*M*) cotyledons. Drawn from *Munzinger et al. 2624* (*A–J*), *McPherson 4394* (*K–M*).

inserted in or just below the tube orifice, slightly longer than the corolla; anthers 1.0–1.3 mm long, glabrous; filament with some scattered trichomes. *Ovary* with 7–9 locules, conical with style, densely hirsute at the base, ~2.0 mm long. *Fruit* obovoid or ovoid, 24–37 × 14–22 mm, glabrous, crowned with a minute remnant style; seed scar 70% of seed circumference and 100% of the seed

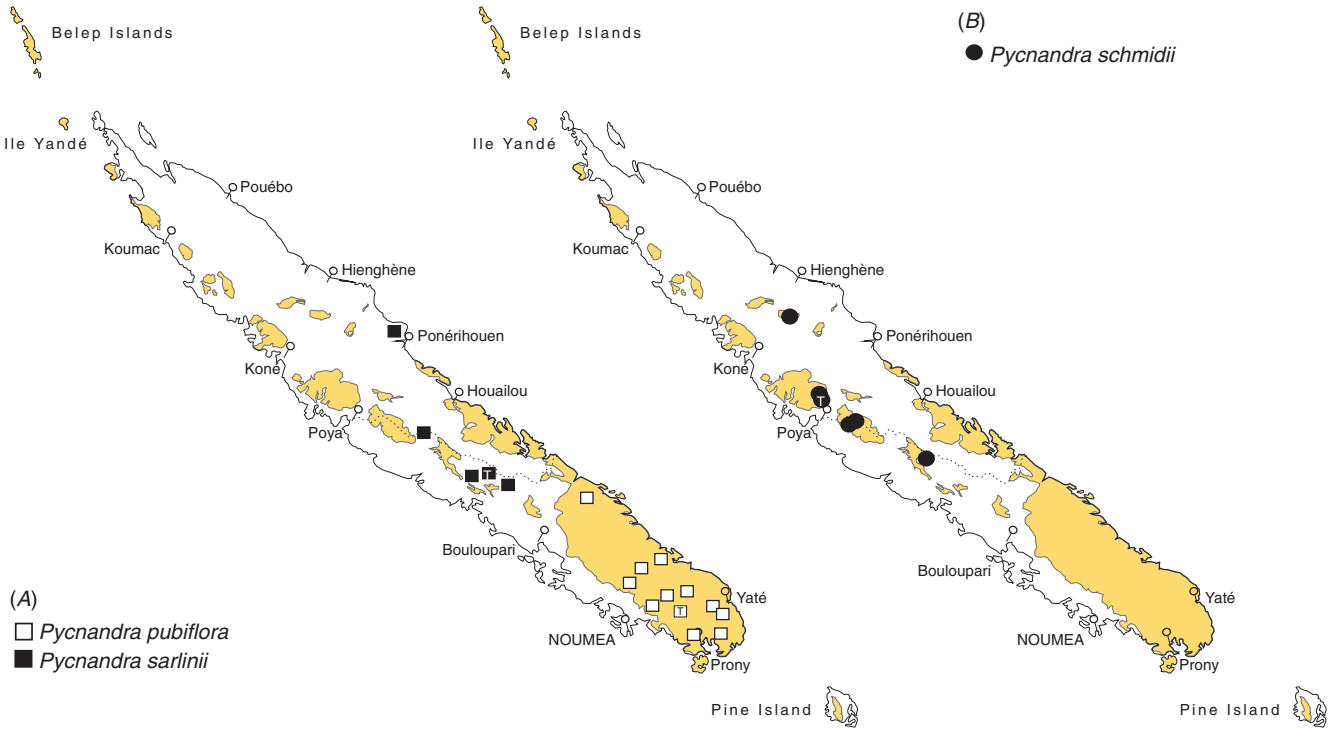

Fig. 18. Map of New Caledonia, with distributions of (*A*) *Pycnandra pubiflora* (□) and *P. sarlinii* (■), and (*B*) *P. schmidii* (●). Type localities are indicated with 'T'. Shaded areas are land/mountain ranges dominated by ultramafic soil.

length; testa dull, brown, thin (0.5 mm); cotyledons ± ruminate (Fig. 19).

Recognition

Pycnandra sarlinii is a poorly collected and understood species and many specimens were once identified under the sister taxon (Swenson *et al*. 2008*a*) described here as *P. sessiliflora*. Indeed, sterile specimens have similar, medium-sized, elliptic leaves. However, the lower leaf surface of *P. sarlinii* has a golden brown indument and almost an oblique tertiary venation, which is in sharp contrast to an indument tinged copper and a reticulate tertiary venation in *P. sessiliflora* (cf., Figs 19*B*, 21*C*). Flowers of the two species are sessile and subtended by imbricate bracts; however, the indument lustre in golden brown and the corolla has 9 or 10 lobes in *P. sarlinii*, whereas in *P. sessiliflora*, the sepals and bracts have a copper nuance, their margins are glabrous and the corolla lobes are seven or eight. The pedicel continues to grow a millimetre or two in *P. sarlinii*, resulting in the imbricate bracts being better exposed when the species is fruiting, providing an unmistakable character (Fig. 19*H*).

Phenology

Flowers in July and August; mature fruits have been collected in November and January.

Distribution

Pycnandra sarlinii is a canopy tree growing in primary moist forest on schist, non-ultramafic soils, and on middle elevations in central Grande Terre (Fig. 18*A*).

Etymology

Named in honour of Paul Sarlin, Director of the Forest Department in New Caledonia between 1949 and 1954, who published an important book on forests and trees of New Caledonia (Sarlin 1954).

Conservation status

Pycnandra sarlinii is present in only one protected area, Parc des Grandes Fougères. The species has an EOO of 980 km^2 and the four known subpopulations add to an AOO of 45 km^2. Locations such as Farino and col de Roussettes were logged a few decades ago whereas Col d'Amieu is still under logging activity. A 3-ha forest inventory in Col d'Amieu, where all trees with dbh >10 cm were identified, did not identify any individuals of *P. sarlinii* (Jaffré and Veillon 1995). Despite intense Sapotaceae fieldwork all around New Caledonia since 2004, only a single new population, the one on Plateau Dogny, has been found. Hence, *P. sarlinii* is considered to be a naturally uncommon species and we assigned it a preliminary status of *Vulnerable* VU: B1ab(iii) +B2ab(iii).

Specimens examined

PROVINCE NORD: Poindimié, 10.ix.1976, *MacKee 31934* (NOU, P, S). PROVINCE SUD: col d'Amieu, 19.v.1966, *MacKee 15018* (P); col d'Amieu, Ouaou, 400 m alt., 27.viii.1981, *MacKee 39499* (NOU, P, S); col des Roussettes, v.1950, *Sarlin 308* (P); col des Roussettes, Poarisi, 1.xi.1986, *MacKee 43367* (NOU); Farino, Forêt Mépéou, 550 m alt., 13.vii.1965, *MacKee 13005* (L, P); Farino, Forêt Mépéou, 21°37′05″S, 165°46′35″E, 400–550 m alt., 25.xii.1969, *MacKee 21375* (NOU, P, S); Plateau Dogny, 9.i.2004, *Munzinger 1860* (NOU, P, S), Plateau Dogny, 8.xi.2005,

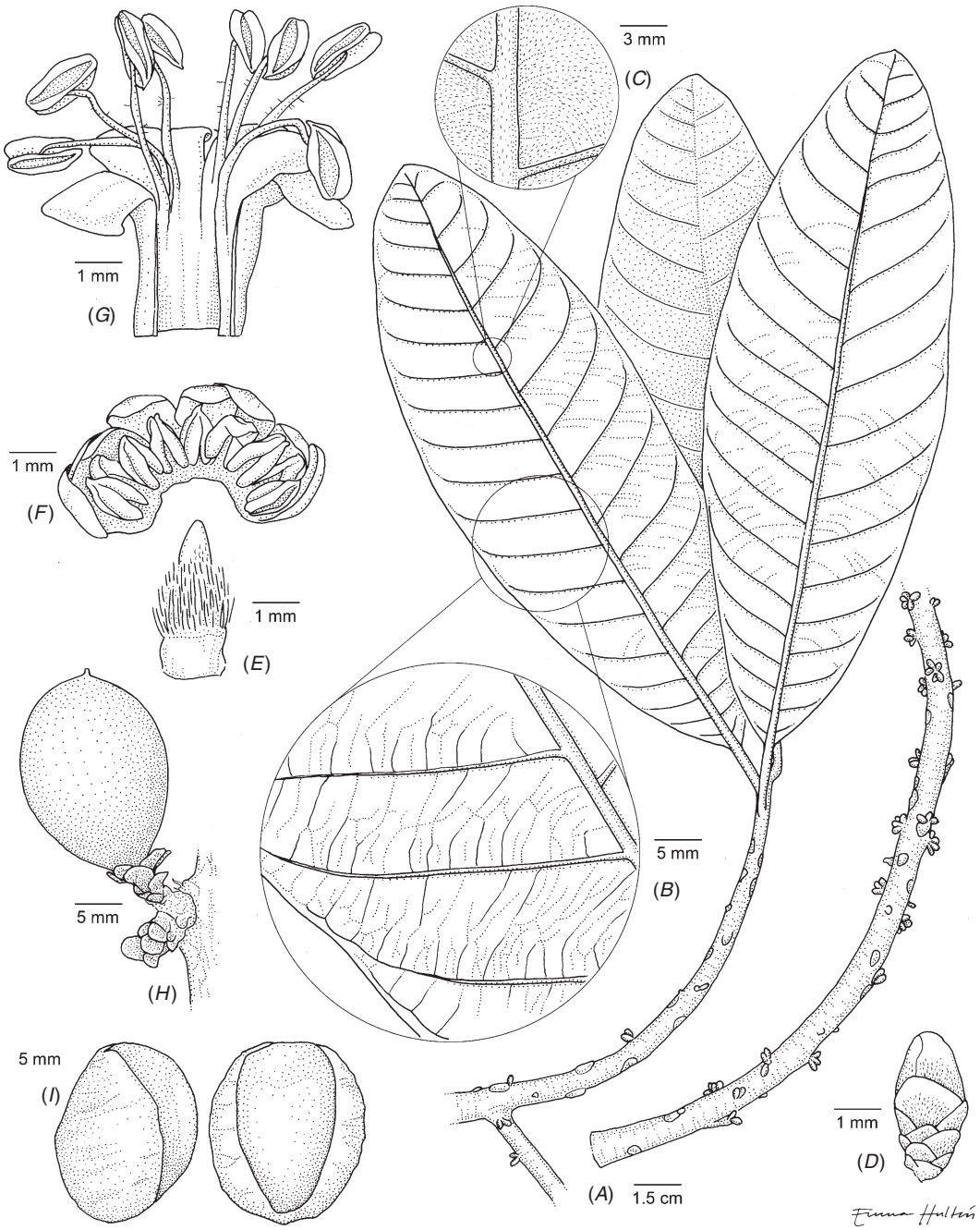

Fig. 19. *Pycnandra sarlinii*. (*A*) Habit, (*B*) leaf venation (lower surface), (*C*) indument on lower surface, (*D*) bud with imbricate sepals and bracts, (*E*) ovary, (*F*) young corolla and stamens, (*G*) open corolla, (*H*) fruit, and (*I*) seed, side view (left) and view of testa (right). Drawn from *MacKee 21375* (*A–D*), *MacKee 39499* (*E–G*), *Munzinger 1860* (*H*, *I*).

Munzinger, *Lowry*, *Knox*, *Brown* & *Palmer 3262* (MO, NOU, NSW, P, S); Plateau Dogny, 23.ii.2009, *Fambart-Tinel* (*leg. CNRS*) *220* (NOU).

Pycnandra schmidii (Aubrév.) Swenson & Munzinger, comb. nov.

≡ *Ochrothallus schmidii* Aubrév., *Fl. Nouv.-Caléd.* 1: 66 (1967). *Holotype*: Nouvelle Calédonie, Mt Boulinda, vers 1200 m alt., 28 Apr. 1965, *M. Schmid 136* (P 00290907), *isotypes* (NOU 006543, S 09-3218).

Tree up to 15 m tall. *Leaves* elliptic to obovate, (8–)10–18 × 4–8 cm, coriaceous, glabrous above, tomentulose below, quickly glabrescent; apex round; venation eucamptodromous, distinct below; secondaries of 8–12 pairs; tertiaries reticulate, with some parallel veins near the midvein; petiole 5–10 mm long, tomentulose. *Flowers* 1–5 in each fascicle, below the leaves along the branches and/or axillary, not on burls; pedicel 10–15 mm long, tomentulose, with 2 or 3 alternate bracts, the upper sometimes similar to the sepals. *Sepals* 5.0–6.0 mm long.

Corolla 8.0–10.0 mm long, with 5 spreading lobes, evenly pubescent on the outside, some scattered trichomes on the inside. *Stamens* 2 opposite each corolla lobe, inserted in the tube orifice, as long as the corolla; anthers 2.2–2.5 mm long, often pubescent; filament with some scattered trichomes. *Ovary* with 5 locules, slender with style, densely hirsute at the base, 4.0–5.0 mm long. *Fruit* obovoid, 25–30 × 15–20 mm, sparsely pubescent behind the sepals, crowned with a 5-mm-long remnant style; seed scar 70% of seed circumference and 100% of the seed length; testa shiny, brown, thin; cotyledons ruminate (Fig. 20).

Recognition

Pycnandra schmidii is the sister species to *P. caeruleilatex* and *P. pubiflora*. The foliage is characteristic, being elliptic, medium-sized and glabrescent, with fairly short petioles. One congener of the same subgenus, 'Sapotaceae Munzinger1717' (Swenson *et al.* 2008*a*), has similar foliage; however, the absence of adequate fertile material prevents us from describing it here. Flowers of *P. schmidii* have relatively long pedicels, a wide and pubescent corolla, and two stamens inserted opposite each corolla lobe, whereas this congener appears to have much smaller flowers and one stamen per corolla lobe. Both grow in high-altitudinal humid forests, but are probably not sympatric.

Phenology

Flowering season is from April and extends into August, followed by a long period when the fruits ripen and these may persist on the tree until the next flowering season.

Distribution

Pycnandra schmidii is known only from humid forests on isolated ultramafic mountains, preferably serpentine, from 1000 to 1400 m (Fig. 18*B*).

Etymology

Named in honour of Maurice Schmid (1922–), botanist at ORSTOM Centre 1964–1975 in Noumea, who collected the very first specimen of *P. schmidii* (Morat 2010).

Conservation status

Pycnandra schmidii is a high-altitudinal species confined to ultramafic rocks and is therefore under high stress from mining exploitation. As far as known, it does not occur in any protected area. One old collection (*MacKee 21553*) might be from the Nodela reserve, but the absence of an exact locality makes it unclear whether the specimen was collected inside or outside the protected area. Recent botanical inventories and efforts have failed to relocate the species in the reserve. Even worse is that the Nodela reserve is only semi-protected and is both a reserve and a mining concession, which of course is a mismanagement. In summary, the five known subpopulations are either inside or very close to mining concessions. The EOO polygon is 1007 km^2 and the AOO is estimated to be 45 km^2. All this confirms that *P. schmidii* is a naturally uncommon species that suffers from habitat destruction and is therefore assigned a preliminary status of *Endangered* EN: B1ab(iii)+B2ab(iii).

Specimens examined

PROVINCE NORD: massif de Boulinda, 1100 m alt., 30.viii.1981, *McPherson 4148* (MO, NOU, P, S); massif de Tchingou, 20°53′36″S, 165°00′42″E, 1160–1175 m alt., 1.iv.2001, *McPherson & Munzinger 18106* (MO, NOU, P, S), massif de Tchingou, forested slopes along trail, 20°53′48″S, 165°00′35″E, 1200 m alt., 3.iv.2001, *McPherson & Munzinger 18119* (MO, P) and *18129* (MO); Mt Boulinda, 1150–1300 m alt., 28.viii.1967, *MacKee 17330* (P, S). PROVINCE SUD: contrefort west Mé Maoya, route mine Emma, 2.x.1965, *MacKee 21553* (NOU), contrefort ouest Mé Maoya au dessus de la mine Emma, 2.x.1965, *MacKee 13499* (P), Mé Maoya, contrefort W au dessus de la mine Emma, 1450 m alt., 23.iv.1970, *MacKee 21794* (NOU, P, S), Mé Maoya, 1400 m alt., xii.1981, *MacKee & Nasi 40104* (P, S); Mé Maoya, 17.xii.1981, *Suprin 1596* (NOU); Mé Ori, plateau sommital, 900–1000 m alt., 3.xii.1969, *MacKee 21192* (P, S), Mé Ori, 1.vi.2006, *Munzinger* (*leg. Butin*) *2922* (NOU).

Pycnandra sessiliflora Swenson & Munzinger, sp. nov.

Species haec *Pycnandrae sarlinii* affinis sed foliis nervis tertiis reticulatis, floribus sessilis et corollis 7–8-lobatis differt.

Holotype: Nouvelle Calédonie, Province Nord, Massif de Tchingou, face est, 20°54′25″S, 165°01′32″E, 760 m alt., 6 Apr. 2001, *J. Munzinger & G. McPherson 696* (P 00217307), *isotypes* (BRI, MO, NOU, S 09-3289).

Tree up to 20 m tall and a stem dbh of 30 cm. *Leaves* elliptic, 9–15(–20) × 3–5(–8) cm, glabrous above, tomentulose below, glabrescent; apex subacute; venation brochidodromous with weak loops; secondaries of 12–16 pairs; tertiaries reticulate, with some short parallel veins near the midvein; petiole 25–40 mm long, tomentulose, glabrescent. *Flowers* 5–12 in each fascicle, sessile, below the leaves and along the branches, not on burls, subtended by 5–8 imbricate, sepal-like bracts. *Sepals* 2.0 mm long, tomentulose of copper-coloured trichomes; margin glabrous. *Corolla* 3.0–5.0 mm long, with 7 or 8 spreading to recurved, glabrous lobes. *Stamens* 1 opposite each corolla lobe, inserted in the tube orifice, slightly longer than the corolla, glabrous; anthers 1.0 mm long. *Ovary* with 4 locules, conical with style, hirsute of short trichomes, ~2.0 mm long. *Fruit* obovoid or ellipsoid, 18–22 × 8–12 mm, glabrous, remnant style absent; seed scar 60% of seed circumference and 90–100% of the seed length; testa dull, grey or brown, thin (0.3 mm); cotyledons slightly ruminate (Fig. 21).

Recognition

Pycnandra sessiliflora is an attractive species, often with dense inflorescences along the branches. Many specimens were earlier identified as *P. sarlinii*, its sister species (Swenson *et al.* 2008*a*), with which it can readily be confused. Sterile specimens have similar foliage, but *P. sessiliflora* has a brochidodromous venation with weak loops (not eucamptodromous), reticulate tertiaries (not oblique), and a copper-coloured indument (not golden brown) that eventually falls off. Both species have sessile flowers subtended by imbricate bracts, but in *P. sessiliflora*, burls are absent and the white corolla is in sharp contrast to the coloured sepals with glabrous margins, whereas flowers of *P. sarlinii* are borne on small burls and the bracts have a golden brown indument. One other member of subg. *Trouettia*, *P. caeruleilatex*, has sessile flowers but the corolla is pubescent, not glabrous as in *P. sessiliflora*. Also, it has been confused with *P. acuminata* (subg. *Sebertia*), a species that has bluish latex, not white.

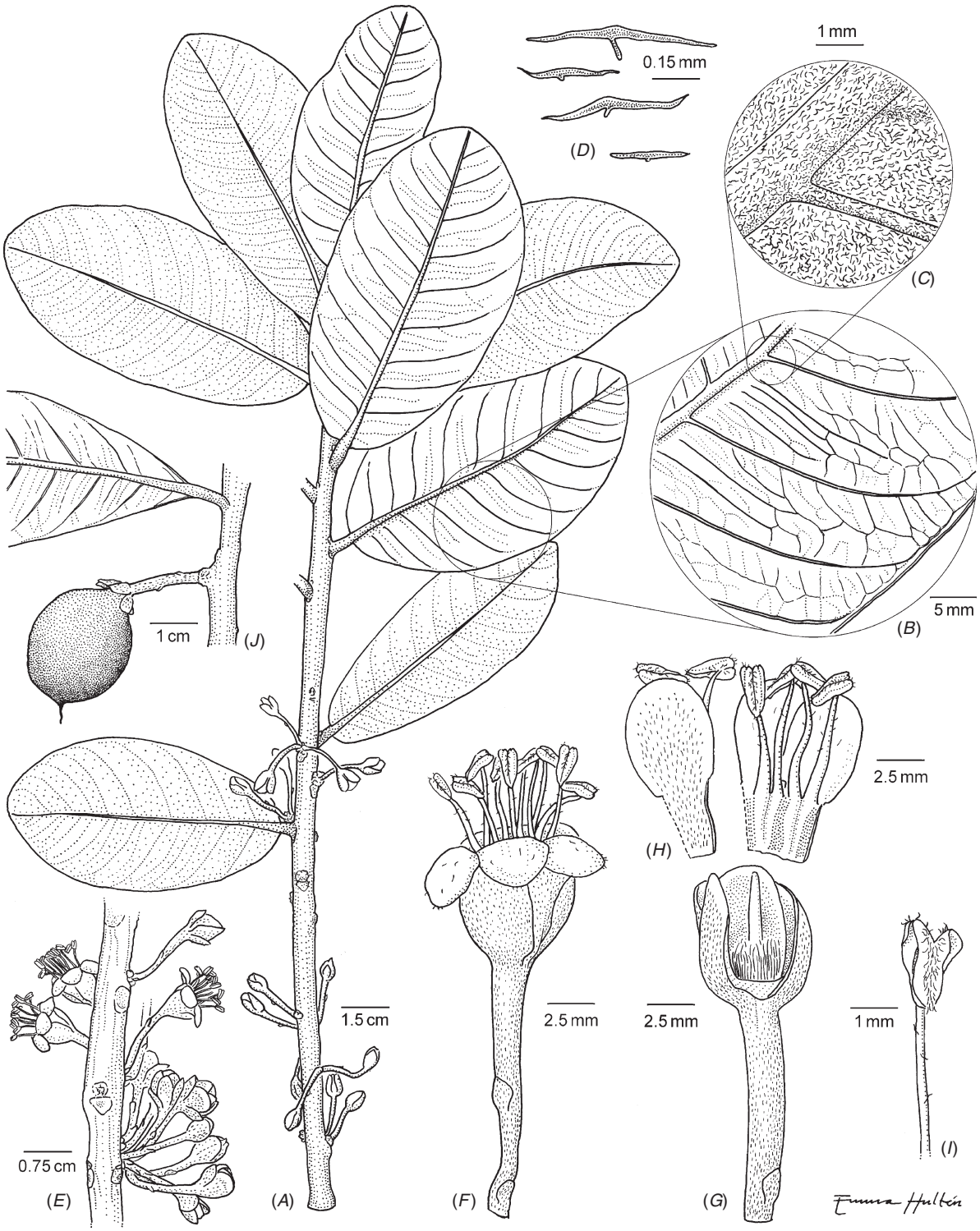

Fig. 20. *Pycnandra schmidii*. (*A*) Habit, (*B*) leaf venation (lower surface), (*C*) indument on the lower surface, (*D*) types of trichomes, (*E*) inflorescence, (*F*) flower, (*G*) transection of flower showing ovary, (*H*) corolla from the outside (left) and the inside (right), (*I*) stamen, (*J*) fruit. Drawn from *McPherson and Munzinger 18129* (*A–E*, *J*) and *18106* (*F–I*).

Phenology

The flowering season begins in March, followed by fruits in August to January.

Distribution

Pycnandra sessiliflora has a wide distribution in Grande Terre, centred in the south, but scattered to the north as far as the

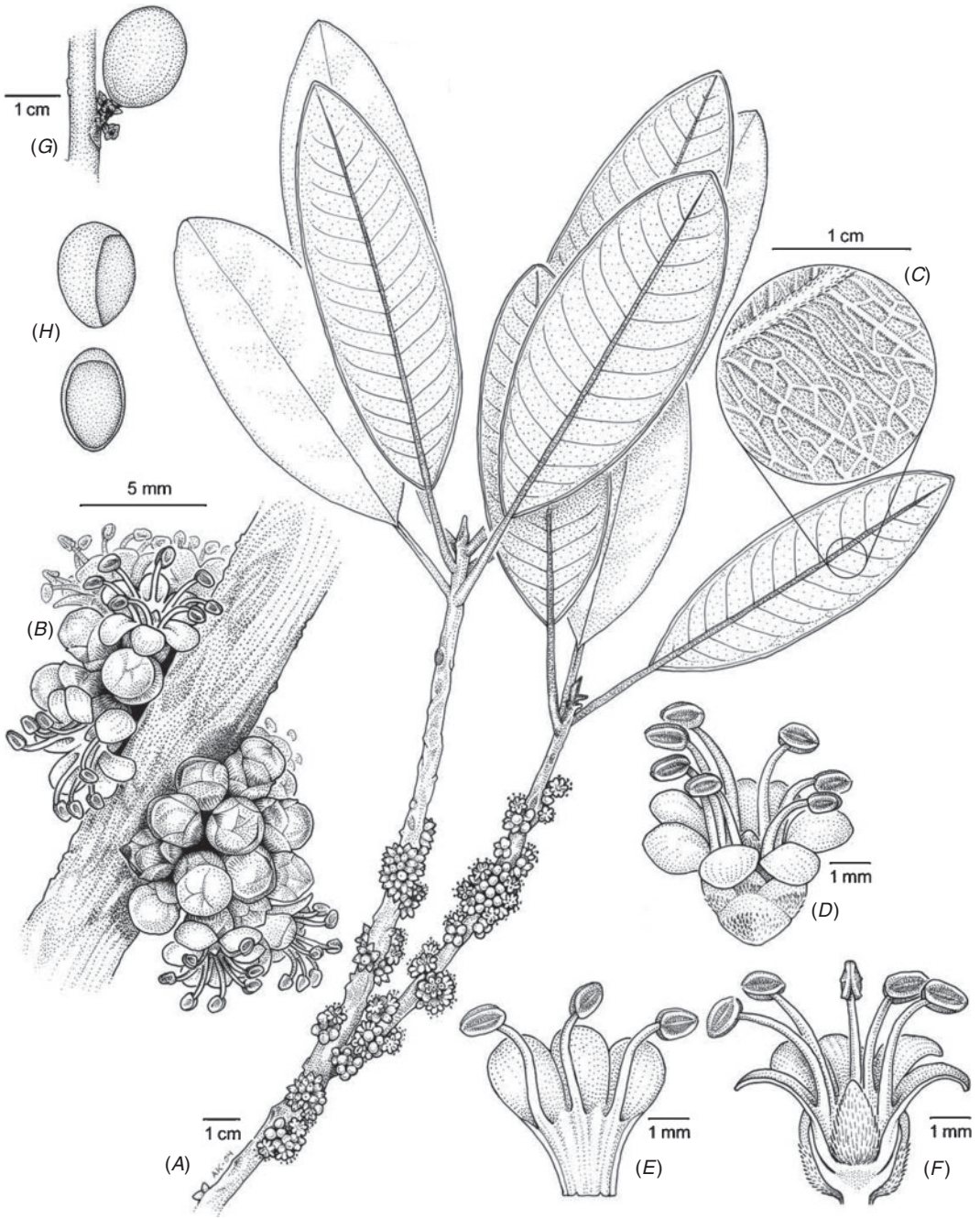

Fig. 21. *Pycnandra sessiliflora*. (*A*) Habit, (*B*) inflorescence, (*C*) leaf venation (lower surface), (*D*) sessile flower, (*E*) part of an open corolla, (*F*) transection of flower, (*G*) fruit, and (*H*) seed, side view (top) and view of testa (bottom). Drawn from *Munzinger and McPherson 696* (*A–F*), *MacKee 16312* (*G*, *H*).

Tchingou massif (Fig. 22*A*). It is a species of the humid forest, primarily on ultramafic soil, between 200 m altitude in the south to 800 m in the north.

Etymology

The species epithet *sessiliflora* refers to the sessile flowers.

Conservation status

Pycnandra sessiliflora is known from nine subpopulations and has an EOO of 5025 km^2 (1995 km^2 are on ultramafic soil) and an AOO of no more than 90 km^2. The species is disjunct in Grande Terre, with populations separated by large, non-ultramafic areas. In the South Province, the species occurs in the following four protected areas: Forêt Nord, Mount Kouakoué, Rivière Bleue,

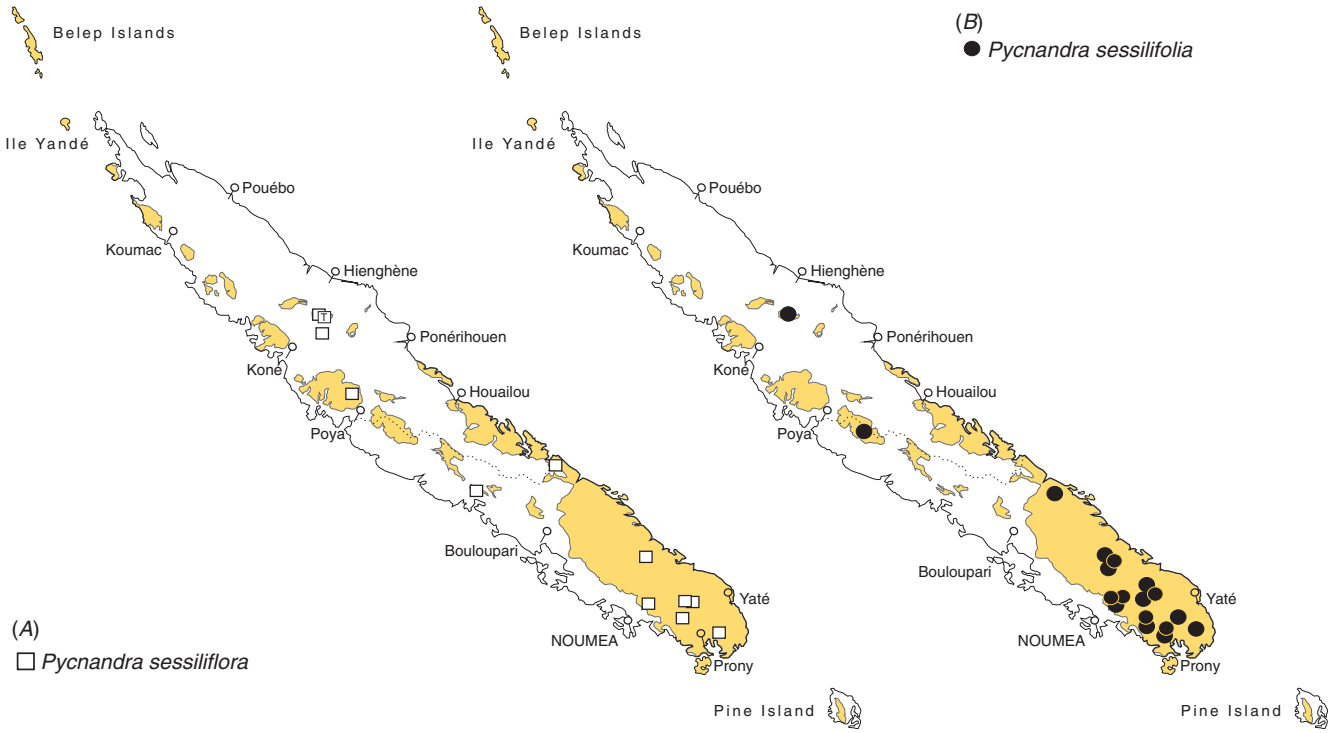

Fig. 22. Map of New Caledonia, with distributions of (*A*) *Pycnandra sessiliflora* (□) and (*B*) *P. sessilifolia* (●). Type localities are indicated with 'T'. Shaded areas are land/mountain ranges dominated by ultramafic soil.

and Thy (Koghis), and Forêt Demazures is classified as a natural area (site naturel classé) without mining concessions. The northern population of Tchingou is inside an inactive mining concession, whereas the collection from Boulinda (*Suprin 268*) might be inside an area of current, active exploitation. We, therefore, assign this species a provisional threat status of *Vulnerable* VU: B1ab(iii)+B2ab(iii).

Specimens examined

PROVINCE NORD: col de Petchicara, 300 m alt., 8.viii.1966, *MacKee 15484* (L, NOU, P), col de Petchicara, 300 m alt., 19.i.1967, *MacKee 16312* (P, S); massif de Tchingou, 20°54′27′′S, 165°01′14′′E, 794 m alt., 17.xi.2004, *Munzinger*, *Labat* & *Butin 2595* (NOU, S); massif du Boulinda, 24.ii.1978, *Suprin 268* (NOU); plateau de Tango, 400 m alt., 22.x.1981, *Veillon 4673* (NOU, P, S). PROVINCE SUD: Boghen, Mt Kujua, 500–600 m alt., iii.1970, *Schmid 3077* (P, S); Forêt Desmazures, 2.iii.2005, *Munzinger* & *Rigault 2711* (NOU, P, S); Forêt Nord, 22.xii.2004, *Munzinger* (*leg. Kurpisz*) *2608* (NOU, S); haute Ouinnée, 26.xi.1981, *Suprin 1544* (NOU); haute Yaté, Rivière Bleue, 150 m alt., 17.iii.1981, *MacKee 38835*, *38884* (NOU, P, S); Mt Koghis, ~12 km N of Noumea, 700 m alt., 21.x.1979, *McPherson 1965* (MO, P); Rivière Bleue, *Veillon 2192* (NOU, P), Rivière Bleue, 180 m alt., x.1979, *Veillon 4209* (NOU, P, S); Rivière Bleue reserve, 150 m alt., 17.xi.1981, *McPherson 4397* (MO, S), Rivière Bleue reserve, 7.xi.1979, *Sévenet* & *Pusset 1758* (NOU), Rivière Bleue reserve, 7.vii.1981, *Suprin 1255* (NOU), Rivière Bleue reserve, 17.xi.1981, *Pennington* & *McPherson 10325* (NOU), Rivière Bleue reserve, vi.1986, *Veillon 6531* (NOU).

Pycnandra sessilifolia (Pancher & Sebert) Swenson & Munzinger, comb. nov.

≡ *Chrysophyllum sessilifolium* Pancher & Sebert, *Not. Bois Nouv. Caléd.*: 195 (1874). ≡ *Ochrothallus sessilifolius* (Pancher & Sebert) Pierre ex Baill., *Hist. Pl.* 11: 298 (1891*c*). ≡ *Niemeyera sessilifolia* (Pancher & Sebert) T.D.Penn., *Gen. Sapotac.*: 236 (1991). *Holotype*: Nouvelle Calédonie (without locality), 186, *Sébert* & *Fournier 76* (P 00290985), *isotype* (P 00290984).

Tree up to 20 m tall, young branches tomentose or villous of ferruginous trichomes. *Leaves* elliptic to broadly oblanceolate, 18–40 × 5–10 cm, glabrous above, tomentose below, glabrescent except for midvein and secondaries, ultimately glabrous; base truncate to cordate; apex round to subacute; venation eucamptodromous, impressed above, distinct below; secondaries of 11–20 pairs; tertiaries reticulate or oblique; petiole 5–15 mm long, tomentose or villous of ferruginous trichomes, finally glabrous. *Flowers* 8–15 in each fascicle, below the leaves along the branches or axillary, not on burls; pedicel 5–10 mm long, tomentose to villous, with 1–3 bracts at the base. *Sepals* 4.0–5.0 mm long, tomentose or villous. *Corolla* 5.0–7.0 mm long, with 8–11 spreading to recurved lobes, pubescent outside and along the corolla lobe margin. *Stamens* 1 opposite each corolla lobe, inserted in the tube orifice, as long as the corolla, glabrous; anthers 1.5 mm long. *Ovary* with 5 locules, slender with style, densely hirsute, except for the top of style, ~4.0 mm long. *Fruit* ellipsoid, sparsely pubescent, glabrescent except for behind the sepals and apex, crowned with a 1–2-mm long remnant style; seed scar 70% of seed circumference and 100% of the seed length; testa shiny, light brown, hard (1.0 mm); cotyledons ± ruminate (Fig. 23).

Recognition

Pycnandra sessilifolia is one of the most easily recognised species in the entire genus. It is a rather large-leaved species with truncate

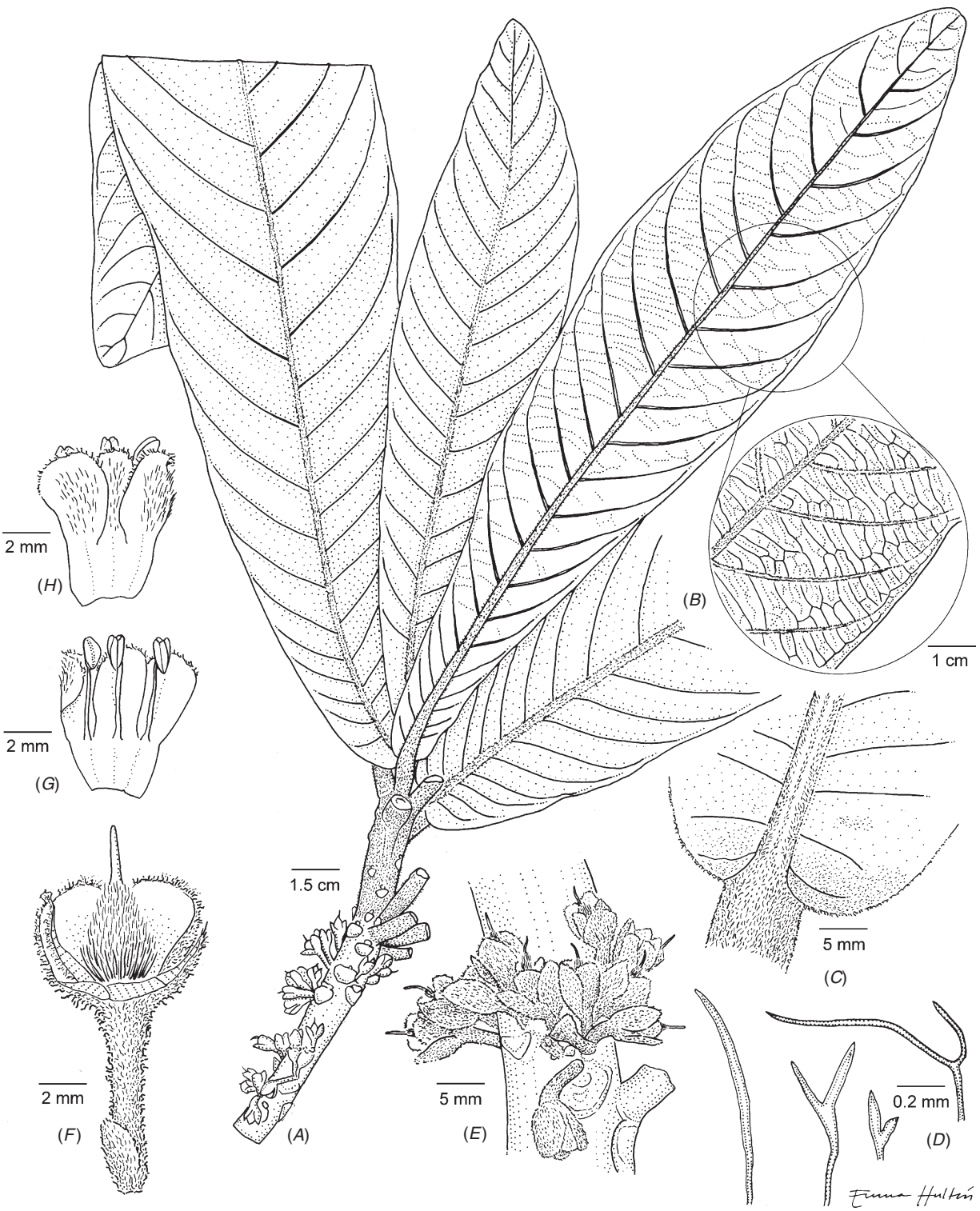

Fig. 23. *Pycnandra sessilifolia*. (*A*) Habit, (*B*) leaf venation (lower surface), (*C*) leaf base, (*D*) types of trichomes, (*E*) inflorescence, (*F*) transection of flower showing ovary, (*G*) part of an open corolla from the inside, and (*H*) the outside. Drawn from *MacKee 20188* (*A–H*).

to cordate leaf bases, eucamptodromous leaf venation and an almost villous indument on young branches, petioles, base of primary veins and sepals, characters that make sterile specimens unmistakable. Fertile material has pubescent flowers and trichomes along the corolla-lobe margin. Only one species, *P. francii*, shares this character combination; however, it is a

shrub or small tree, with much smaller leaves, a brochidodromous leaf venation and rounded or retuse leaf apices.

Phenology

Flowers between late January and May and fruits seem to be mature in November or December.

Distribution

Pycnandra sessilifolia has a disjunct distribution found in the Tchingou massif in the north, but with a centre in the south of Grande Terre (Fig. 22*B*). It forms understorey or canopy trees in humid forests on ultramafic soil, predominantly on serpentine or rocky iron crust. In the south, it extends up to ~400 m above the sea, but in Tchingou, it occurs up to an altitude of ~800 m.

Etymology

The specific epithet *sessilifolia* refers to the almost sessile leaves, evident on the type specimen.

Conservation status

Pycnandra sessilifolia is known from 11 subpopulations, giving an EOO of 3614 km^2 of which 1951 km^2 are on ultramafic soils, and an AOO of only 90 km^2. However, the species occurs in the following seven protected areas: Forêt de Saille, Grand Kaori, Mount Kouakoué, Nodéla, Pic du Pin, Rivière Bleue and Thy. Its most northern collection on Tchingou is inside an inactive mining area, whereas the locality to the south-west is in the semi-protected (mining concession) Nodela reserve. *Pycnandra sessilifolia* is assigned a preliminary status of *Least Concern*; however, if mining activity in the Tchingou area is resumed, the threat status should be reconsidered.

Specimens examined

PROVINCE NORD: haute Tiwaka, contrefort est du Tchingou, 800 m alt., 6.i.1969, *MacKee 20111* (NOU, P, S); massif de Tchingou, 5.iv.2001, *McPherson* & *Munzinger 18176* (MO, P). PROVINCE SUD: creek au Mois de Mai, 350 m alt., 16.viii.1951, *Baumann 15263* (G, P, Z); crête au sud du Grand Lac, 300 m alt., 23.i.1969, *MacKee 20188* (NOU, P, S); Dumbéa valley to Mt Dzumac, 8.xi.1981, *Pennington* & *McPherson 10293* (MO, NOU); Forêt Desmazures, 22°11′59′S, 166°39′33′E, 23.v.2004, *Munzinger 2094* (NOU, P, S); Forêt Pic du Pin, 18.xi.2004, *Dagostini* (*leg. Rigault*) *893* (NOU); haute Uinnée (forest Mathieu), 26.xi.1981, *Suprin 1544* (NOU, P); Mois de Mai, 25.vi.1951, *Baumann-Bodenheim 14241* (P); Mt Dzumac, 8.vii.1965, *Aubréville* & *Heiné 225* (P); Mt Kouakoué, 21°58′45′S, 166°30′52′E, 5.v.2004, *Munzinger*, *Pignal* & *Lowry 2025* (MO, NOU, P, S); Mt Pénari, ii.1872, *Balansa 3465* (P); Plaine des Lacs, haute Rivière Blanche, Forêt les Electriques, 27.vii.1966, *MacKee 15367* (P); Prony, bord des Torrents, 1913, *Franc 1835* (P), Prony, ii.1914, *Franc 1771* (BRI, G, NOU, P, Z); réserve de la Nodela, 19.x.2005, *Dumontet 566* (NOU), réserve de la Nodela, 28.i.2008, *Dagostini 1520* (NOU); Rivière Bleue, 28.ii.1969, *Schmid 2748* (NOU), Rivière Bleue, 10.xi.1970, *Veillon 2193* (NOU), Rivière Bleue, xi.1979, *Veillon 4214* (NOU, P, S); Rivière Bleue reserve, 170 m alt., 17.xi.1981, *Pennington* & *McPherson 10324* (MO, NOU); Rivière le Pirogue, 350–400 m alt., 10.ix.1981, *Gentry* & *McPherson 34656* (MO); road to Mt Dzumac, 8.xi.1981, *McPherson 4322* (MO); route de Yaté, Les Dalmates, 5.vi.1981, *MacKee 39181* (P); Thy River valley, 200–300 m alt, 9.v.1979, *McPherson 1616* (MO, NOU, P), Thy River valley, along old road through forest, 450 m alt., 14.vii.1979, *McPherson 1755* (MO, NOU, P); valley of Rivière des Pirogue, 200 m alt., 4.xi.1981, *Pennington* & *McPherson 10284* (MO, NOU).

Acknowledgements

We are grateful to one anonymous reviewer for comments on the manuscript, to Jens Klackenberg who checked the Latin diagnoses and to Emma Hultén who drew the illustrations. Andrea Klintbjer illustrated *Pycnandra sessiliflora*. Gordon McPherson is thanked for his review and early sending of his collections of Sapotaceae to US, collections that inspired to further studies of the family. We also direct our thanks to Daniel & Irène Létocart, Jean-Pierre Butin, Christian Létocart, Rémy Amice and Odile Chapelle for enthusiastic field company in New Caledonia. Philippe Morat and Christiane Tirel helped with various issues in the Paris herbarium. Marion Beauvallet checked the fruiting of *P. confusa* several times in the field. We are grateful to the Conservation authorities of the North and South Provinces of New Caledonia (DDEE and DENV), who provided us with collecting permits. Financial support has been received from the Swedish Research Council (VR) and the European SYNTHESYS program to Ulf Swenson for ongoing phylogenetic, biogeographic and conservation research of the pantropical family Sapotaceae. *Pycnandra confusa* was found while conducting fieldwork for ULTRABIO project funded by French National Research agency (ANR).

References

Aubréville A (1962) Notes sur les Sapotacées de la Nouvelle Calédonie. *Adansonia, n.s.* **2**, 172–199.

Aubréville A (1964) Les Sapotacées: taxonomie et phytogéographie. *Adansonia Mémoire* **1**, 1–157.

Aubréville A (1967) 'Flore de la Nouvelle Calédonie et dépendances: Sapotacées. Vol. 1.' (Muséum National d'Histoire Naturelle: Paris)

Baehni C (1938) Mémoires sur les Sapotacées. I. Système de classification. *Candollea* **7**, 394–508.

Baillon MH (1890) Observations sur les Sapotacées de la Nouvelle-Calédonie (séance du 3 décembre). *Bulletin Mensuel de la Société Linnéenne de Paris* **2**, 881–888.

Baillon MH (1891*a*) Observations sur les Sapotacées de la Nouvelle-Calédonie (séance du 3 janvier). *Bulletin Mensuel de la Société Linnéenne de Paris* **2**, 897–904.

Baillon MH (1891*b*) Observations sur les Sapotacées de la Nouvelle-Calédonie (séance du 3 juin). *Bulletin Mensuel de la Société Linnéenne de Paris* **2**, 945–949.

Baillon MH (1891*c*) 'Histoire des plantes: Sapotacées. Vol. 11.' (Libraire de L. Hachette: Paris)

Bartish IV, Swenson U, Munzinger J, Anderberg AA (2005) Phylogenetic relationships among New Caledonian Sapotaceae (Ericales): molecular evidence for generic polyphyly and repeated dispersal. *American Journal of Botany* **92**, 667–673. doi:10.3732/ajb.92.4.667

Callmander MW, Schatz GE, Lowry PP II (2005) IUCN Red List assessment and the global strategy for plant conservation: taxonomists must act now. *Taxon* **54**, 1047–1050. doi:10.2307/25065491

Callmander MW, Schatz GE, Lowry PP II, Laivao MO, Raharimampionona J, Andriambololonera S, Raminosoa T, Consiglio TK (2007) Identification of priority areas for plant conservation in Madagascar using Red List criteria: rare and threatened Pandanaceae indicate sites in need of protection. *Oryx* **41**, 168–176. doi:10.1017/S0030605307001731

Engler A (1897) Sapotaceae. In 'Die natürlichen Pflanzenfamilien, Nachträge. Vol. 4 (1)'. (Eds A Engler, K Prantl) pp. 271–280. (Verlag von Wilhelm Engelmann: Leipzig, Germany)

Good TC, Zjhra ML, Kremen C (2006) Addressing data deficiency in classifying extinction risk: a case study of a radiation of Bignoniaceae from Madagascar. *Conservation Biology* **20**, 1099–1110. doi:10.1111/j.1523-1739.2006.00473.x

Govaerts R, Frodin DG, Pennington TD (2001) 'World checklist and bibliography of Sapotaceae.' (Royal Botanic Gardens, Kew: London)

Guillaumin MA (1911) Catalogue des plantes phanérogames de la Nouvelle-Calédonie et dépandances (Iles des Pines et Loyalty). *Annales Musée Colonial de Marseille* **9**, 79–284.

Guillaumin A (1948) 'Flore analytique et synoptique de la Nouvelle-Calédonie phanérogames.' (Muséum National d'Histoire Naturelle: Paris)

Harris GJ, Harris MW (1997) 'Plant identification terminology: an illustrated glossary.' (Spring Lake: Payson, UT)

Holmgren PK, Holmgren NH, Barnett LC (1990) 'Index herbariorum. Edn 8, Part I. The Herbaria of the World.' (New York Botanical Garden Press: Bronx, NY)

Hopkins HCF, Pillon Y, Bradford JC (2009) The endemic genus *Pancheria* (Cunoniaceae) in New Caledonia: notes on morphology and the description of three new species. *Kew Bulletin* **64**, 429–446. doi:10.1007/s12225-009-9137-z

IUCN (2001) 'Red listed categories and criteria: version 3.1.' (IUCN: Gland, Switzerland)

IUCN (2008) 'Guidelines for using the IUCN Red List categories and criteria: version 7.0.' Prepared by the Standards and Petitions Working Group of the IUCN SSC Biodiversity Assessments Sub-Committee in August 2008. Available at http://www.iucnredlist.org/about/publications-links [accessed January 2010].

Jaffré T, Veillon JM (1995) Structural and floristic characteristics of a rain forest on schist in New Caledonia: a comparison with an ultramafic rain forest. *Bulletin Muséum Natlional d'Histoire Naturelle, Paris, Section B. Adansonia* **17**, 201–226.

Jaffré T, Bouchet P, Veillon JM (1998) Threatened plants of New Caledonia: is the system of protected areas adequate? *Biodiversity and Conservation* **7**, 109–135. doi:10.1023/A:1008815930865

Jaffré T, Rigault F, Munzinger J (2008) Identification and characterization of floristic groups in dry forests relicts of a west coast region of New Caledonia. *Pacific Conservation Biology* **14**, 128–145.

McNeill J, Barrie FR, Burdet HM, Demoulin D, Hawksworth DL, Marhold K, Nicolson DH, Prado J, Silva PC, Skog JE, Wiersema JH, Turland NJ (2006) International code of botanical nomenclature (Vienna Code). Adopted by the seventeenth international botanical congress Vienna, Austria, July 2005. *Regnum Vegetabile* **146**, 1–568.

Moore S (1921) A systematic account of the plants collected in New Caledonia by Prof. R. H. Compton: Sapotaceae. *Journal of the Linnean Society. Botany* **45**, 350–355.

Morat P (2010) Les récolteurs botaniques en Nouvelle-Calédonie de 1774 à 2005. *Adansonia* **32**, in press.

Morat P, Chalopin M (2007) Contribution à l'étude des Malvaceae, Sterculieae de la Nouvelle-Calédonie: nouvelles espèces dans le genre *Acropogon* Schltr. *Adansonia* **29**, 93–104.

Mouly A, Hoang N (2007) Une nouvelle espèce d'*Ixora* (Rubiaceae) cauliflore de Nouvelle-Calédonie. *Adansonia* **39**, 123–128.

Munzinger J, Swenson U (2009) Three new species of *Planchonella* (Sapotaceae) with a dichotomous and an online key to the genus in New Caledonia. *Adansonia* **31**, 175–189.

Munzinger J, McPherson G, Lowry PP II (2008) A second species in the endemic New Caledonian genus *Gastrolepis* (Stemonuraceae) and its implications for the conservation status of high-altitude maquis vegetation: coherent application of the IUCN Red List criteria is urgently needed in New Caledonia. *Botanical Journal of the Linnean Society* **157**, 775–783. doi:10.1111/j.1095-8339.2008.00804.x

Pascal M, de Forges BR, le Guyader H, Simberloff D (2008) Mining and other threats to the New Caledonia biodiversity hotspot. *Conservation Biology* **22**, 498–499. doi:10.1111/j.1523-1739.2008.00889.x

Pennington TD (1991) 'The genera of Sapotaceae.' (Royal Botanic Gardens, Kew: London)

Pillon Y, Nooteboom HP (2009) A new species of *Symplocos* (Symplocaceae) from Mont Panié (New Caledonia). *Adansonia* **31**, 191–196.

Pillon Y, Hopkins HCF, Bradford JC (2008) Two new species of *Cunonia* (Cunoniaceae) from New Caledonia. *Kew Bulletin* **63**, 419–431. doi:10.1007/s12225-008-9045-7

Pillon J, Hopkins HCF, Munzinger J, Amir H, Chase M (2009) Cryptic species, gene recombination and hybridization in the genus *Spiraeanthemum* (Cunoniaceae) from New Caledonia. *Botanical Journal of the Linnean Society* **161**, 137–152. doi:10.1111/j.1095-8339.2009.00997.x

Planchon L (1888) 'Étude sur les produits de la famille des Sapotées.' (Imprimerie Centrale du Midi: Montpellier, France)

Sarlin P (1954) 'Bois et forêts de la Nouvelle-Calédonie.' (Centre Technique Forestier Tropical: Nogent-sur-Marne, France)

Schlechter R (1906) Beiträge zur Kenntnis der Flora von Neu-Kaledonien. *Botanische Jahrbücher für Systematik* **39**, 1–275.

Snow N (2009) *Kanakomyrtus* (Myrtaceae): a new endemic genus from New Caledonia with linear stigma lobes and baccate fruits. *Systematic Botany* **34**, 330–344. doi:10.1600/036364409788606253

Swenson U, Anderberg AA (2005) Phylogeny, character evolution, and classification of Sapotaceae (Ericales). *Cladistics* **21**, 101–130. doi:10.1111/j.1096-0031.2005.00056.x

Swenson U, Munzinger J (2009) Revision of *Pycnandra* subgenus *Pycnandra* (Sapotaceae), a genus endemic to New Caledonia. *Australian Systematic Botany* **22**, 437–465. doi:10.1071/SB09029

Swenson U, Munzinger J (2010*a*) Revision of *Pycnandra* subgenus *Achradotypus* (Sapotaceae) with five new species from New Caledonia. *Australian Systematic Botany* **23**, 185–216. doi:10.1071/SB09049

Swenson U, Munzinger J (2010*b*) Revision of *Pycnandra* subgenus *Sebertia* (Sapotaceae) and a generic key to the family in New Caledonia. *Adansonia* **32**, in press.

Swenson U, Bartish IV, Munzinger J (2007*a*) Phylogeny, diagnostic characters, and generic limitation of Australasian Chrysophylloideae (Sapotaceae, Ericales): evidence from ITS sequence data and morphology. *Cladistics* **23**, 201–228. doi:10.1111/j.1096-0031.2006.00141.x

Swenson U, Munzinger J, Bartish IV (2007*b*) Molecular phylogeny of *Planchonella* (Sapotaceae) and eight new species from New Caledonia. *Taxon* **56**, 329–354.

Swenson U, Lowry PP II, Munzinger J, Rydin C, Bartish IV (2008*a*) Phylogeny and generic limits in the *Niemeyera* complex of New Caledonian Sapotaceae: evidence of multiple origins of the anisomerous flower. *Molecular Phylogenetics and Evolution* **49**, 909–929. doi:10.1016/j.ympev.2008.09.022

Swenson U, Richardson JE, Bartish IV (2008*b*) Multi-gene phylogeny of the pantropical subfamily Chrysophylloideae (Sapotaceae): evidence of generic polyphyly and extensive morphological homoplasy. *Cladistics* **24**, 1006–1031. doi:10.1111/j.1096-0031.2008.00235.x

Triono T, Brown AHD, West JG, Crisp MD (2007) A phylogeny of *Pouteria* (Sapotaceae) from Malesia and Australasia. *Australian Systematic Botany* **20**, 107–118. doi:10.1071/SB06011

Venter S, Munzinger J (2007) *Paphia paniensis* (Ericaceae), a new species from New Caledonia critically compared with *P. neocaledonica*. *New Zealand Journal of Botany* **45**, 503–508. doi:10.1080/00288250709509733

Vink W (1957) Revision of the Sapotaceae of the Malaysian area in a wider sense. X. *Leptostylis*. XII. *Pycnandra*. *Nova Guinea, n.s.* **8**, 87–124.

Vink W (1958) Revision of the Sapotaceae of the Malaysian area in a wider sense. XIII. *Chrysophyllum* L. *Blumea* **9**, 21–74.

Manuscript received 14 June 2010, accepted 11 August 2010